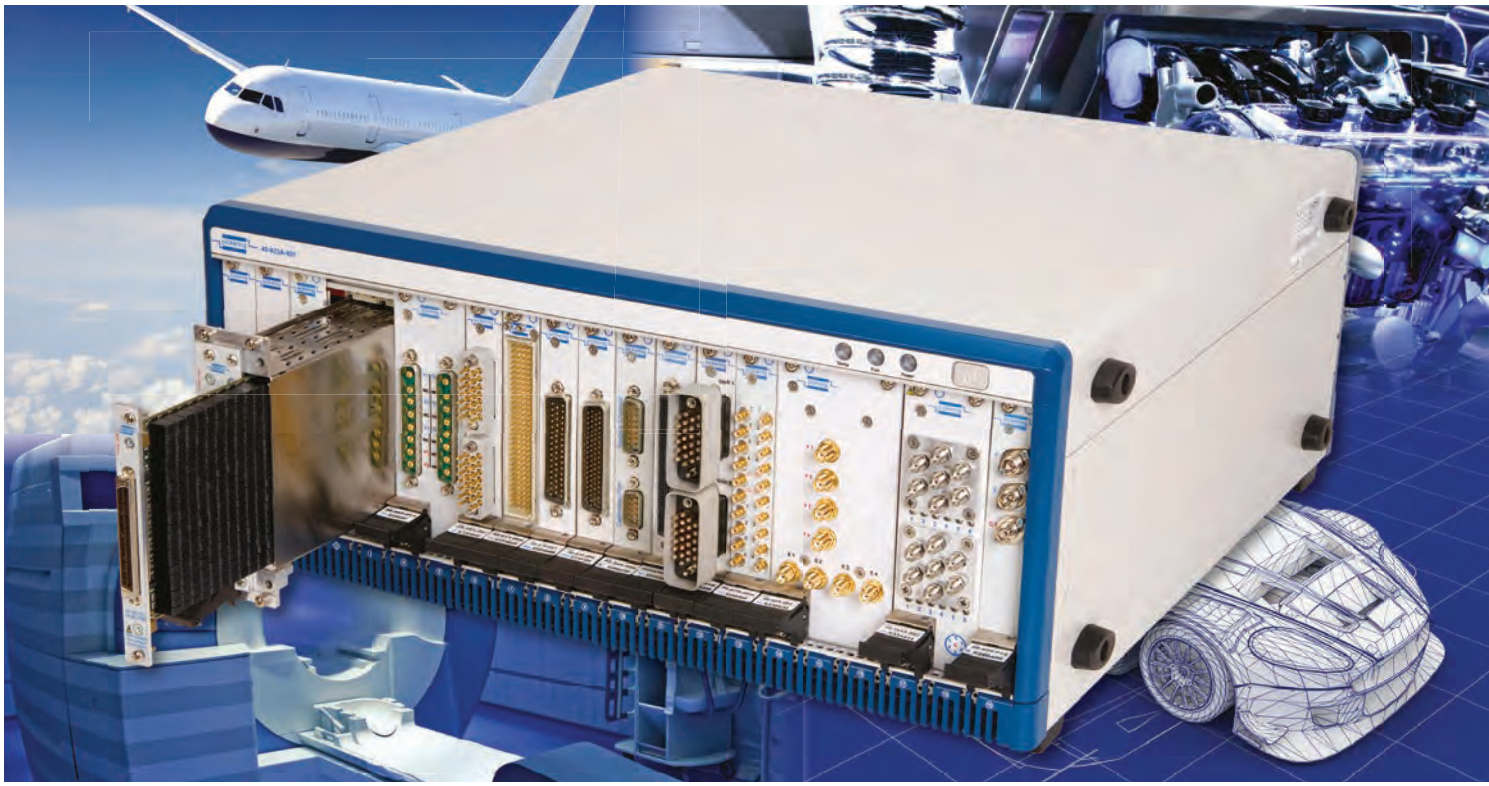
pickering Pickering Interfaces

The Big PXI Catalog



Pickering Interfaces' Range of 1000+ PXI Modules

Switching | Simulation | Programmable Resistors | Custom Design | Connectivity & Cables

pickeringtest.com

Contents

PXI Products Catalog Introduction

Pickering Interfaces are Sponsor members of the PXI Systems Alliance and a leading innovator in the development of PXI products. We provide the widest range of PXI switching and simulation solutions with over 1000 modules available. Each model is available in a variety of densities to suit different applications. Our products set the benchmarks by which others are judged, providing the densest and highest performance solutions available in PXI.

All the reed relays we use are manufactured by our sister company Pickering Electronics using instrument grade reeds to ensure a long service life and repeatable contact performance.

Our PXI modules can be installed in any PXI compliant chassis and are supported in all the popular software environments used in PXI systems through the provision of Kernel, VISA and IVI drivers.

Our award winning BRIC modules provide solutions for larger switching applications requiring matrices, multiplexers or fault insertion.

As well as switching, we provide simulation solutions including a wide range of programmable resistor modules including RTD and strain gauge simulators. We also offer waveform generators, power supplies, battery simulators, RF attenuators, thermocouple simulators and digital I/O modules.

Our PXI Chassis are fully PXI compliant and support all Pickering's PXI modules as well as those from third parties. There is a choice of 8, 14, 18 and 19-slot 3U chassis with options for reduced acoustic noise.

We also offer LXI Modular Chassis which are capable of hosting any of our PXI switching and simulation modules in an LXI environment. Allowing remote control via Gigabit Ethernet, 7 and 18-slot chassis are available as well as a highly portable 2-slot chassis which includes USB control.

For further information on our PXI product range visit www.pickeringtest.com where you can download catalogs, obtain electronic copies of data sheets, manuals, software drivers and get pricing information.

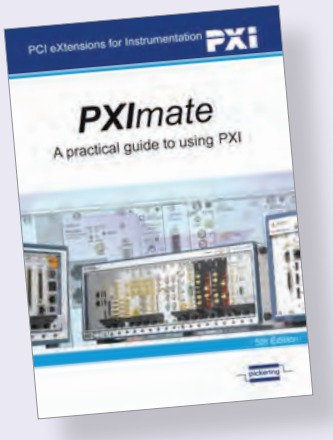
40-560A BRIC4 High Density Matrix Module With Built In Self Test (BIRST)

40-100 High Density 83xSPDT Relay Module

40-293 Programmable Resistor & Relay Module

40-784A Microwave Multiplexer Module

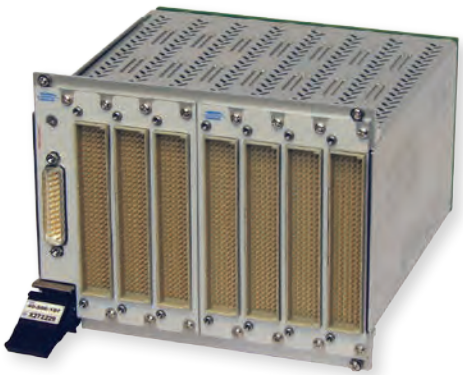
40-764 600MHz RF Multiplexer Module



Ever Wondered What PXI Is All About?

Pickering has published a 84 page book explaining PXI basics and provides useful data for engineers working on Functional Test Systems. Now in its 5th edition, the book contains examples of test systems based on the PXI standard, useful contact information and engineering data.

Hardback copies or PDF downloads can be obtained free of charge by contacting your local Pickering Interfaces sales office or by filling in the enquiry form on our web site: www.pickeringtest.com/pximate



40-566A 2 Amp 2-Pole BRIC Matrix

PXI Products Numerical Index

New PXI Products From Pickering

2-Slot USB/LXI Modular Chassis - September 2016

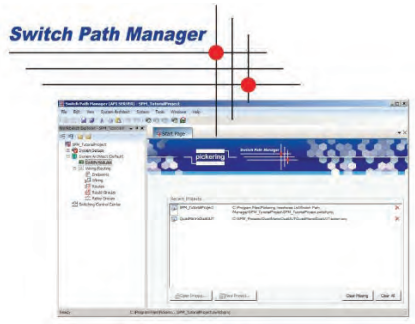
The 60-104 2-slot USB/LXI modular chassis offers a small lightweight form factor, making it ideal for portable, benchtop, and space restrictive applications. The chassis is designed for desk or rack mounting and features remote control via USB or LXI Ethernet. Remote control over a network enables the switching function of a test system to be located as close as possible to the target equipment. The 60-104 supports one or two modules from Pickering's range of over 1000 3U PXI modules, it is the perfect platform to construct small scale applications. (see page 2.15).

High Density 2 Amp PXI Multiplexer Range - September 2016

Available in 20 configurations, the new 40-614 module range uses high-quality electro-mechanical signal relays allowing each channel to switch current up to 2A and voltage up to 300VDC/250VAC and are supported by our eBIRST switching system test tools. These multiplexers are suitable for signal routing in ATE and data acquisition systems. The front panel user connection is via a 160-pin DIN 41612 connector which is fully supported by our comprehensive range of cabling and connector solutions (see page 23.28).

Millivolt Thermocouple Simulator Module - September 2016

The 41-760 PXI Millivolt Thermocouple Simulator Modules are ideal for simulating the operation of thermocouples for applications such as ECU testing. They are available in a choice of 8, 16, 24 or 32 channels—each providing a low-voltage output across two connector pins capable of delivering ±20mV with 0.7µV resolution, ±50mV with 1.7µV resolution and ±100mV with 3.3µV resolution, covering most thermocouple types. We can also supply connection solutions terminated with thermocouple plugs to allow easy integration into a test system (see page 5.15).



Switch Path Manager Signal Routing Software - August 2016

This software simplifies signal routing through switching systems and speeds up the development of switching system software. Switch Path Manager supports Pickering's switching modules and the interconnection between these products. Third-party products can be supported upon request. Once a switching system model has been created, signal routing can be performed by simply defining the endpoints that are required to be connected together. The ability to automate signal routing results in simple and effective switching system management, safe and fast (see page 32.1).

High Density PXI Matrix Module Range - May 2016

The new PXI 40-520 module family are high-density matrices with 22 different configurations and up to 256 crosspoints to suit a large variety of user requirements. The choice of six bus widths (x16, x12, x8, x6, x4 & x2) enables competitively priced solutions using Pickering Electronics' instrumentation quality reed relays. These relays offer very long life with good low-level switching performance and excellent contact resistance stability. The range comes with Built-in Relay Self-Test (BIRST) and is also supported by eBIRST Switching System Test Tools. These tools provide a quick and simple way of finding relay failures within the module (see page 15.7).

2 Amp Electro-Mechanical PXI Relay Module - May 2016

The 40-100 module is configured with 83 SPDT relays, is designed for applications requiring a higher density 2 Amp alternative to Pickering's current 52 SPDT module (model 40-139). The module is suitable for applications requiring medium power switching with very high density. It features a 2 Amp current capacity and voltages to 200VDC/140VAC. Connections are made via a front panel mounted 500-pin SEARAY high-density connector (see page 10.2).

PXI 50Ω 600MHz Multiplexer Range - April 2016

This new range of PXI RF Multiplexers (series 40-760) is available in the following configurations: dual, quad and octal SP4T, single, dual and quad SP8T, single and dual SP16T and SP32T. All of the multiplexers have versions with automatic terminations to manage VSWR effects which could degrade the performance of a test system. All versions of this range of PXI RF multiplexers exhibit low insertion loss and VSWR through the use of modern RF relay technology. Each version has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 600MHz with each path having a nominally equal insertion loss (see page 26.90).

PXI Digital I/O Module With Power Distribution - February 2013

The 40-228 provides 32 channels of digital input and 32 channels of digital output, together with switched +12V, +5V, +3.3V and -12V supply outputs derived from the PXI backplane. The module is available fitted with a DC-DC converter (40-228-001) which provides an additional -5V supply ouput. Alternatively the module can be supplied with an industry standard footprint for a DC-DC converter (40-228-002) allowing the user to fit their own if required. The 40-228 includes a breadboard area that allows users to add their own circuitry (see page 8.5).

PXI 5 Amp Solid State Multiplexer - November 2015

The 40-652 offers a range of configurations suitable for hot or cold switching signals up to ±100V at 5A. The use of solid state relays allows the hot switching of signals without any life degradation, including DC signals that EMR (Electro-Mechanical Relay) designs can only handle with much-reduced service life and power handling. The multiplexer module is available in single pole 48:1, two pole 24:1, single pole dual 24:1 or single pole 24:1 configurations. Additionally the module is supported by our new eBIRST switching system test tools (see page 24.6).

Differential PXI Fault Insertion Switches - September 2015

The Differential PXI Fault Insertion Switch (model 40-200) is designed for lower data rate serial interfaces such as CAN and FlexRay, the High Bandwidth Differential PXI Fault Insertion Switch (model 40-201) is designed for higher data rate serial interfaces such as AFDX and 1000BaseT Ethernet. These modules allow the introduction of fault conditions such as data paths open, data paths shorted together, and data paths shorted to an externally applied fault such as power supply or ground (see page 21.23 & 21.25).

We are continually adding to our PXI range, for the latest new products available, please visit:
www.pickeringtest.com/products/new-switch-products

Chassis & Remote Controllers

- High Performance PXI Chassis
- Available with 8, 14, 18 or 19 Slots
- Desk or Rack Mountable
- Models Available With Low Acoustic Noise Fans

Pickering Interfaces has a range of high performance PXI chassis ranging from 8 to 19 3U slots. Selected chassis are available with optional low acoustic operation, suitable for office or laboratory use. The chassis can be optimized for BRIC matrix modules utilizing unused slot space, for example, a BRIC8 can be installed in the 8-slot 40-908 (see picture).

Pickering can pre-configure PXI modules and ship them pre-installed in our chassis to exact customer requirements, this is done free of charge, please contact the sales office to discuss your requirements.

40-923A High Performance 19-Slot PXI Chassis

40-908 8-Slot PXI Chassis With BRIC8 Module Installed

- PCI to PXI and PCIe to PXI Interface Kits
- High Speed Data Exchange From Desk Top Controller To PXI Chassis
- Supports 32-Bit 33/66MHz PXI Bus
- Available as Separate Cards or as a Kit

The 41-921A Control Interface Kit provides a seamless connection between a control PC and a PXI chassis. This enable the use of a PC instead of an embedded computer to control PXI modules, reducing system cost.

The 41-924 Control Interface Kit enables a PC to control a PXI chassis using a PCIe interface slot.

51-921A/41-921A PCIe to PXI Control Interface

51-924/41-924 PCIe to PXI Control Interface

- Fully LXI 1.4 Compliant Chassis
- Supports Pickering's PXI Switching & Simulation Modules
- Allows Control Via Gigabit Ethernet
- Available in 2, 7 & 18-Slot Versions

Pickering's LXI modular chassis range enables our switching, simulation and selected instrumentation PXI modules to be controlled via a standard network interface. The range includes 7 and 18-slot versions suitable for rack or desk mounting, and an ultra-compact 2-slot version which includes optional control via USB.

60-102B 7-Slot LXI Modular Switching Chassis

60-104 2-Slot USB/LXI Switching Chassis

Description	Power Supplies	Input Voltage Options	Cooling Fans	Cooling Fan Options	Order Code	Page
8 Slot PXI Mainframe	350W	90-264VAC	2	—	**40-922-001**	**2.2**
19 Slot PXI Mainframe	600W		3		**40-923A-001**	**2.4**
8 Slot PXI Mainframe	2 x 175W	90-264VAC	3 (optionally 4)	Standard or 3-Speed or Low Acoustic Noise.	**40-908**	**2.6**
14 Slot PXI Mainframe	2 x 175W		4		**40-914**	
18 Slot PXI Mainframe	4 x 175W		4		**40-918**	**2.8**
PCI to PXI Control Interface Kit	—	—	—	—	**41-921A-001-KIT**	**2.10**
PCI Control Interface Card					**51-921A-001**	
PXI Control Interface Module					**41-921A-001**	
PCIe to PXI Control Interface Kit	—	—	—	—	**41-924-001-KIT**	**2.12**
PCIe Control Interface Card					**51-924-001**	
PXI Control Interface Module					**41-924-001**	
LXI 7-Slot Modular Switching Chassis	350W	90-264VAC	2	—	**60-102B-001**	**2.14**
LXI 18-Slot Modular Switching Chassis	600W		3		**60-103B-001**	
USB/LXI 2-Slot Modular Chassis	External	19VDC	2		**60-104-001**	**2.15**

40-922
8 Slot PXI Mainframe

- High Performance 8 Slot PXI/cPCI Backplane
- 3 Slot PXI System Controller Compatible
- 350W Industrial Grade Power Supply
- Compact Benchtop Footprint
- Integrated Carrying Handles
- Low Profile 4U Rugged Design
- Remote Chassis Monitoring System
- Power, Temperature and Fan Monitoring LEDs
- Low Audible Operating Noise
- Optional Rack Mounting Kit
- RoHS Compliant
- 3 Year Warranty

Pickering Interface 40-922 PXI Chassis is a fully compliant 8 slot PXI chassis that can accept any 3U PXI or cPCI module. The chassis is ideal for bench top use or for use in a rack system.

The 40-922 includes all the features and performance required by the PXI standard and supports a control interface or embedded controller and up to 7 additional 3U peripheral modules. The control interface can be provided by a Pickering's 41-921 PCI to PXI interface kit, allowing the chassis to be controlled from a PC.

The chassis is fitted with a 350W industrial grade power supply mounted at the rear of the unit with sufficient capacity to support PXI modules with very high current demands.

An intelligent chassis management system monitors the power supply voltage, internal temperature and the cooling fan speed. The current condition of the chassis is displayed on front panel status LEDs and can also be monitored remotely via an RS232 port.

Two 60cfm fans insure maximum PXI module cooling and an efficient direct convection design allows the chassis to operate over an extended ambient temperature range of 0°C to +55°C.

The low acoustic emissions make the chassis ideal for applications such as office or laboratory environments where noise levels are critical. The sound pressure level varies between 41.6dB and 47.3dB dependant upon the controlled fan speed which automatically responds to the internal chassis temperature.

The 40-922 chassis can also be supplied with a mounting frame to allow installation into a standard 19" rack. The frame increases the overall height to 5U and allows space for cooling air to be drawn into the underside and expelled from the top of the chassis.

The system slot is compatible with any PC-PXI bridge and any 3 slot wide PXI controller.

40-922 PXI chassis fitted with the 63-102-001 optional rack mounting frame. This allows installation in a 19 inch rack and allows space at the top and bottom of the chassis for the correct flow of cooling air.

Backplane

Number of Slots: 1 system slot, 7 peripheral slots

System Slot: Accepts any 3 slot or narrower PXI compatible controller or interface. Pickering Interfaces recommends the 41-921 interface for remotely controlled configurations. Particularly, Adlink controllers are recommended for applications requiring embedded control.

Bus Design: Incorporates all the features of the PXI specification Rev 2.2. The backplane is 64-bit with PXI triggers, Star Trigger, Local Bus & internal PXI clock.

Cooling

Airflow: Bottom intake, rear exhaust

Per-slot Cooling Capacity: 25W at 55°C ambient
40W at 40°C ambient

Fans: 2 off 60cfm fans with filters

Acoustic Emissions

Sound Pressure Level(dBA): Minimum fan speed: 41.6dB
Maximum fan speed: 47.3dB

Sound Power (dBA): Minimum fan speed: 51.9dB
Maximum fan speed: 55.5dB

Power Supply

Input Voltage Range: 90 - 264VAC
Input Voltage Frequency: 47 to 63Hz
Input Current Rating: 8A 115VAC or 4A 230VAC

Supplied with a 350W DC output power supply with the following capacity:

DC Output	Max Current
+3.3V	20A
+5V	35A
+12V	18A
-12V	2A

Note: Combined 3.3V and 5V current, 35A Maximum.

Chassis Monitoring

Front panel LEDs: Power supply status
Cooling fan status
Internal temperature status

Remote Interface: RS232 port on rear panel

Physical Parameters

Cardcage: Front loading 3U x 160mm, 8slots, IEEE 1101.1, 1101.10 and 1101.11

Dimensions: Width: 280mm (11.02")
Height: 177mm (6.97")
Depth: 303mm (11.93")

Weight: 5.9kg (13 lbs.)

Safety, CE & RoHS Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998. The 40-922 Chassis also complies with the European Restriction of Hazardous Substances directive (RoHS).

Product Order Codes

8 Slot, 3U, PXI Chassis	**40-922-001**
Optional 19 inch rack mounting hardware	**63-102-001**
PCI to PXI Control Interface Kit	**41-921-001-KIT**

For full details of our fast PCI to PXI control Interface see the 41-921 data sheet.

Mating Connectors & Cabling

Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for a full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download.

Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

Operating/Storage Conditions

Operating Conditions (operating with specified airflow)

Operating Temperature: 0°C to +55°C
Humidity: 10% to 95% non-condensing

Storage and Transport Conditions

Storage Temperature: -20°C to +70°C
Humidity: 10% to 90% non-condensing

40-923A
19 Slot PXI Mainframe

- High Performance 19 Slot PXI/cPCI Backplane
- 3 Slot PXI System Controller Compatible
- 600W Industrial Grade Power Supply
- Compact Benchtop Footprint
- Integrated Carrying Handles
- Low Profile 4U Rugged Design
- Remote Chassis Monitoring System
- Power, Temperature and Fan Monitoring LEDs
- Low Audible Operating Noise
- Optional Rack Mounting Kit
- RoHS Compliant
- 3 Year Warranty

Pickering Interface 40-923A PXI Chassis is a fully compliant 19 slot PXI chassis that can accept any 3U PXI or cPCI module. The chassis is ideal for bench top use or for use in a rack system.

The 40-923A includes all the features and performance required by the PXI standard and supports a control interface or embedded controller and up to 18 additional 3U peripheral modules. The control interface can be provided by a Pickering's 41-924 PCIe to PXI interface kit, allowing the chassis to be controlled from a PC.

The chassis is fitted with a 600W industrial grade power supply mounted at the rear of the unit with sufficient capacity to support PXI modules with very high current demands.

An intelligent chassis management system monitors the power supply voltage, internal temperature and the cooling fan speed. The current condition of the chassis is displayed on front panel status LEDs and can also be monitored remotely via an RS232 port

Three 120mm fans insure maximum PXI module cooling and an efficient direct convection design allows the chassis to operate over an extended ambient temperature range of 0°C to +55°C.

The 40-923A chassis can also be supplied with mounting brackets for installation into a standard 19" rack. These brackets are adjustable allowing the chassis to be recessed by up to 10cm, allowing clearance for connector blocks and module wiring.

The system slot is compatible with any PC-PXI bridge and any 3 slot wide PXI controller.

40-923A PXI chassis with 63-103-001 optional rack mounting hardware fitted allowing the front of the chassis to be recessed by up to 10cm in the host rack

Backplane

Number of Slots: 1 system slot, 18 peripheral slots.

System Slot: Accepts any 3 slot or narrower PXI compatible controller or interface. Pickering Interfaces recommends the 41-924 interface for remotely controlled configurations. Particularly, Adlink controllers are recommended for applications requiring embedded control.

Bus Design: Incorporates all the features of the PXI specification Rev 2.2. The backplane is 64-bit with PXI triggers, Star Trigger, Local Bus & internal PXI clock.

Cooling

Airflow: Bottom intake, rear exhaust.

Per-slot Cooling Capacity: 25W at 55ºC ambient
40W at 40ºC ambient

Fans: 3 off 185.9cfm fans

Power Supply

Input Voltage Range: 90 - 264Vac full range
Input Voltage Frequency: 47 to 63Hz

Supplied with a 600W DC output power supply with the following capacity:

DC Output	Max Current
+3.3V	42A
+5V	45A
+12V	15A
-12V	4.75A

Chassis Monitoring

Front panel LEDs: Power supply status
Cooling fan status
Internal temperature status

Remote Interface: RS232 port on rear panel

Frequency Standard

Source: Either 10MHz PXI compliant internal standard or external 10MHz standard applied to rear panel BNC connector.

Physical Parameters

Cardcage: Front loading 3U x 160mm, 19slots, IEEE 1101.1, 1101.10 and 1101.11

Dimensions: Width: 444mm (17.48")
Height: 178mm (7.01")
Depth: 455mm (17.91")

Weight: 13.4kg (29.5 lbs.),

Safety, CE & RoHS Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998. The 40-923 Chassis also complies with the European Restriction of Hazardous Substances directive (RoHS).

Product Order Codes

19 Slot, 3U, PXI Chassis	**40-923A-001**
Optional 19 inch rack mounting hardware	**63-103-001**
PCIe to PXI Control Interface Kit	**41-924-001-KIT**

For full details of our fast PCIe to PXI control Interface see the 41-924 data sheet.

Mating Connectors & Cabling

Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for a full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download.

Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

Operating/Storage Conditions

Operating Conditions (operating with specified airflow)

Operating Temperature: 0°C to +55°C
Humidity: 10% to 90% non-condensing

Storage and Transport Conditions

Storage Temperature: -20°C to +70°C
Humidity: 10% to 90% non-condensing

40-908/914
High Performance 8 & 14 Slot PXI Mainframes

- High Performance 8 or 14 Slot PXI/ cPCI Backplane
- Dual 175 Watt Power Supplies
- Power Supplies Hot Swap Capable
- Voltage Monitoring Included
- Low Profile Rugged Enclosure
- Low Audible Operating Noise
- 40-908 Allows Mechanical Expansion For Multi-Slot Modules Such as The BRIC™ Matrix
- 3 Year Warranty

Pickering Interfaces Model 40-908 and 40-914 PXI Chassis features the industry-standard, eight and fourteen slot PXI/cPCI backplane integrated into a 3U cardcage.

The chassis include all the features and performance required by version 2.1 of the PXI standard and supports a control interface or embedded controller and up to 7 or 13 more 3U peripheral modules. The eight slot chassis has mechanical expansion space on the right hand side allowing the chassis to accept multi-slot modules, such as the BRIC, while only occupying one electrical slot.

The 40-908/914 can be controlled from a PC using Pickering Interfaces PCI to PXI Control Interface 41-921.

The chassis are provided with two hot swap capable 175 watt power supplies. Power supply voltage and fault monitoring is through front panel LEDs. Replacement power supply modules are available from Pickering as spare parts.

The 40-908 has three fans and the 40-914 has four fans to ensure efficient cooling of the chassis and modules.

For applications such as office or laboratory environments where acoustic noise levels are critical, the chassis can be supplied with either lower speed fans or with fans whose speed can be set to full, medium or slow with easily accessed internal switches.

Air intakes include a washable filter that can be easily accessed from the fan tray.

Backplane

Bus Design: Incorporates all the features of Revision2.1 of the PXI specification. The backplane is 64-bit with PXI triggers, Star Trigger, Local Bus & internal PXI clock.

Cooling

Airflow: Bottom intake, side/rear exhaust, pressurized cardcage.

Fans: 40-908: (3) 55cfm fans (165cfm total)
40-914: (4) 56cfm fans (224cfm total)

Acoustic Noise: 40-908: 55.0-56.3dB@1m (A weighting)
40-914: 56.5-58.2dB@1m (A weighting)

Air Filter: Bottom accessible, washable media.

Low Acoustic Noise Versions:
Available with selectable fan speed (3 speeds set by internal switches).
Available with low noise fans.

Power Supply

AC input: 90 - 264VAC, universal input, Line Fuse protected.

Cooling: Convection, with chassis forced air.

Supplied with two 175W power supplies (Type 59102) with the following total capacity:

DC Outputs	Dual Supplies
+3.3V	50A
+5V	50A
+12V	6A
-12V	2A

Note: Combined 3.3V and 5V current, 54Amps Maximum.

Power Factor: 0.99 (typical).

Efficiency: 70% (typical).

Operating/Storage Conditions

Operating Conditions (operating with specified airflow)

Operating Temperature: 0°C to +55°C
Humidity: Up to 95% non-condensing
Altitude: 5000m

Storage and Transport Conditions

Storage Temperature: -20°C to +70°C
Humidity: Up to 95% non-condensing
Altitude: 15000m

Power Supply Monitoring

Interface: Front panel LED indicators.

Functions: Power supply DC output voltage verification (90% nominal).

Indicators: Green LEDs for Power OK, Red LED for Fault.

Physical Parameters

Cardcage: Front loading 3U x 160mm, flush, 8 or 14 slots, IEEE 1101.1, 1101.10 & 1101.11

Dimensions: 257.8mm (10.53"D)
442.2mm (17.41"W)
with out rack mount flanges.
482.6mm (19.00"W)
with rack mount flanges.
191.6mm (7.54"H) including feet.
177mm (6.97"H) foldable feet removed.

Weight: 8.5kg (18.6 lbs.),

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Product Order Codes

8-Slot, 3U, 350W, PXI Chassis	**40-908-001**
8-Slot Chassis with 3 speed fans	**40-908-101**
8-Slot Chassis with low noise fans	**40-908-201**
14-Slot, 3U, 350W, PXI Chassis	**40-914-001**
14-Slot Chassis with 3 speed fans	**40-914-101**
14-Slot Chassis with low noise fans	**40-914-201**
PCI to PXI Control Interface Kit	**41-921-001-KIT**

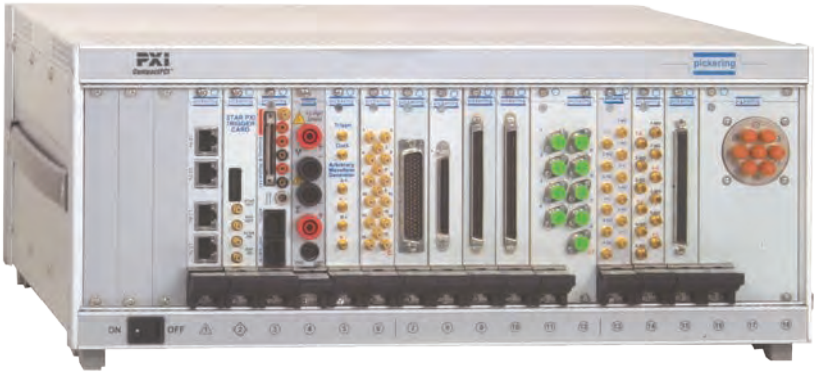
For full details of our fast PCI to PXI control Interface see the 41-921 data sheet.

Spare Parts

Replacement Power Supply Module	**44-910-003**

40-918
High Performance 18 Slot PXI Mainframe

- High Performance 18 Slot PXI/cPCI Backplane
- Four Modular Power Supplies
- Compact Benchtop Footprint
- Integrated Carrying Handles
- Low Profile 4U Rugged Design
- Voltage Monitoring Included
- Power Supplies Hot Swap Capable
- Low Audible Operating Noise Versions Available
- 3 Year Warranty



Pickering Interfaces Model 40-918 PXI Chassis features the industry-standard, eighteen-slot PXI/cPCI backplane integrated into a 3U cardcage.

The 41-918 includes all the features and performance required by the PXI standard and supports a control interface or embedded controller and up to 17 additional 3U peripheral modules.

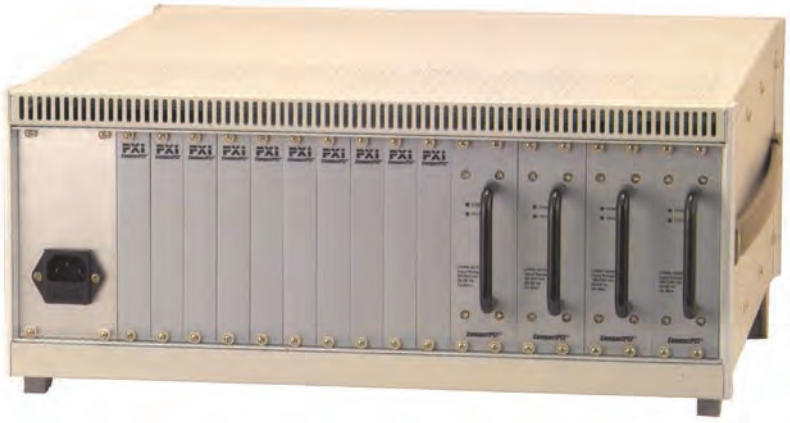
The 40-918 chassis can be controlled from a PC using Pickering Interfaces PCI to PXI Control Interface 41-921.

The 40-918 chassis has a very high capacity power supply provided by using 4 modular power supplies mounted in the rear of the chassis. The capacity of this arrangement is well suited to supporting modules with very high current demands. The modular power supplies are hot swappable, replacement power supply modules are available from Pickering as spare parts

Power supply voltage and fault monitoring is through front panel LEDs. Two 56cfm fans provide dedicated power supply cooling with easy access to the filter media.

Four 56cfm fans (total 224cfm) insure maximum PXI module cooling with minimal noise. Quick filter media and fan maintenance is provided by a removable fan tray.

For applications such as office or laboratory environments where acoustic noise levels are critical the chassis can be supplied with either lower speed fans or with fans whose speed can be set to full, medium or slow with easily accessed internal switches.



Rear View of the Chassis Showing Location of the Four Hot Swappable Power Supplies

Backplane

Bus Design: Incorporates all the features of the PXI specification. The backplane is 64-bit with PXI triggers, Star Trigger, Local Bus & internal PXI clock.

Cooling

Airflow: Bottom intake, side/rear exhaust, pressurized cardcage.

Fans: (4) 56cfm fans (224cfm total).

Acoustic Noise: 68.4 - 70.3dB @ 1meter (A weighting)

Air Filter: Bottom accessible, washable media.

Low Acoustic Noise Versions:
Available with selectable fan speed (3 speeds set by internal switches).
Available with low noise fans.

Power Supply

AC input: 90 - 264VAC, universal input, Line Fuse protected.

Supplied with four 175W power supplies (Type 59102) with the following total capacity:

DC Outputs	Total Current
+3.3V	100A
+5V	100A
+12V	12A
-12V	4A

Note: Combined 3.3V and 5V current, 108Amps Maximum.

Power Factor: 0.99 (typical).

Efficiency: 70% (typical).

Power Supply Cooling

Airflow: Bottom intake, side/rear exhaust

Fans: (2) 56cfm fans (112cfm total).

Air Filter: Bottom accessible, washable media.

Operating/Storage Conditions

Operating Conditions (operating with specified airflow)

Operating Temperature: 0°C to +55°C
Humidity: Up to 95% non-condensing
Altitude: 5000m

Storage and Transport Conditions

Storage Temperature: -20°C to +70°C
Humidity: Up to 95% non-condensing
Altitude: 15000m

Power Supply Monitoring

Interface: Front panel LED indicators.

Functions: Power supply DC output voltage verification (90% nominal).

Indicators: Green LEDs for Power OK, Red LED for Fault.

Physical Parameters

Cardcage: Front loading 3U x 160mm, flush, 18 slots, IEEE 1101.1, 1101.10 and 1101.11

Dimensions: 482.6mm (19.00"D)
442.2mm (17.41"W)
with out rack mount flanges.
482.6mm (19.00"W)
with rack mount flanges.
177mm (6.97"H)

Weight: 14.74kg (32.5 lbs.),

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Product Order Codes

18 Slot, 3U, PXI Chassis	**40-918-001**
Chassis with 3 speed fans	**40-918-101**
Chassis with low noise fans	**40-918-201**
PCI to PXI Control Interface Kit	**41-921-001-KIT**

For full details of our fast PCI to PXI control Interface see the 41-921 data sheet.

Spare Parts

Replacement Power Supply Module	**44-910-003**

Mating Connectors & Cabling

Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for a full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download.

Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

41-921A, 51-921A
PCI to PXI Remote Control Interface

- Provides Seamless Interface Between a PC Controller PCI and PXI Chassis
- Supports Two PXI Chassis From A Single PCI Card
- 2.5Gb/s StarFabric™ Serial Interface Ensures Fast Operation
- Supports 32/64 Bit & 33/66MHz PCI Interfacing
- Compatible With Windows 7 32/64 Bit
- Uses RJ45 Connectors, Shielded Cat 5E Cables
- Operating System Independent
- Low Power Consumption, Supporting 5V and 3.3V PCI
- Single Slot 3U PXI Module (41-921A)
- Single Slot Short PCI Card (51-921A)
- 3 Year Warranty

The 41-921A and 51-921A provide a seamless connection between a control PC's PCI interface and a PXI chassis. The 51-921A resides in one of the controllers PCI slots and provides two independent StarFabric™ serial interfaces, each capable of driving a separate PXI chassis.

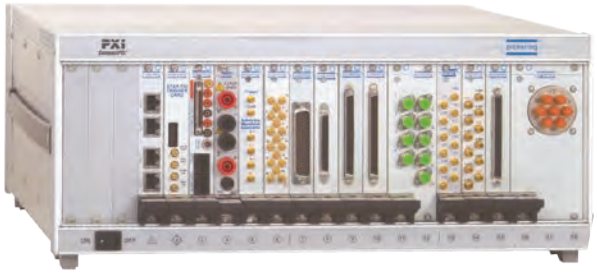
The 41-921A resides in the Slot 1 position of a PXI chassis and interfaces to the backplane of the PXI chassis. When located in a generic peripheral slot the 41-921A can be used to drive two extension PXI chassis.

The use of the StarFabric™ interface operating at 2.5Gb/s minimizes the impact on system speed. The PCI interface of the 51-921A supports both 32-bit and 64-bit operation and backplane speeds of 33MHz and 66MHz, ensuring the highest speed operation under all conditions. The StarFabric™ interface ensures the modules perform seamlessly with no impact on the test system software.

The serial interface connections are made using RJ45 connectors and shielded twisted pair cables (2 per interface connection) to cover distances up to 10m.

The 41-921A and 51-921A are designed to minimize the space taken, and the cost, of control interfaces in both the controller and the PXI chassis for larger systems requiring multiple chassis.

The 41-921A and 51-921A are the ideal choice of PXI chassis control, providing the highest performance and the most cost effective solution with the smallest system mechanical occupancy.



Typical PXI System Using the 41-921A Remote Control Interface

Functionality

51-921A provides two ports between PCI backplane and independent Star Fabric serial interfaces.

41-921A provides a StarFabric™ serial interface connection to the PXI backplane. When placed in a generic PXI slot the 40-921A provides two StarFabric™ interfaces that extend the PXI chassis connection to two further chassis. Further chassis can be added in daisy chain or tree arrangements.

Operation of the modules is operating system and test system software independent.

Chassis Compatibility

51-921A is suitable for any PC with a single PCI slot.

41-921A is suitable for any chassis compliant with the PXI/cPCI standard

Maximum Data Transfer

132 Mbytes/sec (32 bit, 33 MHz PCI)

528 Mbytes/sec (64 bit, 66 MHz PCI)

Maximum Connection Distance

10 m using shielded RJ 45 Cat 5E cables (two per link)

Mechanical

51-921A: 1 PCI slot of the control PC

41-921A: 1 slot of 3U or 6U PXI/cPCI chassis (using a mechanical adaptor)

Each module supports two StarFabric™ serial interfaces.

Serial interface connectors use RJ45 connectors, 2 pairs per interface.

Power Requirements

	+3.3V	+5V	+12V	-12V
51-921	250mA	190mA	0	0
41-921	0	540mA	0	0

Width and Dimensions

51-921A: Single slot short PCI Card

41-921A: Single slot 3U PXI module (CompactPCI card)

PXI & CompactPCI Compliance

All Pickering Interfaces PXI modules comply with the PXI Specification 2.2. Local Bus, Interrupts, Trigger Bus and Star Trigger are not implemented.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	10 to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	10 to 95% non-condensing
Altitude:	15000m

Comparison With National Instruments MXI-4™

National Instruments launched the orginal MXI-3 serial remote interface for PXI in the late 90's. Pickering's 41-921A/51-921A has all the capabilities of the original MXI-3 but with much improved capacity, operating speed, bus width and value and all built around an industry standard interconnect, StarFabric™.

	Pickering 41-921A/ 51-921A	National Instruments MXI-4
Transparent Operation	Yes	Yes
Supports All OSs	Yes	Yes
Supports Both 3.3V and 5V PCI	Yes	Yes
Uses Industry Standard Interconnect	Yes, StarFabric™	No, Proprietary
Bus Speeds Supported	33MHz and 66MHz	33MHz only
Bus Widths Supported	32 Bit and 64 Bit	32 Bit only
Uses Low Cost Cabling	Yes	No, Proprietory only
Supports 1 or 2 PXI Chassis	Yes	1 only

Product Order Codes

PCI To PXI Remote Control Kit	**41-921A-001-KIT**
(complete kit: 51-921A-001, 41-921A-001, 2 x Cat5E 2m cables)	
PCI To Star Fabric Module	**51-921A-001**
Star Fabric To PXI Module	**41-921A-001**

Mating Connectors & Cabling

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Latest Details

Please refer to our Web Site for Latest Product Details.

www.pickeringtest.com

41-924
PCIe to PXI Remote Control Interface

- Provides seamless interface between PC Controller PCIe and PXI chassis
- Fast PCI Express Interface
- Supports 32 bit 33/66MHz PXI Bus
- Supplied Complete with Lead
- Low Power Consumption
- Occupies Single PXI and PCIe Slot
- 3 Year Warranty

The 41-924 kit provides a seamless connection between a PC's PCIe slot and a PXI chassis and is suitable for providing an interface to any PXI chassis.

The kit is supplied with a PCIe card which can plug into any PC PCIe slot, a PXI module for insertion into Slot 1 of a PXI chassis and 3m lead to connect the two parts together.

The interface uses a single lane PCIe connection from the PC to provide a software transparent link from the PC PCIe backplane to the PXI backplane. The supplied 3m shielded lead ensures the system has robust operation and an adequate separation distance between the PC and the PXI chassis.

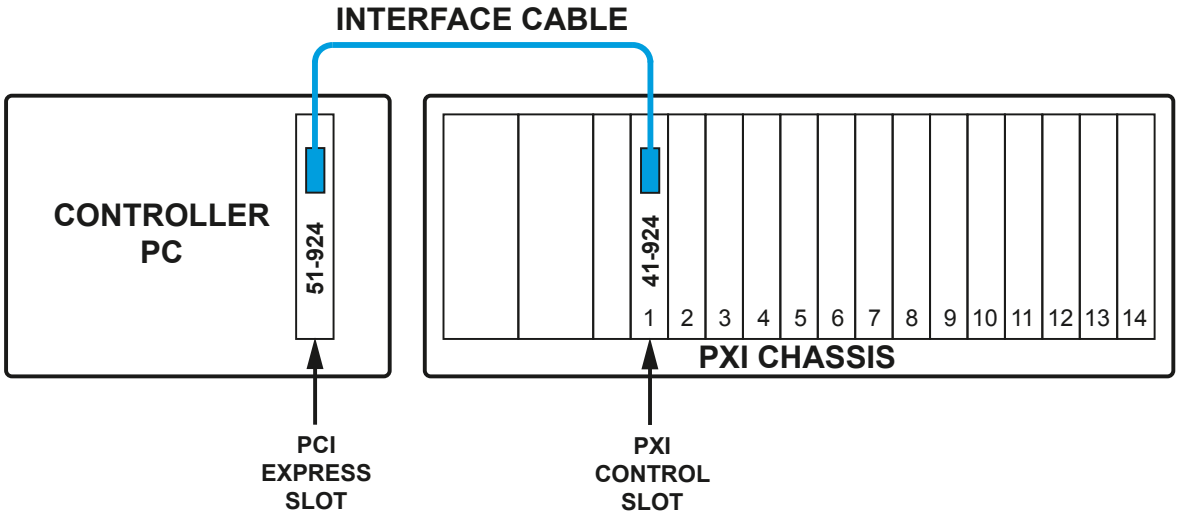

Diagram Showing 41-924 Remote Control Interface Kit Fitted in a Controlling PC and a PXI Chassis, Linked With the Interface Cable

Specification

The system is supplied as kit containing a lead, a 41-924-001 PXI module and a 51-924-001 PCIe module and ordered as a complete kit. Provides a single lane PCIe connection from PCIe to PXI.

Chassis Compatibility.

51-924-001 is suitable for insertion in any PCIe slot of a PC

41-924-001 is suitable for insertion in any PXI chassis controller slot (Slot 1), it is not suitable for PXIe controller slots.

Connection Distance

Supplied with a 3m connecting lead

Power requirements

210mA at 3.3V for PCIe

720mA at 3.3V for PXI module.

PXI & CompactPCI Compliance

All Pickering Interfaces PXI modules comply with the PXI Specification 2.2. Local Bus, Interrupts, Trigger Bus and Star Trigger are not implemented.

Mechanical

51-924-001: 1 PCIe slot of the control PC
41-924-001: 1 slot of 3U or PXI/cPCI chassis

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

Product Order Codes

PCIe To PXI Remote Control Kit	**41-924-001-KIT**
(complete kit: 51-924-001, 41-924-001, 3m Interface cable)	
PCIe Remote Control Interface Module	**51-924-001**
PXI Remote Control Interface Module	**41-924-001**

Mating Connectors & Cabling

Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for a full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download.

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Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

60-102B/103B
7 & 18-Slot LXI Modular Chassis

- Gigabit Ethernet Interface
- Accepts More Than 1000 Pickering Interfaces PXI 3U Switch and Simulation Modules
- Accepts most Pickering Interfaces 3U PXI Instrumentation Modules
- Applications From Simple Switching to RF, Microwave and Optical
- Front Panel IP Address Display
- Low Audible Operating Noise
- 3 Year Warranty

The 60-102B and 60-103B are fully compliant with the LXI Standard 1.4 and support Pickering's 3U PXI switching and simulation modules. Modules are supported as an LXI compliant device, complete with a driverless soft front panel that provides complete control of the module's functions. The 60-102B supports up to 7 and the 60-103 supports up to 18 PXI modules.

The chassis allow all Switching and Simulation 3U PXI modules from Pickering Interfaces and selected instrumentation products (such as digital I/O, attenuators, power supplies) to be installed and controlled through a standardized Ethernet interface.

The LXI compliant Ethernet interface enables the chassis to be controlled over world wide networks. The separation of the chassis from the controller's PCI bus simplifies power-on sequencing of systems.

The chassis can be simply configured over its LXI compliant interface using any industry standard web browser. The interface can be used to load a Java based soft front panel for any of the modules fitted to the chassis, permitting users to manually access modules without the need for drivers on the controller.

Specification

Chassis Backplane:	64 bit backplane, compliant with cPCI/PXI specification. Provides trigger, local bus support (subject to module support).
Chassis Capacity:	7 or 18 off 3U slots available.

PXI Module compatibility

The chassis is supplied with drivers for Pickering system 40 switching modules.

Switching Support	All Pickering Interfaces 3U PXI switching modules, including (but not limited to) all BRIC modules (60-102B is limited to 2 and 4 slot BRICs), reed relay solutions, EMR modules, RF and optical switches.
Instrumentation support:	Programmable resistor and potentiometer modules, RF attenuators, battery simulators, programmable power supplies and digital I/O modules.
Soft Front Panel:	All supported PXI modules can be controlled through a W3C compliant web browser.

Power Supply

Input Voltage Range:	90 - 264VAC
Input Voltage Frequency:	47 to 63Hz
Input Current Rating:	8A 115VAC or 4A 230VAC

Power supply provides the following capacity for PXI modules:

DC Output	Max Current 60-102B	Max Current 60-103B
+3.3V	20A	42A
+5V	35A	45A
+12V	18A	15A
-12V	2A	4.75A

Note: Combined 3.3V and 5V current for 60-102B, 35A Max.

Monitoring

LXI Interface Status LEDs:	Power, Ready, Error, LAN, 100BaseT, 1000BaseT.
Chassis Status LEDs:	Power, Temperature, Fan Speed.
Web Page Monitoring:	Chassis air temperature, Backplane supply voltage levels, Fan speeds..

LAN Interface

Connector:	RJ45 Connector.
Connection Speed:	1000BaseT interface.

Designed to comply with the LXI Standard Version 1.4

Supporting Documentation

Manuals, drivers and a copy of the LXI Product Guide are stored internally and are accessible through any W3C compliant browser.

Width and Dimensions

Dimensions, 60-102B:	W 280mm, H 177mm, D 303mm
Dimensions, 60-103B:	W 444mm, H 178mm, D 455mm
Weight, 60-102B:	5.9kg without PXI modules
Weight, 60-103B:	13.8kg without PXI modules

Product Order Codes

LXI Modular Switching Chassis, 7-Slot	**60-102B-001**
Optional 19" rack mounting hardware	**63-102-001**
LXI Modular Switching Chassis, 18-Slot	**60-103B-001**
Optional 19" rack mounting hardware	**63-103-001**

60-104
2-Slot USB/LXI Modular Chassis

- Fully Compliant LXI Interface (1.4)
- Ethernet 1000baseT Interface
- USB 3 Compatible
- Supports 1000+ Pickering PXI 3U Modules Including:
  - Programmable Resistors
  - Matrices
  - Multiplexers
  - General Purpose Relays
  - RF Switches
  - Fault Insertion
- Supports Two User Slots
- Compact 1/2 Rack Width 1U Form Factor
- 3 Year Warranty

60-104 Chassis With Two Pickering PXI Modules Inserted

Pickering Interfaces' 60-104 modular chassis offers a small lightweight form factor, making it ideal for portable, benchtop, and space restrictive applications.

The 60-104 supports one or two 3U PXI modules and accepts Pickering's PXI products, it is the perfect platform to construct small scale applications.

Possible systems include switching matrices up to 1104 crosspoints (one 40-560 BRIC2 occupying both slots) or up to 36 channels of programmable resistor / sensor emulation (two 40-295A or 40-297 18-channel resistor modules - one in each slot).

For a list of compatible PXI modules, please refer to the 60-104 user manual.

The USB compatible and LXI compliant interfaces enable the chassis to be controlled directly through standard interfaces found on most personal computers, allowing for a very cost effective route into the modular test and measurement market.

The option of a Wi-Fi dongle is useful for control from mobile devices via HTML5 SFP.

The chassis can be controlled through built in software drivers. Chassis configuration and module control is possible through the W3C web page interface.

The 60-104 is powered from an external DC supply, making it lightweight, versatile and extremely portable.

Specification

Chassis Backplane:	32-bit backplane, compatible with cPCI/PXI.
Chassis Capacity:	2 off 3U user slots available.

PXI Module compatibility

The chassis is supplied with drivers for Pickering PXI modules.

Switching Support	Most of 3U Pickering Interface's PXI switching modules. Includes (but not limited to): All 2-slot 3U BRIC matrices, featuring up to 1104 crosspoints.
Simulation support:	All programmable resistor and potentiometer modules offering up to 36 channels, RF attenuators, digital I/O and other simulation modules.

Power Supply

Input Voltage Range:	19V (DC)
Input Current Rating:	5.2A (DC)

Slot Capacity (Per Slot)

+3.3V	+5V	+12V	-12V
6A	6A	1A	1A

Note: Maximum power is 60W for all slots or 30W per slot.

Cooling

Airflow:	Crossflow
Per-slot Cooling Capacity:	25W at 40°C ambient
Fans:	2 off 7.7 cfm fans

Acoustic Noise Emissions

With fans on maximum:	53dBA typical

LAN Interface

Designed to comply with the LXI Standard Version 1.4

Connector:	RJ45 Connector.
Connection Speed:	1000BaseT interface.

USB Interface

Designed to be compatible with USB3 (backwardly compatible with USB/USB2)

Connector:	USB3 type B
Connection Speed:	400MBps

Width and Dimensions

Dimensions:	Width: 165mm (6.50") Height: 58mm (2.28") Depth: 308mm (12.13")
Weight:	1.3kg without PXI modules

Product Order Codes

USB/LXI Modular Switching Chassis, 2-slot:	**60-104-001**

Accessories

Replacement 19V DC power supply:	**63-104-001**
Optional Wi-Fi Dongle:	**63-104-002**

Waveform Generation

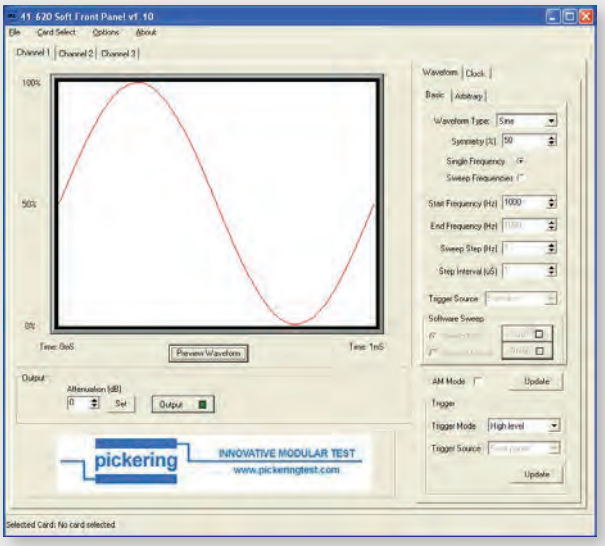
- Function Generator Module
- 3 Channels in One PXI Slot
- DC to 10MHz Frequency Range
- 48-Bit Frequency Resolution
- Simple Generation of Repetitive Arbitrary Waveforms
- Flexible Sweep Capability
- Amplitude Modulation Capability
- VISA and Kernel Support For PXI Environments

41-620 3-Channel Function Generator Module

The Pickering range of PXI instruments includes a function generator suitable for producing waveforms for the emulation of sensors or the stimulation of external systems.

The 41-620 Function Generator is supplied with 3 channels and is capable of generating sine waves up to 10MHz. As it implements a simple method of frequency generation using Direct Digital Synthesis it is easier to use than an ARB for the creation of repetitive waveforms.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.



The Soft Front Panel For the 41-620 Function Generator

Card Configuration	Channels	Maximum Frequency	Maximum Voltage	ADC/DAC Resolution	Memory Size	Order Code	Page
Function Generator Module	3	10MHz	10Vp-p output	10-bit DAC	256k per channel	**41-620-003**	**3.2**

41-620
Function Generator

- DC to 10MHz
- Three Channels in One 3U Slot
- 48-bit Frequency Resolution
- Simple Generation of Repetitive Arbitrary Waveforms
- DC Offset Capability
- Flexible Sweep Capability
- Amplitude Modulation Capability
- Uses 10MHz PXI Clock or External Clock Reference
- Comprehensive Trigger Support
- VISA Driver Supplied For Windows XP/Vista/7/8
- 3 Year Warranty

The 41-620 is a compact 3 channel function generator provided in a PXI 3U single slot module. It is capable of generating sine waves to 10MHz with 48-bit frequency resolution referenced to the 10MHz PXI clock or to an external standard. The 41-620 can generate arbitrary waveforms loaded into the internal 256k memory, allowing the function generator to emulate many waveform types, including the typical waveforms of automotive and aerospace sensors.

The function generator provides a very simple method of providing variable output frequencies through the use of Direct Digital Synthesis (DDS), making it far easier to use than an ARB for repetitive waveform generation.

The 41-620 is capable of generating fast swept frequency signals, permitting the output to emulate the operation of variable speed devices. Sweeps can be single shot events or continuous up and down ramps. The DDS technology ensures the 41-620 settling time is extremely fast, being limited only by the update time over the PXI bus.

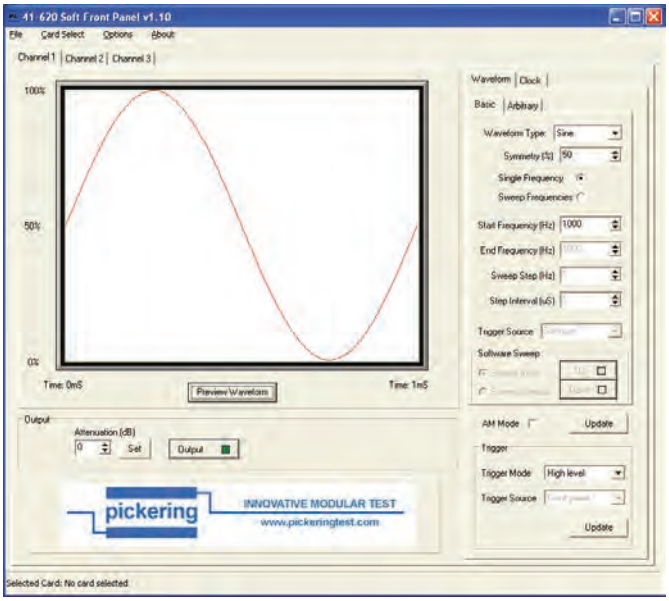
Each channel of the 41-620 can be amplitude modulated from a single AM input connector to allow independent time varying output levels to be reproduced. One channel of the module can be externally connected to provide the time varying level control independently of the waveform being generated.

The waveforms of the function generators are each stored in independent 256k memory blocks, permitting each channel to provide a different waveform shape. Waveforms are easily created externally, using Excel or similar tools, and loaded to the module memory via the backplane.

The 41-620 supports the PXI Trigger functions to allow triggered events from other instruments to initiate waveform generation or sweeps.

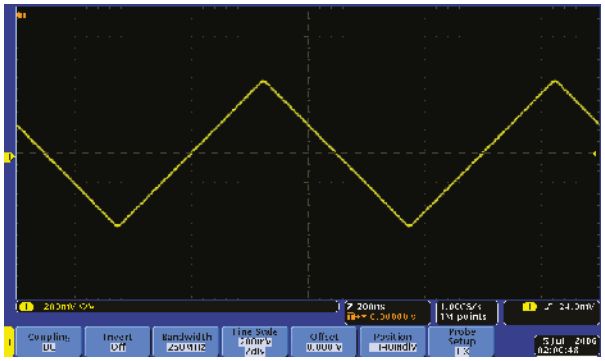
The supplied soft front panel demonstrates the ability of the 41-620 to quickly generate common waveforms and the ability to import external waveforms. The soft front panel also supports swept modes of operation.

The 41-650 high voltage amplifier is perfect partner to the 41-620, allowing the signal levels of the 41-620 to be boosted to 60Vpp.

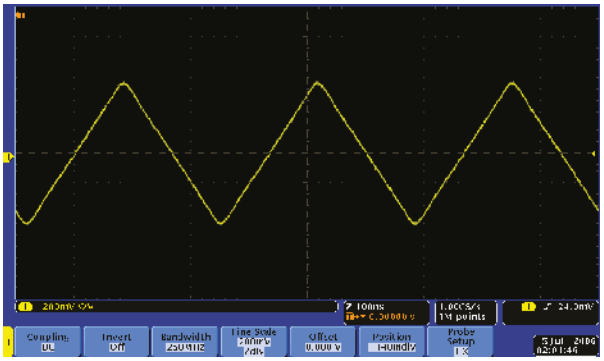


Soft Front Panel for the 41-620 Function Generator

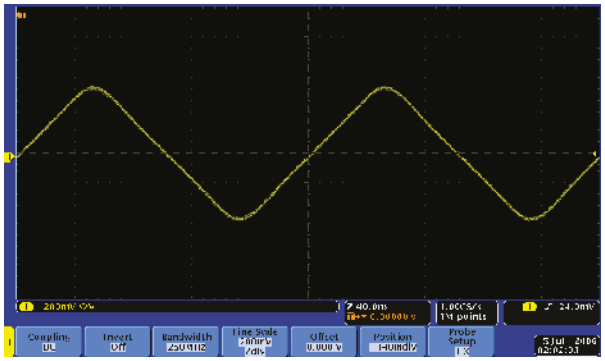
Typical Waveforms Generated by 41-620 With Output Attenuation Set to 10 dB and Loaded into 50Ω



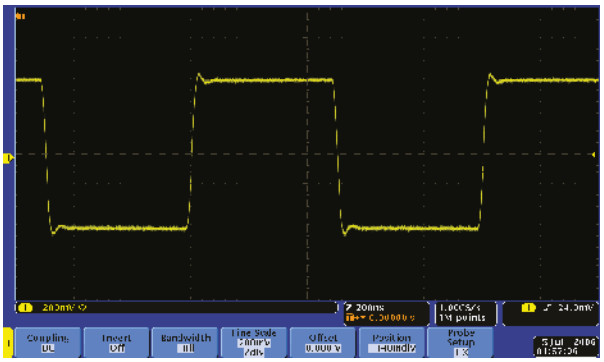
Triangular Waveform at Frequency of1MHz



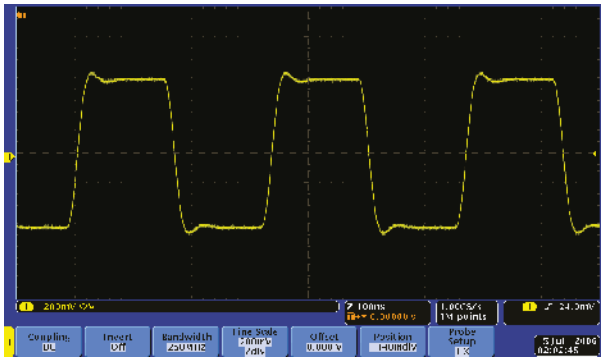
Triangular Waveform at Frequency of 3MHz



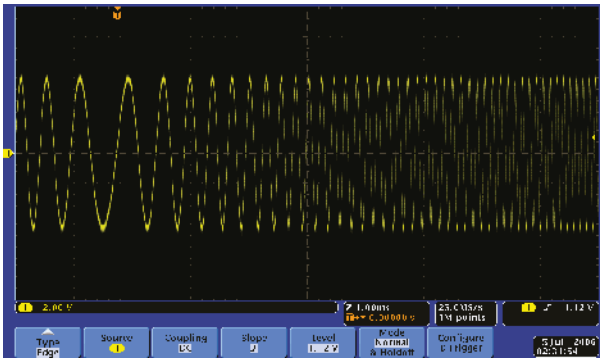
Triangular Waveform at Frequency of 5MHz



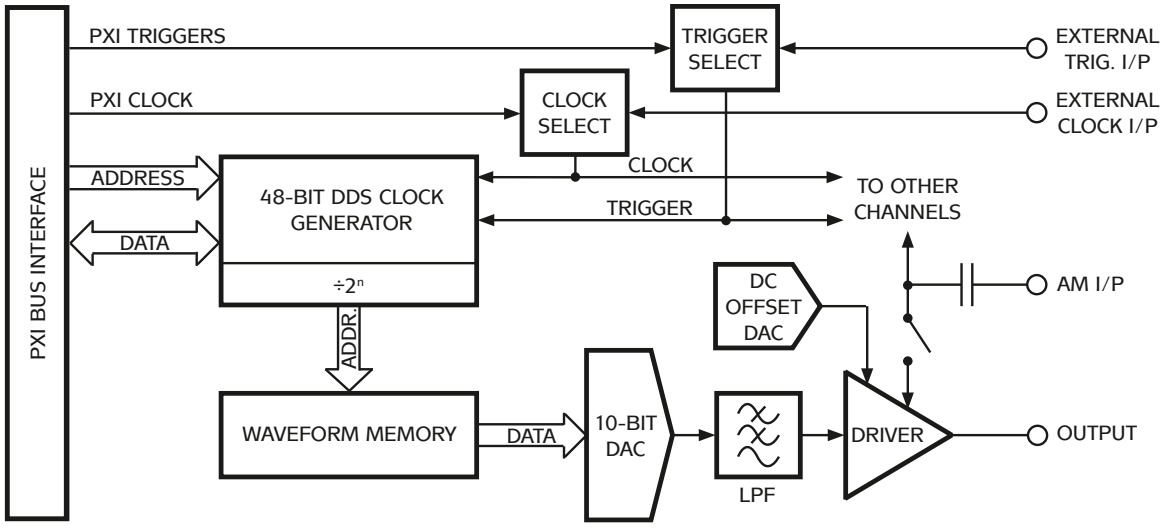
Square Wave at Frequency of 3MHz



Square Wave at Frequency of 5MHz



Swept Sine Wave from 1kHz to 10kHz in 10Hz Steps at 10µs Intervals



41-620 Function Generator Block Diagram

Specification (each channel)

Frequency

Frequency range:	DC to 10MHz (sine wave).
Frequency resolution:	48-bit
Frequency accuracy:	As PXI backplane 10MHz clock.
Frequency sweep:	Frequency sweeps can be single or continuous (ramp up and/or down) phase continuous through use of DDS sweep facility.

Output

Maximum Output:	±10V, open circuit load.
Waveform Signal:	10V pk to pk, open circuit load
Output Offset Voltage:	Settable from -5V to +5V in 10mV steps.
Output DAC resolution:	10-bit
Signal Level Control:	0 to -40dB, <0.1dB steps.
Output Impedance:	50Ω
Output Loading:	Capable of driving 600Ω with 10V peak e.m.f. Typically capable of driving a 50Ω load with 6V peak e.m.f. output (DC and signal).

AM Input

Functionality:	Single input connection can be used to amplitude one, two or three output channels. AC coupled, modulation frequency range 10Hz to 20kHz.

Waveforms

Waveform memory:	256k per channel of fixed length Permits any waveform to be loaded and replayed, including sine, square, ramp. Waveform fidelity limited by fixed 15MHz low pass filter.

Parametric Performance

(AM and DC offset set to 0)

SFDR:	>40dB (DC to 1MHz, 5Vpp) >35dB (1MHz to 10MHz, 5Vpp)
Amplitude accuracy:	±2% DC to 1MHz 0 to -15% (typically -8%) at 10MHz

Trigger and clock

Clock source:	10MHz PXI clock or external clock source.
Trigger:	Level or edge triggered operation. Initiates single shot or continuous operation PXI Trigger sources or external source.
Level:	Clock and trigger inputs require DC coupled signal derived from 5V CMOS logic drivers, nominal +2.5V input threshold voltage.

Physical Parameters

Connectors:	SMB front panel connectors.
Physical Characteristics:	One slot, 3U PXI
PCI Interface:	33MHz 32-bit address 16-bit data

Power Requirements

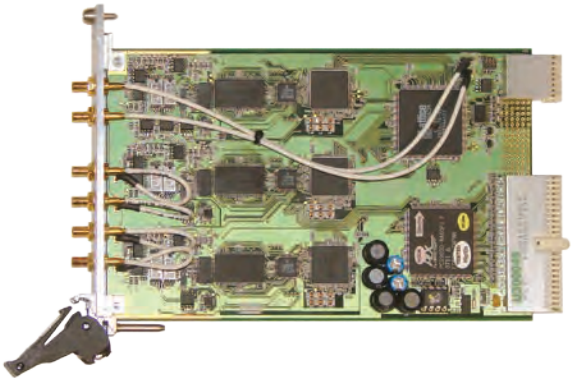
+3.3V	+5V	+12V	-12V
1.8A	110mA	75mA	150mA

Product Order Codes

Three Channel Function Generator	**41-620-003**

Mating Connectors & Cabling

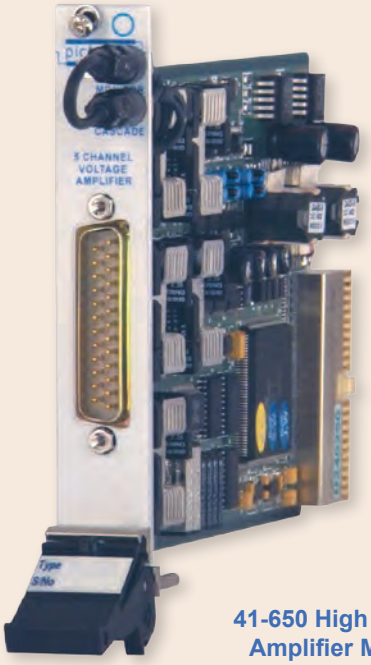
For connection accessories for the 41-620 module please refer to the **90-011D** RF Connector Accessories data sheet where a complete list and documentation can be found for accessories or refer to the Connection Solutions catalog.



Three Channel Function Generator 41-620-003

Amplifier & Attenuator Modules

- Range of Voltage Amplifiers and Attenuators
- RF Attenuators With Frequency Range up to 6GHz
- Attenuators For High Voltage Signals
- Amplifiers Capable of Generating 60V Peak to Peak Output Signals
- Multiple Channels in a Single Module
- VISA and Kernel Support For PXI Environments



41-650 High Voltage Amplifier Module

It is not unusual for test systems to generate high voltage signals incompatible with the instrumentation capability in a PXI system. It is also not unusual for tests systems to be incapable of generating large enough voltage swings to simulate sensors or other devices that stimulate a device under test. The PXI chassis power supplies limit the capability of PXI devices to generate high voltage signals without space consuming power supply conversion.

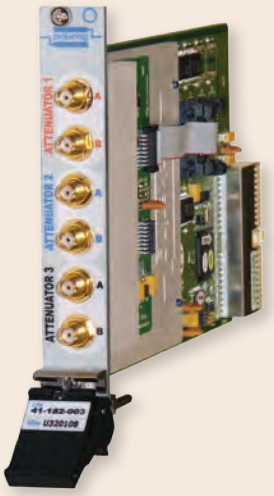
Pickering offers PXI solutions for both these problems. The 41-180 is an accurate DC to 3GHz programmable attenuator that has a 1dB step resolution, allowing it to adjust signal amplitudes for optimum measurement by other devices. The 41-182 is a programmable attenuator based on solid state technology with a frequency range up to 6GHz.

The 41-660 provides a convenient way of attenuating high voltage low frequency signals to levels that can be captured by other PXI devices without risk of damaging them.

The 41-650 provides a convenient solution for increasing the signal amplitude from waveform or function generators to permit them to simulate real life sensors.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

41-180 Dual 3GHz Programmable Attenuatore



41-182 Triple 6GHz Programmable Attenuatore

Card Configuration	Channels	Frequency	Maximum Attenuation	Maximum Gain	Signal Connectors	Order Code	Page
Solid State RF Attenuator	3	10MHz to 6GHz	31.75dB per channel	—	SMA Sockets	**41-182-003**	**4.2**
	6					**41-182-006**	
Programmable Attenuator	1	3GHz	63dB			**41-180-021**	**4.5**
	2					**41-180-022**	
High Voltage Attenuator	10 (single ended)	20kHz	160 times		50-way D-type	**41-660-001**	**4.7**
	5 (differential)					**41-661-001**	
High Voltage Amplifier	5 (600Ω i/p impedance)	1MHz	—	20 times	25-way D-type	**41-650-001**	**4.9**
					SMB	**41-650-002**	
	5 (10kΩ i/p impedance)				25-way D-type	**41-650-011**	
					SMB	**41-650-012**	

41-182
6GHz Triple Solid State Attenuator

- 10MHz To 6GHz Programmable Attenuator
- 0 to 31.75dB in 0.25dB Steps For Fine Level Control
- Three or Six Channels Per Module
- Solid State Switching For Long Service Life
- Robust SMA Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

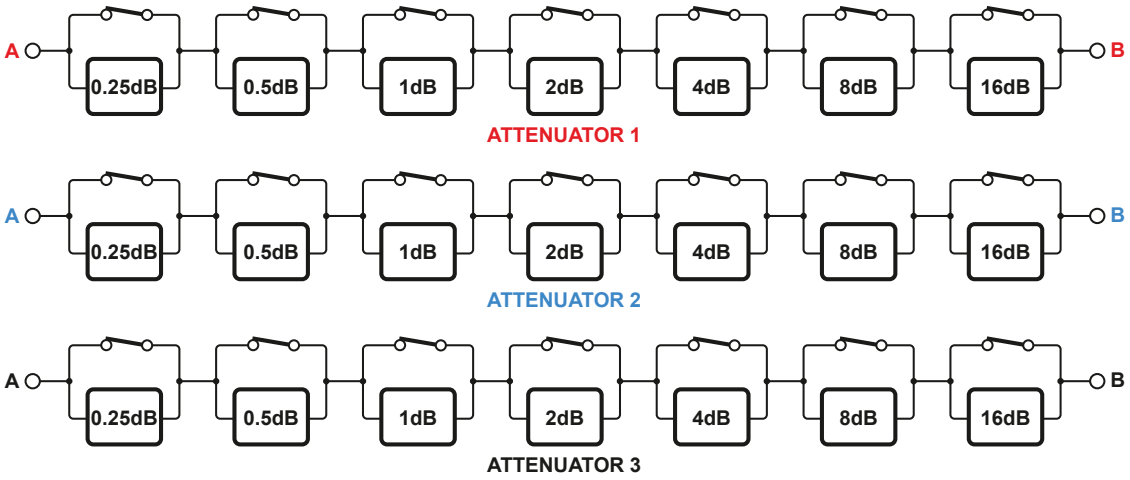
The 41-182 is a programmable RF attenuator module that supports 3 (one slot) or 6 (two slots) attenuators each capable of inserting an additional loss of 0 to 31.75dB in 0.25dB steps. Each attenuator uses solid state switches for a long service life and fast operation with minimum settling time and no signal bounce. The inclusion of DC blocking reduces the risk of damage to the switches by the accidental application of DC sources from amplifiers or other bias devices.

The 41-182 is ideal for conditioning signal levels in RF test systems to ensure equipment is used in its optimal signal level range. Fast attenuator operating speed ensures minimal system delays in setting up the required attenuation and a service life which is independent of the number of operations allows the sequence of RF tests to be arranged to optimise the life of other switching components in the system.

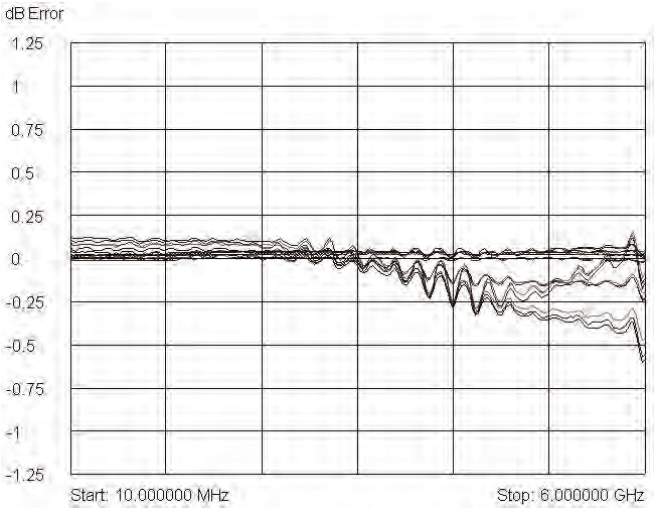
The attenuators can be connected in series to increase the attenuation range available and the high isolation minimizes signal leakage.

The attenuators can be used for the back to back testing of devices, providing the ability to condition the signal level between the two devices. It is also ideal for the conditioning of special to type signal sources which lack fine level control.

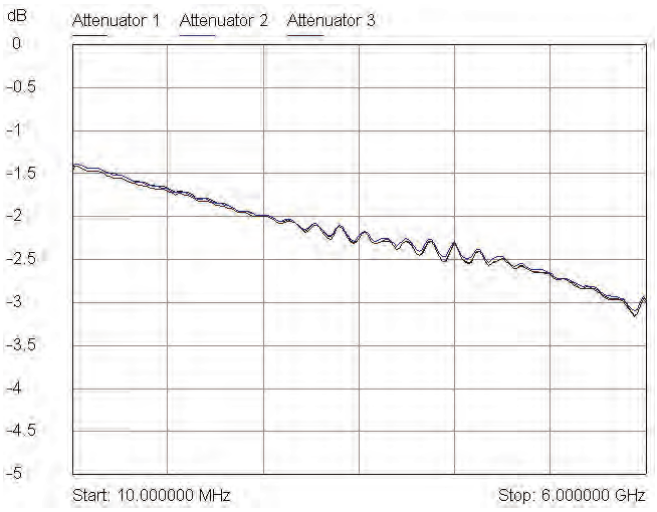
SMA connectors ensure that the attenuators can be used with standard cabling and the input and output ports are fully interchangeable.



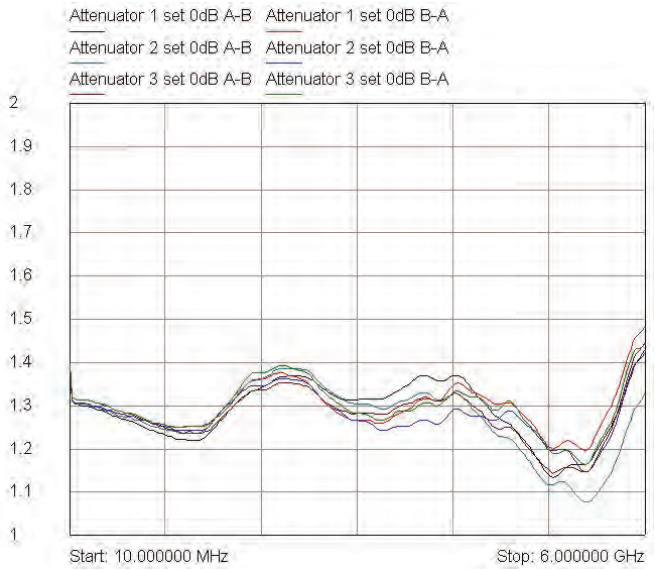
40-182 Triple 6GHz Solid State Attenuator Functional Diagram
(Default Condition Shown - All Channels Set To 0dB Attenuation)



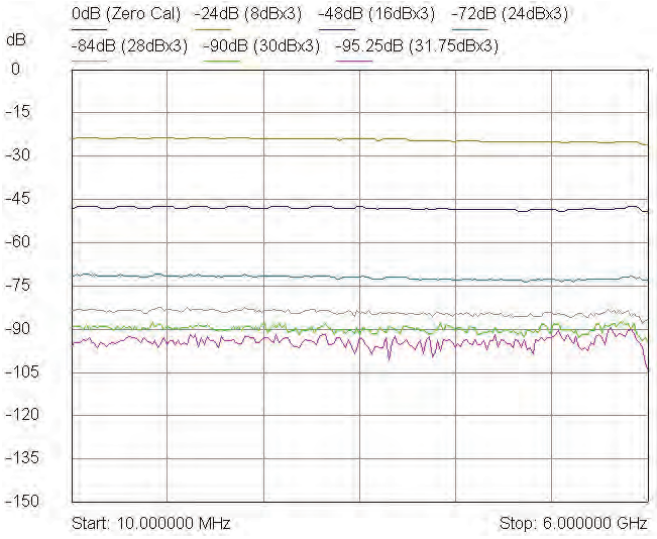
Insertion loss for every discrete attenuator setting for all channels of 41-182-003 (normalised to 0dB)



Insertion loss for 41-182-003 with each attenuator channel set to 0dB



VSWR for 41-182-003 with all attenuator channels set to 0dB



Attenuation values for 41-182-003 with three attenuator channels in series (set to major step values)

Specification

General Characteristics

Frequency Range:	10MHz to 6GHz
Maximum input power:	+23dBm
Input Impedance:	50Ω, AC coupled
VSWR:	<1.4 to 5GHz, <1.5 5GHz to 6GHz
RF Connectors:	SMA
Number of Attenuation Channels:	3 or 6
Switch Lifetime:	Indefinite when used within ratings
Operating Time:	50µs

Attenuation Characteristics

Each attenuator is made up 0.25dB, 0.5dB, 1dB, 2dB, 4dB, 8dB and 16dB pads controlled by solid state switches to give an attenuation range of 0 to 31.75dB relative to the straight thru path.

Insertion Loss (0dB set):	<1.5dB @ 10MHz, <2.5dB @ 3GHz, <3.5dB @ 6GHz
Monotonicity:	0.25dB monotonic to 4GHz, 0.5dB monotonic to 5GHz, 1dB monotonic to 6GHz
Usable attenuation range (3 in series):	95.25dB to 5GHz, 84dB to 6GHz
Attenuator Change Characteristics:	Rise/fall time <10us, bounce and positive transient free.

Linearity

Two Tone Intermodulation:	+59dBm, 20MHz tone separation, third order intercept point.
1dB Compression:	Typically +32dBm (pulsed operation type test, not a usable user power).

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
30mA	100mA	0	0

Mechanical Characteristics

3 channel attenuator is one slot 3U PXI module, six channel attenuator is a 2 slot 3U PXI module.
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

6GHz Solid State Attenuator, Triple	**41-182-003**
6GHz Solid State Attenuator, Hex	**41-182-006**

Mating Connectors & Cabling

For connection accessories for the 41-182 module please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

41-180
DC to 3GHz Programmable Attenuator

- DC to 3GHz Attenuator
- 1dB Attenuation Resolution Ideal for Optimizing Signal Levels in Measuring Systems
- Maximum Attenuation 63dB
- Single or Dual Version in One PXI Slot
- Use of Switched Resistive Attenuator Pads Ensures High Linearity and True DC Coupled Operation
- Input and Output Connector Savers Easily Replaced if Damaged
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- 3 Year Warranty

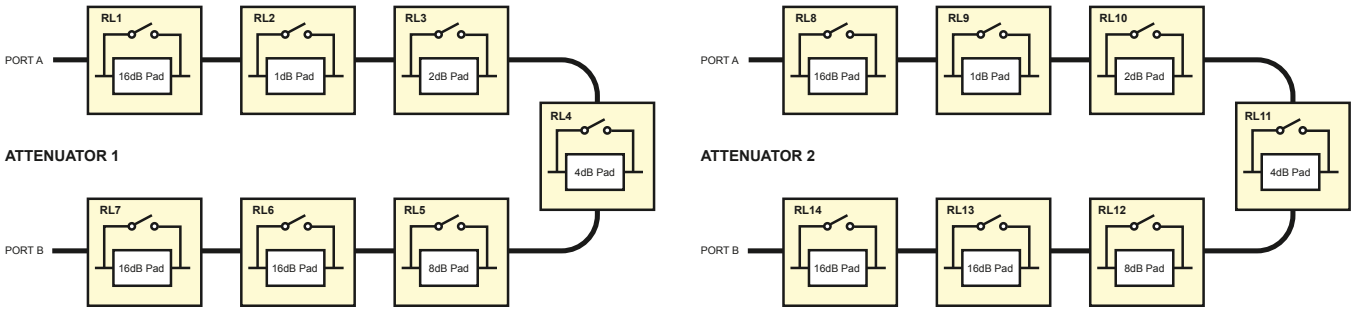
The 41-180 Programmable Attenuator Module is available with either one or two independently programmable attenuators in a single width 3U PXI module. Each attenuator uses high reliability mechanical switches to operate binary weight attenuator pads, providing attenuation values from 0 to 63dB in 1dB steps. Attenuator operating time is typically just 5ms, ensuring fast setting times.

The module is ideal for conditioning the signal levels from devices under test and ensuring that other measuring instruments are operating close to their optimum operating point for noise and linearity. The use of mechanically switched attenuators ensures broad operating bandwidth and freedom from non-linear behavior that might degrade the signals being measured.

The attenuators can be used for back-to-back testing of RF products, allowing the signal levels to be adjusted to quantify the path loss that can be inserted before the communication efficiency degrades, providing a quick indication of receiver sensitivity.

The 41-180 Programmable Attenuator Module is ideal for conditioning the output level of special to type sources, saving the systems integrator the time and effort of providing a variable output level. The use of a PXI solution for variable attenuation requirements minimizes the need for components and cables located outside the PXI chassis, saving time and development costs for systems integrators.

The input and output connectors of the attenuators can be interchanged and the design allows the user to change the front panel connectors quickly and easily in the event of damage occurring. The attenuators can be connected in series to increase the total available attenuation.



Dual DC to 3GHz Attenuator Block Diagram

General Characteristics

Frequency range:	DC to 3GHz.
Maximum Input Power:	1 Watt continuous.
Input Impedance:	50Ω, DC coupled.
VSWR (SMA connector):	Less than 1.5, typically less than 1.3
RF Connectors:	SMA, input and output connections are interchangeable. Versions with SMB connectors can be made available.
Contact Life (each pad):	Typically $1x10^7$ operations. At max power $1x10^6$ operations.
Switching Time (each pad):	Typically 2ms. Maximum 4ms.

Attenuation

The attenuator is made up of 1, 2, 4, 8 and 16dB (3 off) switched pads, attenuation is set to 0dB with no power applied.

Insertion Loss (0dB set):	Typically 3.6dB at 3GHz
Attenuation Range:	0 to 63dB in 1dB steps relative to 0dB condition.

Attenuation Accuracy (individual pads measured in 50Ω system referenced to 0dB condition):

Attenuator Pad	DC to 1GHz		1GHz to 3GHz	
	Maximum	Typical	Maximum	Typical
1dB	±0.05dB	±0.05dB	±0.3dB	±0.12dB
2dB	±0.1dB	±0.08dB	±0.35dB	±0.2dB
4dB	±0.2dB	±0.15dB	±0.5dB	±0.4dB
8dB	±0.2dB	±0.15dB	±0.48dB	±0.4dB
16dB	±0.24dB	±0.24dB	±0.96dB	±0.5dB

Power Requirements

+3.3V	+5V	+12V	-12V
0	100mA	200mA	0

Width and Dimensions

Single width 3U PXI/CompactPCI instrument module.
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector.
RF Signals:	Front panel SMA connectors. Versions with SMB connectors can be made available.

Product Order Codes

Single DC to 3GHz Attenuator	**41-180-021**
Dual DC to 3GHz Attenuator	**41-180-022**

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

Mating Connectors & Cabling

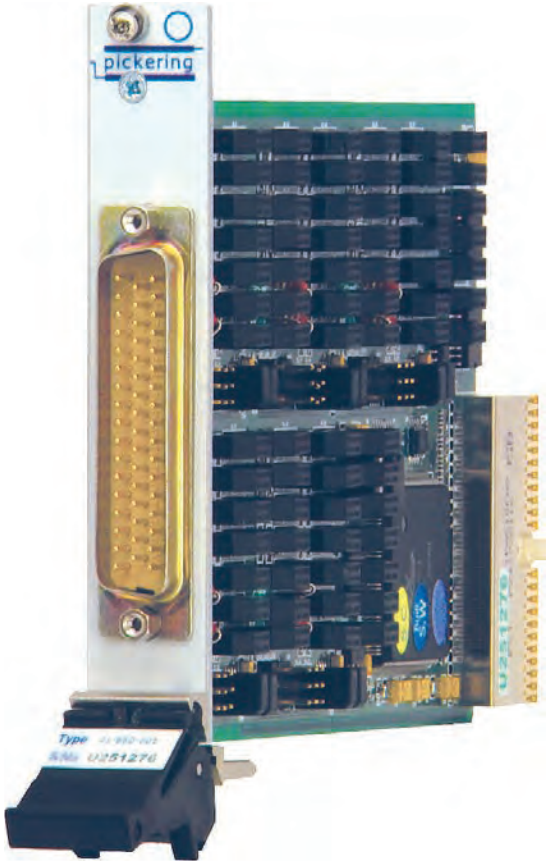
For connection accessories for the 41-180 module please refer to the **90-011D** RF Connector Accessories data sheet where a complete list and documentation can be found for accessories.

Alternatively, refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download. Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Dual DC to 3GHz Programmable Attenuator
41-180-022

41-660/661
Programmable High Voltage Attenuator

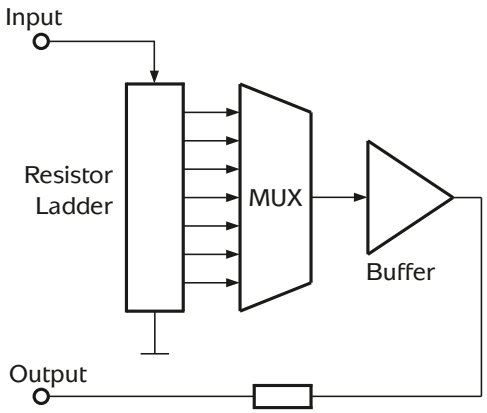
- High Input Impedance
- 600 Volt Input Rating
- Available With Single or Differential Input Configurations
- Buffered Single Ended Output Signal Provides Low Output Impedance
- Wide Output Bandwidth
- High Channel Density
- VISA Drivers Supplied for Windows XP/Vista/7
- 2 Year Warranty



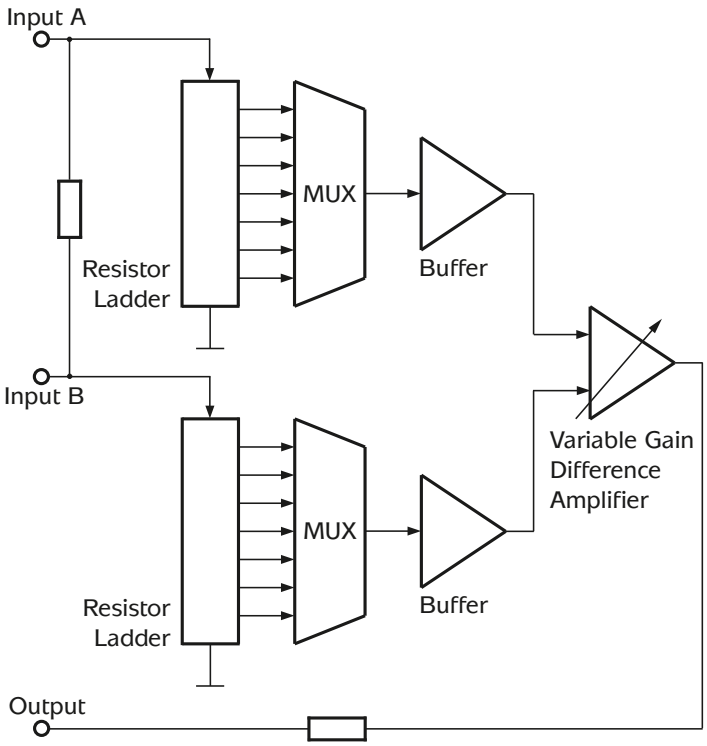
The 41-660 and 41-661 are high voltage attenuators designed to reduce the high output voltages commonly generated by some types of sensors. This is in order to produce manageable signal levels that can be acquired by typical data acquisition devices in a PXI system.

The 41-660 provides 10 single ended attenuator channels while the 41-661 provides 5 differential attenuator channels. The attenuated signals are provided on 50Ω outputs to ensure they can drive simple data acquisition systems with no significant loss of signal level. Each model provides attenuation factors of 10 to 160, permitting a 600V peak signal to be attenuated to less than 4 Volts.

The 41-661 attenuates both the common mode and differential signal equally to ensure the signal cannot overload the data acquisition system and provides a single ended output from a difference amplifier. Attenuation values are controlled by high quality instrument grade relays to ensure long service life. All active devices are fully protected against the application of over-voltages or short circuit loads.



Block Diagram for the 41-660 Programmable High Voltage Attenuator (1 of 10 channels shown)



Block Diagram for the 41-661 Programmable Differential High Voltage Attenuator (1 of 5 channels shown)

Specification

Number of Input Channels	
41-660:	10 off (Single Ended)
41-661:	5 off (Differential)
Maximum Input Voltage:	±600V
Input Impedance	
41-660:	1MΩ
41-661 (Differential):	0.666MΩ
41-661 (Common Mode):	0.5MΩ
Attenuation Values:	10, 20, 40, 80 or 160
Attenuation Accuracy:	1% excluding DC offset
Output Offset Voltage	
41-660:	<10mV
41-661:	<40mV
Output Impedance:	50Ω nominal, single ended
Output Voltage (Max):	±10V into open circuit
Output Current:	Up to 10mA per channel
Output Bandwidth:	20kHz
Output Slew Rate:	13V/µs typical
PCI Interface:	33MHz 32-bit address

Programming

All PXI modules are supplied with complete Windows XP/Vista/7 drivers, these perform the following functions:-

- Write word/s to module (to set relay pattern)
- Write bit to module (to operate an individual relay)
- Full relay status reporting
- Module identification and location information
- Set and read module calibration information

Up to date driver software is available from our web site at www.pickeringtest.com

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.5A max	0.15A max	0.15A max

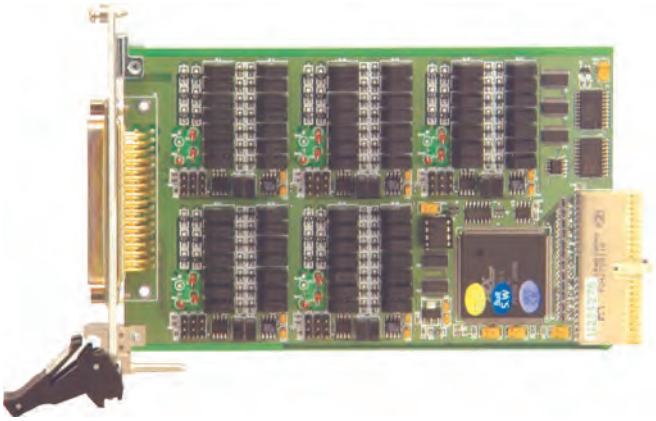
Width and Dimensions

Size: Single width 3U PXI/CompactPCI instrument module

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel connector: 50-way male D-type



PCB Layout for the 41-660 High Voltage Attenuator

PXI & CompactPCI Compliance

All Pickering Interfaces PXI modules comply with the PXI Specification 2.2. Local Bus, Interrupts, Trigger Bus and Star Trigger are not implemented.

Supplied soft front panels and driver software are fully Windows XP/Vista/7 compatible.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

Product Order Codes

10-Channel High Voltage Attenuator	**41-660-001**
5-Channel Differential High Voltage Attenuator	**41-661-001**

Other versions can be supplied with lower channel count or different input impedance. Please contact your Pickering Interface sale office with your requirements.

Latest Details

Please refer to our Web Site for Latest Product Details.

www.pickeringtest.com

Mating Connectors & Cabling

For connection accessories for the 41-660/661 module please refer to the **90-005D** 50-way D-Type Connector Accessories data sheet where a complete list and documentation can be found for accessories.

Alternatively, refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download. Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

41-650
High Voltage Programmable Amplifier

- Up to 5 Amplifier Channels
- Programmable Gain
- DC to 120kHz Power Bandwidth
- Powered by the PXI Chassis
- Short Circuit and Thermal Protection
- Up to 60 Volts pk-pk Output
- Single Slot Width, 3U
- Special Versions Built To Order
- VISA Drivers Supplied for Windows XP/Vista/7, Plus Soft Front Panel
- 2 Year Warranty

The 41-650 is a 5 channel voltage amplifier that is ideal for increasing the output voltage from other PXI modules, enabling users to easily generate the signal voltages commonly required in applications such as automotive test.

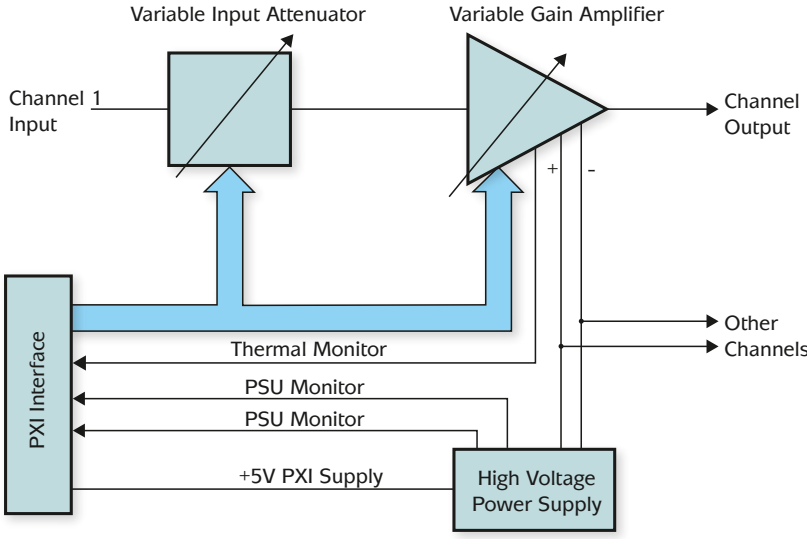
Each amplifier can be independently programmed to a gain of 1, 2, 5, 7, 10, 14 or 20, enabling it to be used with modules with low output voltage capability. Inputs and outputs can be provided either on SMB connectors or on a D-Type connector to suit the user's wiring system.

The 41-650 includes automatic thermal and short circuit protection on all outputs and is capable of supplying load currents up to 50mA peak from each channel.

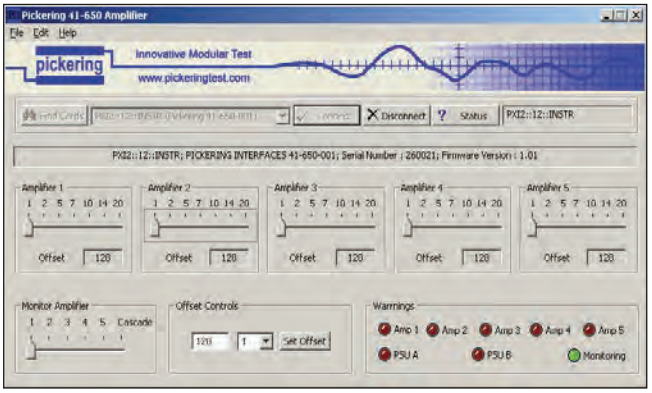
The module requires no external power supply, all power for the amplifier system is drawn from the PXI chassis to minimize the need for external support.

The module includes monitoring of the thermal protection system to detect fault conditions in the DUT and protection of the internal power supplies.

A DC offset facility allows the user to null out the small DC offset generated by the module, or to null out small external DC offsets from the driving source. A monitor facility can be used to connect a DMM to the output of each amplifier through a single connector to aid the nulling of each channel without external multiplexing.



Simplified Functional Diagram Showing One (of the Five) Amplifier Channels



Supplied Soft Front Panel for the 41-650 Voltage Amplifier

Specification

General	
Number of Channels:	Up to 5
Channel Crosstalk:	Typically 50dB ak 100kHz
Inputs	
Input Impedance:	Single ended 600Ω or 10kΩ according to model
Max Input Voltage:	10V
Input Offset Voltage:	±20mV
DC Offset:	Adjustable control for offsetting the input voltage by ±25mV, 8-bit resolution. Monitor output allows the use of a DMM to null any channel.
Outputs	
Output Impedance:	50Ω
Gain:	Adjustable to 1, 2, 5, 7, 10, 14, 20
Gain Accuracy:	<1.5% at DC (typically <1%), excluding DC offset.
Bandwidth:	DC to 1MHz (Gain 10, small signal) typical.
Output Slew Rate:	23V/µs typical
Max Output Voltage:	±30V emf (±33V for **-S1** version)
Power Bandwidth:	Typically 120kHz, ±30V sine wave
Output Current:	±50mA each channel (full power into 600Ω).
Output Noise:	120nV/Hz, 1kHz, Gain 5
Output Protection:	Short circuit proof, thermal protection on each channel. Operation of thermal prtection detected over the PXI interface.

Programming

All PXI modules are supplied with complete Windows XP/ Vista/7 drivers. Up to date driver software is available from our web site at www.pickeringtest.com

PCI Interface

32 bit, 33MHz.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.2A Idle 3.5A at Max. Load	0.05A	0.05A

PXI & CompactPCI Compliance

Complies with the PXI Specification 2.2. Local Bus, Interrupts, Trigger Bus and Star Trigger are not implemented.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

Width, Dimensions and Connectors

Single slot 3U PXI (cPCI card). PXI bus via 32-bit P1/J1 backplane connector.
Signals via:-

- 25-way D-type male connector, model 41-650-001
- 10 x 50Ω SMB, model 41-650-002

Amplifier Module Order Codes

Voltage Amplifier, D-Type Connector	**41-650-001**
Voltage Amplifier, SMB	**41-650-002**
Voltage Amplifier, 10KΩ, D Type	**41-650-011**
Voltage Amplifier, 10KΩ, SMB	**41-650-012**
Voltage Amplifier, ±33V output, D-Type	**41-650-001-S1**

Other versions of this product can be supplied. with variations in input impedance, connector type and voltage rating. Please contact your Pickering Interfaces representative.

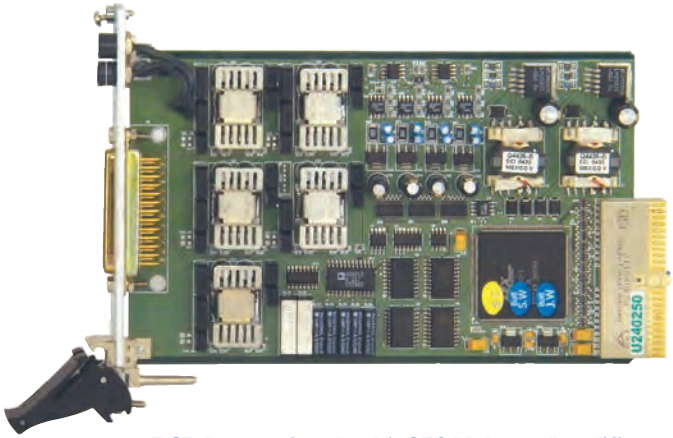
Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

Mating Connectors & Cabling

For connection accessories for the 41-650 module please refer to the **90-008D** 25-way D-Type and **90-011D** RF Connector Accessories data sheets where a complete list and documentation can be found for accessories.

Alternatively, refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download.
Alternatively our web site has dynamically linked connector/ cabling options, including pricing, for all Pickering PXI modules.

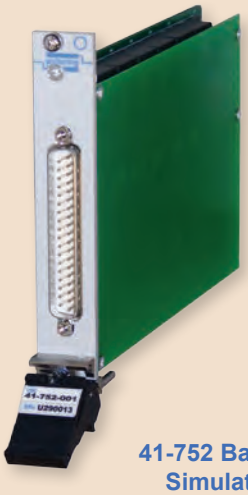


PCB Layout for the 41-650 Voltage Amplifier

Power Supplies & Battery Simulators

- Range of Variable Power Supply Modules
- Battery Simulator Module Capable of Sinking or Sourcing Current
- 6-Channel Battery Simulator For Emulating Electric Vehicle Battery Stacks
- Variable Supplies Can Deliver up to 48V Per Channel With 2A Maximum Current
- Low Voltage Source Suitable For Thermocouple Simulation
- VISA and Kernel Support For PXI Environments
- Supported by PXI or LXI Chassis

41-743 Programmable Power Supply Module



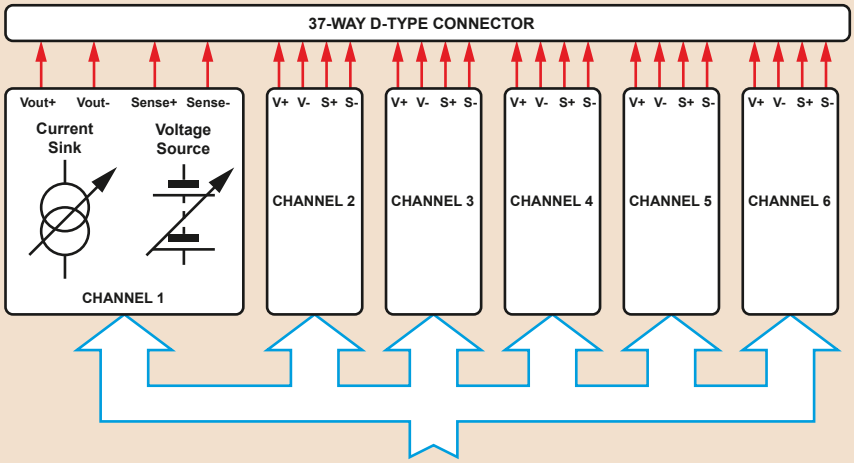
41-752 Battery Simulator Module

Programmable Power Supplies provide voltage outputs which are fully adjustable under software control. The 40-735 delivers positive 10V and the 40-736 delivers negative 10V, both with a maximum current of 1A. The output voltage can either be derived from the PXI chassis supply or from an external source.

The 41-740 is a dual Programmable Power Supplies and can deliver up to 48V at 2A. It is fed from an external DC 56V supply.

The 41-752 and 41-753 Battery Simulator modules are designed to simulate the power supplies of portable battery powered equipment and is particularly suitable for cell phone testing. They can source current to simulate a battery supply or sink current to simulate a battery under charge.

The 41-752 6-cell Battery Simulator is ideal for emulating the battery stacks used for electric vehicles. Its high density and high isolation voltage barrier permits the 41-752 to be used with many cells in series, making it possible to emulate a battery stack of up to 108 cells in a single PXI or LXI chassis.



Functional Block Diagram For The 41-752 6-Channel Battery Simulator

Card Configuration	Channels	Input Voltage	Output Voltage	Max Current	Order Code	Page
+10 Volt Programmable Power Supply	2	+12V from PXI Backplane or external supply	Adjustable 0 to +10V	1A Per Channel	**41-735-001**	**5.2**
-10 Volt Programmable Power Supply	2	-12V from PXI Backplane or external supply	Adjustable 0 to -10V	1A Per Channel	**41-736-001**	**5.5**
Programmable Power Supply	2	+56VDC	Adjustable 0 to 48V	2A Per Channel	**41-740-001**	**5.7**
	1	5V from 2 PXI slots		2A-20V, 0.8A-48V	**41-743-001**	**5.9**
Battery Simulator Module	6	5V from PXI Backplane	Adjustable 0 to 7V, Stackable to 700VDC	300mA Source 100mA Sink	**41-752-001**	**5.11**
Battery Simulator Module, Adjustable Output Resistance	1		Adjustable 0 to 6V	2.8A Source, 0.5A Sink	**41-753-001**	**5.13**
Millivolt Thermocouple Simulator	32, 24, 16 or 8	From PXI Backplane	±20mV, ±50mV and ±100mV ranges	–	**41-760**	**5.15**

41-735
Dual Programmable +10V Power Supply

- Dual Output Non-Isolated Power Supply
- Fast Transient Load Response <25µs
- Low Noise Outputs For Testing Sensitive Devices
- Fine 16-bit Output Voltage Control For Evaluating Device Characteristics
- Up To 1 Amp and 10V Output On Each Channel
- Port For High Accuracy Current Monitoring With DMM
- Leakage Measurement Capability
- Remote Sense Lines
- PXI Backplane Or External Source Of Power
- Single Slot 3U Instrument
- VISA Drivers Supplied For Windows XP/Vista/7/8 Plus Soft Front Panel
- 2 Year Warranty

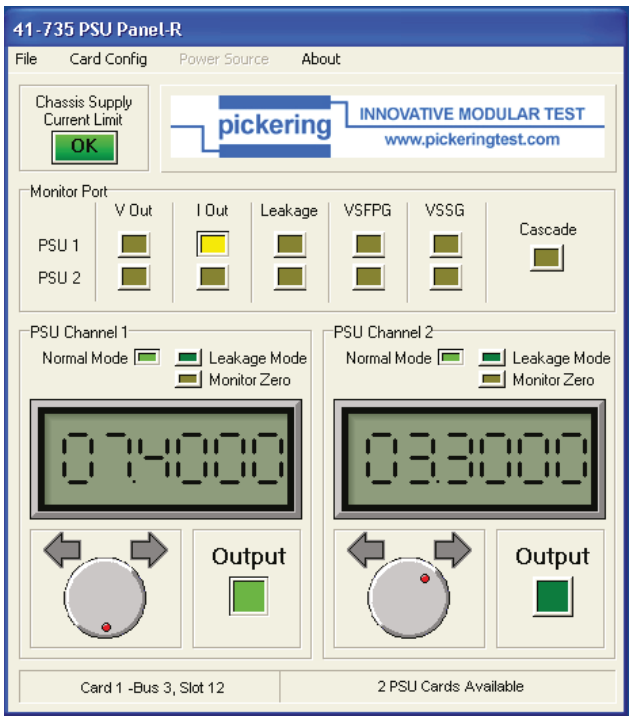
The 41-735 is a single slot power supply module providing two programmable positive output voltages. The module provides high quality regulated voltages from a linear regulator to ensure low levels of output noise. The module is perfect for exercising power to low power test targets and provides fine control of the DC output level to allow the accurate characterisation of device sensitivity and efficiency.

The module allows the power to be supplied either from the PXI +12V chassis supply or from an external power source.

Remote sense connections on both the positive and ground outputs are used to regulate the output voltage at the load, ensuring that wiring voltage drops do not affect measurement accuracy in the test system.

The monitor facility provides a simple and effective method of connection a DMM or Data Acquisition device to a single port that allows the output voltages at the front panel or the load to be very accurately measured and for the current consumption of the load to be calculated. A special mode can be invoked to allow the measurement of leakage or standby current for devices designed for power sensitive applications. The monitor port is available on both the D Type connector and a dedicated monitor connector designed to make the daisy chaining of modules simple to use with a single DMM.

The 16-bit setting resolution of the output voltage combined with the accurate monitoring facility is perfect for characterising device performance as a function of supply voltage.



41-735 Soft Front Panel

Specifications

Output Voltage: 0 to +10V, o/p is referenced to GND.

Remote Sense: Provided on positive and ground connections, maximum voltage drop 300mV on power connection leads. If sense is not connected automatically regulates the front panel voltage.

Voltage Accuracy: ±0.5%., ±25mV. Output voltage can be monitored through monitor port.

Voltage Setting: 16-bit resolution.

Transient Response <25µs

Number of Channels: 2

Output Current: 1 Amp each channel. When power is taken from the PXI chassis current consumption is limited to 1 Amp total.

Sense Connection: On each output, the sense connection will compensate for a maximum voltage drop of 300mV on power feeds. Sense connections can be enabled and disabled under software control and include sense of remote ground.

Load Ripple: <<1mV measured from 10Hz to 100kHz

Power Source: From the PXI chassis or from an external supply, software selectable. External power source is +12V min for full output voltage range. Voltage can be raised to +25V without damage but may limit available output current.

Protection: Short circuit protection. Thermal protection. Chassis +12V supply is protected by an active current limiter. Protected from accidental application of reverse voltages to 25V.

Monitor: Built in Pickering Interfaces Monitor allows the use of an external DMM to measure voltage and current. Voltage measurement accuracy is as the DMM ±30µV. Load current is measured across a sense resistor. Accuracy is 1% ±0.3mA. Accuracy can be improved by using sense resistor calibration

Leakage Monitor: Allows the measurement of leakage current. Maximum current is 10µA. Accuracy ±2% ±3nA

Load Regulation: Recovers in 20µs from a load current change of 1 Amp (full load).

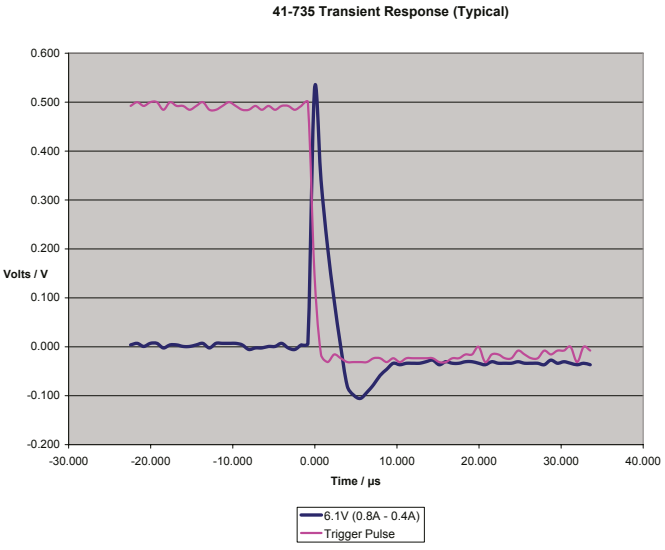
On/Off Control: Separate from voltage setting control. 20µs rise and fall time (no additional capacitive load, load current 1A).

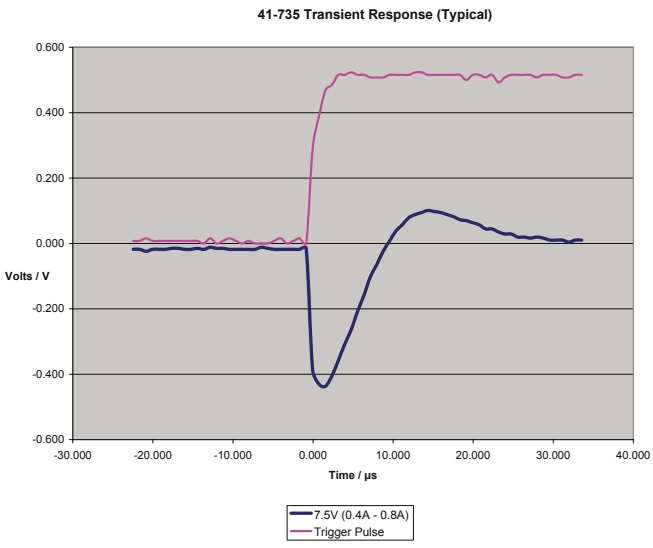
Programming: All PXI modules are supplied with complete Windows XP/Vista/7 drivers. Up to date driver software is available from our web site at www.pickeringtest.com

PCI Interface: 32-bit, 33MHz

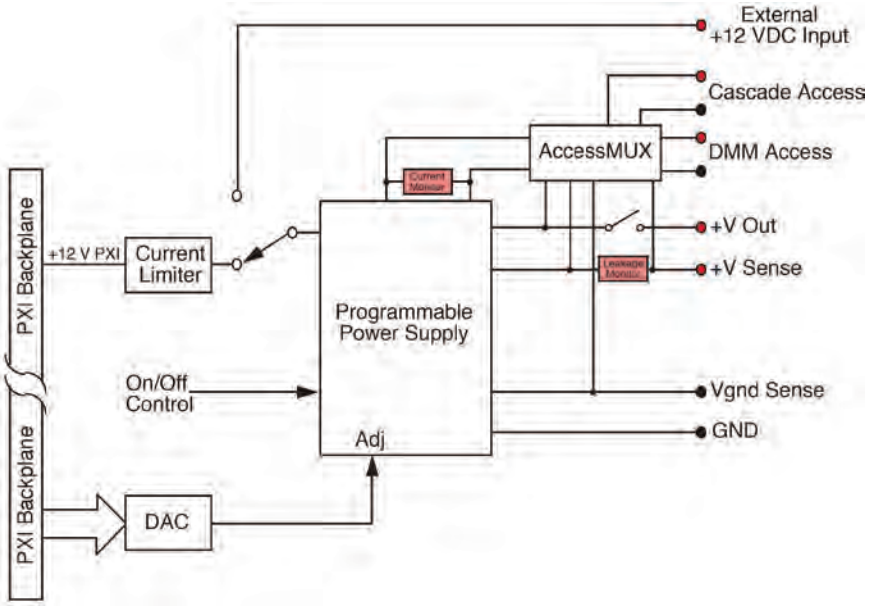
Width & Dimensions: Single slot 3U PXI (cPCI card).

Connectors: Power supply outputs:
25-way male D-type connector.
PXI bus:
32-bit P1/J1 backplane connector

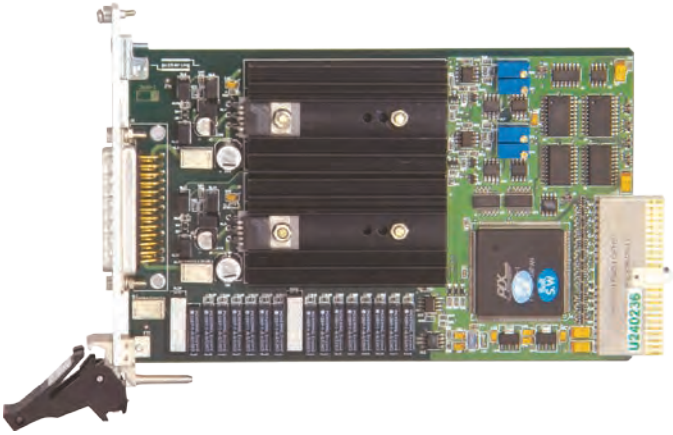




Transient Response Plots For 41-735 Power Supply Module



Block Diagram for 41-735 Power Supply Module



Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.15A	Up to 1A	0.05A

PXI and CompactPCI Compliance

All Pickering Interfaces PXI modules comply with the PXI Specification 2.2. Local Bus, Interrupts, Trigger Bus and Start Trigger are not implemented.

Product Order Codes

Dual Programmable +10V Power Supply	**41-735-001**

Mating Connectors & Cabling

For connection accessories for the 41-735 please refer to the **90-008D** 25-way D-Type Connector Accessories data sheet where a complete list and documentation can be found for accessories.

Alternatively, refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download.
Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

41-736
Dual Programmable –10V Power Supply

- Dual Output Non-Isolated Power Supply
- Low Noise Outputs For Testing Sensitive Devices
- Fine 16 bit Output Voltage Control For Evaluating Device Characteristics
- Up To 1 Amp and –10V Output On Each Channel
- Port For High Accuracy Current Monitoring With DMM
- Leakage Measurement Capability
- Remote Sense Lines
- PXI Backplane Or External Source Of Power
- Single Slot 3U Instrument
- VISA Drivers Supplied For Windows XP/Vista/7 Plus Soft Front Panel
- 2 Year Warranty

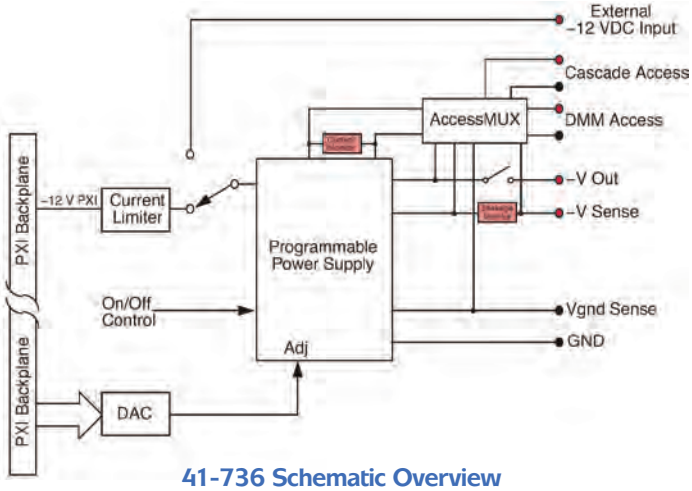
The 41-736 is a single slot power supply module providing two programmable negative output voltages. The module provides high quality regulated voltages from a linear regulator to ensure low levels of output noise. The module is perfect for providing power to low power test targets and provides fine control of the DC output level to allow the accurate characterisation of device sensitivity and efficiency.

The module allows the power to be supplied either from the PXI -12V chassis supply or from an external power source.

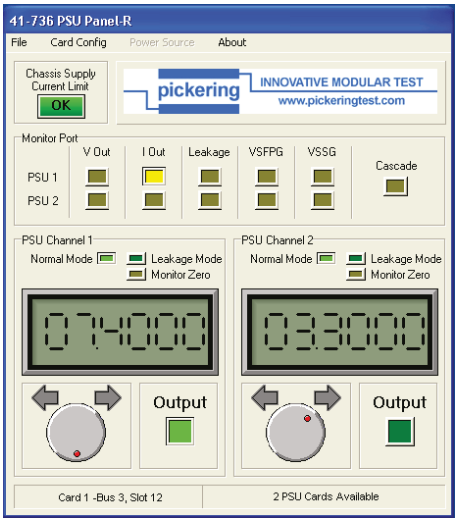
Remote sense connections on both the positive and ground outputs are used to regulate the output voltage at the load, ensuring that wiring voltage drops do not affect measurement accuracy in the test system.

The monitor facility provides a simple and effective method of connection a DMM or Data Acquisition device to a single port that allows the output voltages at the front panel or the load to be very accurately measured and for the current consumption of the load to be calculated. A special mode can be invoked to allow the measurement of leakage or standby current for devices designed for power sensitive applications. The monitor port is available on both the D Type connector and a dedicated monitor connector designed to make the daisy chaining of modules simple to use with a single DMM.

The 16-bit setting resolution of the output voltage combined with the accurate monitoring facility is perfect for characterising device performance as a function of supply voltage.



41-736 Schematic Overview



41-736 Soft Front Panel

Output Voltage: 0 to -10V, o/p is referenced to GND.

Remote Sense: Provided on negative and ground connections, maximum voltage drop 300mV on power connection leads.
If sense is not connected automatically regulates the front panel voltage.

Voltage Accuracy: ±0.5%., ±25mV. Output voltage can be monitored through monitor port.

Voltage Setting: 16-bit resolution.

Number of Channels: 2

Output Current: 1 Amp each channel. When power is taken from the PXI chassis current consumption is limited to 1 Amp total.

Sense Connection: On each output, the sense connection will compensate for a maximum voltage drop of 300mV on power feeds. Sense connections can be enabled and disabled under software control and include sense of remote ground.

Load Ripple: <<1mV measured from 10Hz to 100kHz

Power Source: From the PXI chassis or from an external supply, software selectable.
External power source is -12V min for full output voltage range. Voltage can be raised to -25V without damage but may limit available output current.

Protection: Short circuit protection. Thermal protection. Chassis -12V supply is protected by an active current limiter. Protected from accidental application of reverse voltages to 25V.

Monitor: Built in Pickering Interfaces Monitor allows the use of an external DMM to measure voltage and current. Voltage measurement accuracy is as the DMM ±30µV. Load current is measured across a sense resistor. Accuracy is 1%± 0.3mA. Accuracy can be improved by using sense resistor calibration

Leakage Monitor: Allows the measurement of leakage current. Maximum current is 10µA. Accuracy ±2% ±3nA

Load Regulation: Recovers in 20µs from a load current change of 1 Amp (full load).

On/Off Control: Separate from voltage setting control. 20us rise and fall time (no additional capacitive load, load current 1A).

Programming: All PXI modules are supplied with complete Windows XP/Vista/7 drivers. Up to date driver software is available from our web site at www.pickeringtest.com

PCI Interface: 32 bit, 33MHz

Width & Dimensions: Single slot 3U PXI (cPCI card).

Connectors: Power supply outputs:
25-way male D-type connector.
PXI bus:
32-bit P1/J1 backplane connector

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.15A	0.05A	Up to 1A

PXI and CompactPCI Compliance

All Pickering Interfaces PXI modules comply with the PXI Specification 2.2. Local Bus, Interrupts, Trigger Bus and Start Trigger are not implemented.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

Product Order Codes

Dual Programmable -10V Power Supply	**41-736-001**

Mating Connectors & Cabling

For connection accessories for the 41-736 please refer to the **90-008** 25-way D-Type Connector Accessories data sheet where a complete list and documentation can be found for accessories.

Alternatively, refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download.
Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

41-740
Programmable DC Power Supply

- Dual Isolated Outputs; 0-48VDC/ 2A / 60W
- Current Capability 2A to 30V, 1.25A at 48V
- Programmable Current Limit
- Includes Over Voltage, Over Current and Short Circuit Protection
- On-Board Isolation and Remote Sense Relays
- 16 Bit Read Back of Output Voltage and Current
- Outputs May Be Connected in Parallel or Series
- DLLs & LabVIEW™ Application Software

Pickering Interfaces' 41-740 programmable power supply is designed specifically for test applications that demand precision output voltage/current and tightly coupled measurement capabilities.

The versatile design of the 41-740 makes it ideal for a broad range of testing applications in markets as diverse as communications, aerospace, and automotive manufacturing.

Power Levels

The 41-740 programmable power supply provides two independent and isolated 60W(MAX) supplies, each channel is programmable from 0-48VDC to a maximum of 2.0 Amps. The 41-740 includes a programmable current limit to protect critical UUTs from excessive current, the output will automatically switch into constant current mode when limit is reached. For greater power or voltage applications, channels can be connected in series or parallel.

Measurement function

In operation, the capabilities include quickly setting I/V and then measuring I/V automatically without processor intervention. The 41-740 has a hardware built in sequence list that can execute commands and store data in a FIFO without processor action. With the tight integration of a Pickering Interfaces 41-740, you'll get high speeds for high throughput as well as high measurement accuracy and repeatability for yield integrity.

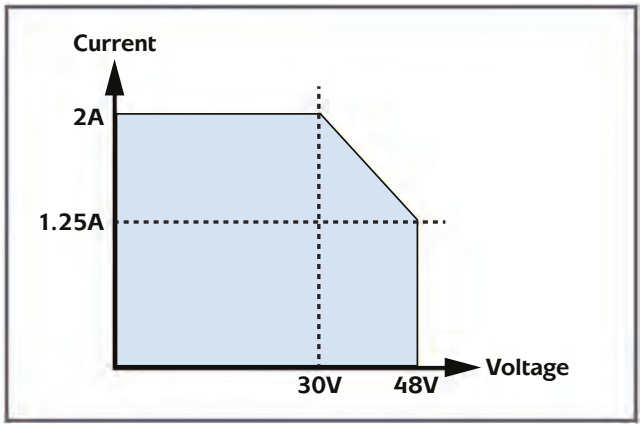
Input Power

To avoid excess power draw from the PXI backplane, the 41-740-001 draws input power (+56VDC) via front panel connections. This approach not only minimizes power required from the backplane but also maintains complete isolation between backplane logic and power conversion circuitry thereby increasing noise immunity. Pickering Interfaces includes an AC-DC adapter with the 41-740-001 which allows the instrument to be operate from 90–260VAC mains where +56VDC is not readily available.

Pickering's Range of PXI Power Supplies

Model No.	Configuration	Channels	Input	Output Voltage	Max Current
41-735	Programmable	2	Backplane or External	0 to +10V	1A
41-736	Programmable	2	Backplane or External	0 to -10V	1A
41-740	Programmable	2	56VDC	0 to 48V	2A to 30V, 1.25A at 48V
41-743	Programmable	1	Backplane	0 to 48V	2A to 20V, 0.8A at 48V
41-752	Battery Simulator	6	Backplane	0 to 7V	300mA Source, 100mA Sink
41-753	Battery Simulator	1	Backplane	0 to 6V	2.8A Source, 0.5A Sink

Power Input:	+56VDC or 90 to 260VAC, 47 to 63Hz via supplied AC to 56VDC converter
Output Channels:	2
Output Voltage Range:	0V to 48V
Output Voltage Accuracy:	0.5% of programmed value ±50mV
Voltage Setting Resolution:	12-Bits
Line Regulation:	0.1%
Load Regulation:	0.1% (10 to 90% load change)
Output Current Range:	2A to 30V, 1.25A at 48V.
Current Limit Accuracy:	0.5% ±50mA
Read back Voltage:	±0.2% of Reading +60mV
Read back Current:	±0.5% of Reading +10mA
Rise Time (typical):	14ms (full load)
Efficiency	84% typical
Isolation:	500V (channel to channel) 500V (channel to chassis)
Measurement Function:	Maximum sampling rate: 5kS/s of each channel
	Input Impedance: 5kΩ
	Trigger sources: Software, external
	Buffer size: 2K samples per channel
	Data transfers: Polling
Sequence Function:	Trigger sources: Software, external
	Input Impedance - 5kΩ
	Buffer size: 256 command words per channel
PCI Interface:	32 bit, 33MHz
Width & Dimensions:	41-740-001: 1-slot 3U PXI (CPCI)
	41-740-901 adapter: 230mm x 160mm x 70mm
Connectors:	Power supply input (41-740-001): 4-way plug-in screw terminal block
	Power supply outputs & sense: 8-way plug-in screw terminal block
	Trigger Input: SMB coaxial connector.
	PXI bus: 32 bit P1/J1 backplane connector



41-740 Safe Operational Area

Product Order Codes

Dual 0-48VDC Programmable Power Supply 56VDC input (including 41-740-901 AC-DC Adapter).	**41-740-001**
Spare AC-DC Adapter 90-260VAC input, 56VDC output (for use with 41-740-001).	**41-740-901**

41-740-901 AC-DC Adapter
(included with the 41-740-001 Power Supply Module)

41-743
Programmable Power Supply 48V

- Fully Isolated 0 to 48V PSU
- High Accuracy and Low Noise
- Current Capacity 2A to 20V, 0.8A at 48V
- Remote Sense Connections
- Programmable Current Limit
- Voltage Monitor
- Trigger For Measurement Operation or Output Update
- Backplane Power From 2 PXI Slots
- VISA & IVI Drivers Supplied For Windows XP/Vista/7/8 and Soft Front Panel
- Supported by PXI or LXI Chassis

The 41-743 is a fully isolated programmable power supply capable of delivering output voltages to 48V with a voltage setting resolution of less than 1mV. The output is capable of delivering up to 40W to the user load and requires no external power supply – power is drawn from two PXI backplane slots.

Sense connections allow the 41-743 to provide regulated voltages to remote points in a test system to improve the accuracy and reproducibility of test results when voltage drops in the external wiring are significant. The sense connections can be set to use the remote connection or to regulate the output on the user terminals.

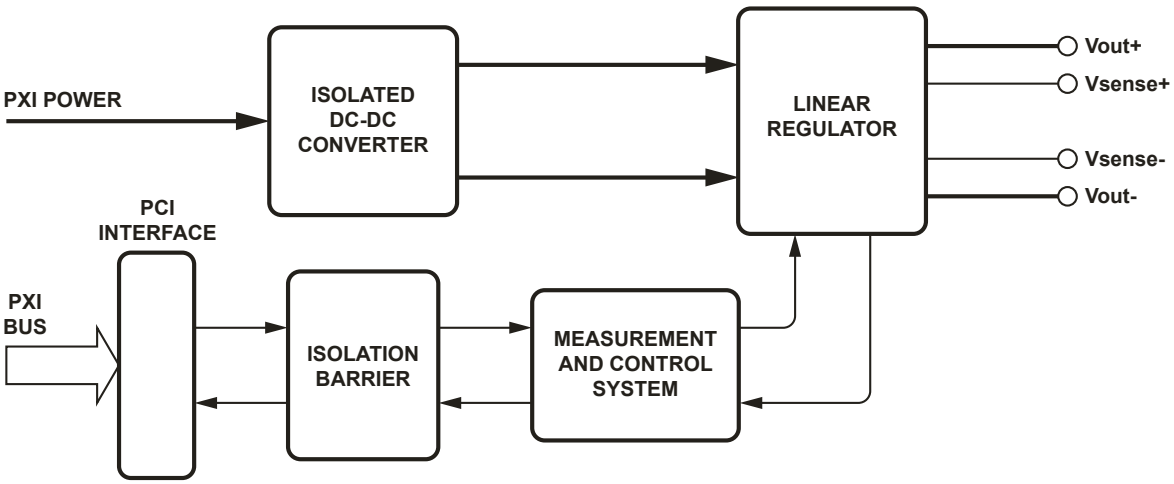
A programmable current limit permits users to limit the output current to protect switching systems and the UUT when faults in the system are present and to limit power supply current draw.

A monitor facility permits the user to read back the actual voltage being supplied by the module and the current delivered to the load.

Trigger operation allows the 41-743 to execute output current limit or voltage settings in response to a hardware event from the front panel or from the PXI Trigger Bus. The trigger also supports the capture of current and voltage measurements at the output, an output buffer allows measurement results to be stored and read back when the system is ready to process the results. Measurements can also be made at timed intervals.

Output voltage rise time is controlled to avoid excessive inrush current damaging the switching system in the presence of capacitive loads.

The 41-743 can be supported by any PXI chassis or by Pickering Interfaces' LXI modular chassis.



Block Diagram for 41-743 Power Supply Module

Output Voltage Range: 0V to 48V, 0.74mV nominal resolution.

Output Voltage Accuracy: ±0.2% ±25mV.

Voltage Slew Rate: 1V/ms nominal at full load

Output Noise: 1.5mVrms, 6mV peak to peak, full load, DC to 1MHz.

Output Current Range: 2A to 20V, de-rating linearly to 0.8A at 48V.

Current Limit: 0 to 2A, 34µA nominal resolution.

Current Limit Accuracy: ±0.5% of set value ±10mA.

Voltage Sense: Voltage sense lines compensate for up to 0.5V voltage drop (0.25V for each connection), can be switched to sense output voltage on user connector.

Current Monitor: Accuracy: ±0.2% of reading ±5mA
Resolution: 35µA

Voltage Monitor: Accuracy: ±0.1% of reading ±10mV
Resolution: 0.74mV

Isolation Barrier: Designed with ±250V isolation barrier, recommended to ±60V relative to PXI ground.

>100Mohm insulation resistance from voltage outputs to PXI ground.

Trigger Input: Sourced from front panel or PXI Trigger Bus. Permits triggered output changes or measurements, permits sampled output measurements at time intervals a sub multiple of 100µs, permits a sequence of output changes from stored settings.

Minimum trigger width 20µs.

Front panel trigger input is optically isolated, maximum input voltage +12V, 50mA.

PCI Interface: 32 bit, 33MHz

Width & Dimensions: Dual slot 3U PXI (cPCI card).

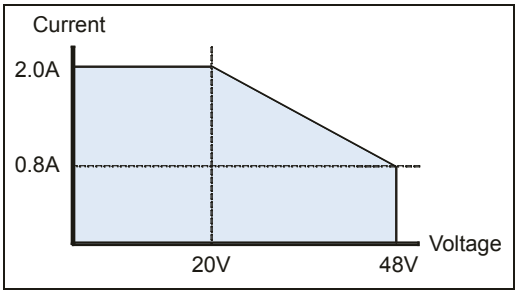
Connectors: Power supply outputs & sense:
4-way plug-in screw terminal block.

Trigger Input:
SMB coaxial connector.

PXI bus:
32 bit P1/J1 backplane connector.

Power Requirements

+3.3V	+5V	+12V	-12V
750mA	12A maximum (from 2 slots)	60mA	0



41-743 Safe Operational Area

Product Order Codes

0-48Vdc Programmable Power Supply	**41-743-001**

Mating Connectors & Cabling

The 41-743 is supplied with a 4-way female plug-in connector block with screw terminals for the user to construct their own cabling.

Pickering can supply spare 4-way female plug-in connectors, contact the sales office for details.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

41-752
6 Channel Battery Simulator Module

- 6 Power Supplies In A Single PXI Slot
- Independent Sense Connections
- Ideal For Battery Stack Emulation
- 750V Independent Isolation Barriers
- Up To 300mA Output Per Simulator
- Battery Charging Emulation To 100mA
- Uses Backplane Power Sources
- Hardware shutdown control
- VISA and Kernel Drivers Supplied For Windows XP/Vista/7/8 Plus Soft Front Panel
- Use In Pickering 19-Slot PXI Chassis Or 18-Slot LXI Chassis

The 41-752 is a 6 channel battery simulator, each channel being capable of supplying up to 7V and 300mA to the load. Each channel is fully isolated from ground and from each other allowing the channels to be connected in series to simulate batteries arranged in a stacked architecture. The 750V isolation barrier permits the 41-752 to be used to create a lower power version of a battery stack representative of those used for vehicle propulsion.

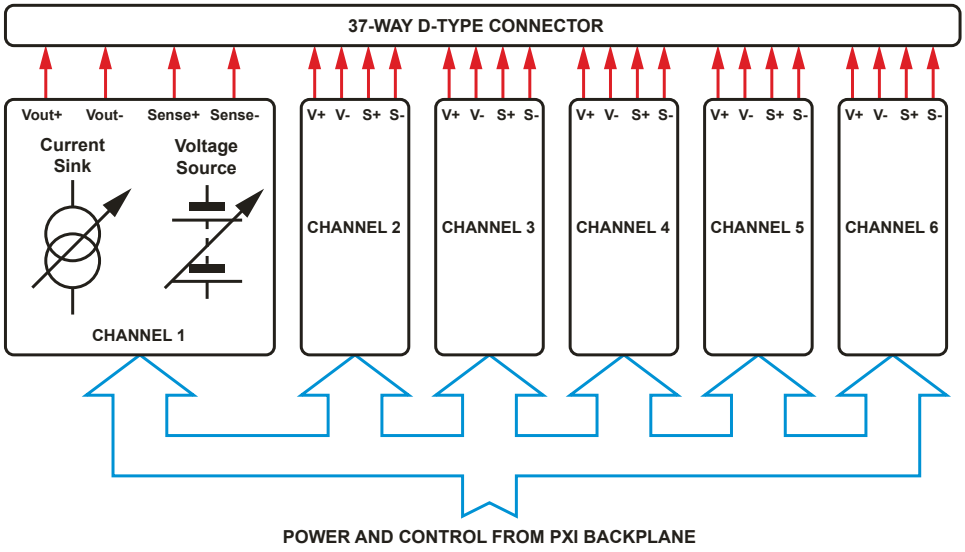
Each battery simulator provides independent power and sense connections, allowing the battery simulator to sense a remote load and correct for wiring voltage losses. The battery simulator is designed to respond to dynamic loads, minimizing the need for local decoupling capacitors at the load.

A signal line on the user connector allows the user to shutdown all battery simulator channels with a single connection. Mulitple module control lines may be linked together to provide an easy way of inhibiting voltage generation when using many series connected modules that provide high output voltages and providing a means of automatic shutdown when connectors are removed.

Soft Front Panel for Battery Simulator Modules

The 41-752 can be used as a 6 channel fully isolated power supply with independent sense lines on each channel

The user connector is a 37-way high voltage D Type which is fully supported by the wide range of Pickering Interfaces connector accessories.



Functional Block Diagram For The 41-752 6-Channel Battery Simulator

Specification

Number of Channels:	6 independent isolated channels.
Output Voltage Range:	0 to 7V, settable with 14-bit resolution (approximately 0.43mV).
Output Voltage Accuracy:	±0.2% ±20mV from 1V to 7V output over ambient temperature range +11°C to +31°C.
Isolation Voltage:	±750V
Output Current:	Up to 300mA per channel for voltages from 2.5V to 7V Linearly de-rate to 200mA into a short circuit below 2.5V without thermal shutdown.
Current Sink:	Variable current sink permits the output to be loaded so the battery simulator can sink current from a charger. Current sink can be set from 0 to 100mA in 16 steps. Current sink setting reduces the current available at the user connector.
Output Connections:	Vout+, Vout- and two sense inputs for each simulator channel. Sense inputs detect output voltage at front panel connector if no remote sense lines are connected.
Load Response Time:	250µs
Power Source:	PXI backplane +12V, +5V, +3.3V and -12V.
Protection:	All simulators are short circuit protected, reverse voltage protected and include thermal shutdown.
Output Connector:	37-way D-type, high voltage

PXI Characteristics

Backplane connection:	33MHz, 32-bit.
Mechanical:	3U, 1-slot.

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.8A	2.0A	0.6A	0.3A

At maximum load for all channels,

Recommended chassis are 60-103 and 60-103A or 40-923 and 40-923A for applications requiring many modules (up to 18 off) in a single chassis to avoid chassis limitations.

Product Order Codes

Battery Simulator, 6-Channel	**41-752-001**

Mating Connectors & Cabling

For connection accessories for the 41-752 please refer to the **90-007D** 37-way D-Type Connector Accessories data sheet where a complete list and documentation can be found for accessories.

41-753
Battery Simulator Module

- Single Slot Battery Simulator
- Remote Voltage Sense
- Isolated Outputs
- Output Voltage Up To 6V
- Power Supplied From PXI Backplane
- Programmable Output Resistance
- Programmable Current Sink Capability To 0.5A For Charger Load Simulation
- VISA and Kernel Drivers Supplied For Windows XP/Vista/7/8 Plus Soft Front Panel
- Supported by PXI or LXI Chassis

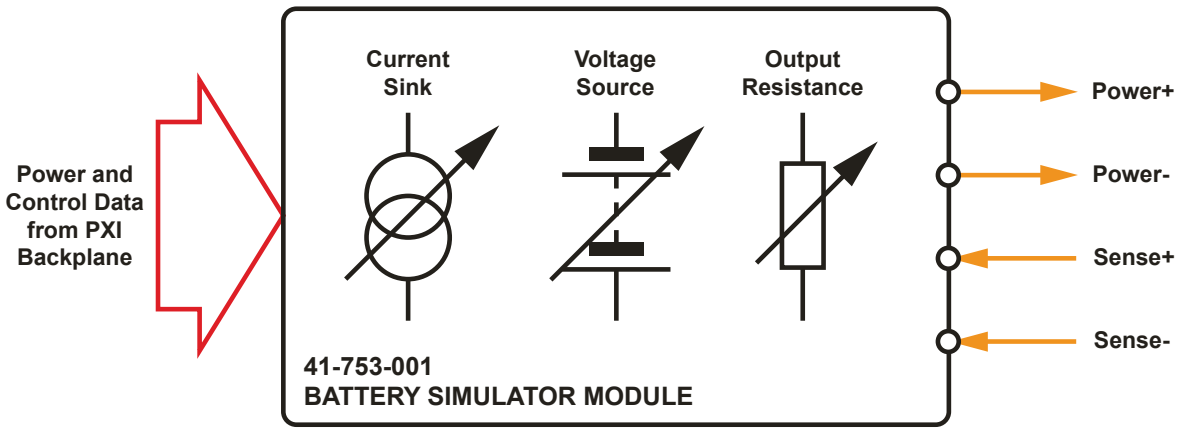
The 41-753 is a battery simulator module that can be used to simulate the power supplies of cellular phones and other portable battery devices. It features fully floating output terminals that can deliver voltages up to 6 Volts. The fast responding remote sense connections allow the module to regulate the supply voltage at the device under test. The output terminals can float ±50V relative to the front panel ground to ensure the accurate simulation of battery operation.

A module can source or sink current to provide simulation of a battery supply or a battery under charge. The programmable current sink can be set to divert up to 0.5A of the load current, permitting the battery simulator to act as a net current sink when connected to a charger circuit. The 41-753 is capable of delivering up to 2.8 Amps into the load.

The output resistance of the 41-753 can be programmed for values up to 1.15Ω to simulate the effect of battery output resistance when connected to time varying loads.

The module derives its power from the PXI backplane and requires no external power source.

The battery simulator can be configured to prevent misleading operation. If the remote sense lines are not connected to the device under test, the power supply is automatically closed down. The alternative configuration regulates the front panel voltage if the sense lines are not connected to the load.



Block Diagram For 41-753 Battery Simulator

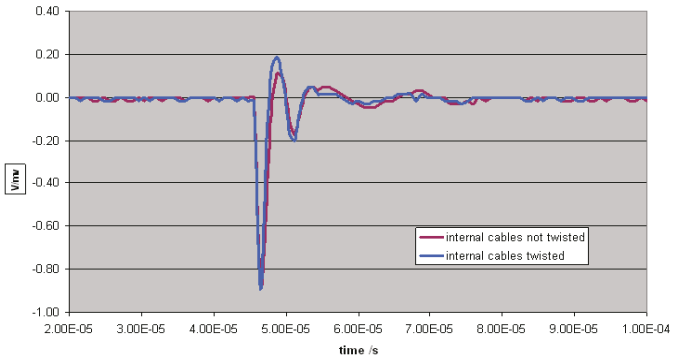
Specification

Number of Channels:	1 (isolated)
Output Voltage Range:	0 to 6 Volts (at front panel), isolated ±50V maximum common mode voltage.
Voltage Resolution:	Set with 16-bit resolution.
Voltage Sense:	Remote sensing of load voltage, mechanically configurable to either regulate front panel voltage or close down if not connected.
Output Current:	Up to 2.8 Amps at 5.5V Up to 2.5 Amps at 6V (includes set sink current).
Output resistance:	Programmable from 0Ω to 1.15Ω
Current Sink:	Programmable current sink from 0 to 0.5 Amps available for output voltages above 0.5V. Current sink setting reduces the available maximum output current delivered to the load if an external current source is not applied.
Load Response Time:	15µs (1A to 2A, 2m connection wire, using all connection pins).
Power Source:	PXI backplane +5V.
Monitor:	Provided through monitor pins to measure output voltages and current. Can be used to measure load voltage, front panel voltage, load current and sink current. Current is measured by voltage sensing across a resistor.
Monitor Accuracy:	Voltage DMM ±30µV Current 1% ±1mA (after zero correction).
Load Detection:	Read back flag indicates if load is drawing more than 10mA.
Protection:	Short circuit protection. Thermal protection. Operation of protection is reported. Prolonged operation of protection is not recommended.
Output Connector:	25-way male D-Type. Each connection is supported by two pins to permit doubling up of connections.

PXI Characteristics

Backplane connection:	33MHz, 32-bit.
Mechanical:	3U, 1-slot.

Soft Front Panel for Battery Simulator Modules



Typical load transient response of 41-753 for 6V output when load is changed abruptly from 1A to 2A in <<1µs

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.2A	6A	0.15A	0.1A

Product Order Codes

Battery Simulator 2.8 Amps	**41-753-001**

Mating Connectors & Cabling

For connection accessories for the 41-753 please refer to the **90-008D** 25-way D-Type Connector Accessories data sheet where a complete list and documentation can be found for accessories.

41-760
Millivolt Thermocouple Simulator Module

- 32, 24, 16 or 8 Channel Low Voltage Source
- Ideal For Thermocouple Simulation
- +/-100mV, +/-50mV and +/-20mV Output Ranges
- 0.7µV Voltage Resolution (+/-20mV Range)
- Two-Wire Output for Each Channel
- Remote Sense for Breaking Ground Loop Effects
- Open Circuit Simulation
- Supported in PXI or LXI Chassis
- Kernel and VISA Drivers
- 3 Year Warranty

The 41-760 is a low voltage source module ideal for simulating the operation of a thermocouple, available with a choice of 32, 24, 16 or 8 channels. Each channel of the 41-760 provides a low voltage output across two connector pins capable of providing ±20mV with 0.7µV resolution, ±50mV with 1.7µV resolution and ±100mV with 3.3µV resolution, covering most thermocouple types.

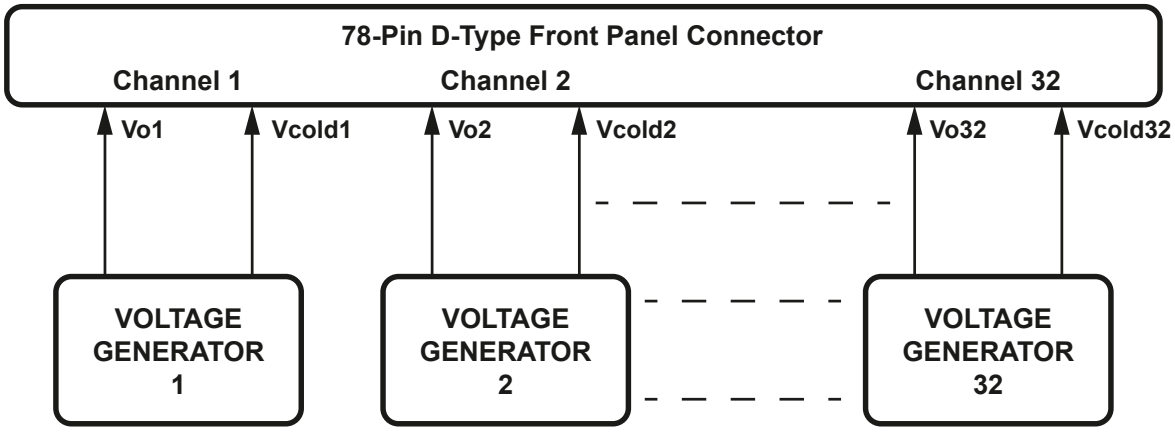
The use of two wire outputs ensures that the 41-760 can be used to accurately simulate low voltages even in the presence of common mode voltages in the system. Each Vcold connection is independent permitting the 41-760 to be connected to multiple cold junctions.

Each simulation channel is able to provide an open circuit setting to simulate faulty wiring connections to a sensor.

For improved accuracy each channel of the Low Voltage Source carries accurate calibration data stored in EEPROM on the module. Regular calibration of the channels is not necessary.

When used for Thermocouple Simulation the 41-760 can be connected straight into the measurement system, bypassing the need for Isothermal Blocks and Cold Junction Compensation. To aid in this, Pickering offers a 78-pin connector solution that has 32, 24, 16 or 8 copper twisted pairs terminated with mini copper thermocouple plugs. Use of copper connections minimises offset voltage generation in the connection interface.

Alternatively Pickering can also supply connector blocks that convert the copper connections of the module's 78-pin connector to that of the required thermocouple type.



Functional Diagram for the 41-760-001 Millivolt Thermocouple Simulator Module

Specification

Low Voltage Channels

Number of Channels:	32, 24, 16 or 8
Output Voltage Range:	±20mV, ±50mV and ±100mV ranges (Vo to Vcold).
Voltage Resolution:	0.7µV nominal (±20mV range), 1.7µV nominal (±50mV range), 3.3µV nominal (±100mV range).
Common Mode Output:	Up to 1V common mode peak output voltage, better than 80dB common mode output rejection ratio.
Output Resistance:	50Ω nominal
Accuracy*:	0.1% ±5µV (±20mV range), 0.1% ±10µV (±50mV range), 0.1% ±15µV (±100mV range).

* Valid at ±10°C from calibration temperature (factory calibrated at 21°C).

Power Off State:	Open circuit
Software support:	Supplied with software that responds to a voltage instruction on the selected channel.

Power

+3.3V	+5V	+12V	-12V
250mA	100mA	200mA	200mA

Physical Parameters

Physical characteristics:	One slot, 3U PXI
PCI Interface:	33MHz, 32 bit address, 16 bit data Interface is compatible with PXI, PXI Express Legacy and PXI Express Hybrid slots.
Connectors:	78-pin male D-type carrying low voltage source channels.

Product Order Codes

32 Channel Millivolt Thermocouple Simulator	**41-760-001**
24 Channel Millivolt Thermocouple Simulator	**41-760-002**
16 Channel Millivolt Thermocouple Simulator	**41-760-003**
8 Channel Millivolt Thermocouple Simulator	**41-760-004**

Accessories

78-pin D-type to 32off mini copper thermocouple plugs, 1m length.*	**41-760-801-1m**
78-pin D-type to 24off mini copper thermocouple plugs, 1m length.*	**41-760-802-1m**
78-pin D-type to 16off mini copper thermocouple plugs, 1m length.*	**41-760-803-1m**
78-pin D-type to 8off mini copper thermocouple plugs, 1m length.*	**41-760-804-1m**

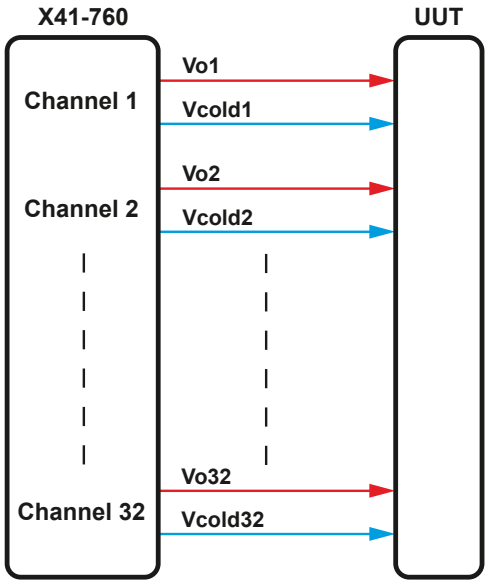
*Other lengths are available.

For applications requiring specific thermocouple wiring and connector types. please contact your local Pickering Sales Office.

Mating Connectors & Cabling

For connection accessories for the 41-760 please refer to the **90-006D** 78 pin D Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Interconnections Solutions catalog.

Pickering Interfaces is dedicated to developing its Millivolt Thermocouple Simulation range. If there are any sensor types or features that are not currently available, please contact your local sales office with details.



Using 41-760-001 directly connected to UUT for Thermocouple Simulation

Programmable Resistor Modules

- **Versatile Range of Resistor Modules Including Programmable Resistors and Potentiometers**
- **Fully Programmable Versions With Resolution of Up to 24-bit**
- **Resistance Range From 0 to 16MΩ**
- **Low Cost Fixed Value Selectable Resistor Versions With User Defined Values**
- **Optional Uncommitted SPDT Relays Available on Selecetd Modules**
- **VISA and Kernel Support For PXI Environments**

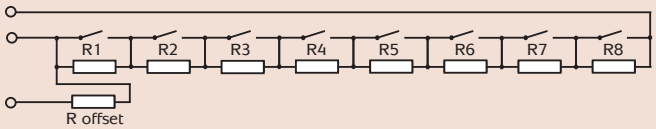
The range of programmable resistor modules includes fully programmable resistor and potentiometer modules for applications that require fine adjustment with a resolution of up to 24-bit. Also in the range are selectable resistor and potentiometer modules. These consist of fixed resistor values pre-defined by the user which can be switched in and out of circuit with reed relays.

All modules are based on either high quality ruthenium reed relays or high quality electro-mechanical relays.

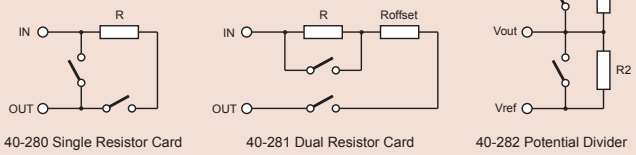
All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

40-293 Programmable Resistor Module

40-295 Programmable Resistor Module



Example Resistor Chain as used on Programmable Resistor Modules (8-bit chain shown)



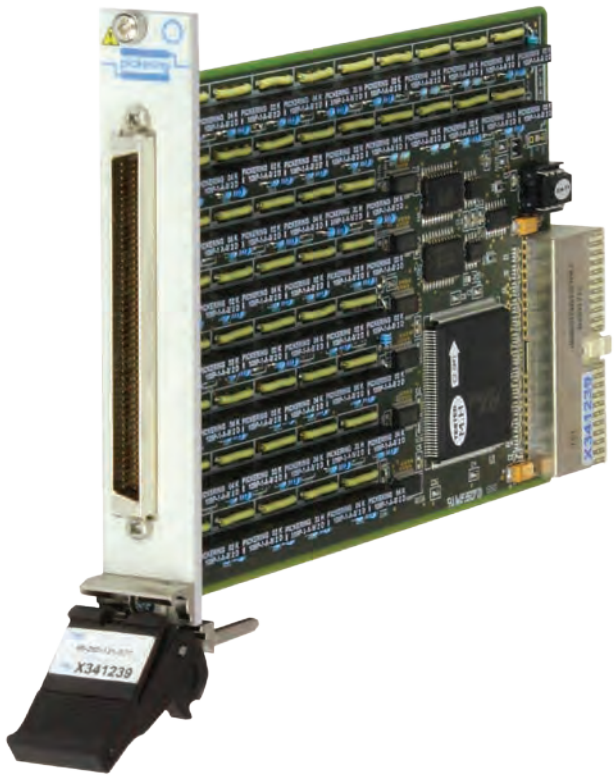
Fixed Value Resistor Configurations as used on Selectable Resistor Modules

Resistor Card Configuration	Number of Channels	Resolution	Resistance Range ‡	Max Resistor Power	Order Code	Page
Fixed Value Selectable Resistor	24 or 48	—	User Specified	0.5W	**40-280**	**6.2**
Dual Selectable Resistor	12 or 24				**40-281**	
Fixed Value Potential Divider	12 or 24				**40-282**	
Programmable Resistor	Dual	16-bit	0.5Ω to 32kΩ	1W	**40-290**	**6.4**
Programmable Resistor + SPDT Relays						
Programmable Resistor	Quad	8-bit	0.5Ω to 128Ω		**40-291**	
Programmable Resistor + SPDT Relays						
Programmable Load Resistor	Single		40Ω to 295Ω, or 10Ω to 2.56kΩ	15W	**40-292**	**6.6**
Programmable Resistor, SPDT Options Electro-mechanical Relay Based	2 or 4	0.25, 0.5, 1 or 2Ω	Up to 131kΩ	0.5W	**40-293**	**6.8**
Programmable Resistor, SPST Options Reed Relay Based					**40-294**	**6.11**
Programmable Resistor	10 or 18	8-bit	0 to 255Ω		**40-295**	**6.14**
	5 or 10	12-bit	0 to 4kΩ			
		16-bit	0 to 65kΩ			
	3 or 6	24-bit	0 to 16MΩ			
Programmable Potentiometer	5 or 9	8-bit	0 to 255Ω		**40-296**	
	2 or 4	12-bit	0 to 4kΩ			
		16-bit	0 to 65kΩ			
	1 or 3	24-bit	0 to 16MΩ			

‡ Most modules can be offered with alternative resistance range, for more information contact Pickering Interfaces

40-280/281/282
Selectable Resistor Module

- High Density Selectable Resistor Module
- Up to 48 Separate Channels of Switchable Resistors
- Customer Defined Resistor Values
- Channels Can be Set as Open or Short Circuit or a Pre-set Resistor Value (40-280)
- Version Available With Switchable Offset Resistance (40-281)
- Potential Divider Version Available (40-282)
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- VISA/IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-280 series provides a cost effective, high-density solution for applications requiring a high channel count of simple resistor configurations.

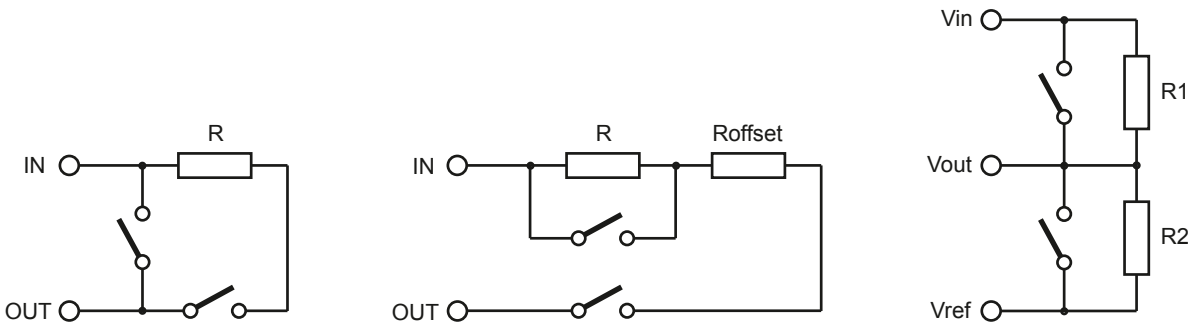
The 40-280 provides up to 48 isolated channels, each of which can be programmed as a short circuit, an open circuit or a fixed resistor value.

The 40-281 provides up to 24 isolated channels, each of which can be set as an open circuit, an offset resistor value or a fixed resistor value plus the offset.

The 40-282 is a potential divider with up 24 separate channels. This can be used to emulate potentiometer devices, each channel having a fixed R1 R2 ratio. Additionally, the centre point can be shorted to either of the potentiometer end points.

Modules are supplied without any resistors fitted, permitting the user to fit the values required. The flexibility of this allows users to select components that best meet their application needs. Alternatively, please contact the Pickering Sales Office if the module is required pre-fitted with resistors.

All the versions of the 40-280 series use high quality instrument grade reed relays to ensure long service life The modules are ideal for applications involving go/no-go testing where emulation of adjustable components or remote sensors is required. The modules provide a lower cost and higher density solution than approaches using fully programmable resistor chains.



40-280 Single Resistor Card | 40-281 Dual Resistor Card | 40-282 Potential Divider

Simplified Block Diagrams for one channel of the 40-280/281/282 Selectable Resistor Modules

Resistor Specification

Resistor Value:	Customer specified
Resistor Tolerance:	Customer specified
Resistor Power:	0.5W

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power:	10W
Max Switch Current:	0.5A
Max Carry Current:	1.2A
Initial Path Resistance	
On:	<1Ω (500mΩ nominal)
Off:	$>10^9\Omega$
Thermal Offset:	<10µV
Operate Time:	<0.5ms, 0.25ms typical
Release Time:	<0.5ms, 0.25ms typical
Expected Life	
Low power load:	$1x10^9$ operations
Full power load:	$>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.57A max	0	0

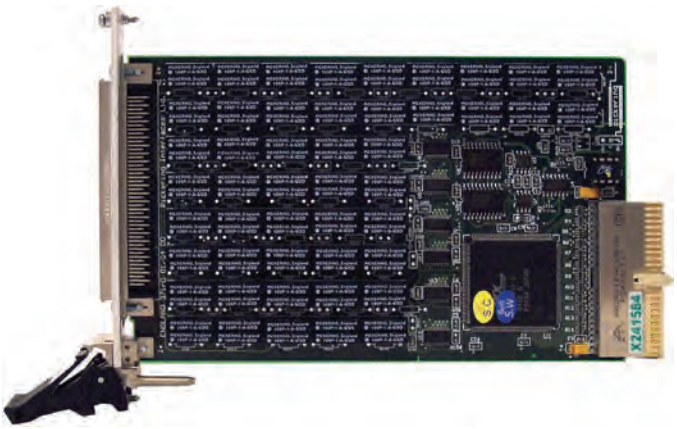
Width and Dimensions

Size: Single width 3U PXI/CompactPCI instrument module (3D models in a variety of popular file formats are available on request).

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel connector: 96-way male SCSI style micro-D connector



PCB Layout for the 40-280 Selectable Resistor Module

Other Resistor Modules

Pickering Interfaces manufacture a large range of variable resistor modules in the PXI and PCI formats. If you require assistance in selecting the right resistor module for your application please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Product Order Codes

Fixed Value Selectable Resistor Module:	
24-Channel	**40-280-021**
48-Channel	**40-280-121**
Dual Selectable Resistor Module:	
12-Channel	**40-281-021**
24-Channel	**40-281-121**
Fixed Value Potential Divider Module:	
12-Channel	**40-282-021**
24-Channel	**40-282-121**

NOTE: Modules are supplied without any resistors fitted. Please contact the Pickering Sales Office if you require the module to be pre-fitted with resistors.

Mating Connectors & Cabling

For connection accessories for the 40-280 series please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-290/291
Programmable Resistor Module

- Dual 16-Bit or Quad 8-Bit Resolution Resistor Module
- Programmable From 0Ω to 32767.5Ω in 0.5Ω Steps
- Built-In Non-Volatile Parametric Memory For Calibration Data
- Option To Include 16 SPDT Reed Relays
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Over 1000 Value Changes Per Second
- Special Versions Built To Order
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

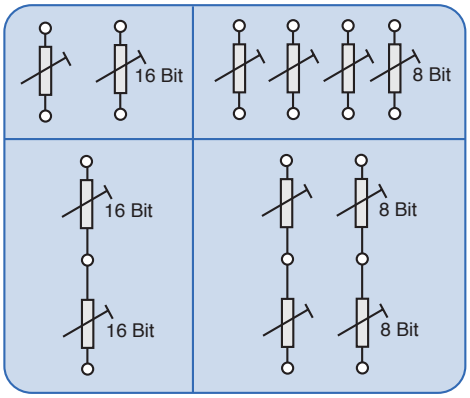
The 40-290 Programmable Resistor Module comprises a dual 16 bit resistor chain together with 16 optional SPDT Reed Relays (see diagram below). The 40-291 is configured as a quad 8 bit programmable resistor chain and also has the option of 16 SPDT relays. Connections are made via a front panel 68 pin male connector.

Programmable resistors may be connected together either in series or in parallel to form many types of configuration. For example potentiometers (2 resistors in series) and more accurate resistors (connecting in parallel). Each programmable resistor has a position for a user inserted offset value.

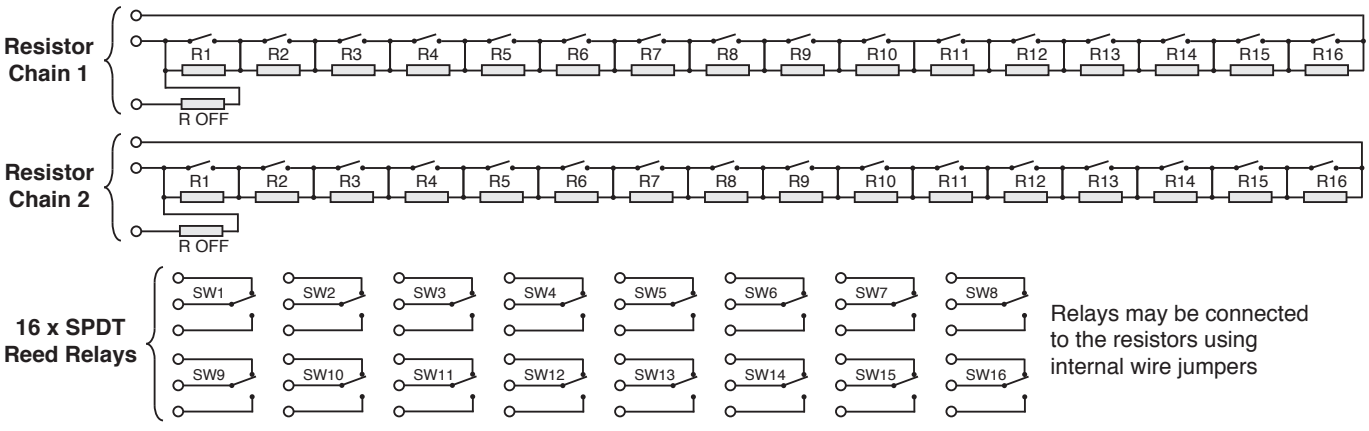
The 40-290 and 40-291 use Ruthenium Reed Relays for maximum switching accuracy and operating life.

To give maximum accuracy each resistor chain has on-board E^2PROM, this allows accurate calibration data to be recorded for each resistor in the chain.

If versions are required with different resistor ranges than those shown, please contact the Pickering Interface's Sales Office for assistance.



Programmable Resistor Module Overview



Programmable Resistor Module Configured In Dual 16-Bit Resistor Mode With 16 x SPDT Reed Relays

Relay Type

The 40-290 and 40-291 are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Programmable Resistor Specification

Max Switch Voltage:	100V
Resolution:	0.5Ω
† Accuracy of Fitted Resistor:	0.5%
Residual Resistance, typical (when chain is set to 0Ω):	1Ω (8-bit) 2Ω (16-bit)
Max Power: 0.5 to 10Ω 10 to 100Ω 100Ω+	1W 0.5W 0.25W
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life, Low power load: Expected Life, Full power load:	>1x10^8 operations >1x10^6 operations

† Overall accuracy of module is a combination of the fitted resistor accuracy and the relay/track resistance that makes up the residual path resistance.

Switching Specification (16 x SPDT Reed Relays)

Switch Type:	**Ruthenium Reed**
Max Standoff Voltage:	100V
Max Power: Max Switch Current: Max Carry Current:	3W 0.25A 0.5A
Initial Path Resistance, On: Path Resistance, Off:	<250mΩ >1x10^{9}Ω
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life, Low power load: Expected Life, Full power load:	>1x10^8 operations >1x10^6 operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	740mA (typ 400mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 180g (40-290-021)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 68-Way female SCSI style micro-D connector. Each resistor has 4 wire connections (Kelvin) so allowing elimination of wires and connectors in high accuracy measurements.

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Product Order Codes

Dual 16 Bit Resistor Module **40-290-021**
(resistor value is 0Ω to 32,767.5Ω excluding residual resistance)

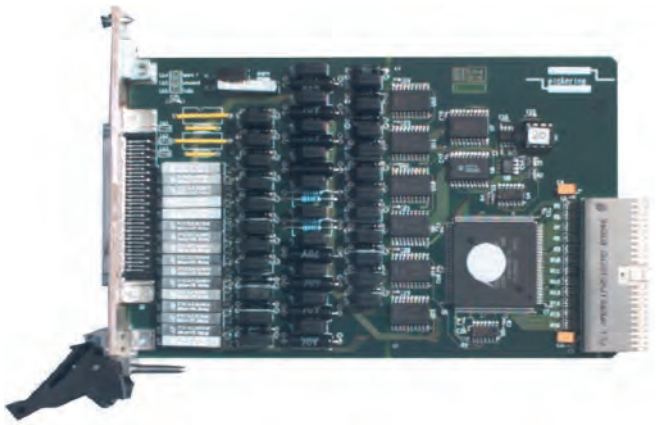
Dual 16 Bit Resistor Module + 16 x SPDT Relays **40-290-121**
(resistor value is 0Ω to 32,767.5Ω excluding residual resistance)

Quad 8 Bit Resistor Module **40-291-021**
(resistor value is 0Ω to 127.5Ω excluding residual resistance)

Quad 8 Bit Resistor Module + 16 x SPDT Relays **40-291-121**
(resistor value is 0Ω to 127.5Ω excluding residual resistance)

Mating Connectors & Cabling

For connection accessories for the 40-290 series please refer to the **90-015D** 68-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-290 Resistor Module

40-292
Load Resistor Module

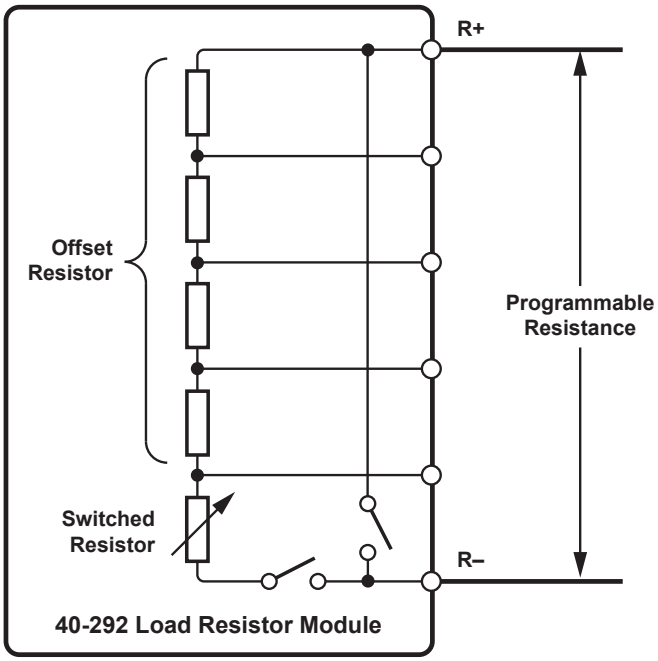
- Up To 15 Watt Resistor Load
- Short and Open Circuit Simulation
- Solid State Switching For Long Service Life
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-292 provides a simple solution for applications requiring a programmable load resistor with up to 15W power handling.

The 40-292 module is able to simulate the common short circuit and open circuit conditions that can be experienced in a system due to faulty wiring or sensors. The short circuit position is fully thermally protected and provides a short circuit current limit. The series open switch provides an automatic current limit through the resistor chain and is thermally protected.

The offset resistor can be partially or fully bypassed by the user to provide a lower minimum resistance at a lower power rating.

For applications requiring greater resolution and lower power, users should consider the **40-260 or 40-297 series Precision resistor Modules**.



Specification

Resistance Channels

Model Number	40-292-011	40-292-012
Resistance Range	40Ω to 295Ω	10Ω to 2.56kΩ
Setting Resolution	1Ω	10Ω
Offset Resistance	40Ω with tap points available to user	10Ω with tap points available to user
Load Power	15W †	10W †

† **Note:** Power handling is 7.5W if the offset resistance is bypassed.

Resistance Accuracy:	5%, ± 0.5Ω
Fault Simulation:	Open and short circuit (typically <0.6Ω). Short circuit path includes thermal overload protection and current limit (1A typical). The open position switch limits the resistor chain current to typically 1A and is fully thermally protected, the switch automatically opens when a thermal threshold is reached.
Number of Operations:	Unlimited within module rating.
Voltage Range:	0 to +55V, polarity sensitive.
Settling time:	<1ms

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.5A max	0	0

Physical Parameters

Physical characteristics:	One slot, 3U PXI. 3D models for all versions in a variety of popular file formats are available on request.
PCI Interface:	33MHz, 32-bit address, 16-bit data.
Signal Connectors:	Male 9-way D-type

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

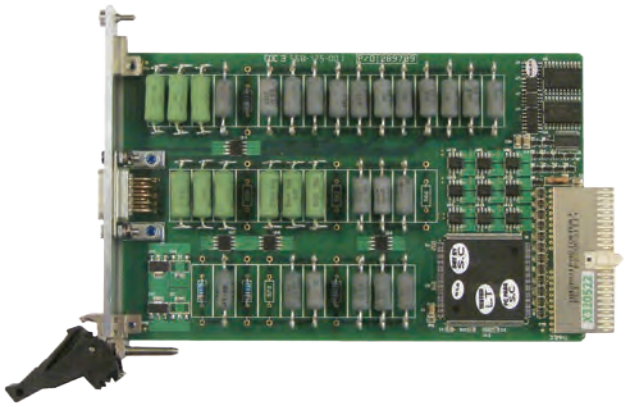
Product Order Codes

40Ω to 295Ω Power Resistor Module	**40-292-011**
10Ω to 2.56kΩ Power Resistor Module	**40-292-012**

Note: The 40-292-011 supersedes the 40-292-001 and the 40-292-012 supersedes the 40-292-002. The new and old versions are functionally the same.

Mating Connectors & Cabling

For connection accessories for the 40-292 please refer to the **90-003D** 9-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-293
Programmable Resistor & Relay Module

- Dual or Quad Channel Resistor Module
- Fitted with Electromechanical Relays
- Short and Open Simulation
- Simple Software Control Through Resistance Calls
- Provides Fully Isolated Variable Resistors
- Option of Added SPDT Uncommitted Relays
- Option of Increasing The Length of Resistor Channels
- Special Versions With Non Standard Resistors Built To Order
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8 Plus Soft Front Panel
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-293 is a Programmable Resistor with either two or four resistor channels in a single 3U PXI module. The module is ideal for simulating sensors for control and management systems under test, allowing the user to verify system response in design verification or manufacturing test applications.

The 40-293 can also be supplied with 8xSPDT electro-mechanical relays. These uncommitted relays have a number of uses, including extending the resistor channels, adding additional fault conditions and providing the functionality of a resistor module and an uncommitted relay module in a single PXI slot. Each SPDT relay includes a footprint for the fitting of a user supplied axial leaded resistor which can be bypassed by the SPDT relay to provide the user resistance value or a short circuit.

Software control of the 40-293 is simplified by the use of resistor value calls. The module works out the channel setting closest to the requested value and sets that value. The user can interrogate the module to find the actual resistance setting used by the module. Alternatively, users can operate individual relays within the resistor chains by setting the appropriate bit pattern.

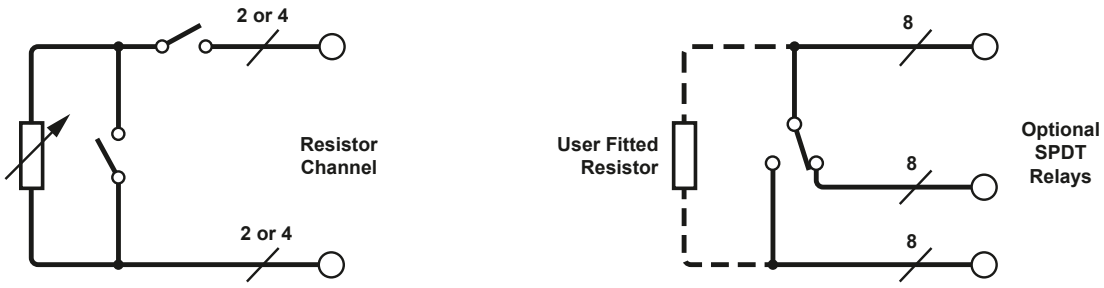
Versions with other resistance values can be provided to meet the requirements for specific applications. This includes the fitting of an offset resistor that can be used to set the minimum resistance value. If versions are required with different resistance ranges than those shown, please contact the Pickering Interfaces' Sales Office for assistance.

Pickering's Range of PXI Resistor Modules

Model No.	Description	Channels	Range
40-280/1/2	Selectable	12 to 48	User Specified
40-290	Programmable Resistor	2	0.5Ω to 32kΩ
40-291		4	0.5Ω to 128Ω
40-292	Programmable Load	1	40Ω to 295Ω or 10Ω to 2.56kΩ
40-293	Programmable Resistor	2 or 4	Up to 131kΩ
40-295	Programmable Resistor	10 or 18	0Ω to 255Ω
		5 or 10	0Ω to 4kΩ or 0Ω to 65kΩ
		3 or 6	0Ω to 16MΩ
40-296	Programmable Potentiometer	5 or 9	0Ω to 255Ω
		2 or 4	0Ω to 4kΩ or 0Ω to 65kΩ
		1 or 3	0Ω to 16MΩ
40-297	High Density Precision	3, 4, 6, 9 or 18	Up to 1.5MΩ

For improved accuracy each resistor channel has accurate calibration data stored on the module.

The module is supplied with VISA drivers and a soft front panel.



Functional Diagram for the 40-293 Programmable Resistor & Relay Module

Relay Type

The 40-293 is fitted with electro-mechanical relays with Palladium-Ruthenium Gold covered contacts.
A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Programmable Resistor Specification

Accuracy of Resistance Call: Accuracy of Resistance Readback:	±1% ±Resolution † ±0.3% ±0.1Ω †
Max Switch Voltage:	100V
Max Power:	0.5W
Residual Resistance, typical: (when chain resistance is set to 0Ω)	1Ω (40-293-x1x) 1.5Ω (40-293-x2x) 2Ω (40-293-x3x)
Operate Time:	3ms ‡
Expected Life Low power load: Full power load:	 >1x10^8 operations >1x10^5 operations

† Valid between ±10°C from calibration temperature (factory calibrated at 21°C).

‡ The total operate time when setting a resistance may be longer depending upon the change requested due to relay sequencing.

Uncommitted SPDT Relay Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	100VDC
Max Power: Max Switch Current: Max Continuous Carry Current: Max Pulsed Carry Current Example (for a single switch path):	60W/62.5VA 2A 2A 6A for 100ms (up to 10% duty cycle)
Initial Path Resistance, On: Initial Path Resistance, Off: Minimum Voltage:	0.2Ω > 10^{9}Ω 100µV
Operate Time:	3ms
Expected Life (operations) Very low power signal load: Low power load (2W): Medium power load (30W): Full power load (60W):	 > 10^8 > 1.5x10^7 (0.1A 20VDC) > 5x10^6 (1A, 30VDC) > 1x10^5 (2A, 30VDC)

Note: When user defined resistors are fitted to SPDT relays, the above ratings may be affected, refer to fitted resistor ratings.

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.5A	0	0

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 37-way male D-type connector.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Resistor Module Order Codes

0.25Ω Resolution

Range	No. of Channels	Order Code, No SPDT Relays	Order Code, With SPDT Relays
1Ω to 63.7Ω	4	**40-293-011**	**40-293-111**
1.5Ω to 1.02kΩ	2	**40-293-021**	**40-293-121**
2Ω to 16.3kΩ	2	**40-293-031**	**40-293-131**

0.5Ω Resolution

Range	No. of Channels	Order Code, No SPDT Relays	Order Code, With SPDT Relays
1Ω to 127Ω	4	**40-293-012**	**40-293-112**
1.5Ω to 2.04kΩ	2	**40-293-022**	**40-293-122**
2Ω to 32.7kΩ	2	**40-293-032**	**40-293-132**

1Ω Resolution

Range	No. of Channels	Order Code, No SPDT Relays	Order Code, With SPDT Relays
1Ω to 255Ω	4	**40-293-013**	**40-293-113**
1.5Ω to 4.09kΩ	2	**40-293-023**	**40-293-123**
2Ω to 65.5kΩ	2	**40-293-033**	**40-293-133**

2Ω Resolution

Range	No. of Channels	Order Code, No SPDT Relays	Order Code, With SPDT Relays
1Ω to 510Ω	4	**40-293-014**	**40-293-114**
1.5Ω to 8.19kΩ	2	**40-293-024**	**40-293-124**
2Ω to 131kΩ	2	**40-293-034**	**40-293-134**

Mating Connectors & Cabling

For connection accessories for the 40-293 please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

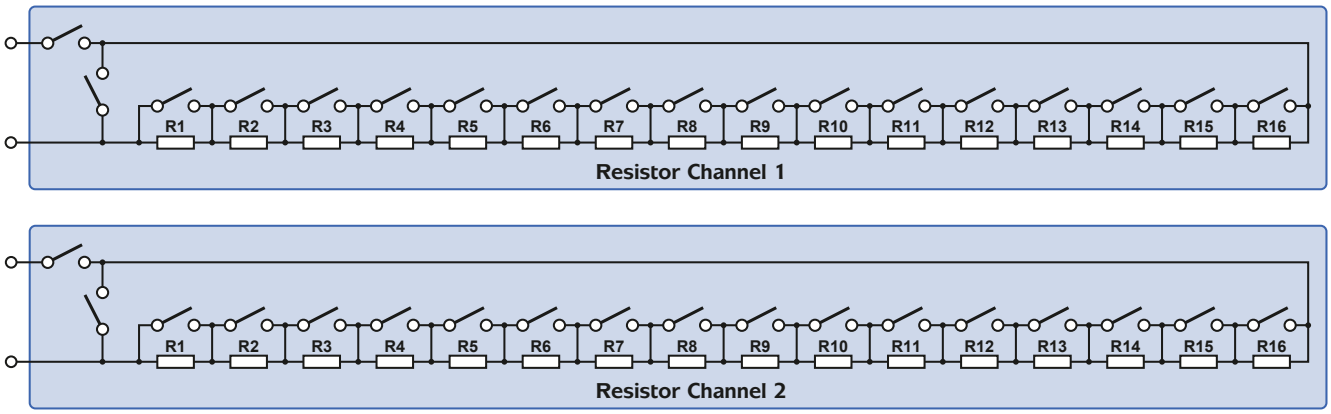
Accessories

Calibration lead for 4-wire resistance measurement of the Programmable Resistor Channels using DMM - 37-way D-type socket to shrouded 4mm bayonet plugs, 1Meter length: 40-975-037-02-1m

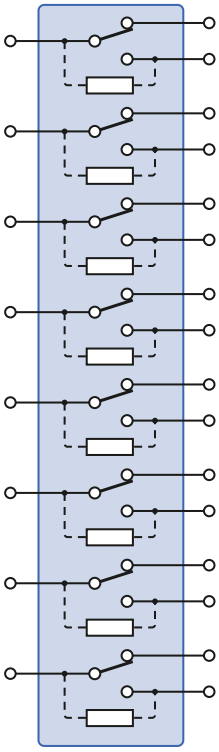
Pickering Interfaces manufacture a large range of variable resistor modules in the PXI and PCI formats. If you require assistance in selecting the right resistor module for your application please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

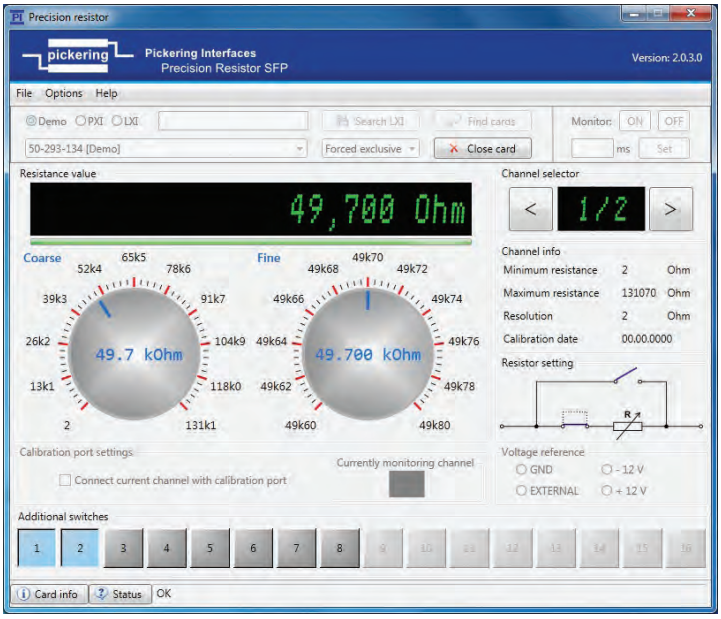
† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.



Schematic for 40-293-x3x Resistor Module

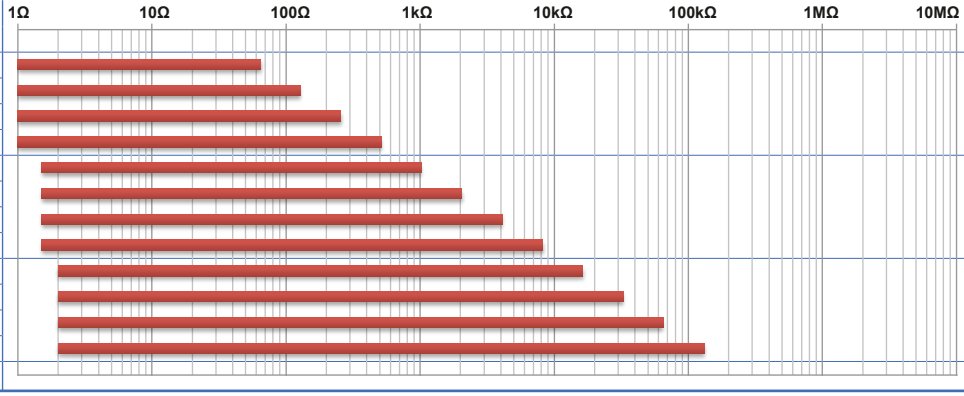


8 x SPDT Relay Option



Example Soft Front Panel for the Resistor Module

PXI Part Number (Number of Channels)	Resolution
40-293-011(4) 40-293-111(4+8xSPDT)	0.25Ω
40-293-012(4) 40-293-112(4+8xSPDT)	0.5Ω
40-293-013(4) 40-293-113(4+8xSPDT)	1Ω
40-293-014(4) 40-293-114(4+8xSPDT)	2Ω
40-293-021(2) 40-293-121(2+8xSPDT)	0.25Ω
40-293-022(2) 40-293-122(2+8xSPDT)	0.5Ω
40-293-023(2) 40-293-123(2+8xSPDT)	1Ω
40-293-024(2) 40-293-124(2+8xSPDT)	2Ω
40-293-031(2) 40-293-131(2+8xSPDT)	0.25Ω
40-293-032(2) 40-293-132(2+8xSPDT)	0.5Ω
40-293-033(2) 40-293-133(2+8xSPDT)	1Ω
40-293-034(2) 40-293-134(2+8xSPDT)	2Ω



Graphical Representation of the 40-293 Resistor Module Range

40-294
Programmable Resistor & Relay Module

- Dual or Quad Channel Resistor Module
- Fitted With Pickering Reed Relays, Providing Superior Speed of Operation and Module Life
- Short and Open Simulation
- Simple Software Control Through Resistance Calls
- Provides Fully Isolated Variable Resistors
- Option of Added SPST Uncommitted Relays
- Special Versions With Non Standard Resistors Built To Order
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8 Plus Soft Front Panel
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-294 is a Programmable Resistor with either two or four resistor channels in a single 3U PXI module. The module is ideal for simulating sensors for control and management systems under test, allowing the user to verify system response in design verification or manufacturing test applications.

The 40-294 can also be supplied with 8xSPST Pickering reed relays. These uncommitted relays have a number of uses, including extending the resistor channels, adding additional fault conditions and providing the functionality of a resistor module and an uncommitted relay module in a single PXI slot. Each SPST relay includes a footprint for the fitting of a user supplied axial leaded resistor which can be bypassed by the relay to provide the user resistance value or a short circuit.

Software control of the 40-294 is simplified by the use of resistor value calls. The module works out the channel setting closest to the requested value and sets that value. The user can interrogate the module to find the actual resistance setting used by the module. Alternatively, users can operate individual relays within the resistor chains by setting the appropriate bit pattern.

Versions with other resistance values can be provided to meet the requirements for specific applications, this includes the fitting of an offset resistor that can be used to set the minimum resistance value. If versions are required with different resistance ranges than those shown, please contact the Pickering Interfaces' Sales Office for assistance.

Pickering's Range of PXI Resistor Modules			
Model No.	**Description**	**Channels**	**Range**
40-280/1/2	Selectable	12 to 48	User Specified
40-290	Programmable Resistor	2	0.5Ω to 32kΩ
40-291		4	0.5Ω to 128Ω
40-292	Programmable Load	1	40Ω to 295Ω or 10Ω to 2.56kΩ
40-293	Programmable Resistor + SPDT	2 or 4	Up to 131kΩ
40-294	Programmable Resistor + SPST	2 or 4	Up to 131kΩ
40-295	Programmable Resistor	3, 6, 5, 10 or 18	Up to 16MΩ
40-296	Programmable Potentiometer	1, 2, 3, 4, 5 or 9	Up to 16MΩ
Precision Resistor Modules			
For applications requiring a Resistor Module with greater resolution (to <2mΩ) or better accuracy (to <0.03%), look to our Precision Resistor range which includes models 40-260, 40-261, 40-262, 40-265, and 40-297			
Custom Resistor Modules			
If our range of Resistor Modules does not meet your specific requirements, please contact you local sales office to discuss your application. Customizations include: different start and stop values, current, power, voltage, precision, accuracy, number of channels, connector etc.			

For improved accuracy each resistor channel has accurate calibration data stored on the module.

The module is supplied with VISA drivers and a soft front panel.

Functional Diagram for the 40-294 Programmable Resistor & Relay Module

Relay Type

The 40-294 is fitted with Pickering Reed Relays with Sputtered Ruthenium contacts.
A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Programmable Resistor Specification

Accuracy of Resistance Call: Accuracy of Resistance Readback:	±1% ±Resolution † ±0.3% ±0.2Ω †
Max Switch Voltage:	100V
Max Power:	0.5W
Residual Resistance, typical: (when chain resistance is set to 0Ω)	2Ω (40-294-x1x) 2.5Ω (40-294-x2x) 3Ω (40-294-x3x)
Thermal Offset:	<200µV
Relay Operate Time:	0.3ms ‡
Expected Life:	>1x10^9 operations

† Valid between ±10°C from calibration temperature (factory calibrated at 21°C), excluding thermo-electric effects.

‡ The total operate time when setting a resistance may be longer depending upon the change requested due to relay sequencing.

Uncommitted SPST Relay Specification

Switch Type:	Pickering Reed Relay
Contact Type:	Sputtered Ruthenium
Max Switch Voltage:	100VDC
Max Power: Max Switch Current: Max Continuous Carry Current:	10W 0.5A 1A
Initial Path Resistance, On: Initial Path Resistance, Off:	0.2Ω (0.12Ω typical) > 10^{9}Ω
Relay Operate Time:	0.3ms
Expected Life:	>1x10^9 operations

Note: When user defined resistors are fitted to SPST relays, the above ratings may be affected, refer to fitted resistor ratings.

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.5A	0	0

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 37-way male D-type connector.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Resistor Module Order Codes

0.25Ω Resolution

Range	No. of Channels	Order Code, No SPST Relays	Order Code, With SPST Relays
2Ω to 63.7Ω	4	**40-294-011**	**40-294-111**
2.5Ω to 1.02kΩ	2	**40-294-021**	**40-294-121**
3Ω to 16.3kΩ	2	**40-294-031**	**40-294-131**

0.5Ω Resolution

Range	No. of Channels	Order Code, No SPST Relays	Order Code, With SPST Relays
2Ω to 127Ω	4	**40-294-012**	**40-294-112**
2.5Ω to 2.04kΩ	2	**40-294-022**	**40-294-122**
3Ω to 32.7kΩ	2	**40-294-032**	**40-294-132**

1Ω Resolution

Range	No. of Channels	Order Code, No SPST Relays	Order Code, With SPST Relays
2Ω to 255Ω	4	**40-294-013**	**40-294-113**
2.5Ω to 4.09kΩ	2	**40-294-023**	**40-294-123**
3Ω to 65.5kΩ	2	**40-294-033**	**40-294-133**

2Ω Resolution

Range	No. of Channels	Order Code, No SPST Relays	Order Code, With SPST Relays
2Ω to 510Ω	4	**40-294-014**	**40-294-114**
2.5Ω to 8.19kΩ	2	**40-294-024**	**40-294-124**
3Ω to 131kΩ	2	**40-294-034**	**40-294-134**

Mating Connectors & Cabling

For connection accessories for the 40-294 please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

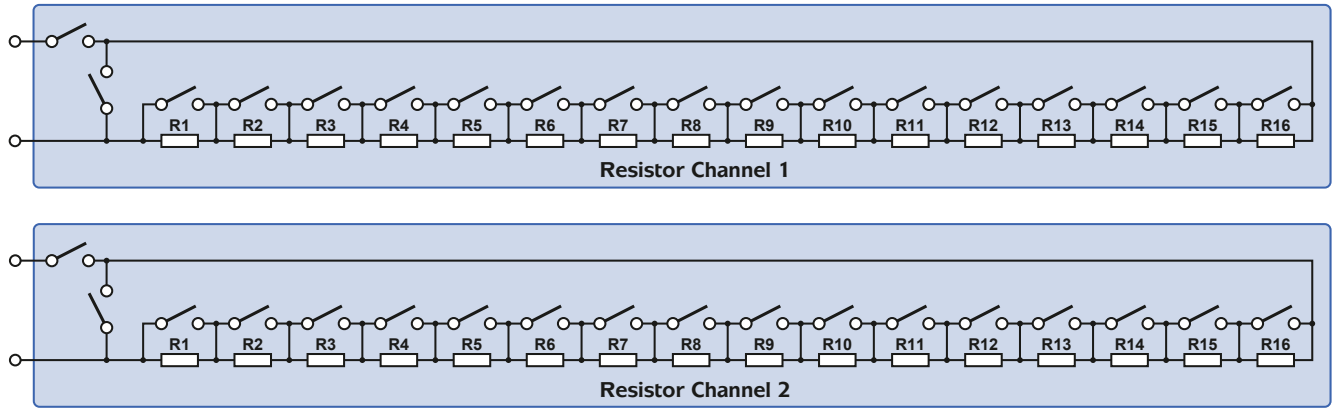
Accessories

Calibration lead for 4-wire resistance measurement of the Programmable Resistor Channels using DMM - 37-way D-type socket to shrouded 4mm bayonet plugs, 1 Meter length: 40-975-037-02-1m

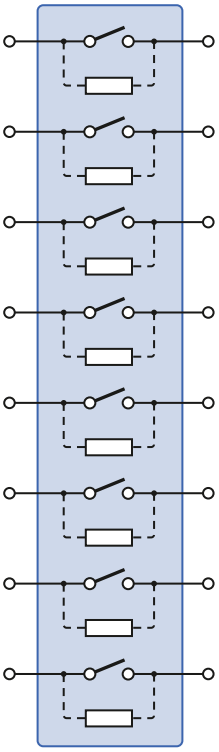
Pickering Interfaces manufacture a large range of variable resistor modules in the PXI and PCI formats. If you require assistance in selecting the right resistor module for your application please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

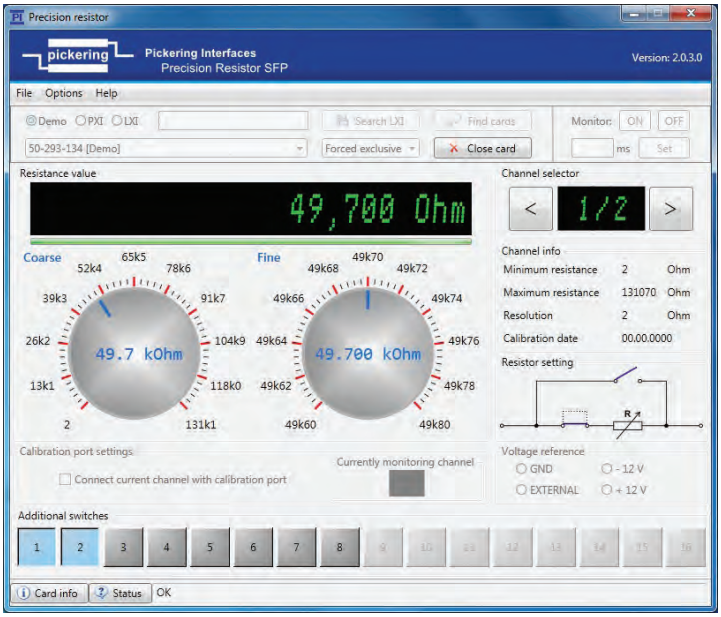
† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.



Schematic for 40-294-x3x Resistor Module

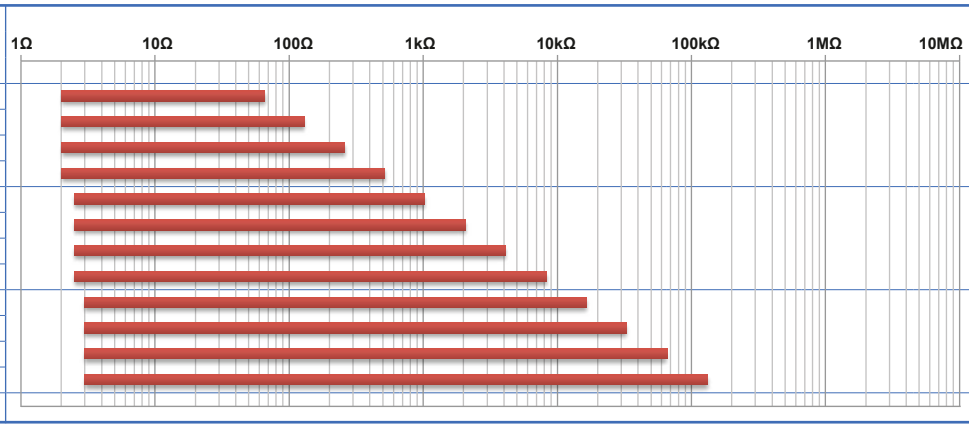


8 x SPST Relay Option



Example Soft Front Panel for the Resistor Module

PXI Part Number (Number of Channels)	Resolution
40-294-011(4) 40-294-111(4+8xSPST)	0.25Ω
40-294-012(4) 40-294-112(4+8xSPST)	0.5Ω
40-294-013(4) 40-294-113(4+8xSPST)	1Ω
40-294-014(4) 40-294-114(4+8xSPST)	2Ω
40-294-021(2) 40-294-121(2+8xSPST)	0.25Ω
40-294-022(2) 40-294-122(2+8xSPST)	0.5Ω
40-294-023(2) 40-294-123(2+8xSPST)	1Ω
40-294-024(2) 40-294-124(2+8xSPST)	2Ω
40-294-031(2) 40-294-131(2+8xSPST)	0.25Ω
40-294-032(2) 40-294-132(2+8xSPST)	0.5Ω
40-294-033(2) 40-294-133(2+8xSPST)	1Ω
40-294-034(2) 40-294-134(2+8xSPST)	2Ω



Graphical Representation of the 40-294 Resistor Module Range

40-295/296
Programmable Resistor Module

- Highest Density Resistor Module
- Configurable To 8, 12, 16 or 24-Bit Resolution
- Up To 18 Channels of 8-Bit Resolution
- Up To 10 Channels of 16-Bit Resolution
- Provides Fully Isolated Variable Resistors
- Configure As Adjustable Resistor Or Potentiometer
- Built-In Non-Volatile Parametric Memory For Calibration Data
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Up to 2000 Value Changes Per Second
- Special Versions With Non Standard Resistors Built To Order
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8 Plus Soft Front Panel
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-295 is a Programmable Resistor module with up to 18 channels of 8 bit resolution resistor chains in a single 3U PXI module. The flexible architecture allows the module to also be supplied as 12-bit, 16-bit or 24-bit resolution versions for applications requiring finer resolution, greater resistance range or higher channel count. The module is ideal for simulating the sensors for control and management systems under test, allowing the user to verify system response in design verification or manufacturing test applications.

The programmable resistors can be configured as potentiometers with a wiper connection, model 40-296, simulating the response to external adjustable components.

Versions with other resistor values can be provided to meet the requirements for specific applications. Each resistor chain includes an offset resistor that can be used to set the minimum resistance value.

If versions are required with different resistor ranges than those shown, please contact the Pickering Interface's Sales Office for assistance.

The module is available in a variety of densities that allow the user to select the most appropriate solution in terms of density and cost for every application. The high channel count in each module ensures that large systems can be simulated with minimal PXI slot occupancy.

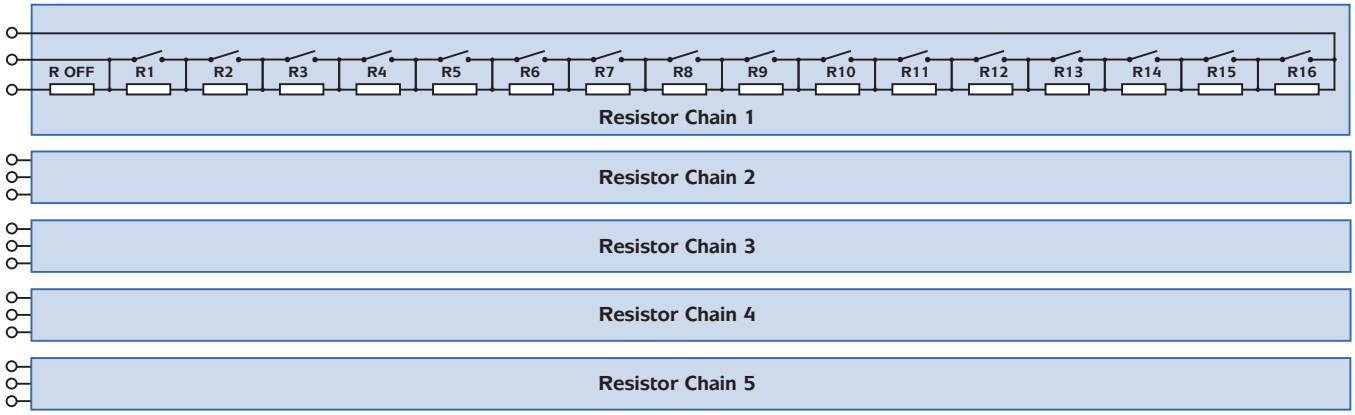
All switches use instrument grade reed relays with low thermal offset voltage to ensure accurate operation under all conditions and a long service life.

To give maximum accuracy each resistor chain has on-board E^2PROM, this allows accurate calibration data to be recorded for each resistor in the chain.

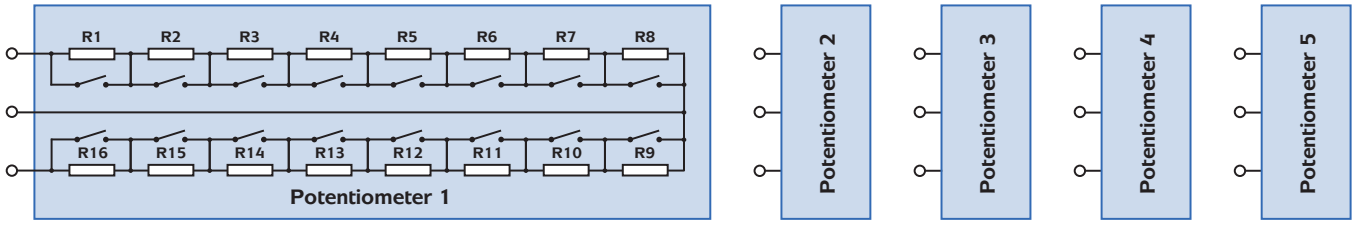
The module is supplied with VISA drivers and a soft front panel.

Resolution	Resistance Range	Configuration	Number Per Module
8-Bit	0Ω to 255Ω	 Resistor	10 or 18
12-Bit	0Ω to 4kΩ		5 or 10
16-Bit	0Ω to 65kΩ		5 or 10
24-Bit	0Ω to 16MΩ		3 or 6
8-Bit	0Ω to 255Ω Wiper	 Potentiometer	5 or 9
12-Bit	0Ω to 4kΩ Wiper		2 or 4
16-Bit	0Ω to 65kΩ Wiper		2 or 4
24-Bit	0Ω to 16MΩ Wiper		1 or 3

Programmable Resistor Module Options Overview



Schematic for 5 x 16 bit Resistor Module 40-295-021-5/16



Schematic for 5 x 8 bit Potentiometer Module 40-296-021-5/8

Relay Type

The 40-295/296 is fitted with Reed Relays (Sputtered Ruthenium type), these offer very long life with good low level switching performance and excellent contact resistance stability.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Power Requirements

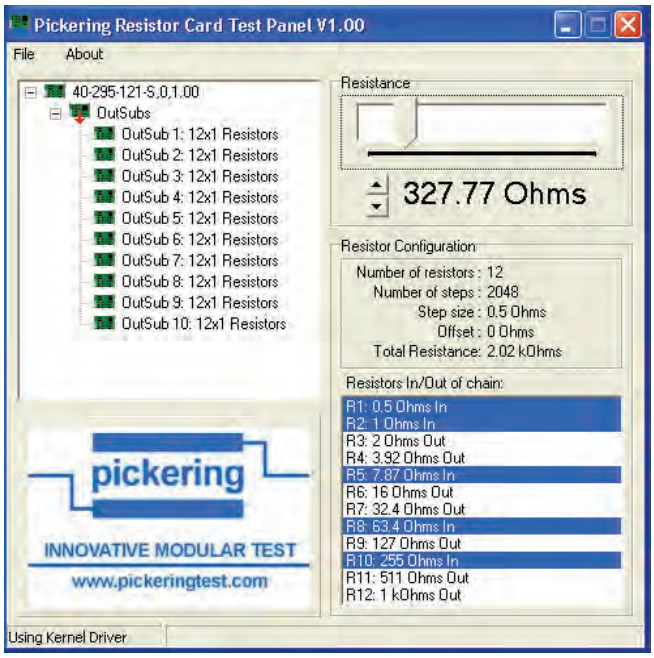
+3.3V	+5V	+12V	-12V
0	1.85A (typ 450mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-295-021-3/24)
240g (40-295-021-10/8)
340g (40-295-121-10/16)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 37-way male D-type connector.

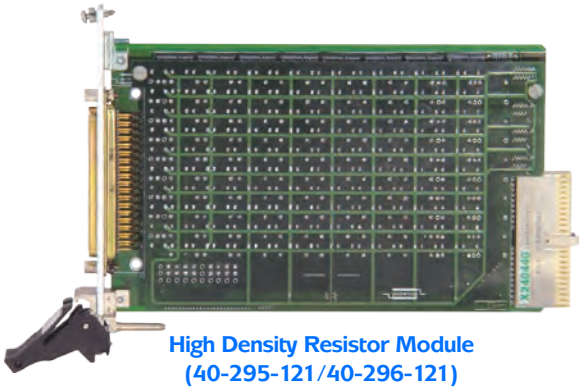


40-295 Soft Front Panel

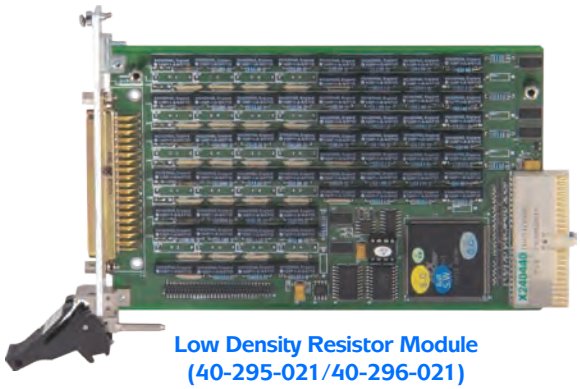
Programmable Resistor Specification

Max Switch Voltage:	100V
Resolution	1Ω
† Accuracy of Fitted Resistor:	±0.5% (0 to 1MΩ) ±1% (>1MΩ)
Residual Resistance, typical: (when chain resistance is set to 0Ω)	1Ω (8-bit) 1.5Ω (12-bit) 2Ω (16-bit) 3Ω (24-bit)
Max Power: Max Switch Current: Max Carry Current:	0.5W 0.5A 1.0A
Thermal Offset:	<35uV (8-bit) <45uV (12-bit) <50uV (16-bit) <60uV (24-bit)
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 >1x10^8 operations >1x10^6 operations

† Overall accuracy of module is a combination of the fitted resistor accuracy and the relay/track resistance that makes up the residual path resistance.



High Density Resistor Module
(40-295-121/40-296-121)



Low Density Resistor Module
(40-295-021/40-296-021)

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Resistor Module Order Codes

10 x 8 Bit (0Ω to 255Ω)	**40-295-021-10/8**
18 x 8 Bit (0Ω to 255Ω)	**40-295-121-18/8**
5 x 12 Bit (0Ω to 4kΩ)	**40-295-021-5/12**
10 x 12 Bit (0Ω to 4kΩ)	**40-295-121-10/12**
5 x 16 Bit (0Ω to 65kΩ)	**40-295-021-5/16**
10 x 16 Bit (0Ω to 65kΩ)	**40-295-121-10/16**
3 x 24 Bit (0Ω to 16MΩ)	**40-295-021-3/24**
6 x 24 Bit (0Ω to 16MΩ)	**40-295-121-6/24**

Potentiometer Module Order Codes

5 x 8 Bit Pot (0Ω to 255Ω Wiper)	**40-296-021-5/8**
9 x 8 Bit Pot (0Ω to 255Ω Wiper)	**40-296-121-9/8**
2 x 12 Bit Pot (0Ω to 4kΩ Wiper)	**40-296-021-2/12**
4 x 12 Bit Pot (0Ω to 4kΩ Wiper)	**40-296-121-4/12**
2 x 16 Bit Pot (0Ω to 65kΩ Wiper)	**40-296-021-2/16**
4 x 16 Bit Pot (0Ω to 65kΩ Wiper)	**40-296-121-4/16**
1 x 24 Bit Pot (0Ω to 16MΩ Wiper)	**40-296-021-1/24**
3 x 24 Bit Pot (0Ω to 16MΩ Wiper)	**40-296-121-3/24**

Mating Connectors & Cabling

For connection accessories for the 40-295/296 please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Precision Programmable Resistors

- Precision Variable Resistors With a Choice of Resistance Ranges
- Very High Accuracy and Stability
- Fine Setting Resolution
- Low Thermo-Electric EMF
- Simple Calibration With an External DMM
- VISA and Kernel Support For PXI Environments

40-260 Precision Programmable Resistor Module

40-297 High Density Precision Programmable Resistor Module

This range of programmable resistor modules feature high setting resolution with excellent stability and accuracy through the use of innovative switching networks and software correction techniques. This also means all resistance values can be set - there are no missing values due to switch resistance or resistor tolerance.

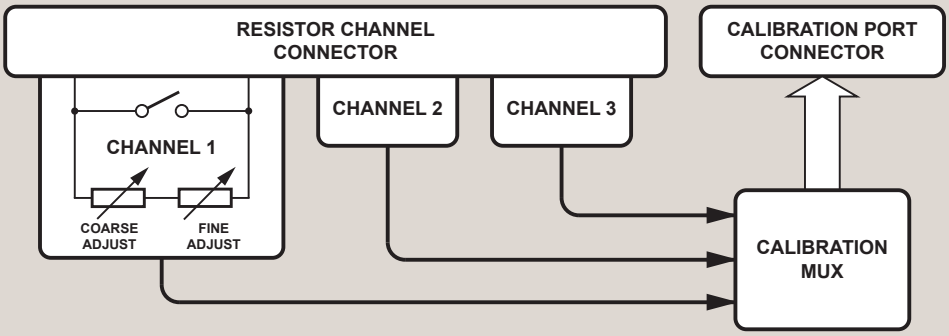
They are ideal for simulation of sensors that require very fine adjustment and also have the capability of being set as open or short circuit to simulate faults in cabling systems. The range includes modules specifically designed for RTD and strain gauge simulation.

Some modules incorporate a calibration port for connection to a DMM to assist in the confirmation of the module's performance. Calibration can be performed with the UUT connected to the module and multiple modules can be cascaded and calibrated with a single DMM (this does not apply to the 40-297 which uses the same connector for the UUT and calibration).

The resistor channels and calibration port occupy separate connectors on the module's front panel. All connectors are supported by a comprehensive range of cable and connector accessories.

New versions of the precision resistor cards are being regularly introduced, please contact your local sales office for more details.

Diagram for 40-260 Three Channel Precision Programmable Resistor Modules



Resistor Card Type	Number of Channels	Resolution	Module Accuracy	Resistance Range	Max Resistor Power	Order Code	Page
Precision Programmable	3	<10mΩ	0.1%	90Ω to 8kΩ	100mW	**40-260**	**7.2**
	2	<2mΩ or <15mΩ	±0.08% ±70mΩ	1.5Ω-2.9kΩ or 10Ω-36kΩ		**40-261**	**7.4**
RTD Simulator	6, 12 or 18	<8mΩ or <90mΩ	0.1%	90Ω-250Ω or 900Ω-2500Ω		**40-262**	**7.6**
Strain Gauge Simulator	6	2mΩ or 25mΩ	0.03% or 0.06%	350Ω, 1kΩ, 1.5kΩ, 2kΩ or 3kΩ Bridge		**40-265**	**7.9**
High Density Precision Programmable	3, 4, 6, 9 or 18	0.125, 0.25, 0.5, 1 or 2Ω	±0.2% ±Resolution	Up to 1.5MΩ	500mW	**40-297**	**7.11**

40-260
Precision Programmable Resistor Module

- Precision Variable Resistance From 90Ω to 8kΩ
- 3 Channels Per Module
- Very High Accuracy and Stability
- Controlled by Simple Resistor Value Calls
- Fine Setting Resolution <10mΩ
- Short and Open Circuit Simulation
- Low Thermo-Electric EMF
- Simple Calibration With External DMM
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-260 is the first in a new family of PXI based precision programmable resistor modules from Pickering Interfaces. This new generation of modules features high resistance setting resolution with excellent resistance stability and accuracy through the use of innovative switching networks and software correction techniques.

Each module supports three identical resistor channels that can be set to a range of resistance values with a setting resolution of better than 10mΩ, making the 40-260 ideal for simulating sensors that require fine adjustment of their resistance. Thanks to the use of innovative technology the 40-260 ensures all resistance values can be set – no missing values because of switch resistance or resistor tolerance. Additionally, each channel can be set as open or short circuit to simulate faults in cabling systems.

Applications include strain gauge and temperature dependent resistor emulation.

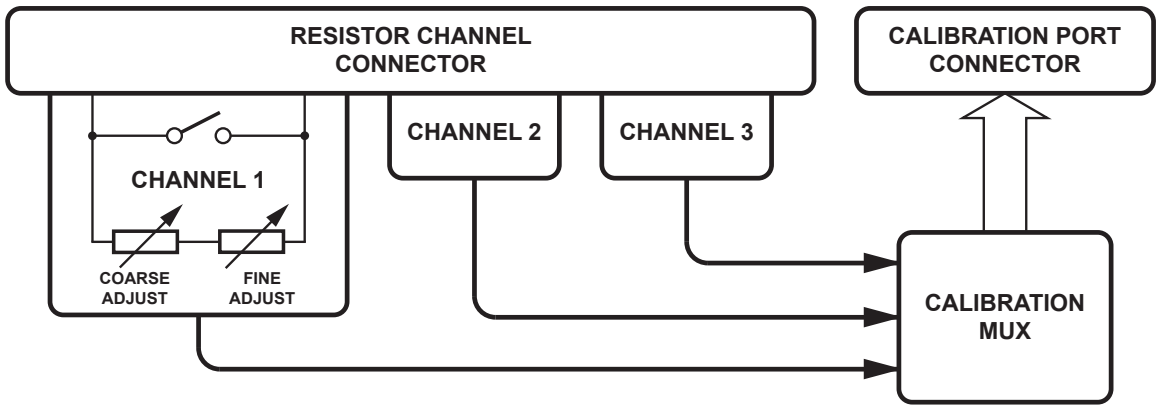
Each channel can operate with a differential input voltage range of greater than ±15V relative to a defined common mode voltage. The common mode voltage can be set to 0V, (input range of at least ±15V), +12V (input range of +27V to -3V), -12V (input range of -27V to +3V) or an external common mode source of up to ±50V.

The 40-260 provides a convenient system to support calibration of the resistance for each channel using an external DMM connected to the Calibration port. The calibration system permits modules to be cascaded so just one DMM can support the calibration of multiple devices and resistor channels in-situ. Calibration can be performed while the UUT is connected to the resistor channel connector.

Use of special switching techniques reduces measurement errors caused by thermo-electric EMFs to a minimum.

The 40-260 offers a stability, accuracy and setting resolution unmatched by any other PXI resistor module, minimizing the need for customized resistor modules and user calibration in the test system.

The 40-260 can be supported in an LXI Modular Switching Chassis such as the Pickering 60-100A, 60-102 or 60-103.



Functional Diagram for the 40-260 Precision Programmable Resistor Module

Specification

Resistor Channels

Configuration:	3 resistor channels per module.
Resistance Range 40-260-001	90Ω to 8kΩ and open circuit or short circuit.
Resistance resolution:	<10mΩ, continuous resolution, no missing settings.
Accuracy:	0.1% (can be improved with calibration).
Short Circuit Setting:	<0.3Ω initial
Open Circuit Setting:	>10^9Ω
Operating Voltage:	

Common mode voltage	Input voltage range
0V	-15V to +15V
+12V	-3V to +27V
-12V	-27V to +3V
External	Exernal ±15V

Common mode voltage can be selected by software control. Default value is 0 Volts.
Damage level is a differential voltage level of ±18V wrt common or the maximum power rating, whichever is lower.

Ext common mode voltage:	±50V
Maximum power:	100mW
Thermo-electric emf:	<2µV 90Ω to 260Ω <5µV 260Ω to 8kΩ
Resistance - power off:	Open circuit
Operating time:	3ms typical

Calibration Channel

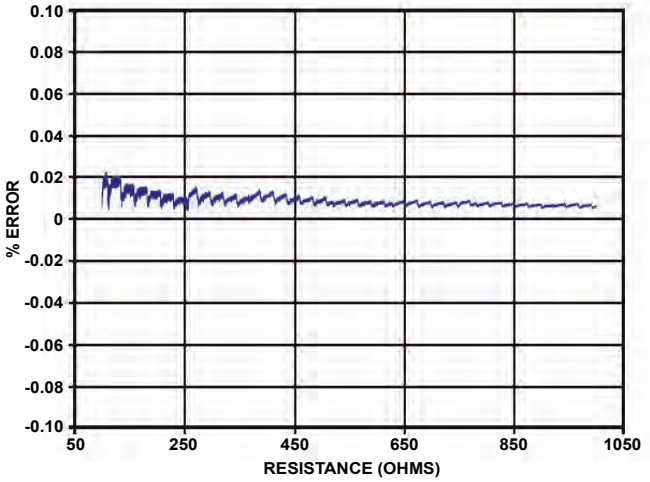
Function:	Supports 4 terminal measurements of all the channels in the module. Modules can be cascaded together to permit single DMM to support multiple modules with resistor channel connected to UUT.
Software support:	Supplied with software that accepts a resistance instruction.

Power

+3.3V	+5V	+12V	-12V
0	0.2A	10mA	10mA

Physical Parameters

Physical characteristics:	One slot, 3U PXI. Weight: 280g 3D models in a variety of popular file formats are available on request.
PCI Interface:	33MHz, 32-bit address, 16 bit data.
Connectors:	15-way male D-type for resistor channels. 9-way male D-type for calibration connection.



Typical accuracy of 40-260 over the entire resistance range measured at 21˚C

Performance is measured in 10mΩ increments by making a resistance call (in Ohms) to the module and then measuring the actual resistance with a DMM. Vertical axis shows the reading error as % of the requested value.

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Product Order Codes

3 Channel Precision Resistor 90Ω to 8kΩ	**40-260-001**

Accessories:

Calibration port to DMM lead (shrouded 4mm bayonet plug)	
for single module (1x9way D-type)	**40-975-009-SL1**
for two modules (2x9way D-types)	**40-975-009-SL2**
for three modules (3x9way D-types)	**40-975-009-SL3**

(calibration leads capable of supporting a greater number of modules are available, please contact sales office)

Mating Connectors & Cabling

For connection accessories for the 40-260 please refer to the **90-010D** 15-way D-type and **90-003D** 9-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

The 40-260 uses innovative techniques which are the subject of protected Pickering Interfaces intellectual property rights.

40-261
Precision Programmable Resistor Module

- Precision Variable Resistance From 1.5Ω
- 2 Channels Per Module
- Fine Setting Resolution <2mΩ or 15mΩ
- Short and Open Circuit Simulation
- Low Thermo-electric EMF Errors
- Simple Calibration With External DMM
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-261 is a new generation of PXI based programmable resistors that features high resistance setting resolution and excellent resistance stability and accuracy through the use of innovative switching networks and software correction techniques.

Each module supports two identical resistor channels that can be set to values of between 1.5Ω to 2.9kΩ or 10Ω to 36kΩ with a precision of better than 2mΩ (40-261-001) or 15mΩ (40-261-002) making the 40-261 ideal for simulating sensors that can be accurately controlled to fine values. Thanks to the use of innovative technology the 40-261 ensures all resistance values can be set – no missing values because of switch resistance or resistor tolerance. Applications include air bag squib, strain gauge and temperature dependent resistor emulation.

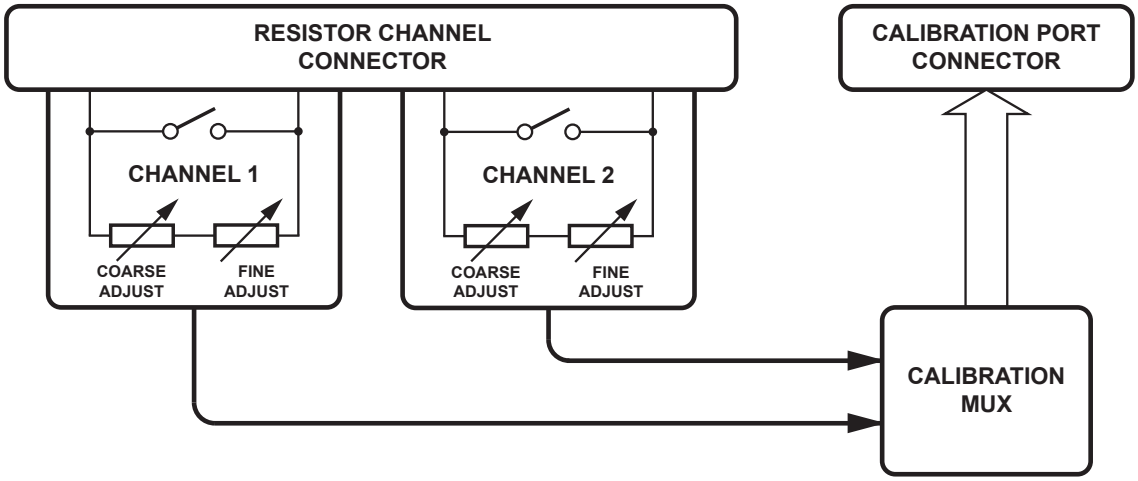
Each channel is fully isolated from the chassis ground and each other, allowing the resistor chains to be used in floating systems.

The 40-261 provides a convenient system to support calibration of the resistance value for each chain using an external DMM .The calibration system permits modules to be cascaded so just one DMM can support the calibration of multiple devices. Calibration can be performed while the UUT is connected to the resistor channel connector.

Use of special switching techniques reduces measurement errors caused by thermo-electric emf's to a minimum

The 40-261 occupies just one 3U PXI slot and can be supplied with other resistance ranges.

For applications requiring a higher starting resistance the 40-260 offers a solution with three channels in each module.



Functional Diagram for the 40-261 Precision Programmable Resistor Module

Specification

Resistor Channels

Configuration:	2 per module.
Resistance Range	1.5Ω to 2.9kΩ (40-261-001) 10Ω to 36kΩ (40-261-002)
Resistance Resolution:	<2mΩ, (40-261-001) <15mΩ, (40-261-002) continuous resolution, no missing settings.
Resistance Accuracy:	±0.08% ±70mΩ from 12°C to 32°C Typical temperature coefficient 4mΩ per °C (low resistance settings)
Short Circuit Setting:	<0.1Ω initial
Open Circuit Setting:	$>10^9\Omega$
Maximum Power:	100mW
Maximum Voltage:	100V or as limited by power
Thermo-electric emf:	<2μV 1.5Ω to 18Ω (40-261-001) 10Ω to 220Ω (40-261-002) <5μV >18Ω (40-261-001) >220Ω (40-261-002)
Resistance - power off:	Open circuit
Operating Time:	3ms typical

Calibration Channel

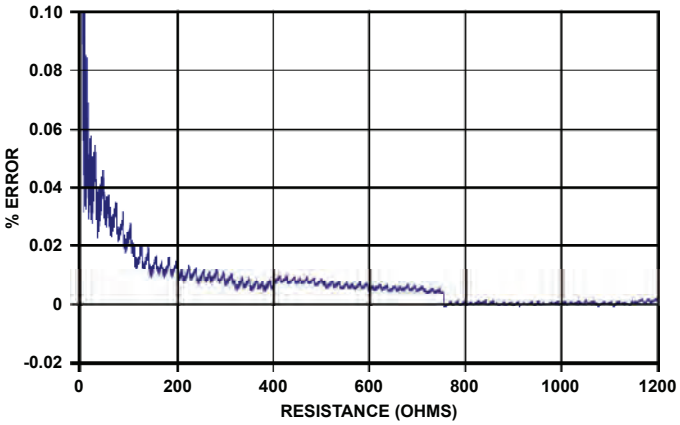
Function:	Supports 4 terminal measurements of all the channels in the module. Modules can be cascaded together to permit single DMM to support multiple modules with resistor channel connected to UUT.
DMM:	DMM with 10mA source current measurement capability recommended.
Software support:	Supplied with software that accepts a resistance instruction.

Power

+3.3V	+5V	+12V	-12V
0	0.2A	0	0

Physical Parameters

Physical characteristics:	One slot, 3U PXI. 3D models in a variety of popular file formats are available on request.
PCI Interface:	33MHz, 32-bit address, 16 bit data.
Connectors:	15-way male D-type for resistor channels 9-way male D-type for calibration connection.



Typical accuracy of 40-261 over the entire resistance range measured at 21˚C

Performance is measured in 10mΩ increments by making a resistance call (in Ohms) to the module and then measuring the actual resistance with a DMM. Vertical axis shows the reading error as % of the requested value.

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Product Order Codes

2 Channel Resistor 1.5Ω to 2.9kΩ	**40-261-001**
2 Channel Resistor 10Ω to 36kΩ	**40-261-002**

Accessories:

Calibration port to DMM lead (shrouded 4mm bayonet plug)	
for single module (1x9way D-type)	**40-975-009-SL1**
for two modules (2x9way D-types)	**40-975-009-SL2**
for three modules (3x9way D-types)	**40-975-009-SL3**

(calibration leads capable of supporting a greater number of modules are available, please contact sales office)

Mating Connectors & Cabling

For connection accessories for the 40-261 please refer to the **90-010D** 15-way D-type and **90-003D** 9-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

The 40-261 uses innovative techniques which are the subject of protected Pickering Interfaces intellectual property rights.

40-262
RTD Simulator Module

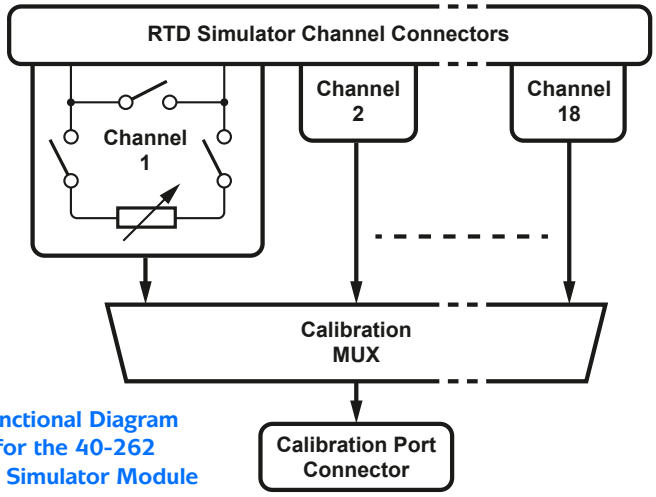
- Choice of 6, 12 or 18 Channels of Accurate RTD Simulation
- PT100 or PT1000 Versions
- Simple Control By Resistance Calls
- High Accuracy and Fine Resistance Control
- Short and Open Circuit Simulation
- Simple Calibration With External DMM
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Ethernet Chassis
- 3 Year Warranty

The 40-262 is a 3U PXI module that supports 6 (in one slot), 12 or 18 (in two slots) channels of RTD simulation. Each simulation channel is able to provide a short or open circuit setting to simulate faulty wiring connections to a sensor. The module is a cost effective method of simulating PT100 or PT1000 RTDs.

Each module can be specified with a resistance range of either 90Ω to 250Ω suitable for PT100 simulation (40-262-001/201/101), or 900Ω to 2500Ω suitable for PT1000 simulation (40-262-002/202/102). Both resistance ranges are suitable for simulating a temperature range of approximately -25°C to 410°C for their given sensor type. The use of resistance value calls makes programming simple, an API to convert temperature requests to resistance calls using a model of the sensor being used is also available.

Each channel can operate with a differential input voltage range of greater than ±15V relative to a defined common mode voltage. The common mode voltage can be set to 0V, (input range of at least ±15V), +12V (input range of -3V to +27V), -12V (input range of -27V to +3V) or an external common mode source of up to ±50V.

The 40-262 provides a convenient system to support verification of the resistance for each channel using an external DMM connected to the Calibration port. The calibration system permits modules to be cascaded so just one DMM can support the verification of multiple devices and resistor channels in-situ. Verification can be performed while the UUT is connected to the resistor channel connector.



Functional Diagram for the 40-262 RTD Simulator Module

Pickering's Range of PXI Precision Resistor Modules					
Model	**Description**	**Chan.**	**Range**	**Resolution**	**Accuracy**
40-260	Precision Programmable Resistor	3	90Ω to 8kΩ	<10mΩ	0.1%
40-261		2	1.5Ω to 2.9kΩ or 10Ω to 36kΩ	<2mΩ or <15mΩ	0.08%
40-262	RTD Simulator	6, 12 or 18	90Ω to 250Ω or 900Ω to 2500Ω	<8mΩ or <90mΩ	0.1%
40-265	Strain Gauge Simulator	6	350Ω, 1kΩ, 1.5kΩ, 2kΩ or 3kΩ	<2mΩ, <10mΩ, <12.5mΩ, <20mΩ or <25mΩ	0.03% or 0.06%
40-297	High Density Precision Resistor	3, 4, 6, 9 or 18	Up to 1.51MΩ	0.125Ω, 0.25Ω, 0.5Ω, 1Ω or 2Ω	0.2%
Standard Resistor Modules					
For applications that do not require the precision or accuracy of our precision range, look to our Standard Resistor range which includes models 40-280/1/2, 40-290/1, 40-292, 40-293, 40-294 and 40-295/6					
Custom Resistor Modules					
If our range of Resistor Modules does not meet your specific requirements, please contact you local sales office to discuss your application. Customizations include: different start and stop values, current, power, voltage, precision, accuracy, number of channels, connector etc.					

Specifications

Simulation Channels

	40-262 Builds					
	-001	-201	-101	-002	-202	-102
Simulated Sensor Type	PT100			PT1000		
Number of Channels	18	12	6	18	12	6
Number of PXI Slots	2		1	2		1
Resistance Range	90Ω to 250Ω			900Ω to 2500Ω		
Resistance Resolution†	<8mΩ			<90mΩ		
Simulated Temperature Range	-25°C to +410°C					
Simulated Temperature Resolution†	<0.03°C					
Accuracy‡	0.1%					

† Continuous resolution, no missing setting.

‡ @ ±10°C from calibration temperature (factory calibration @ 21°C).

Short Circuit Resistance: 0.1Ω typical

Open Circuit Setting: >10^9Ω

Operating Voltage:

Common mode voltage	Input voltage range
0V	-15V to +15V
+12V	-3V to +27V
-12V	-27V to +3V
External	Exernal ±15V

Common mode voltage can be selected by software control. Default value is 0 Volts. Damage level is a differential voltage level of ±18V wrt common or the maximum power rating, whichever is lower.

Ext common mode voltage: ±50V

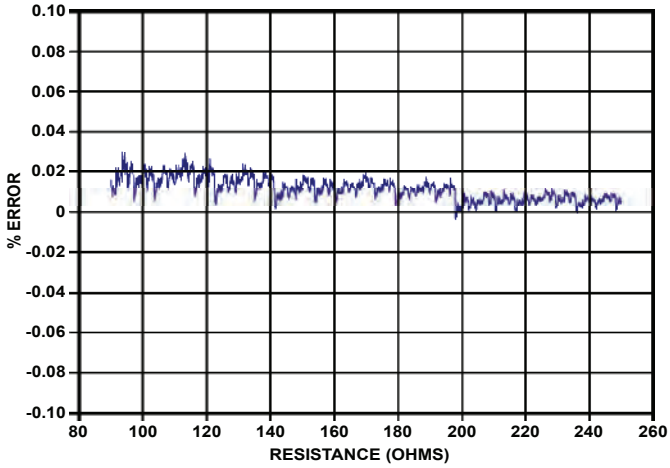
Maximum power: 100mW

Thermo-electric emf: <3µV

Resistance - power off: Open circuit

Operating time: 3ms typical*

* The total operate time when setting a resistance may vary depending upon the change requested due to relay sequencing.



Typical accuracy of 40-262 over the entire resistance range measured at 21˚C

Performance is measured in 10mΩ increments by making a resistance call (in Ohms) to the module and then measuring the actual resistance with a DMM. Vertical axis shows the reading error as % of the requested value.

Calibration Port

Function: Supports 4 terminal measurements of all the channels in the module. Modules can be cascaded together to permit single DMM to support multiple modules with simulation channel connected to UUT.

Software support: Supplied with software that accepts a resistance instruction.

Power

+3.3V	+5V	+12V	-12V
0	0.6A (40-262-1xx) 1.0A (40-262-2xx) 1.4A (40-262-0xx)	10mA	10mA

Physical Parameters

Physical characteristics: 3U PXI, 2 slots for 12 & 18 channel versions, 1 slot for 6 channel versions. 3D models for all versions in a variety of popular file formats are available on request.

PCI Interface: 33MHz, 32-bit address, 16 bit data.

Connectors: 15-way male D-type for simulation channels (1 per 6 channels), 9-way male D-type calibration port.

The 40-262 uses innovative techniques which are the subject of protected Pickering Interfaces intellectual property rights.

Product Order Codes

18ch 90Ω to 250Ω PT100 RTD Simulator	40-262-001
18ch 900Ω to 2500Ω PT1000 RTD Simulator	40-262-002
12ch 90Ω to 250Ω PT100 RTD Simulator	40-262-201
12ch 900Ω to 2500Ω PT1000 RTD Simulator	40-262-202
6ch 90Ω to 250Ω PT100 RTD Simulator	40-262-101
6ch 900Ω to 2500Ω PT1000 RTD Simulator	40-262-102

Accessories

Calibration port to DMM lead (shrouded 4mm bayonet plug)	
for single module (1x9way D-type)	40-975-009-SL1
for two modules (2x9way D-types)	40-975-009-SL2
for three modules (3x9way D-types)	40-975-009-SL3

(calibration leads capable of supporting a greater number of modules are available, please contact sales office)

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Other RTD Sensors

If you need to simulate other RTD devices please contact the local sales office or Pickering Interfaces direct with information on the RTD type and resistance or temperature range you need to cover.

Mating Connectors & Cabling

For connection accessories for the 40-262 please refer to the **90-010D** 15-way D-type and **90-003D** 9-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-265
Strain Gauge Simulator Module

- Simulates Resistive Strain Gauge Bridge Circuits
- 6 Simulators Per Module
- Simple Software Operation
- Fine Resistance Adjustment Over Full Operating Range
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-265 is a 6 channel strain gauge simulator that simulates the operation of a range of strain gauges making it ideal for testing strain gauge meters and a wide variety of industrial control systems. It provides a simple way of replacing in house developed sensors with a low cost simulator having excellent performance that is easy to calibrate and use. The 40-265 uses the same resistor bridge techniques that real life strain gauges are based on, ensuring accurate emulation of the strain gauge operation under all conditions.

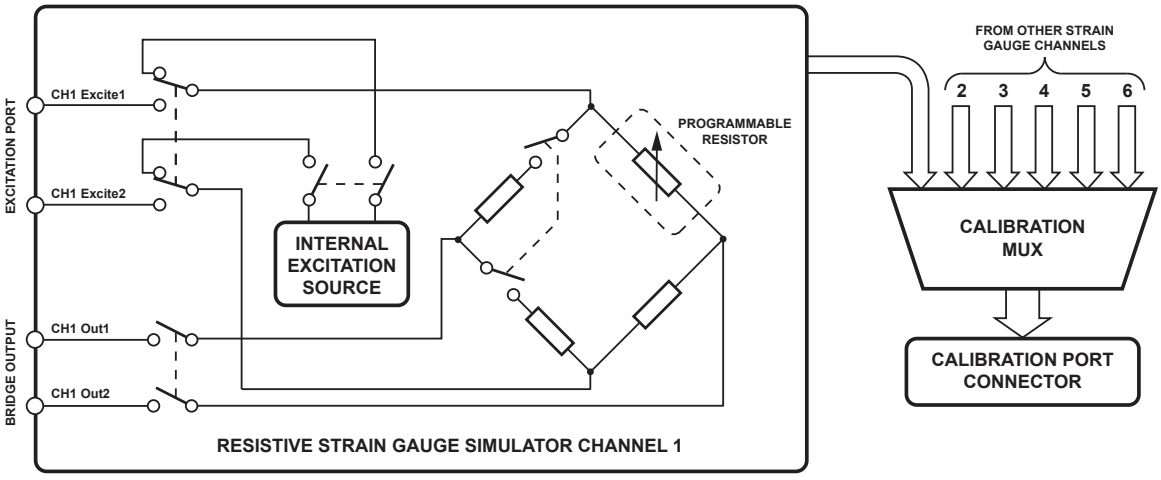
Each strain gauge simulator includes an independent input for the Excitation Voltage and a bridge output to simulate a strain gauge. The Excitation Voltage port can be driven by an AC or a DC source. The bridge circuit includes three fixed resistors and a fourth programmable resistor that can be adjusted over a narrow resistance range with fine adjustment capability and excellent accuracy. The adjustment range provided is sufficient to simulate quarter, half or full bridge circuits. The standard bridges are 350Ω, 1kΩ, 1.5kΩ, 2kΩ and 3kΩ, Pickering Interfaces can offer other resistance models of the strain gauge simulator and has a wide range of precision resistance modules that are suitable for simulating individual strain gauges. Please contact your local sales office for more information.

The strain gauge simulator is extremely simple to use, for each simulator the variable resistor element can be programmed using a simple resistance call. The module supplies the user with the resistance value required to balance the bridge, and the resistance call to the simulator can be varied above and below this value to simulate extension and compression of the strain gauge resistor.

The 40-265 provides a simple means of user verification using an external DMM via the calibration port where users can select any of the strain gauges to check their functionality without mechanically disconnecting the module from the test system. The calibration port can also be used to find the bridge balance setting using the internal DC excitation source.

Adjustment is not routinely required thanks to the factory calibration information and the excellent long term stability of the bridge system.

Pickering Interfaces can offer variations of this strain gauge simulator, including designs that simulate a resistor instead of a bridge. Please contact your local Pickering Interfaces sales office.



Functional Diagram for a single channel of the 40-265 Strain Gauge Simulator Module

Specifications

Strain Gauge Channels

	40-265 -016	40-265 -206	40-265 -406	40-265 -306	40-265 -106
Number of channels:	6 per module				
Channel Configuration:	Independent excitation ports and bridge output.				
Resistor Values:	350Ω	1kΩ	1.5kΩ	2kΩ	3kΩ
Variable Resistor:	±2%	±5.3%			
Resolution:	<2mΩ	<10mΩ	<12.5 mΩ	<20mΩ	<25mΩ
Variable Resistor Accuracy:	0.03%	0.06%			
Exitation Voltage:	Up to ±10V peak (relative to ground) 20V peak-to-peak, DC or AC †	Up to ±12V peak (relative to ground) 24V peak-to-peak, DC or AC †			
Bridge Output:	> ±0.45% of excitation voltage ‡	> ±1.25% of excitation voltage ‡			

† Internal ±5V DC source can be used. Excitation port is disconnected when card power is off.

‡ Bridge Output disconnected when card power is off.

Calibration Port

Function: Allows connection to any of the strain gauge bridges. Provides a simple means of checking the operation of any of the strain gauges and finding bridge balance points when internal excitation source is selected. Can be used for module verification procedures.

Also used by Pickering Interfaces for module adjustment.

Software support: Supplied with software that accepts a simple resistance instruction

Power

+3.3V	+5V	+12V	-12V
0	0.2A (0.55A max)	0.1A (0.2A max)	0.1A

Physical Parameters

Physical characteristics: One slot, 3U PXI.
Weight: 240g (40-265-016)
3D models in a variety of popular file formats are available on request.

PCI Interface: 33MHz, 32-bit address, 16-bit data.

Connectors: 26-way male High Density D-type for strain gauge channels,
9-way male D-type for calibration connection.

Other Resistor Modules

Pickering Interfaces manufacture a range of variable resistor modules in the PXI format. If you have a requirement for a variable resistor module please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Product Order Codes

6 Channel Strain Gauge Simulator 350Ω 40-265-016
6 Channel Strain Gauge Simulator 1kΩ 40-265-206
6 Channel Strain Gauge Simulator 1.5kΩ 40-265-406
6 Channel Strain Gauge Simulator 2kΩ 40-265-306
6 Channel Strain Gauge Simulator 3kΩ 40-265-106

Note: The 40-265-016 supersedes the 40-265-006. Both modules have the same functionality but the -016 has a resistor variation of ±2% whereas the -006 has a resistor variation of ±1%.

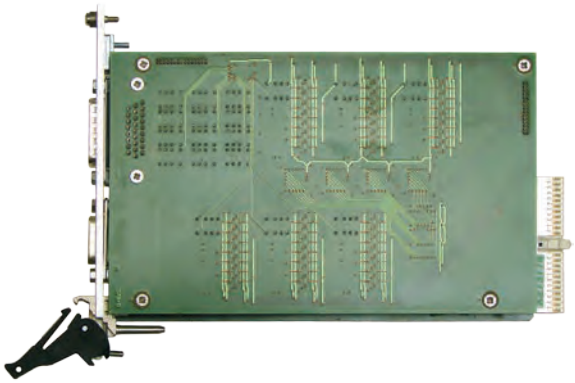
Accessories:

Calibration port to DMM lead (shrouded 4mm bayonet plug)
for single module (1x9way D-type) 40-975-009-SL1
for two modules (2x9way D-types) 40-975-009-SL2
for three modules (3x9way D-types) 40-975-009-SL3
(leads capable of supporting a greater number of modules are available, please contact sales office)

Mating Connectors & Cabling

For connection accessories for the 40-265 please refer to the **90-009D** 26-way D-type and **90-003D** 9-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

The 40-265 uses innovative techniques which are the subject of protected Pickering Interfaces intellectual property rights.



40-297
High Density Precision Resistor Module

- High Density Resistor Simulation
- Up To 18 Channels in a One Slot Module
- Resistance Resolution to 0.125Ω
- Values From 1Ω to 22MΩ
- Accuracy of ±0.2% ± Resolution
- Short and Open Simulation
- Simple Software Control Through Resistance Calls
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

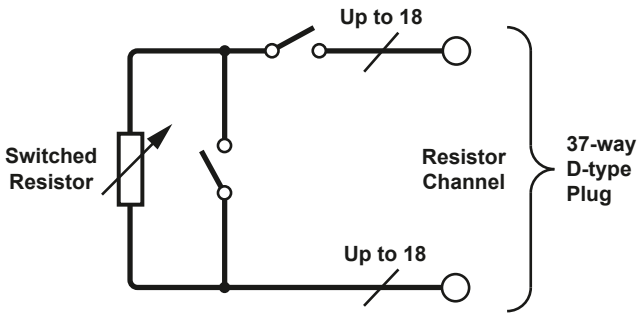
The 40-297 provides a simple solution for applications requiring accurate simulation of resistive sensors. The 40-297 is available in a variety of resistance ranges and resolution capabilities that meet the needs of most functional test systems. It is particularly well suited to applications such as the testing of engine controllers where resistive sensors provide information on parameters such as temperature.

Each channel of the 40-297 module is able to simulate the common short circuit and open circuit conditions that can be experienced in a system due to faulty wiring or sensors.

Software control of the 40-297 is simplified by the use of resistor value calls. The module works out the channel setting closest to the requested value and sets that value. The user can interrogate the module to find the actual resistance setting used by the module.

A calibration cable assembly can be attached to the module to enable an external DMM to be connected to each channel in turn to support the process of verification. This considerably simplifies the effort required to check the module's calibration. Verification is performed with the UUT disconnected from the module.

Pickering's Range of PXI Precision Resistor Modules					
Model	**Description**	**Chan.**	**Range**	**Resolution**	**Accuracy**
40-260	Precision Programmable Resistor	3	90Ω to 8kΩ	<10mΩ	0.1%
40-261		2	1.5Ω to 2.9kΩ or 10Ω to 36kΩ	<2mΩ or <15mΩ	0.08%
40-262	RTD Simulator	6 or 18	90Ω to 250Ω or 900Ω to 2500Ω	<8mΩ or <90mΩ	0.1%
40-265	Strain Gauge Simulator	6	350Ω, 1kΩ, 1.5kΩ, 2kΩ or 3kΩ	<2mΩ, <10mΩ, <12.5mΩ, <20mΩ or <25mΩ	0.03% or 0.06%
40-297	High Density Precision Resistor	3, 4, 6, 9 or 18	Up to 22.3MΩ	0.125Ω, 0.25Ω, 0.5Ω, 1Ω or 2Ω	0.2%
Standard Resistor Modules					
For applications that do not require the precision or accuracy of our precision range, look to our Standard Resistor range which includes models 40-280/1/2, 40-290/1, 40-292, 40-293, 40-294 and 40-295/6					
Custom Resistor Modules					
If our range of Resistor Modules does not meet your specific requirements, please contact you local sales office to discuss your application. Customizations include: different start and stop values, current, power, voltage, precision, accuracy, number of channels, connector etc.					



Functional Diagram for the 40-297 High Density Precision Resistor Module

The 40-297 is available in 50 standard builds that suit the most common configurations required:

- A narrow resistance range version, available in 9 or 18 channel variants.
- A medium resistance range version, available in 4 or 9 channel variants.
- A wide resistance range version, available in 3 or 6 channel variants.

For applications requiring greater resolution and accuracy, or to support verification with the UUT connected, users should consider the **40-260 series Precision resistor Modules**.

Specification

Accuracy:	±0.2% ±Resolution @ ±10°C from calibration temperature (factory calibration @ 21°C)
Fault Simulation:	Open and short circuit (typically <0.3Ω)
Power:	0.5W maximum
Number of Operations:	100 million (10mA)
Maximum Voltage:	100V or as limited by power
Settling time:	<3ms
Software Control:	By resistance calls to module for selected channel.
Calibration:	4-wire resistance measurement of selected channel for verification purposes with UUT removed and a special cable assembly attached. Factory calibration data is stored in the module.

Power Requirements

+3.3V	+5V	+12V	-12V
0	4.3A max	0	0

Physical Parameters

Physical characteristics:	One slot, 3U PXI. 3D models for all versions in a variety of popular file formats are available on request.
PCI Interface:	33MHz, 32-bit address, 16-bit data.
Signal Connectors:	Male 37-way D-type

Pickering Interfaces manufacture a large range of variable resistor modules in the PXI and PCI formats. If you require assistance in selecting the right resistor module for your application please contact your local sales office with the information below and we will advise you on the best solution for your application.

Lowest Resistance †	
Highest Resistance	
Resistance Resolution	
Overall Accuracy	
Maximum Power/Current	
Number of Channels (variable resistors)	

† Resistance is as measured across the user connector terminals, minimum resistance must have a non-zero value.

Resistor Module Order Codes

0.125Ω Resolution

Range	No. of Channels	Order Code	No. of Channels	Order Code
1Ω to 31.5Ω	9	**40-297-110**	18	**40-297-010**
1.5Ω to 472Ω	4	**40-297-120**	9	**40-297-020**
2Ω to 6.97kΩ	4	**40-297-130**	9	**40-297-030**
2.5Ω to 102kΩ	3	**40-297-140**	6	**40-297-040**
3Ω to 1.51MΩ	3	**40-297-150**	6	**40-297-050**

0.25Ω Resolution

Range	No. of Channels	Order Code	No. of Channels	Order Code
1Ω to 62.1Ω	9	**40-297-111**	18	**40-297-011**
1.5Ω to 925Ω	4	**40-297-121**	9	**40-297-021**
2Ω to 13.6kΩ	4	**40-297-131**	9	**40-297-031**
2.5Ω to 201kΩ	3	**40-297-141**	6	**40-297-041**
3Ω to 2.97MΩ	3	**40-297-151**	6	**40-297-051**

0.5Ω Resolution

Range	No. of Channels	Order Code	No. of Channels	Order Code
1Ω to 122Ω	9	**40-297-112**	18	**40-297-012**
1.5Ω to 1.81kΩ	4	**40-297-122**	9	**40-297-022**
2Ω to 26.7kΩ	4	**40-297-132**	9	**40-297-032**
2.5Ω to 395kΩ	3	**40-297-142**	6	**40-297-042**
3Ω to 5.82MΩ	3	**40-297-152**	6	**40-297-052**

1Ω Resolution

Range	No. of Channels	Order Code	No. of Channels	Order Code
1Ω to 239Ω	9	**40-297-113**	18	**40-297-013**
1.5Ω to 3.55kΩ	4	**40-297-123**	9	**40-297-023**
2Ω to 52.4kΩ	4	**40-297-133**	9	**40-297-033**
2.5Ω to 773kΩ	3	**40-297-143**	6	**40-297-043**
3Ω to 11.4MΩ	3	**40-297-153**	6	**40-297-053**

2Ω Resolution

Range	No. of Channels	Order Code	No. of Channels	Order Code
1Ω to 470Ω	9	**40-297-114**	18	**40-297-014**
1.5Ω to 6.97kΩ	4	**40-297-124**	9	**40-297-024**
2Ω to 102kΩ	4	**40-297-134**	9	**40-297-034**
2.5Ω to 1.51MΩ	3	**40-297-144**	6	**40-297-044**
3Ω to 22.3MΩ	3	**40-297-154**	6	**40-297-054**

Accessories

Calibration lead for 4-wire resistance measurement using DMM - 37-way D-type socket to shrouded 4mm bayonet plugs, 1Meter length 40-975-037-1m

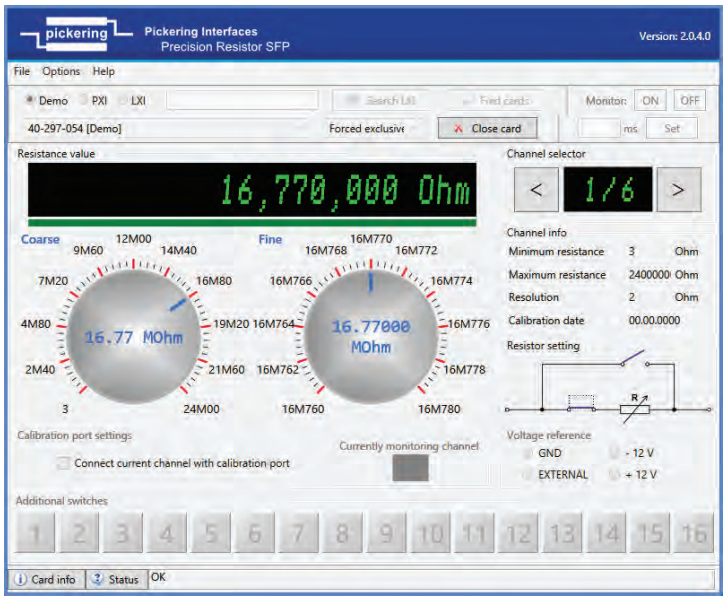
Mating Connectors & Cabling

For connection accessories for the 40-297 please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

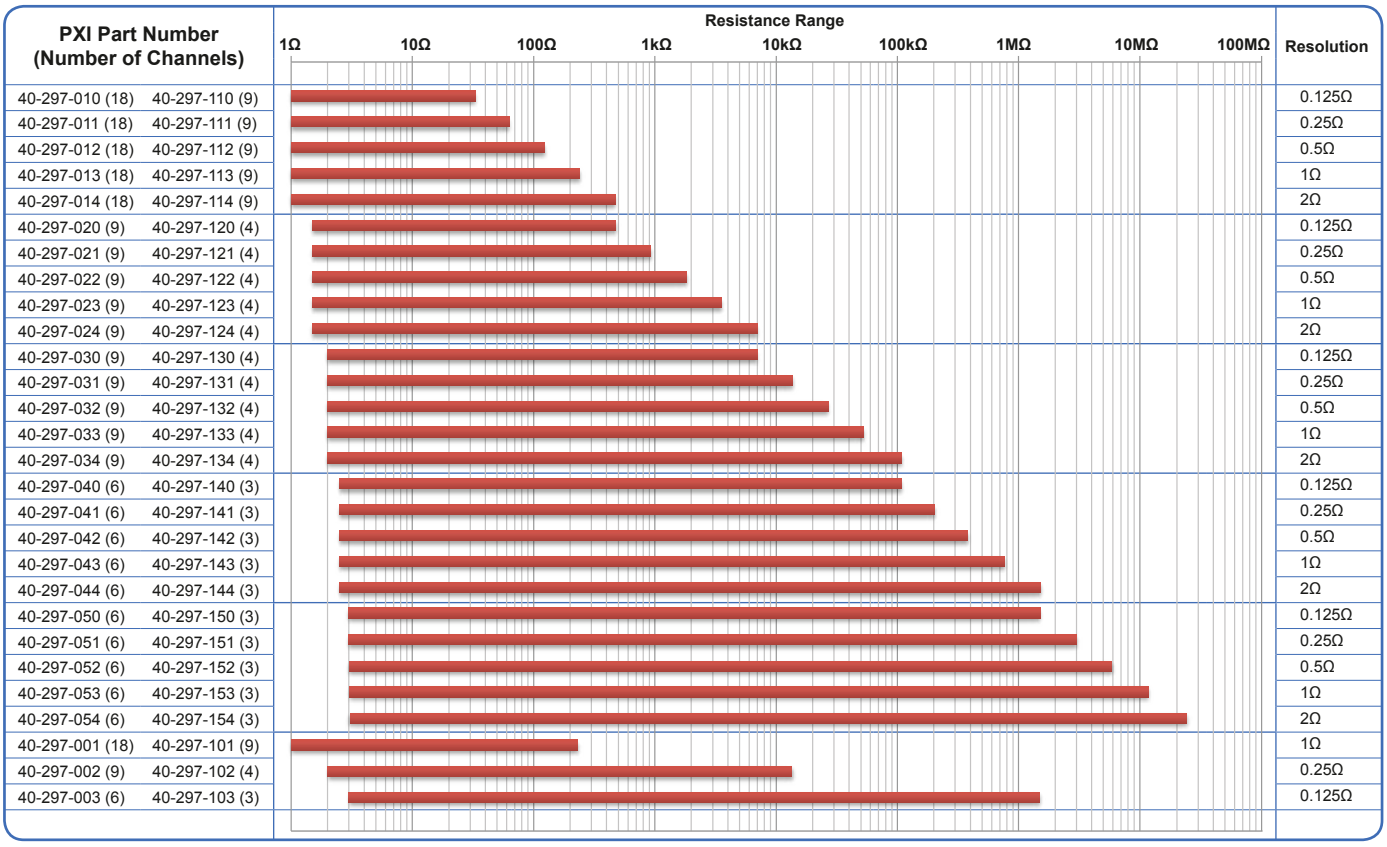
Legacy Support

Due to the new expanded range of builds available within the 40-297 family, the part numbering has been revised. Users are encouraged to order under the new part numbering system where possible. However, to support our existing users the following legacy part numbers are still available:

Resistor Module Description	Legacy Part Number	New Part Number
9 Channel Precision Resistor, 1Ω Resolution	40-297-101	40-297-113
18 Channel Precision Resistor, 1Ω Resolution	40-297-001	40-297-013
4 Channel Precision Resistor, 0.25Ω Resolution	40-297-102	40-297-131
9 Channel Precision Resistor, 0.25Ω Resolution	40-297-002	40-297-031
3 Channel Precision Resistor, 0.125Ω Resolution	40-297-103	40-297-150
6 Channel Precision Resistor, 0.125Ω Resolution	40-297-003	40-297-050



Soft Front Panel for the 40-297 Precision Resistor Module



Graphical Representation of the 40-297 Precision Resistor Module Range

Digital I/O Prototyping & Switch Simulators

- Versatile Range of Modules Including Digital I/O
- Versions With Breadboard Area for Prototyping
- Versions With Optically Isolated Input/Output For Interfacing to Electrically Noisy Environments
- TTL Inputs and Outputs Suitable for Interfacing to External Logic
- Open Collector Transistor Output Versions Suitable for Driving Internal or External Relay Coils
- Version With Programmable Input Threshold and High-Side or Low-Side Drive Capability
- Switch Simulator Modules are Designed for Dirty Contact Emulation in Automotive Test Applications
- VISA and Kernel Support For PXI Environments

This range of Digital I/O Modules are suitable for operating external devices, or for interfacing with external logic. Two choices of output driver are available: TTL for interacting with external logic and Open Collector Transistor for operating external devices with voltages to 50VDC and currents to 500mA.

The versions that incorporate a breadboard area allow the user to construct their own circuits for applications where a standard module is not available.

Optically isolated versions are intended for input-output functions in electrically noisy environments. All inputs and outputs share a common ground and have an isolation barrier of 500VDC. Power for the isolated input/output circuit can be supplied by the user or supplied by an optional on-board DC-DC converter.

40-413 Digital I/O Module with Programmable Threshold

40-410 32-Channel Digital I/O Module

Versions of I/O module are available with programmable input threshold which allows the user to set the voltage of the high and low states of incoming signals. Additionally, they have output channels that can be used as high-side drivers for sourcing current or low-side drivers for sinking current.

Switch Simulator Modules are designed for automotive test applications. They can simulate contaminated contacts or current leakage conditions enabling the correct operation of I/O devices to be tested.

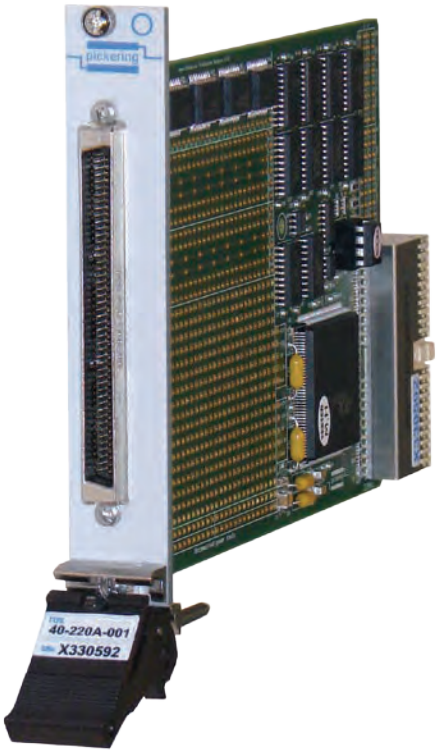
All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

Card Configuration	Number of Channels		Prototyping Area	Front Panel Connector	Order Code	Page
DIGITAL I/O MODULES						
Digital Input/Output Module	32 TTL I/P	32 TTL O/P	—	96-way	**40-410-001**	**8.8**
		32 O/C O/P			**40-410-002**	
Relay Driver Module	64 relay drive channels			78-way	**40-411-001**	**8.10**
Digital Input/Output Module with Programmable Threshold	32 I/P, 0.3V to 50V threshold	32 high or low-side drivers (0.4A source, 0.5A sink)			**40-412**	**8.12**
		32 high or low-side drivers (2A source, 2A sink)			**40-413**	**8.14**
Optically Isolated I/O Module With on board DC-DC converter	16 I/P	32 O/P		68-way	**40-490-001**	**8.16**
	16 TTL I/P				**40-491-001**	
Optically Isolated I/O Module No DC-DC converter	16 I/P				**40-490-002**	
	16 TTL I/P				**40-491-002**	
BREADBOARD & SWITCH SIMULATOR MODULES						
Breadboard Module with digital I/O (1 or 2 slot)	32 TTL I/P	32 TTL O/P	65²cm 0.1" grid	9, 15, 25, 37, 50, 78-way D-type, 96-way micro-D, 20-way GMCT or no connector	**40-220A**	**8.2**
Prototyping Module - no I/O (1 or 2 slot)	—	—			**40-225A**	
Breadboard Module with digital I/O and Power Distribution	32 TTL I/P	32 TTL O/P	0.1" grid	50-way D-type	**40-228**	**8.5**
Automotive Switch Simulator	8, 16 or 32 channel		—	37-way D-type	**40-480**	**8.18**
Dual Automotive Switch Simulator	Single or dual 8 or 16 channel				**40-485**	

40-220A/225A
Breadboard & Prototyping Module

- Versatile PXI Breadboard with 65²cm (10 Sq In) of Prototype Area
- Selection of Industry Standard Connectors Available
- Access to All PXI Power Supplies (+3.3, +5, +12 and -12VDC)
- Built-In Digital I/O 32-Bits Out, 32-Bits In, TTL or Transistor
- TTL Outputs Suitable for Driving External Logic
- Open Collector Transistor Outputs Suitable for Driving Internal or External Relay Coils
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- 3 Year Warranty

- 40-225A Prototype Module Has All Circuitry Removed



The 40-220A series of breadboard modules allow the user to construct their own circuit in situations where a PXI module is not available. For example when it is required to integrate a non-switching function into a PXI chassis. Typical applications include: Creating custom circuitry that can be housed in on a 3U board, or to build special "one-off" switching modules.

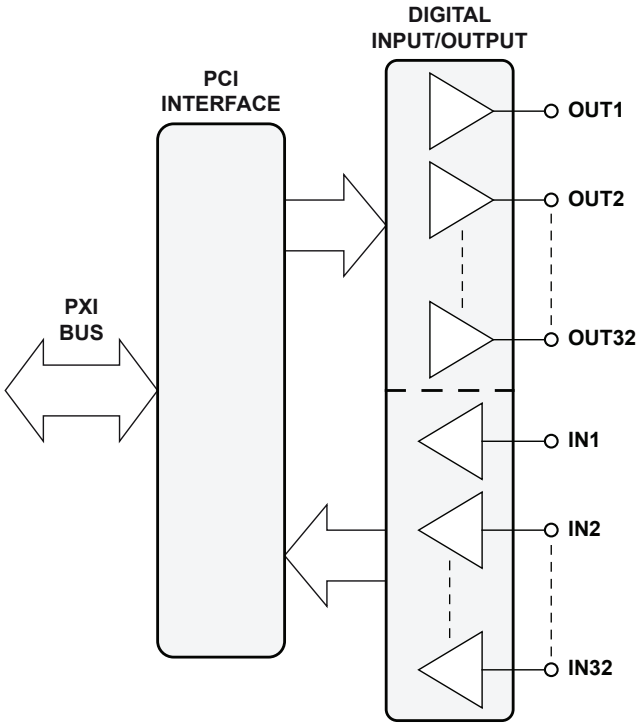
Two choices of output drive are available: TTL for interacting with external logic and Open Collector Transistor for operating external devices with voltages to 50VDC and currents to 500mA.

Writing and reading can be done at bit, byte or word level to simplify programming effort. Applications include generating control signals, stimulus and sensing status from digital devices.

Pickering can construct and test breadboard circuits to your exact specifications, please contact sales office to discuss your application in detail.

Typical Applications

- Construction of Special One-Off Circuits
- Programmable Amplifiers
- Programmable Attenuators
- Filters
- Special Circuits to Drive External Relays
- Mounting Special Relay Types
- Dummy Multiplexer Channels for Calibration Purposes



Digital I/O Capabillity Of The 40-220A Breadboard Module

General Specification (40-220A)

TTL Output Driver	
Maximum Drive:	15 TTL Inputs
Maximum Voltage:	7V
Maximum Current Drive:	Sink 8mA, Source 0.4mA
Operating Time:	<10µs

Open Collector Transistor	
Driver I.C.:	ULN2803LW O.C. driver
Maximum Standoff Volts:	50V
Maximum Power per o/p:	1.0W
Maximum Power per byte:	1.6W
Maximum Current Drive:	500mA
Operating Time:	<10µs

Digital Input (All Models)	
Maximum Standoff Volts:	7V
Nominal True Voltage:	>2.0V
Maximum Power per byte:	<0.8V
Data is strobed when the read operation executes	

Note: Care must be taken when interfacing the 40-220A module with external circuits which may produce high voltage spikes or RF interference. Additional noise protection may be required, please contact Pickering if you wish to discuss your requirement.

40-225A PXI Prototype Module

Pickering Interfaces also have a "stripped down" version, the 40-225A. This is a very basic, low cost, prototype module. It has no PXI interface, but does have access to fused power supplies from the PXI backplane.

Connector Details

The 40-220A/225A is available with either a blank panel or a selection of connector types.

Connector Type	Max Current	Max Voltage
96-way SCSI Plug	1A	250V
37-way D-type Plug	5A	500V
25-way D-type Plug	5A	500V
78-way D-type Plug	3A	250V
50-way D-type Plug	5A	500V
15-way D-type Plug	5A	500V
9-way D-type Plug	5A	500V
20-way GMCT Plug	13A	500V

General Breadboard Details

Square pad and DIP construction areas. Approximately 65^{2}cm (10 sq inches) of prototype area. 0.1" grid spacing.

Maximum Component Height:	13mm (single slot) 33mm (dual slot)
Maximum Lead Length Below PCB:	1.52mm (defined by PXI)
Maximum Lead Diameter:	0.7mm
Maximum Voltage:	300V

Uncommitted Power Rails / Bus Lines:

Maximum Lead Diameter:	0.7mm
Maximum Current:	4A
Maximum Voltage:	300V

Power Supply

Choice of all four PXI system voltages: +3.3V, +5V and ±12V.

Up to 5A for +3.3V and +5V, and 1A for ±12V (within the overall limit of the power supply).

The power supplies are fused at 5A for +3.3V and +5V, and 1A for ±12V.

Special versions with all supplies fused at 1A are available on request.

Connectors

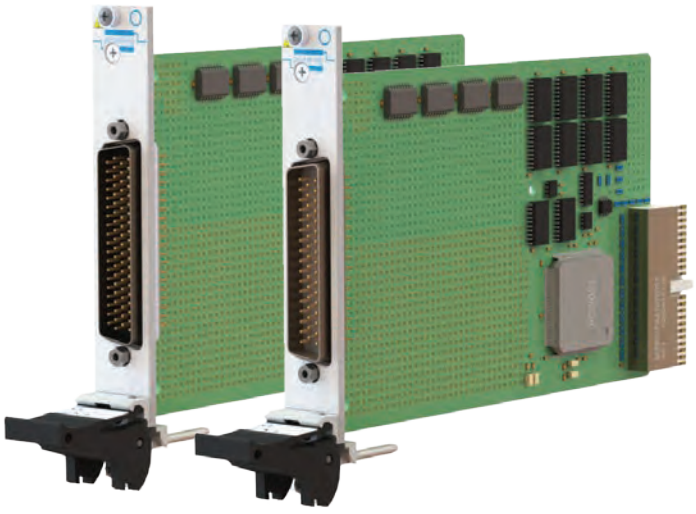
PXI bus via 32-bit P1/J1 backplane connector.
Signals via an option of front panel mounted connectors.

Power Requirements

Power consumption from the 5V backplane supply is as follows: 0.9W + 0.25W from User 5V.

Mechanical Characteristics

Single or dual slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.



40-220A Breadboard Modules With 78-way and 50-Way D-type Connectors - Examples of the Large Range of Connector Types Available

Product Order Codes

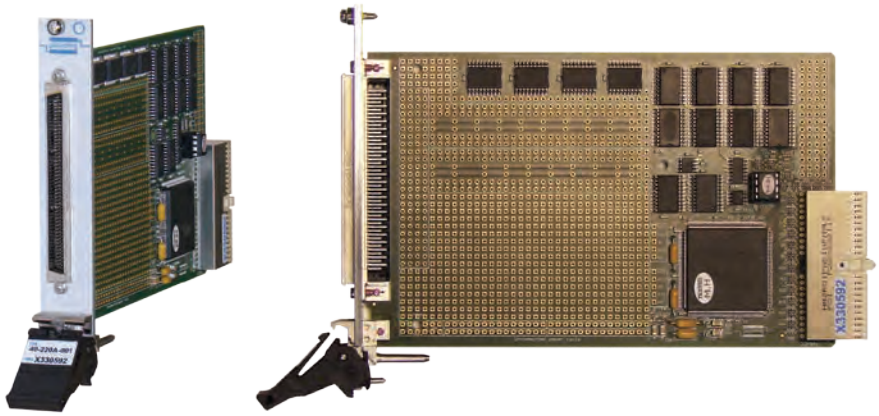
Breadboard Modules	Single Slot	Dual Slot
96-way SCSI Plug	**40-220A-001**	**40-220A-002**
No Connector	**40-220A-101**	**40-220A-102**
37-way D-type Plug	**40-220A-201**	**40-220A-202**
25-way D-type Plug	**40-220A-301**	**40-220A-302**
78-way D-type Plug	**40-220A-401**	**40-220A-402**
50-way D-type Plug	**40-220A-501**	**40-220A-502**
15-way D-type Plug	**40-220A-601**	**40-220A-602**
9-way D-type Plug	**40-220A-701**	**40-220A-702**
20-way GMCT Plug	**40-220A-801**	**40-220A-802**
Dual 20-way GMCT Plug	**40-220A-811**	**40-220A-812**

Prototype Modules	Single Slot	Dual Slot
No Connector	**40-225A-001**	**40-225A-002**
96-way SCSI Plug	**40-225A-101**	**40-225A-102**
37-way D-type Plug	**40-225A-201**	**40-225A-202**
25-way D-type Plug	**40-225A-301**	**40-225A-302**
78-way D-type Plug	**40-225A-401**	**40-225A-402**
50-way D-type Plug	**40-225A-501**	**40-225A-502**
15-way D-type Plug	**40-225A-601**	**40-225A-602**
9-way D-type Plug	**40-225A-701**	**40-225A-702**
20-way GMCT Plug	**40-225A-801**	**40-225A-802**
Dual 20-way GMCT Plug	**40-225A-811**	**40-225A-812**

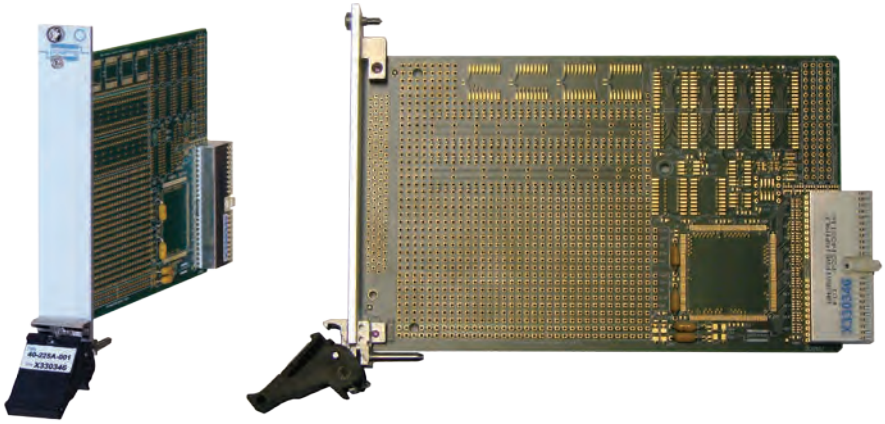
Mating Connectors & Cabling

For connection accessories for the 40-220A/225A series please refer to the connector data sheets listed below, where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Connector Type	Data Sheet
96-way SCSI Plug	**90-016D**
37-way D-type Plug	**90-007D**
25-way D-type Plug	**90-008D**
78-way D-type Plug	**90-006D**
50-way D-type Plug	**90-005D**
15-way D-type Plug	**90-010D**
9-way D-type Plug	**90-003D**
20-way GMCT Plug	**90-014D**



40-220A-001 Breadboard Module - Version With 96-way SCSI Style Connector



40-225A-001 Prototype Module - Version With no Connector Fitted
The Prototype Module is for the construction of circuits which do not need a PXI interface, just power supplies (with fuse protection)

40-228
Digital I/O Module
With Power Distribution

- Versatile PXI Breadboard With Prototype Area
- Built-In Digital I/O, 32-Bits Out, 32-Bits In
- TTL Outputs Suitable for Driving External Logic
- Open Collector Outputs For High Current Drive
- Switched +12V, +5V, +3.3V and -12V Power Supply Outputs
- DC-DC Converter Option For Additional Power Supply Output
- VISA & Kernel Drivers Supplied for Windows
- 3 Year Warranty

The 40-228 provides 32 channels of digital input and 32 channels of digital output, together with switched +12V, +5V, +3.3V and -12V supply outputs derived from the PXI backplane. The module is available fitted with a DC-DC converter (40-228-001) which provides an additional -5V supply ouput. Alternatively the module can be supplied with an industry standard footprint for a DC-DC converter (40-228-002) allowing the user to fit one of their own specification if required.

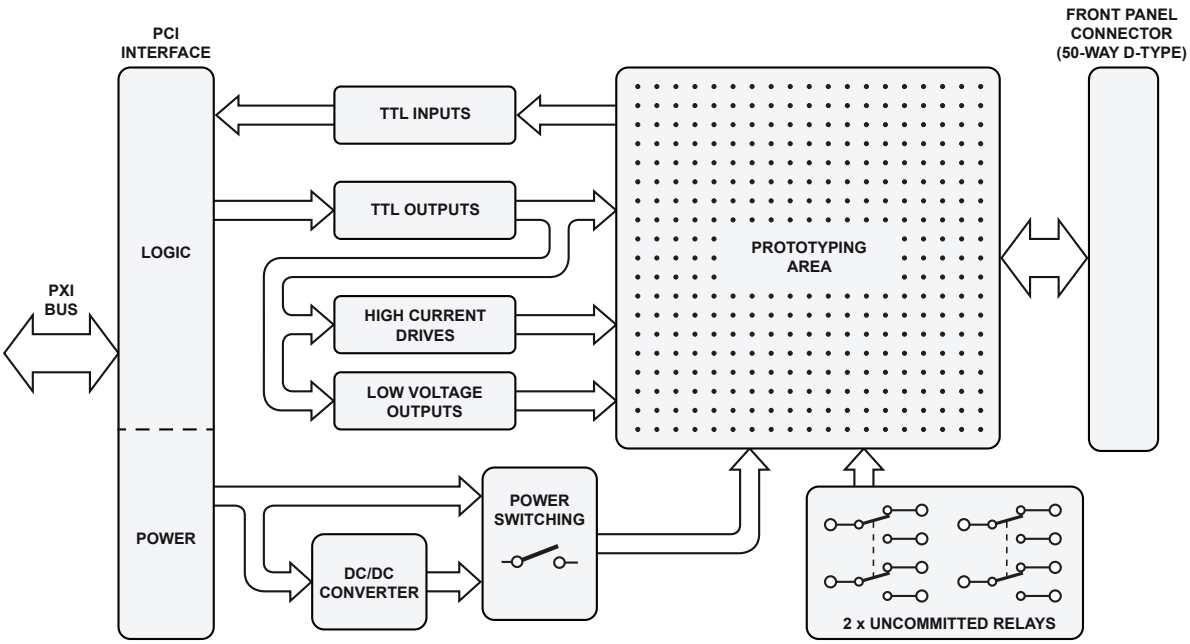
The 40-228 includes a breadboard area that allows users to add their own circuitry to the module.

Writing and reading can be done at bit, byte or word level to simplify programming effort. Applications include generating control signals, stimulus and sensing status from digital devices.

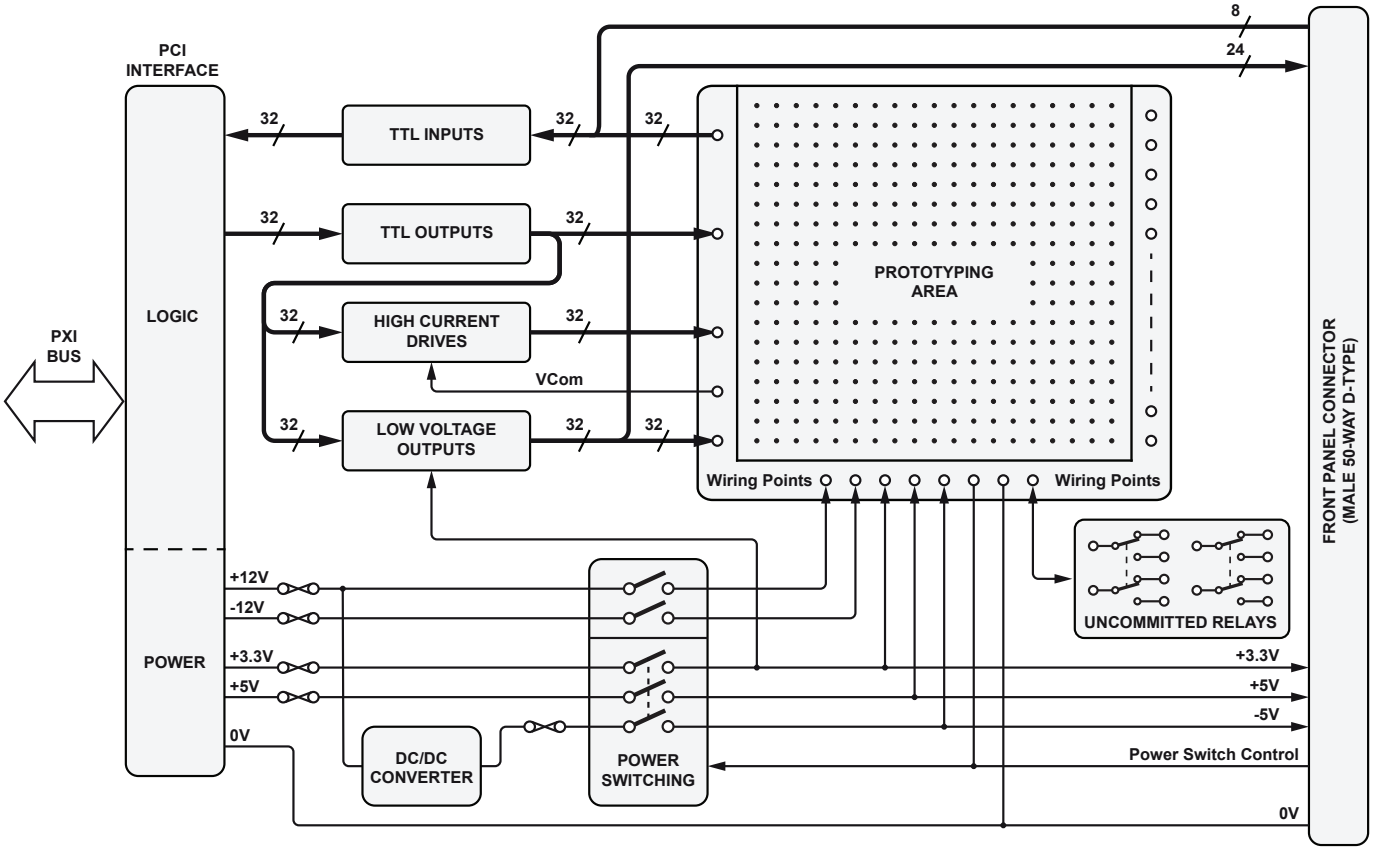
The switched power supply outputs on the 40-228-001 are controlled using a single externally applied signal to the front panel, providing a simple means of controlling the supplies, while also providing a safety interlock as if the front panel connection is removed the supplies shut down.

Typical Applications

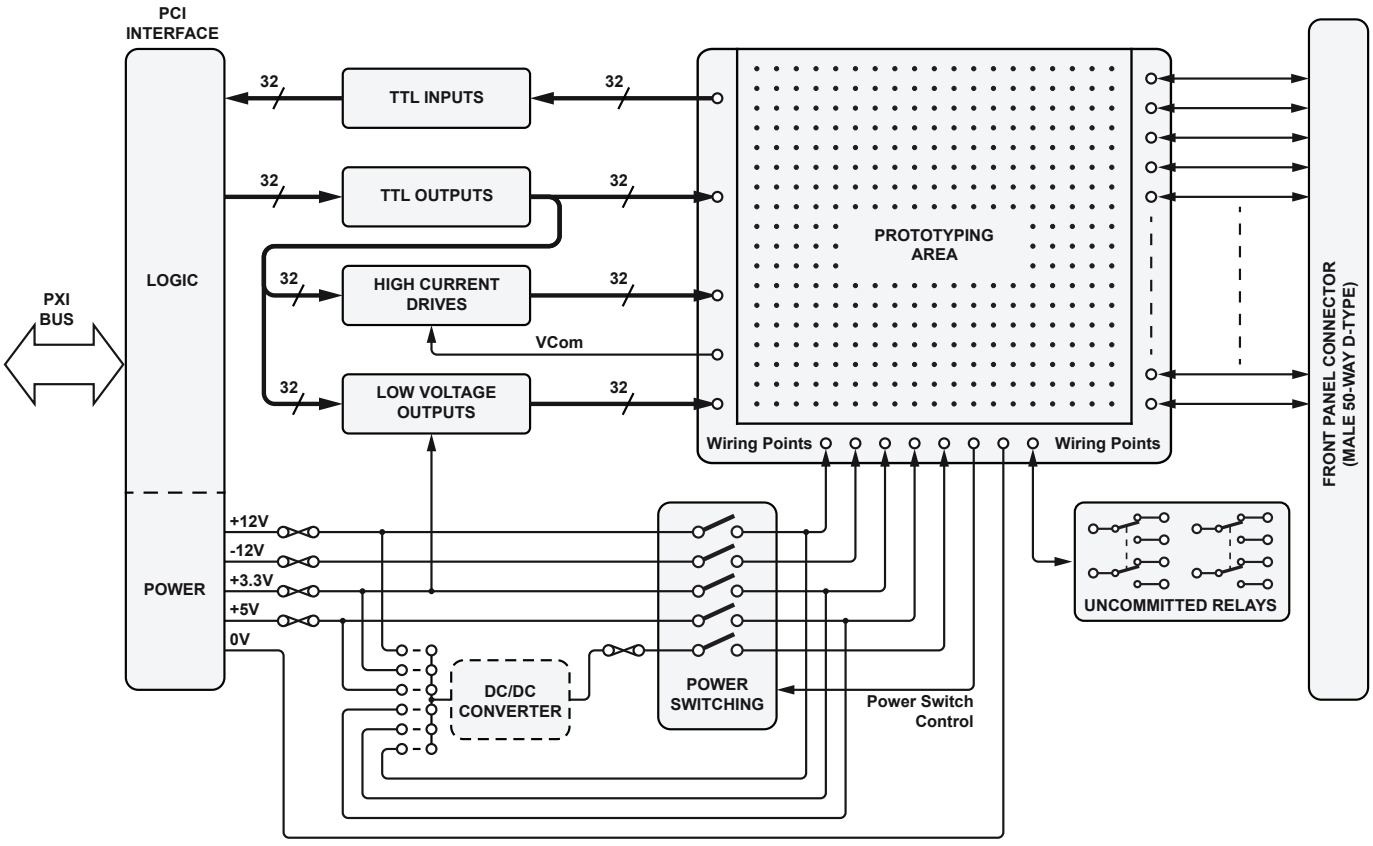
- Construction of Special One-Off Circuits
- Programmable Amplifiers
- Programmable Attenuators
- Filters
- Special Circuits to Drive External Relays
- Mounting Special Relay Types
- Dummy Multiplexer Channels for Calibration Purposes



40-228 Digital I/O Module With Power Distribution - Simplified Block Diagram



40-228-001 Digital I/O Module With Power Distribution (DC-DC Converter Fitted)



40-228-002 Digital I/O Module With Power Distribution (With Footprint For User Fitted DC-DC Converter)

General Specification

Digital Outputs	
Output Voltage:	5V
Sink Current:	24mA
Source Current:	24mA

Digital Outputs, Low Voltage	
Output Voltage:	3.3V
Sink Current:	24mA
Source Current:	24mA

Digital Outputs, Open Collector	
Output Voltage:	50V
Load Current:	500mA*
Power Dissipation, per output:	1W
Power Dissipation, per 8 output device:	2.5W

* Outputs may be paralleled to increase current capability.

Digital Inputs	
Maximum Standoff Volts:	7V
Nominal True Voltage:	>2.0V
Maximum Power per byte:	<0.8V
Data is strobed when the read operation executes	

Note: Care must be taken when interfacing the module with external circuits which may produce high voltage spikes or RF interference. Additional noise protection may be required, please contact Pickering if you wish to discuss your requirement.

Power Outputs

Choice of switched output voltages: +12V, +5V, +3.3V, -12V and -5V supplied from DC-DC converter (40-228-001).

Up to 4A for +3.3V and +5V, 1A for -5V and ±12V.

Output signals are controlled using an externally supplied 3.3V, 50mA, control line (40-228-001) or onboard output (40-228-002).

Breadboard Supply Rails

Choice of all four PXI system voltages: +3.3V, +5V and ±12V.

Up to 5A for +3.3V and +5V, and 1A for ±12V (within the overall limit of the power supply).

The power supplies are fused at 5A for +3.3V and +5V, and 1A for ±12V.

General Breadboard Details

Square pad and DIP construction areas, 0.1" grid spacing.

Maximum Component Height: 13mm (single slot)

Maximum Lead Length Below PCB: 1.52mm (defined by PXI)

Maximum Lead Diameter: 0.7mm

Maximum Voltage: 300V

Uncommitted Power Rails / Bus Lines:

- Maximum Lead Diameter: 0.7mm
- Maximum Current: 4A
- Maximum Voltage: 300V

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel mounted 50-way male D-type connector.

Power Requirements

+3.3V	+5V	+12V	-12V
20mA	200mA	30mA	0

Mechanical Characteristics

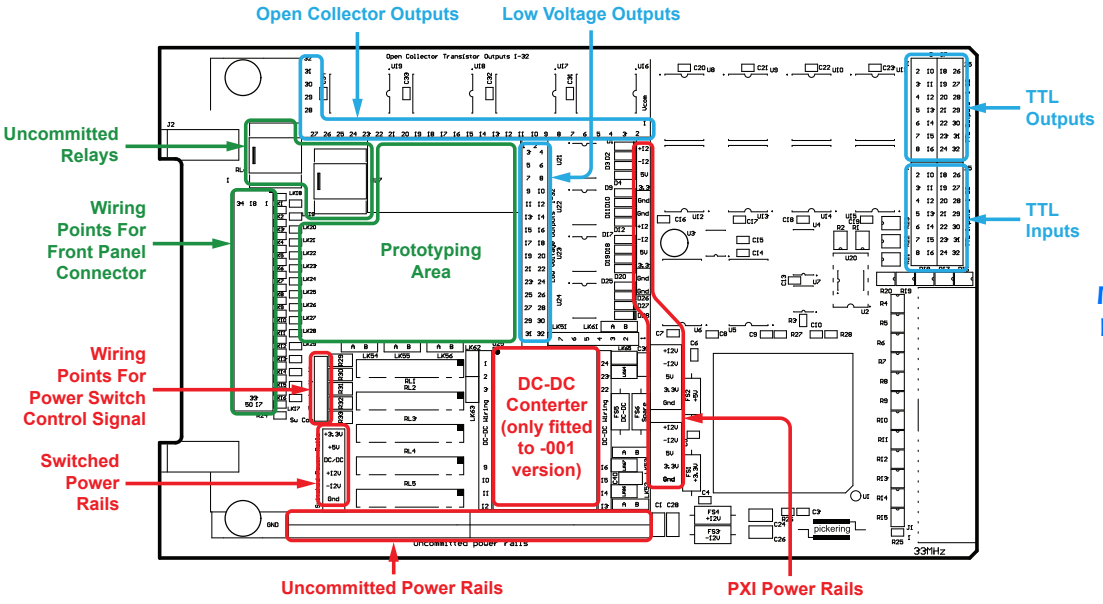
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Digital I/O Module With Power Distribution With DC-DC Converter	**40-228-001**
Digital I/O Module With Power Distribution Without DC-DC Converter	**40-228-002**

Mating Connectors & Cabling

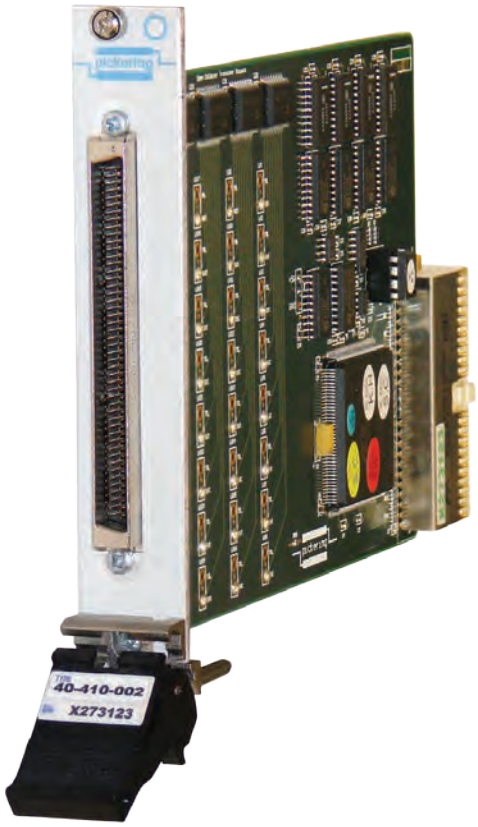
For connection accessories for the 40-228 module please refer to the **90-005D** 50-way D-type Connector and Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-228 Digital I/O Module With Power Distribution - Areas on PCB For User's Wiring

40-410
Digital I/O Module

- Digital I/O Module - 32-Bits Out, 32-Bits In
- Open Collector and TTL Output Versions
- Programmable By Bit, Byte or Word
- TTL Outputs Suitable for Driving External Logic
- Open Collector Transistor Outputs Suitable for Driving External Relay Coils
- Operating Speed <10µs
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

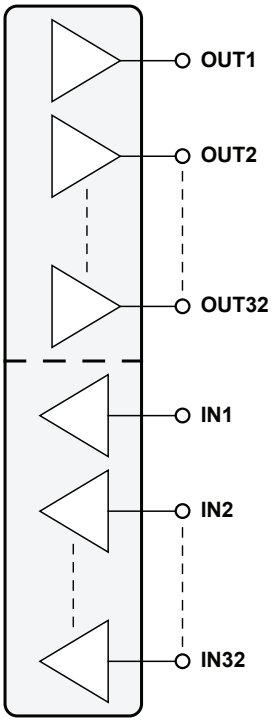


The 40-410 range of Digital I/O Modules are suitable for operating external devices, such as heavy duty relays (power, RF and high voltage types), solenoids and lamps, or for interfacing with external logic, e.g. a programmable instrument with a BCD interface.

Two choices of output drive are available: TTL for interacting with external logic and Open Collector Transistor for operating external devices with voltages to 50VDC and current to 500mA.

Writing and reading can be done at bit, byte or word level to simplify programming effort. Applications include generating control signals, stimulus and sensing status from digital devices.

If you would like to build your own circuitry into a digital I/O module then please look at our 40-220 Breadboard Module.



Digital I/O Capabillity Of The 40-410

General Specification

TTL Output Driver

Maximum Drive:	15 TTL loads
Maximum Voltage:	7V
Maximum Current Drive:	Sink 8mA, Source 0.4mA
Operate/Release Time:	<10µs

Open Collector Transistor

Driver I.C.:	ULN2803LW O.C. driver
Maximum Standoff Volts:	50V
Maximum Current Sink:	500mA single output per byte, 120mA all outputs on.
Operate/Release Time:	<10µs

Digital Input (All Models)

Input Range:	TTL input thresholds, absolute maximum input: -1.5V to +6.5V, ±20mA

Note: Care must be taken when interfacing the 40-410 module with external circuits which may produce high voltage spikes or RF interference. Additional noise protection may be required, please contact Pickering if you wish to discuss your requirement.

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0V	0.2A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel mounted 96-way male SCSI style micro-D connector.

Product Order Codes

Digital I/O Module	
32In/32 Out (TTL)	**40-410-001**
32In/32 Out (Open Collector)	**40-410-002**

Mating Connectors & Cabling

For connection accessories for the 40-410 please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-411
Relay Driver Module

- 64-Channel Relay Driver
- 60V Drive Capability, Up to 1A Per Channel
- Short Circuit and Thermal Protection
- Over Voltage Clamp
- High Current Capacity
- Switch With External or Internal Relay Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

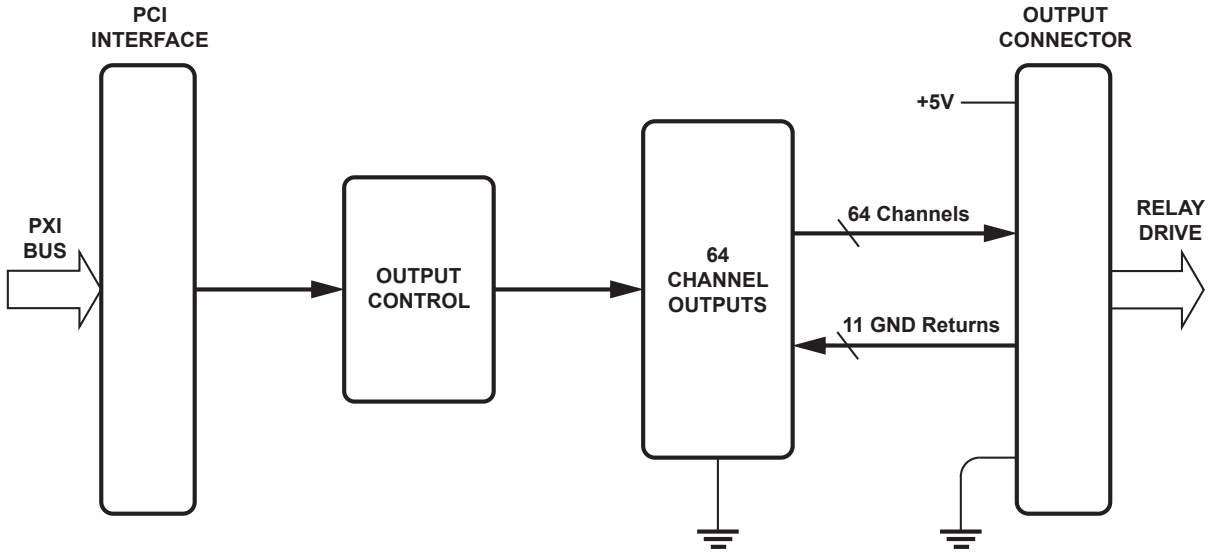
The 40-411 is the perfect solution for driving external relays from a PXI system or from Pickering Interfaces LXI modular chassis.

Each module provides 64 channels of low side switching for external relays. Users need to simply connect a positive voltage source to one side of the relay coil and the other side to the 40-411 output. Each output is capable of sinking up to 1 Amp of continuous current.

Each output is protected by current, thermal and overvoltage circuits. The thermal and current limit circuits protect the output from failure even when directly connected to voltages up to 36V. When switching relays inductive spikes from the load are clamped at 80V to dump relay coil energy of up to 550m Joule without the use of additional diode clamps.

Relay coil current is prevented from flowing back into the chassis backplane by the use of an isolation barrier.

Power for the relays can be supplied by the 40-411 for low power relay applications.



40-411 Relay Driver Functional Diagram

Specification

Number of Output Channels:	64
Typical Output Resistance:	0.6Ω (on state)
Off State Leakage Current:	3µA maximum at 12V (start up condition is open circuit).
Maximum Output Current:	1A on any channel, 25A module total.
Maximum Output Voltage:	60V (recommended maximum continuous voltage).
Output Protection:	Limits at 1.3A nominal Thermal limit activates at typically 1.5W in output device. Overvoltage clamp operates at 80V.
Internal Relay Voltage Source:	Three outputs each +5V at 2A. Overall maximum 6A, Polyfuse protected. 11 ground pins provided.
Output Connector:	78-pin male D-type.

PXI Characteristics

Backplane connection:	33MHz, 32-bit.
Mechanical:	3U, 1 slot. 3D models for all versions in a variety of popular file formats are available on request.

Power Requirements from PXI Power Supply

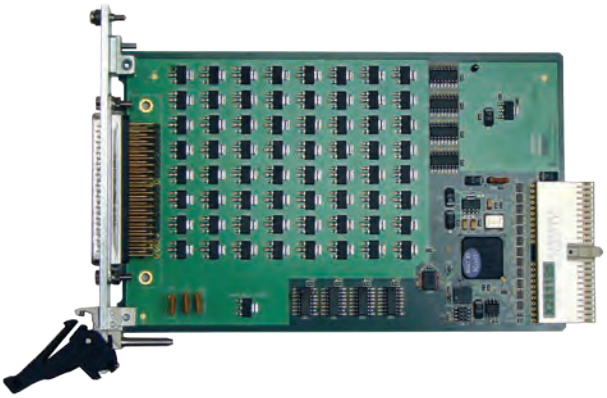
+3.3V	+5V	+12V	-12V
0.12A	0.05A †	0.15A	0

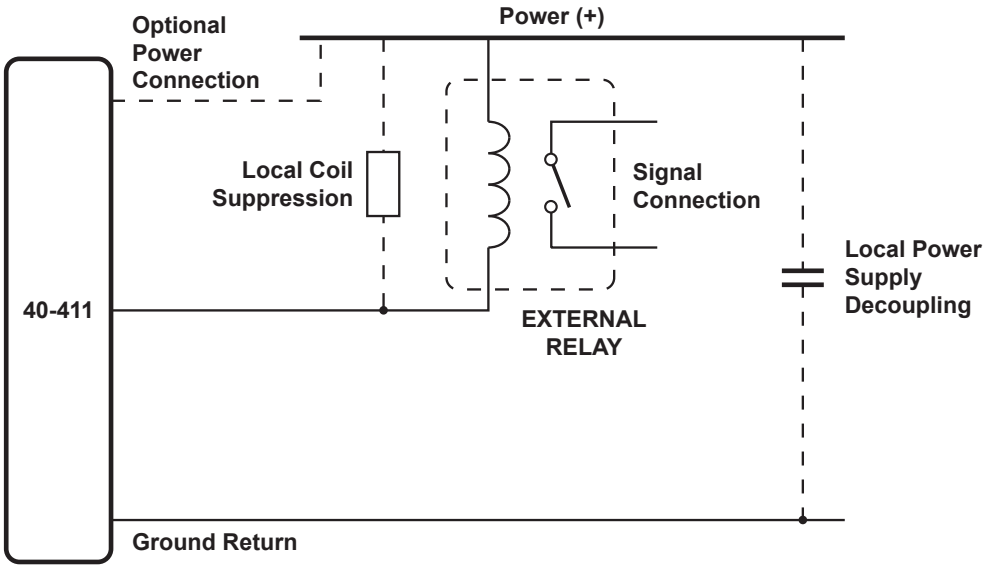
Product Order Codes

64-Channel Relay Driver Module	**40-411-001**

Mating Connectors & Cabling

For connection accessories for the 40-411 please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.





Using the 40-411 to drive an external relay.Local power supply decoupling for the relay and coil suppression circuits are reccommended for best EMC characteristics with high current relays, but are not essential for safe operation due to the built in protection system.

40-412
32 Channel Digital I/O - Programmable Threshold

- 32-Channel Input
- Dual Programmable Voltage Threshold, 0.3 to 50V
- Serial or Parallel Acquisition Versions
- High Input Voltage Tolerance

- 32-Channel Output
- High Side or Low Side Driving
- 0.5A Low Side Sink Capability
- 0.4A High Side Source Capability
- Fully Protected Outputs
- High Side External Voltage Input

- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-412 is a 32-channel Digital I/O module with high output voltage and current capability and a dual variable threshold input.

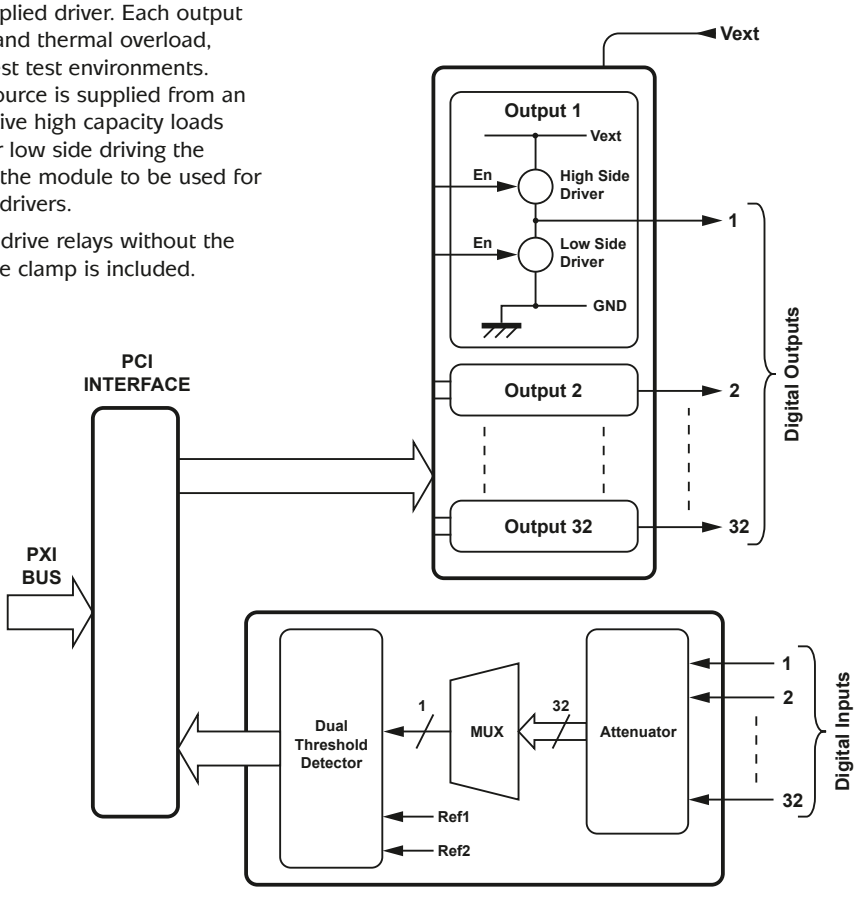
Each of the 32 channel outputs can be used to drive the output high or low using a high current capacity drive capable of sourcing 0.4A from the high side or 0.5A sink on the low side for each channel. Accidental operation of both the high and low side driver is prevented by the supplied driver. Each output is fully protected against over-voltage, over-current and thermal overload, ensuring robust and reliable operation in the toughest test environments. For high side voltage driving the high side voltage source is supplied from an external voltage source, permitting the module to drive high capacity loads without impacting the PXI chassis power supply. For low side driving the external source can be left unconnected, permitting the module to be used for applications served by open collector or open drain drivers.

The built in protection systems allow the module to drive relays without the use of flyback diodes if required since an overvoltage clamp is included.

The 32 input channels can be read back through the PXI interface by comparing the voltage to two threshold voltages that can be set between 0.3 and 50V by the user. The thresholds can be set with 12.5mV resolution, permitting the user to test the input against the system test limits that define a logic low or logic high. The 40-412 is supplied with one of two different read back methods. The 40-412-001 uses a series acquisition to capture the input status using a single set of comparators. The driver includes a facility to capture the input status of all 32 channels from a single command. The 40-412-111 uses 32 sets of comparators to synchronously capture all 32 input states and then reads the status in a single operation.

Each input can withstand the accidental application of high external voltage to greater than 100V. The inputs can be user connected to the driver outputs without risk of damage, allowing the module to be configured for operation as 32 channels of independent input and output or as 32 channels of configurable I/O.

The 40-412 provides it's I/O on an easy to use 78-pin D-type connector which is supported by a full range of connector accessories.



Functional Diagram 40-412-001 32-Channel Digital I/O Module With Serial Input Acquisition

Output Specification

No. of Output Channels:	32
Output States:	Driven high, driven low or off.
Low Side Driver Output Resistance:	0.6Ω at 0.5A
High Side Driver Output Voltage:	Vext less 1.5V at 0.4A
Maximum Current:	0.5A for Low Side drivers, 0.4A for High Side drivers, 10A module total (40-412-001), 8A module total (40-412-111),
Maximum Voltage:	+50V
Output Protection:	Current limited, overvoltage limited, thermal protection. Overvoltage limit can be used to limit back emf generated from inductive loads such as relay coils.
Vext:	User supplied +5V to +50V, applied to multiple pins of user connector, relative to front panel ground.

Input Specification

No. of Input Channels:	32
Logic Threshold:	Compares selected input voltage against two reference voltages, each of which can be set from 0.3 to 50V with 12.5mV setting resolution. 40-412-001 uses serial acquisition 40-412-111 uses faster parallel acquisition from a common pair of threshold voltages.
Settling Time (40-412-001):	50µs following a state change or channel selection. Typical read back time for all 32 states 1.3ms.
Settling Time (40-412-111):	5µs following a state change. Read back time for all 32 states 50µs typical.
Channel Selection:	Single channel selection or automated sequential access to all 32 channels.
Maximum Input Voltage:	100V
Input Impedance:	1MΩ

PXI Characteristics

Backplane connection:	33MHz, 32-bit.
Mechanical:	3U, 1-slot. Weight: 180g 3D models for all versions in a variety of popular file formats are available on request.
Front Panel I/O:	78 pin male D-type.connector

Power Requirements from PXI Power Supply

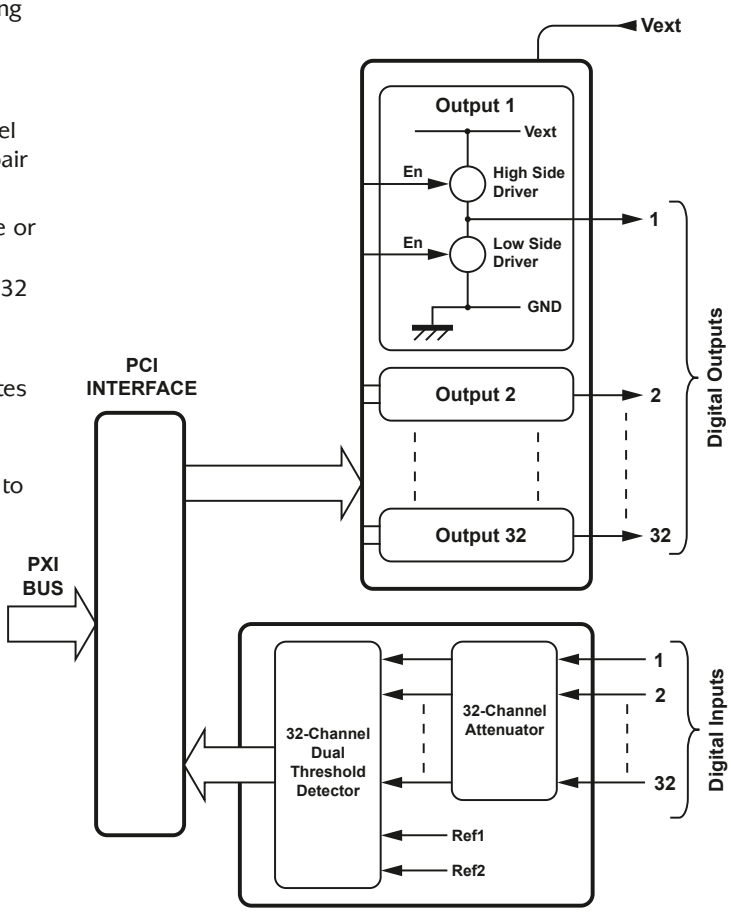
+3.3V	+5V	+12V	-12V
0V	0.1A	0.05A	0.05A

Product Order Codes

32-Channel Digital I/O Module - Serial Input Acquisition, Programmable Threshold	**40-412-001**
32-Channel Digital I/O Module - Parallel Input Acquisition, Programmable Threshold	**40-412-111**

Mating Connectors & Cabling

For connection accessories for the 40-412 please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Functional Diagram 40-412-111 32-Channel Digital I/O Module With Parallel Input Acquisition

40-413
32 Channel Digital I/O - Programmable Threshold

- 32-Channel Input
- Dual Programmable Voltage Threshold, 0.3 to 50V
- High Input Voltage Tolerance
- 32-Channel 40V Output
- 2A High Side Source Capability (40-413-001)
- 2A Low Side Sink Capability (40-413-002)
- 2A High & Low Side Drivers (40-413-003)
- Fully Protected Outputs
- High Side External Voltage Input
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

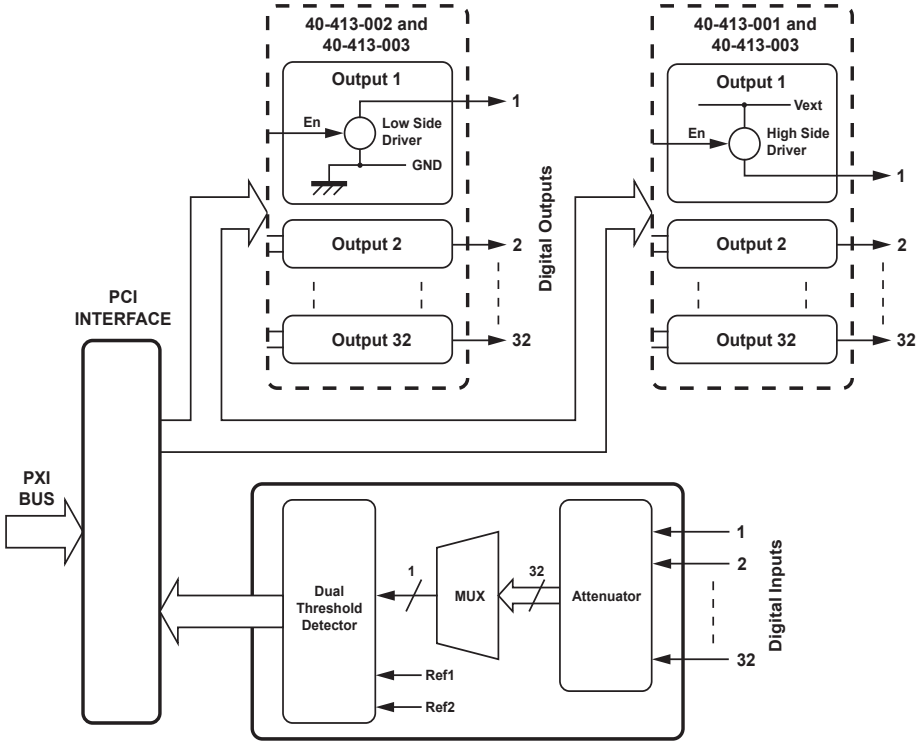
The 40-413 is a 32 channel Digital I/O module with high output voltage and current capability and a dual variable threshold input.

The 40-413 is available with three configuration versions – a high side only, a low side only and a combined high and low side – each capable of driving 2A loads. Each output is fully protected against over-voltage, over-current and thermal overload, ensuring robust and reliable operation in the toughest test environments. For high side voltage driving, the high side voltage source is supplied from an external voltage source permitting the module to drive high capacity loads without impacting the PXI chassis power supply.

The built in protection systems allow the module to drive relays without the use of flyback diodes if required, since an overvoltage clamp is included.

The 32 input channels can be read back through the PXI interface by comparing the voltage to two threshold voltages that can be set between 0.3 and 50V by the user. The thresholds can be set with 12.5mV resolution permitting the user to test the input against the system test limits that define a logic low or logic high. The driver includes a facility to capture the input status of all 32 channels from a single command. Each input can withstand the accidental application of high external voltage to greater than 100V. The inputs can be user connected to the driver outputs without risk of damage, allowing the module to be configured for operation as 32 channels of independent input and output or as 32 channels of configurable I/O.

The 40-413 provides it's I/O on an easy to use 78-pin D-type connector which is supported by a full range of cables and accessories.



40-413 32-Channel Digital I/O Module Functional Diagram

Output Specification

No. of Output Channels:	32
Output States:	High side only driver 40-413-001 Low side only driver 40-413-002 High and low side driver 40-413-003
Driver Current:	Capable of sourcing/sinking 2A, module limit of 20A continuous.
Driver Output Resistance:	40-413-001/002, <350mΩ 40-413-003, <350mΩ low side, <1.3V voltage drop high side at 2A
Output Voltage Range:	0 to 40V for low side drivers 11V to 40V (Vext) for high side drivers
Output Protection:	Current limited, overvoltage limited, thermal protection. Overvoltage limit can be used to limit back emf generated from inductive loads such as relay coils.
Vext:	User supplied 11V to 40V, applied on multiple pins (5A per pin) of user connector relative to front panel ground. High side driver automatically turns off if Vext is less than typically 9.5V.

Input Specification

No. of Input Channels:	32
Logic Threshold:	Compares selected input voltage against two reference voltages, each of which can be set from 0.3 to 50V with 12.5mV setting resolution.
Settling Time:	50µs following a state change or channel selection.
Channel Selection:	Single channel selection or automated sequential access to all 32 channels.
Maximum Input Voltage:	100V
Input Impedance:	1MΩ

PXI Characteristics

Backplane connection:	33MHz, 32-bit.
Mechanical:	3U, 1 slot. 3D models for all versions in a variety of popular file formats are available on request.
Front Panel I/O:	78-pin male D-type.connector

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0A	0.1A	0.05A	0.05A

Product Order Codes

32-Channel Digital I/O Module, High Side Drive, Programmable Threshold	**40-413-001**
32-Channel Digital I/O Module, Low Side Drive, Programmable Threshold	**40-413-002**
32-Channel Digital I/O Module, High & Low Side Drive, Programmable Threshold	**40-413-003**

Mating Connectors & Cabling

For connection accessories for the 40-413 please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-490/491
Opto Isolated Digital I/O Module

- Digital I/O Module With Opto Isolation
- High Side Output Switches For Controlling Common Negative Loads
- 32 Bits Out + 16 Bits In
- Suitable For Industrial Automation Applications, e.g. Operating Pneumatic Valves, Power Relays, etc.
- Operating Speed <10ms
- All I/O Ports Are Protected Against Damage
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

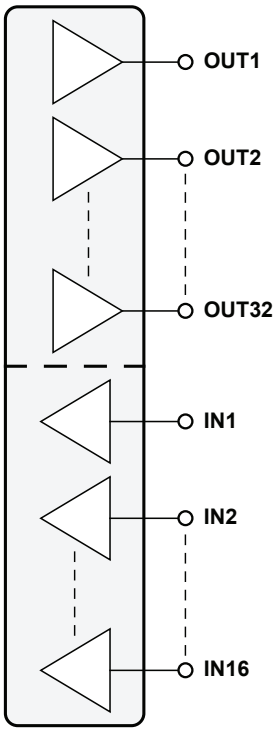
The 40-490/491 Digital I/O Modules are designed for applications requiring optically isolated digital I/O, typically in industrial automation. This module features 32 digital outputs and 16 digital inputs, they may be programmed by word or individual bit.

The 40-490 input ports have a nominal logical threshold of 6V while the 40-491 thresholds are TTL compatible. Versions of each module are offered with either an internal +5V supply (DC to DC converter) for the isolated side or requiring an external +5V isolated supply.

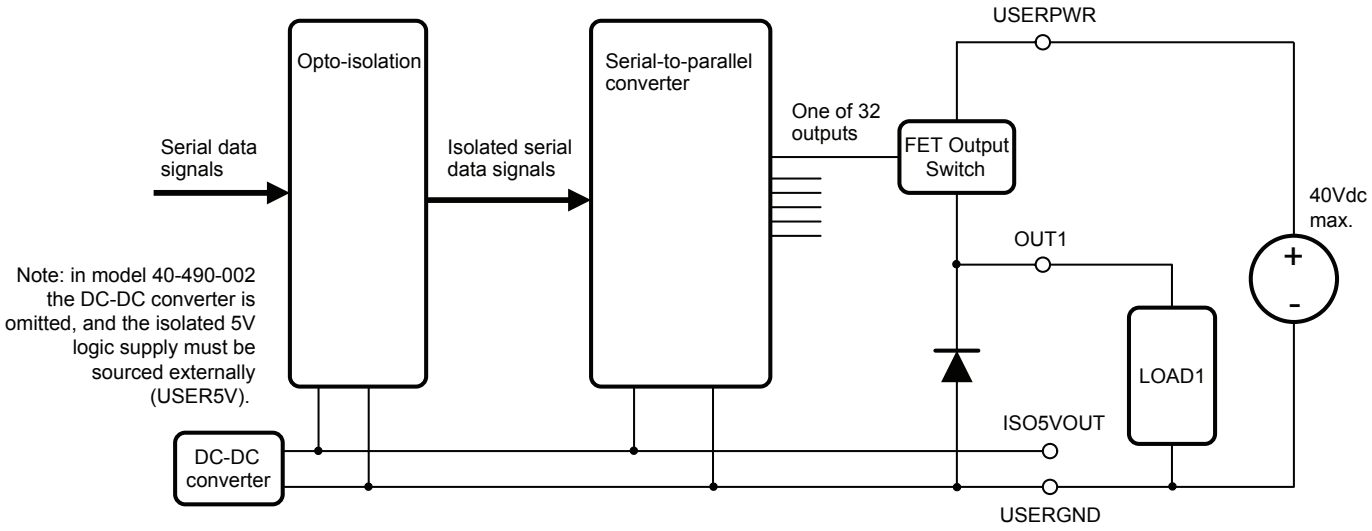
The 40-490 Digital I/O module has many applications in process control, sensing inputs, volt free contacts, product testing, noise free inputs, driving relays and solenoids

40-490 Opto-Isolated Digital I/O Module Details

The 40-490 is intended for moderate speed input-output in potentially noisy environments. All inputs and outputs share a common negative ground, which is isolated to 500VDC from the PXI chassis ground.



The 40-490 Opto Isolated Digital I/O Module



40-490 Output Circuit Detail

Specifications

Inputs

Type:	Inputs are low pass filtered and clamped to reject transients. The electrical time constant at the inputs is approximately 3.5ms. Inputs are pulled low, and present a load of greater than 3.3KΩ to the source.
Input Threshold	6V (40-490) or TTL (40-491).
Max Voltage:	The input connections can withstand the application of voltages to 40V.
Read Time:	1ms typical excluding input filter settling time.

Outputs

Switch Type:	High side FET switch
Protection:	Switch protected against overcurrent, overvoltage, overtemperature and inductive loading. Clamp diode limits voltage excursion below negative voltage.
Switch Ratings,	
Voltage:	+40V relative to negative output.
Current:	400mA for single output, 1A for any group of 8 outputs sharing power and return pins.
Write Time:	2ms typical excluding any external filtering.

Internal Isolated 5VDC supply (DC to DC Converter)

Type:	Fully regulated, short-circuit protected.
Rating:	5VDC +/-2%. A maximum of 350mA may be drawn externally.

External DC Voltage Versions

Requirement:	5VDC +/-5% at 50mA, isolated.

Custom options

Alternate values may be substituted in the input filter circuits to obtain different filter or threshold characteristics.

Additional resistors may be fitted to pull inputs up to a user-supplied positive voltage.

Power Requirements

Power consumption from the 5V backplane supply is as follows:

+3.3V	+5V	+12V	-12V
0	0.36A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 68-way female SCSI style micro-D connector.

Product Order Codes

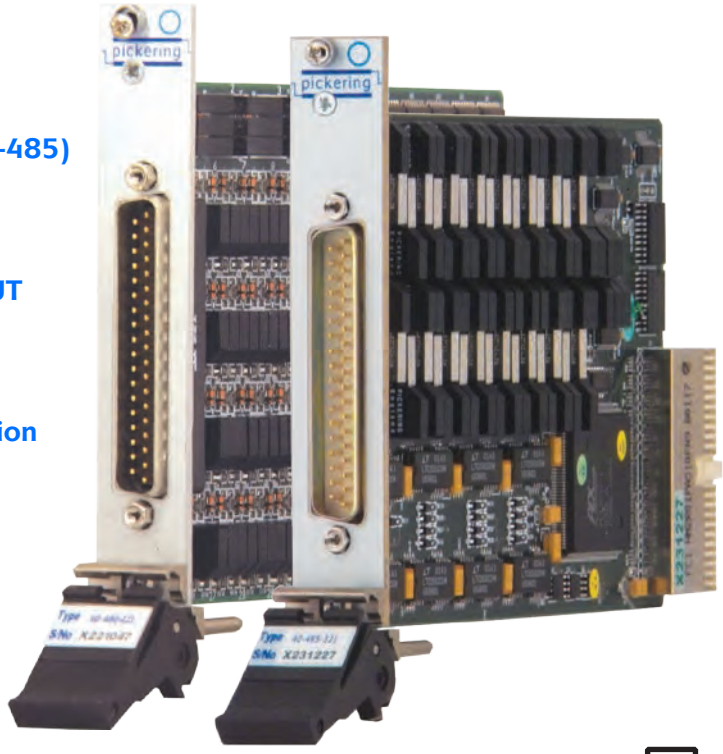
Opto Isolated Digital I/O Module	
With DC to DC Converter	**40-490-001**
No DC to DC Converter	**40-490-002**
Opto Isolated Digital I/O Module, TTL Input	
With DC to DC Converter	**40-491-001**
No DC to DC Converter	**40-491-002**

Mating Connectors & Cabling

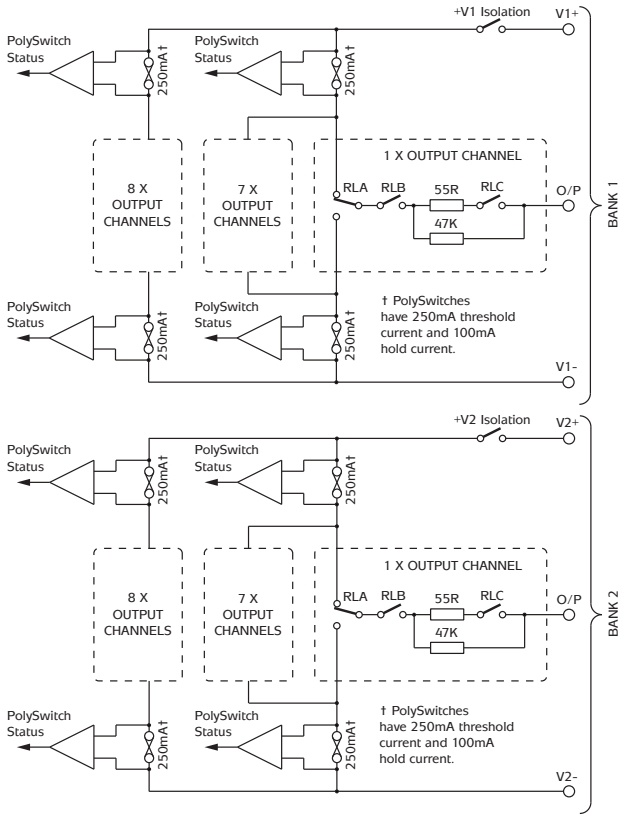
For connection accessories for the 40-490/491 please refer to the **90-015D** 68-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-480/485
Automotive Switch Simulator

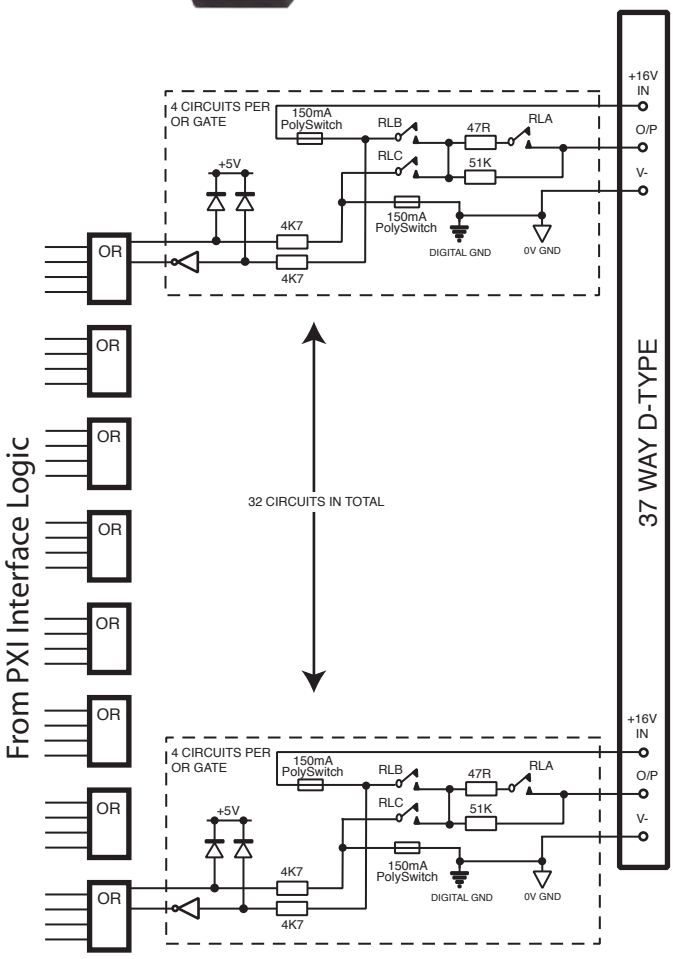
- Simulates 8, 16 or 32 Switches (40-480)
- 2 Banks of 16 Switch Simulator Channels (40-485)
- Simulates Leaky or Dirty switches
- Protects UUT From Fault Conditions
- Robust Design Protected Against Faults In DUT
- Suitable for 12V and 24V Systems
- Built In Fault Monitoring
- Suitable For Switch Simulation In Transportation Electronics Module Testing
- VISA & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-480 is designed to simulate the operation of automotive switches where dirty contacts or leaking current can be expected from switch contamination. It allows automotive I/O devices to be tested for correct operation under adverse conditions. The design includes protection circuits that ensure module damage cannot be caused by wiring faults or UUT failures. Each module can support up to 32 channels and is suitable for both 12V and 24V automotive applications.



Functional Block Diagram for the 40-485 Dual Bank16 Channel Switch Simulator Module



Functional Block Diagram for the 40-480 8, 16 or 32 Channel Switch Simulator Module

Module Operation

The module has a common input voltage connection for all channels present in the module. Each output can be set to be an open circuit by opening all the relays. With RLC closed (see diagram overleaf) the output can simulate a switch with a leakage resistance to the supply voltage, conditions that can be caused by oil or dirt contamination across the switch terminals or contacts of an automotive switch.

With the output set to simulate a switch closure each channel can be set to have a contact resistance of 47Ω by closing RLA and RLB, simulating the effect of a switch with a high contact resistance caused by contamination. The module can be configured to simulate switches operating to ground or to the common input voltage.

The 40-480/485 includes protection systems that ensure neither the device under test or the module can be easily damaged by programming errors, faulty wiring connections or faults in the device under test. Each channel is supplied with PolySwitches whose condition can be monitored over the PXI interface.

Specification (40-480)

Input Voltage Range:	8V-24VDC
Power Rating:	0.25W per channel
PolySwitch Rating:	150mA threshold current, 50mA hold current (each bank).
Switch Simulation (typical):	47Ω, 51kΩ or open circuit to ground or input voltage.
Off State Resistance:	$>10^9\Omega$
Operate Time:	<0.5ms
Release Time:	<0.5ms
Expected Life (operations) Low power load:	$>1x10^8$

Specification (40-485)

Input Voltage Range:	8V-24VDC
Power Rating:	2W per channel
PolySwitch Rating:	250mA threshold current, 100mA hold current (each bank).
Switch Simulation (typical):	55Ω, 47kΩ or open circuit to ground or input voltage.
Off State Resistance:	$>10^9\Omega$
Operate Time:	<0.5ms
Release Time:	<0.5ms
Expected Life (operations) Low power load:	$>1x10^8$

Relay Type

The 40-480/485 is fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime in the unlikely event of failure.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Power Requirements (40-480)

+3.3V	+5V	+12V	-12V
0	750mA (typ 400mA)	0	0

Power Requirements (40-485)

+3.3V	+5V	+12V	-12V
0	1.1A Max (typ 400mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 240g (40-480-221)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 37-Way male D-type connector.

Product Order Codes

8 Channel Switch Simulation Module	**40-480-021**
16 Channel Switch Simulation Module	**40-480-121**
32 Channel Switch Simulation Module	**40-480-221**
8-Channel Switch Simulator Module	**40-485-021**
Dual 8-Channel Switch Simulator Module	**40-485-121**
16-Channel Switch Simulation Module	**40-485-221**
Dual 16-Channel Switch Simulator Module	**40-485-321**

Mating Connectors & Cabling

For connection accessories for the 40-480/485 please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-480 range is as follows:

91-100-015 Relay Kit 15 for 40-480-021/121/221

For further assistance, please contact your local Pickering sales office.

General Purpose: Low Density Reed Relays

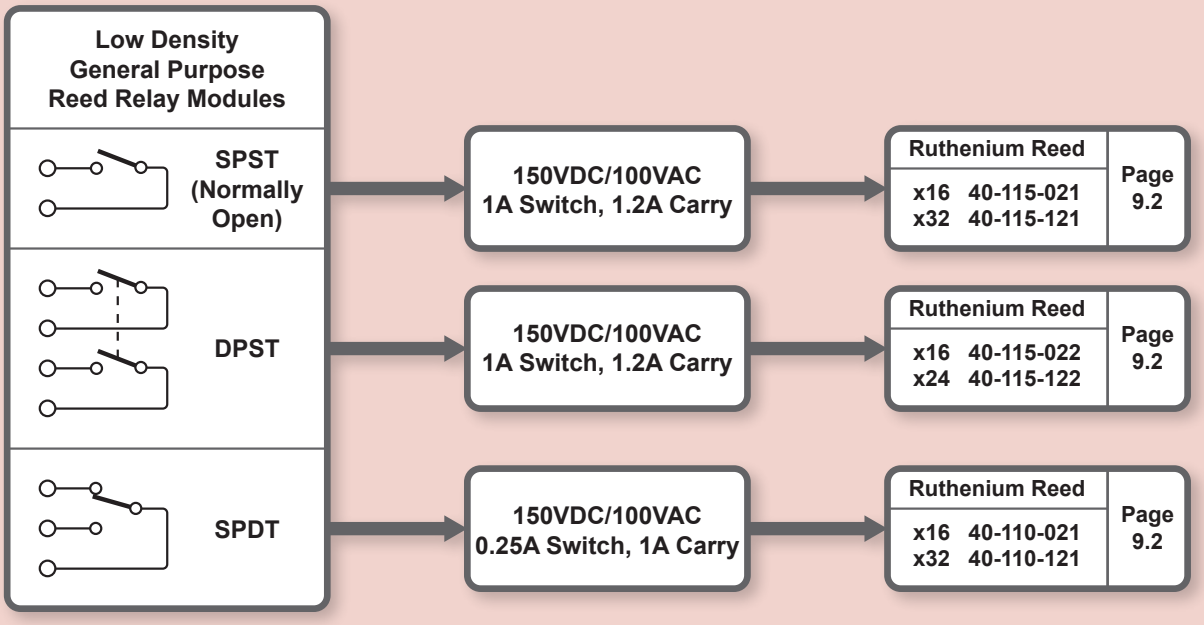
- 16, 24 or 32 Reed Relays Per Module
- SPST, DPST and SPDT Configurations
- Ruthenium Reed Relays Suitable For Low Level Signals
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Fast Operating Speed 250µs Typical
- Switch up to 150Volts, 1.2A with 20W Max Power
- 96-Pin Front Panel Connector
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-110 General Purpose Reed Relay Module

Pickering Interfaces range of low density general purpose reed relay modules provide a cost effective solution for applications where high density relays are not required. All these modules use a 96-pin male connector that is supported by a comprehensive range of cable and connector accessories, ensuring they can be quickly integrated into the user's test system with a minimum of effort.

The relays are not committed to a particular configuration and are available in changeover and normally open configurations.

The use of sputtered ruthenium reed relays allows the modules to be used for low and medium level switching with minimal level dependent characteristics. This provides enhanced reliability for low level switching compared to electromechanical or rhodium reed relays.



40-110/115
Reed Relay Module

- 16, 24 or 32 Reed Relays Per Module
- SPST, DPST and SPDT
- Ruthenium Reed Relays Suitable For Low Level Signals
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Fast Operating Speed 250µs Typical
- Switch up to 150V, 1.2A with 20W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-110/115 range of switching modules are available in both Changeover (SPDT) and Normally Open (SPST & DPST) configurations. Connections are made via a front panel 96 pin male connector.

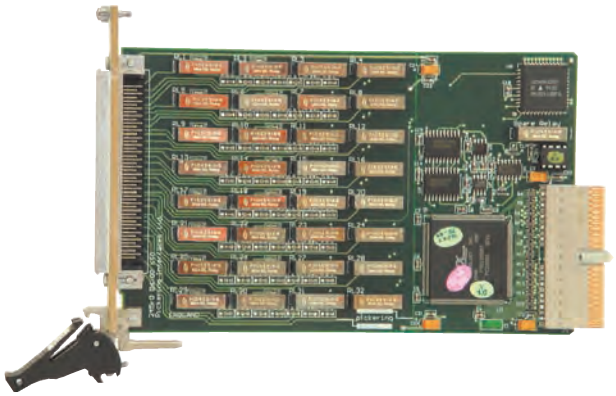
General purpose reed relays are suitable for the construction of small switching networks, for slaving up to larger switches or for operating external devices (e.g. lamps, solenoids etc.). To simplify inter-relay wiring, interconnection points are built onto the circuit board thus easing the construction of complicated wiring.

Range Description:

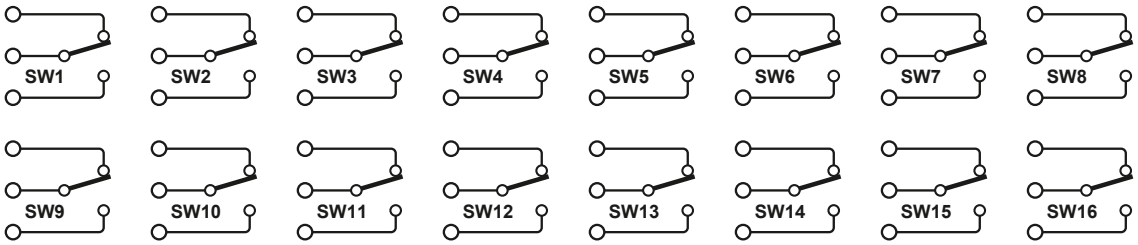
40-110	16 or 32 x SPDT Reed Relays.
40-115	16, 24 or 32 x SPST/DPST Reed Relays.

Supported by eBIRST

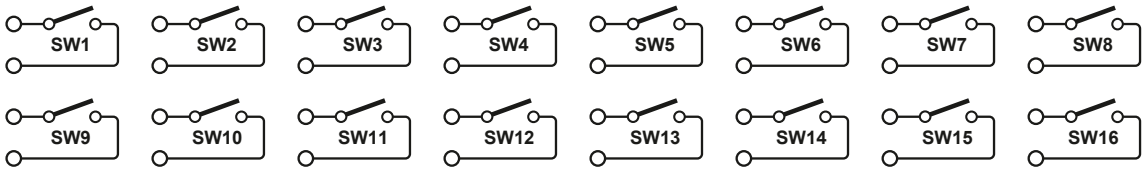
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



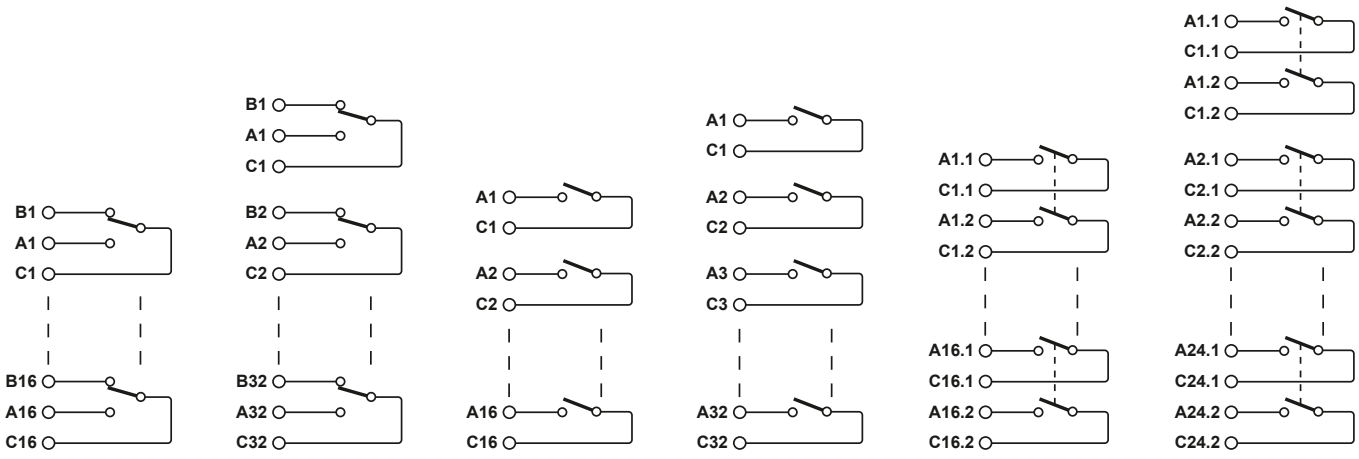
PCB Layout of 40-110 Module



Schematic of 40-110 Relay Module – 16 x SPDT



Schematic of 40-115 Relay Module – 16 x SPST



Switching Diagrams for the 40-110/115 Reed Relay Modules

Relay Type

The 40-110 & 40-115 are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability. Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.
All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W (SPST & DPST) 3W (SPDT) 1A (SPST & DPST) 0.25A (SPDT) 1.2A (SPST & DPST) 1A (SPDT)
Initial On Path Resistance: Off Path Resistance: Single-Ended Thermal Offset:	<500mΩ $>10^9$Ω <10µV
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life, low power: Expected Life, high power:	$1x10^9$ operations $>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	360mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-115-121)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 96-way male SCSI style micro-D connector, for pin outs please refer to the operating manual.

Product Order Codes

16 x SPDT, Ruthenium Reed Relays	**40-110-021**
32 x SPDT, Ruthenium Reed Relays	**40-110-121**
16 x SPST, Ruthenium Reed Relays	**40-115-021**
32 x SPST, Ruthenium Reed Relays	**40-115-121**
16 x DPST, Ruthenium Reed Relays	**40-115-022**
24 x DPST, Ruthenium Reed Relays	**40-115-122**

Product Customization

Pickering PXI modules are designed and manufactured on our own flexible manufacturing lines, giving complete product control and enabling simple customization to meet very specific requirements. Customization can include:

- Alternative reed relay types
- Mixture of reed relay types
- Alternative number of relays
- Different performance specifications

All customized products are given a unique part number, fully documented and may be ordered at any time in the future. Please contact your local sales office to discuss.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below.
For more information see **eBIRST**.

Product	Test Tool	Adaptor	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-110-021/121	**91-100-061**
40-115-021/121	**91-100-045**
40-115-022/122	**91-100-017**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-110 series please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

General Purpose: High Density Relays

- Up to 100 Relays Per Module
- SPST, SPDT and DPST Configurations
- Ruthenium Reed Relays Suitable For Maximum Signal Performance
- Electromechanical Relays For Higher Power Applications
- High Density Front Panel Connectors
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

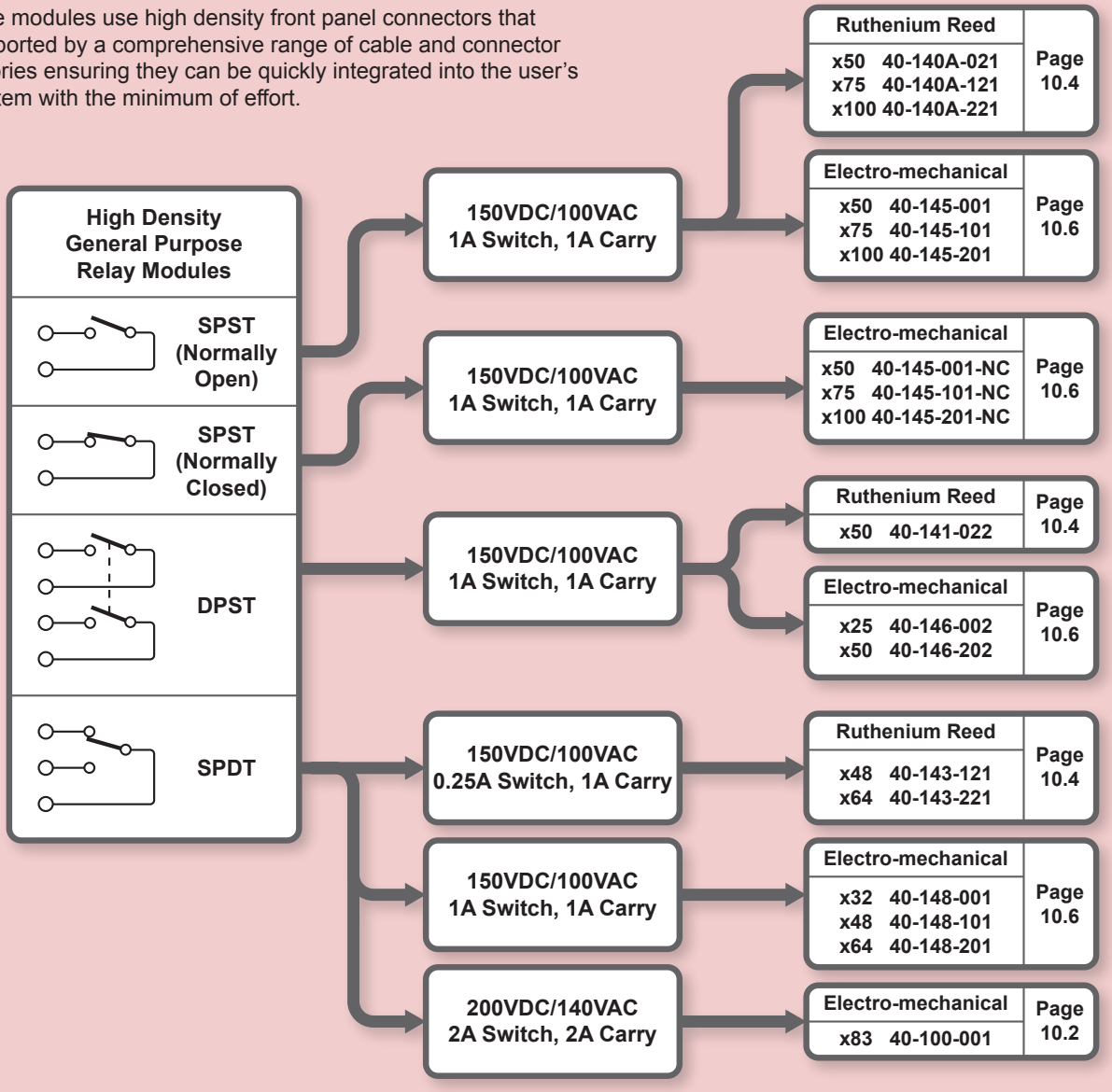
40-100 Very High Density 2 Amp Relay Module

40-148 High Density General Purpose Relay Module

Pickering Interfaces range of high density general purpose relay modules provide an ideal solution for applications requiring dense arrays of uncommitted relays. The range includes both electromechanical and reed relay solutions in a variety of configurations.

All reed relay versions use high quality sputtered ruthenium relays that exhibit excellent contact performance under low and medium level switching conditions. For general purpose applications that also require higher power handling, the range of electromechanical relays provides an ideal solution.

All these modules use high density front panel connectors that are supported by a comprehensive range of cable and connector accessories ensuring they can be quickly integrated into the user's test system with the minimum of effort.



40-100
Very High Density 2 Amp Relay Module

- 83 x SPDT Configuration
- Electro-Mechanical Relays
- Maximum Current 2A Hot or Cold Switching
- Switch up to 200VDC/140VAC and up to 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-100 2A Relay Module is suitable for applications requiring medium power switching with very high density.

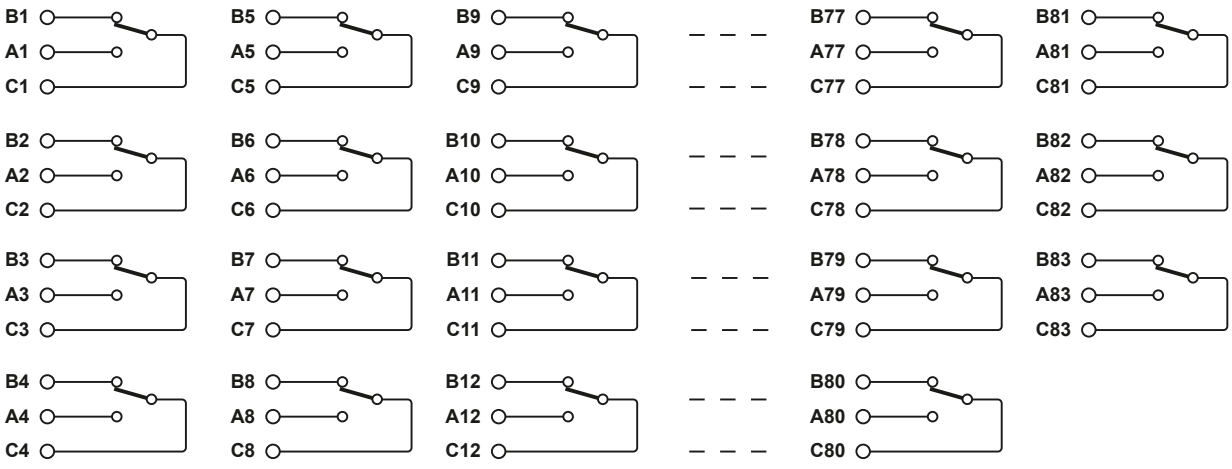
Featuring 2A current capacity and voltages to 200VDC/140VAC, the module is configured as 83 x SPDT (Single Pole Double Throw)

Connections are made via a front panel mounted 500-pin SEARAY high density connector. Pickering also provide a wide range of connector and cabling solutions, refer to Pickering's "Interconnection Catalog" or visit our web site.

Typical uses will be found in Automotive, Aerospace, Military and Power Cell Testing applications.

Alternative Lower Density 2A SPDT Relay Modules:

• **40-131-001**	16 x SPDT Relays
• **40-131-201**	26 x SPDT Relays
• **40-138**	Custom configurations, up to 52 SPDT Relays in multiples of 4
• **40-139-201**	52 x SPDT Relays



40-100 Ultra High Density 2A Relay Module - 83 x SPDT

Relay Type & Maintenance

The 40-100 module is fitted with electro-mechanical signal relays, palladium-ruthenium, gold covered contacts.

The module is of a single circuit board construction and uses through hole relays (not SMT relays) so field maintenance is greatly simplified. In addition a **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Switch Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	200VDC/140VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A for 10 Relays, 1A for 83 Relays
Initial Path Resistance, On:	<350mΩ, 150mΩ typical
Initial Path Resistance, Off:	>10^9Ω
Thermal Offset:	<10µV
Typical Operate Time:	3ms
Expected Life (operations)	
Very low power signal load:	> 10^8
Low power load (2W):	> $1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	> $5x10^6$ (1A, 30VDC)
Full power load (60W):	> $1x10^5$ (2A, 30VDC) > $1x10^5$ (0.3A, 200VDC)

RF Specification

Bandwidth (-3dB):	40MHz	
Crosstalk (typical):	10kHz: 100kHz: 1MHz: 10MHz	-80dB -65dB -40dB -20dB
Isolation (typical):	10kHz 100kHz: 1MHz: 10MHz:	80dB 65dB 40dB 20dB

Power Requirements

+3.3V	+5V	+12V	-12V
200mA	1A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 220g

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 500-pin SEARAY female connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Product Order Codes

83 x SPDT, 2A Relay Module **40-100-001**

Accessories:

The following is a sample of the connection accessories available for the 40-100-001 module:

SEARAY 500-pin male connector to 5x50-pin female D-type connector (250-port version) - 1m **A250RMR-5F050D-5A100**

SEARAY 500-pin male connector to unterminated cable assembly (250-port version) - 1m **A250RMR-F-5A100**

Pickering can supply mating SEARAY connector and cable assemblies to enable easy integration of the 40-100 Relay Module

Mating Connectors & Cabling

For the full range of connection accessories for the 40-100 module please refer to the **90-021D** 500-pin SEARAY Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Support Products

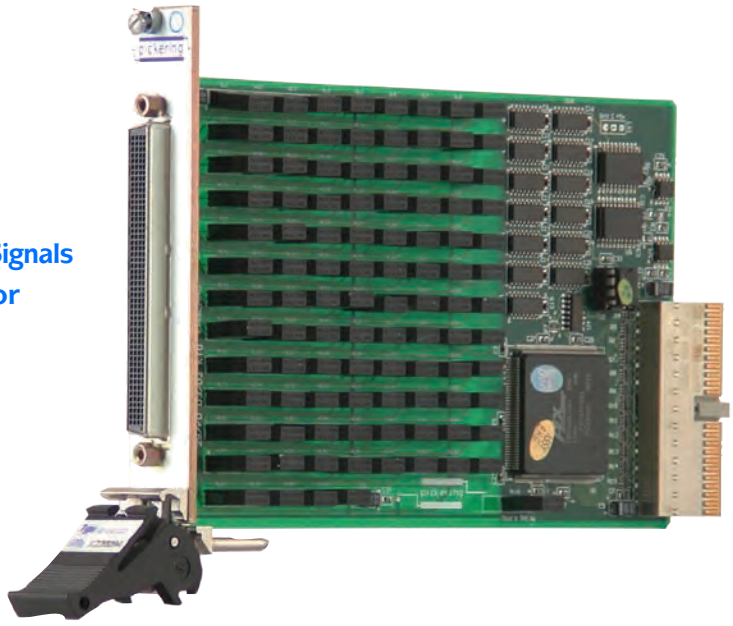
Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

40-140A/141/143
High Density Reed Relay Module



- Highest Density Reed Relay Modules in PXI
- Up To 100 Reed Relays Per Module
- SPST, DPST and SPDT Configurations
- Ruthenium Reed Relays Suitable For Low Level Signals
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Fast Operating Speed 250µs Typical
- Pin Compatible With Alternate 40-145 Electro-mechanical Relay Modules
- Switch up to 150Volts, 1A with 20W Max Power
- Single PCB Construction With Leaded Relays Allow Easy Maintenance
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-140A/141/143 range of high density switching modules are available in Normally Open (SPST & DPST) and changeover (SPDT) configurations. Connections are made via a front panel 200-pin female connector.

General purpose reed relays are suitable for the construction of small switching networks, I/O port switching, for slaving up to larger switches or for operating external devices (e.g. lamps, solenoids etc.).

Range Description:

40-140A	50, 75 or 100 x SPST Reed Relays.
40-141	50 x DPST Reed Relays.
40-143	48 or 64 x SPDT Reed Relays.

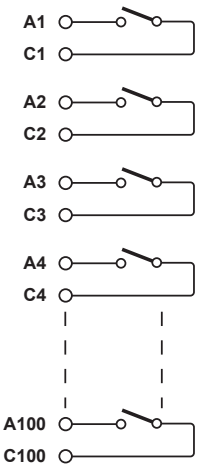
Choice of Signal Relay Types

40-140A/141/142/143 series modules are fitted with **Reed Relays** (Sputtered Ruthenium Type) which are designed solely for high-end instrumentation applications. They offer very long life to 1000 million operations, fast operate time of 0.25ms and exceptional low level switching performance. Reed Relays are hermetically sealed so ensuring consistent and stable contact resistance with long life. All of the reed relays used in our PXI modules are manufactured by our sister company Pickering Electronics (www.pickeringrelay.com).

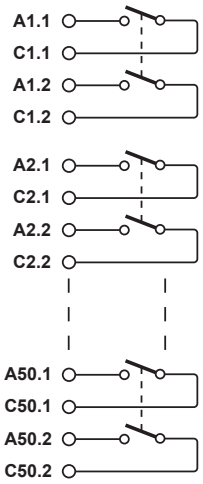
Electro-mechanical Relays (Palladium-Ruthenium, Gold covered) are used in module series 40-145/146/148. They offer good general purpose performance, switching times of 3ms and are lower cost than instrumentation grade reed relays. Overall they offer a good general purpose choice.

Pin Compatibility. 40-140A & 40-145 series modules are 100% pin compatible (except shielded types) so allowing use of either module type in your Test System.

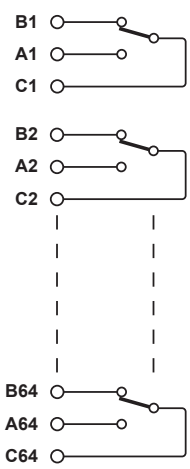
Exactly which type to select depends on your application, if in doubt please contact your nearest Pickering sales office.



40-140A-221 SPST Reed Relay Module



40-141-022 DPST Reed Relay Module



40-143-221 SPDT Reed Relay Module

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf

High Density 200-Way Connector

Pickering Interfaces have a range of connector solutions for the 200 way connector used on the 40-14X module. These include mating connectors, pre-made cable assemblies and also cable assemblies that break out the 200-way to more manageable 50-way transition connectors. Please refer to web site for latest details or the Interconnection Solutions Catalog.

Relay Type

The 40-140A series are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

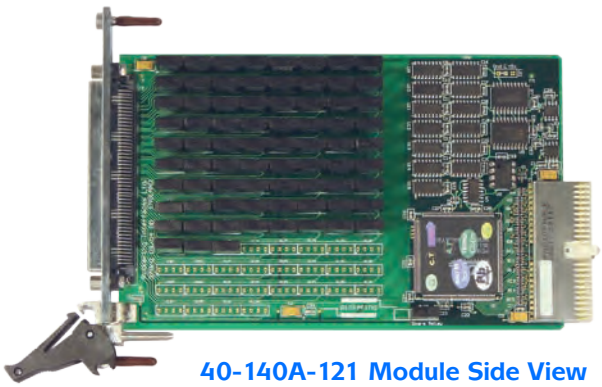
All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W (SPST & DPST) 3W (SPDT) 1A (SPST & DPST) 0.25A (SPDT) 1A
Initial Path Resistance On: Off:	 <500mΩ (300mΩ typical) $>10^9$Ω
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	1400mA (typ 600mA)	0	0



40-140A-121 Module Side View (75 x SPST Ruthenium Reed Relays)

40-961A-200 200-Way Mating Connector

40-971A-200 200 Way to 4x50-Way Cable Assembly

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 200g (40-140A-121)
240g (40-140A-221)
200g (40-141-022)
200g (40-143-221)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 200-Way female LFH connector, for pin outs please refer to the operating manual.

Product Order Codes

50 x SPST, Ruthenium Reed Relays	**40-140A-021**
75 x SPST, Ruthenium Reed Relays	**40-140A-121**
100 x SPST, Ruthenium Reed Relays	**40-140A-221**
50 x DPST, Ruthenium Reed Relays	**40-141-022**
48 x SPDT Reed Relays	**40-143-121**
64 x SPDT Reed Relays	**40-143-221**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-140A-021/121/221	**91-100-015**
40-141-022	**91-100-005**
40-143-121/221	**91-100-025**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-140 series please refer to the **90-002D** 200-way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-145/146/148
High Density SPST, SPDT & DPST Relay Module

- SPST Choice of 50, 75 or 100 Relays Per Module
- DPST Choice of 25 or 50 Relays Per Module
- SPDT Choice of 32, 48 or 64 Relays Per Module
- SPST, Normally Closed, Choice of 50, 75 or 100 Relays Per Module
- Electro-mechanical High Density Relays
- Pin Compatible With Alternate 40-140A Reed Relay Modules
- Operating Speed 3ms Typical
- Switching up to 150V/1A/60W
- Single PCB Construction With Leaded Relays Allow Easy Maintenance
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-145/146/148 range of high density switching modules are available in Normally Open (SPST & DPST), Changeover (SPDT) and Normally Closed (SPST) configurations. Connections are made via a front panel 200-pin female connector.

General purpose reed relays are suitable for the construction of small switching networks, I/O port switching, for slaving up to larger switches or for operating external devices (e.g. lamps, solenoids etc.).

Range Description:

40-145	50, 75 or 100 x SPST Relays (Normally Open or Normally Closed Versions).
40-146	25 or 50 x DPST Relays.
40-148	32, 48 or 64 x SPDT Relays.

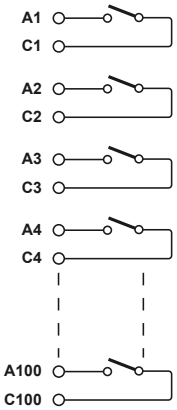
Choice of Signal Relay Types

40-145/146/148 series modules are fitted with **Electro-mechanical Relays** (Palladium-Ruthenium, Gold covered) offering good general purpose performance, switching times of 3ms and are lower cost than instrumentation grade reed relays. Overall they offer a good general purpose choice.

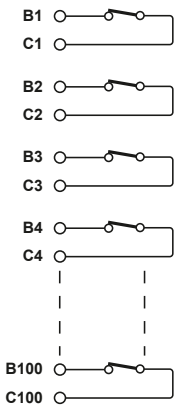
Reed Relays (Sputtered Ruthenium Type) which are designed solely for high-end instrumentation applications are used in series 40-140A/141/142/143 modules, they offer very long life up to 1000 million operations, fast operate time of 0.25ms and exceptional low level switching performance. Reed Relays are hermetically sealed so ensuring consistent and stable contact resistance with long life. All of the reed relays used in our PXI modules are manufactured by our sister company Pickering Electronics (www.pickeringrelay.com).

Pin Compatibility. 40-140A & 40-145 series modules are 100% pin compatible (except shielded types) so allowing use of either module type in your Test System.

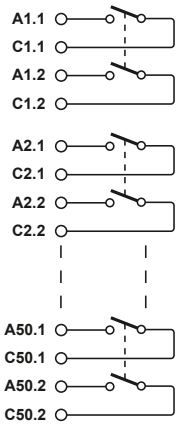
Exactly which type to select depends on your application, if in doubt please contact your nearest Pickering sales office.



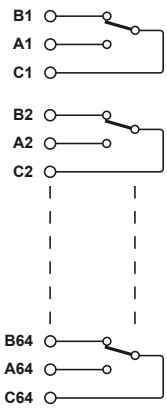
40-145-201 SPST Relay Module



40-145-201-NC SPST Normally Closed Relay Module



40-146-202 DPST Relay Module



40-148-201 SPDT Relay Module

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf

High Density 200-Way Connector

Pickering Interfaces have a range of connector solutions for the 200-way connector used on the 40-14X module. These include mating connectors, pre-made cable assemblies and also cable assemblies that break out the 200-way to more manageable 50-way transition connectors. Please refer to web site for latest details or the Interconnection Solutions Catalog.

Relay Type & Maintenance

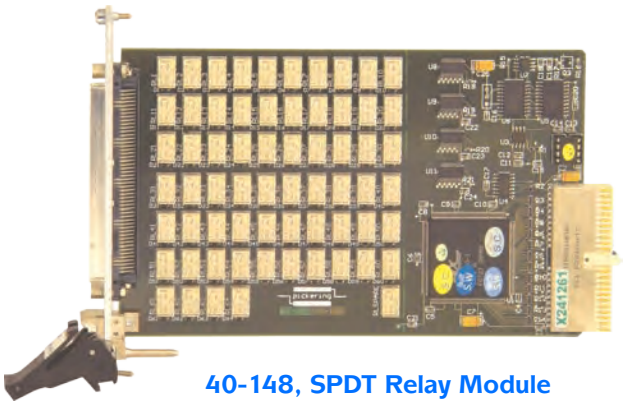
The 40-145/46/48 series modules are fitted with electro-mechanical signal relays, palladium-ruthenium, gold covered contacts. The module is of a single circuit board construction and uses leaded relays (not SMT relays) so in field maintenance is greatly simplified. In addition a **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Switching Specification

Switch Type:	**Electro-mechanical**
Contact Type:	Palladium-ruthenium, Gold Covered Bifurcated contact
Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	60W/62.5VA 1A 1A
Initial On Path Resistance: Initial Off Path Resistance: Minimum Voltage: Thermal Offset:	<500mΩ typical $>10^9$Ω 100µV <10µV
Operate Time:	<3ms
Expected Life (operations) Very low power load: Low power load (2W): Med power load (30W): Full power load (60W):	 $>1x10^8$ $>1.5x10^7$ (0.1A, 20VDC) $>5x10^6$ (1A, 30VDC) $>1x10^5$ (1A, 60VDC)

Power Requirements

+3.3V	+5V	+12V	-12V
0	1440mA (typ 840mA)	0	0



40-148, SPDT Relay Module

40-961A-200
200-Way
Mating Connector

40-971A-200 200 Way
to 4x50-Way Cable
Assembly

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-145-201)
125g (40-146-202)
180g (40-148-201)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 200-Way female LFH connector, for pin outs please refer to the operating manual.

Product Order Codes

50 x SPST Electro-mechanical Relays	**40-145-001**
75 x SPST Electro-mechanical Relays	**40-145-101**
100 x SPST Electro-mechanical Relays	**40-145-201**
50 x SPST Normally Closed Relays	**40-145-001-NC**
75 x SPST Normally Closed Relays	**40-145-101-NC**
100 x SPST Normally Closed Relays	**40-145-201-NC**
25 x DPST Electro-mechanical Relays	**40-146-002**
50 x DPST Electro-mechanical Relays	**40-146-202**
32 x SPDT Electro-mechanical Relays	**40-148-001**
48 x SPDT Electro-mechanical Relays	**40-148-101**
64 x SPDT Electro-mechanical Relays	**40-148-201**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-145 series please refer to the **90-002D** 200-way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

General Purpose: Medium Power Relays

- Reed Relay Solutions up to 2.5A
- Electromechanical Relays up to 5A
- SPST, DPST and DPDT Versions
- Versatile Cell-Based Mixed Configuration Versions
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-139 High Density
2 Amp Relay Module

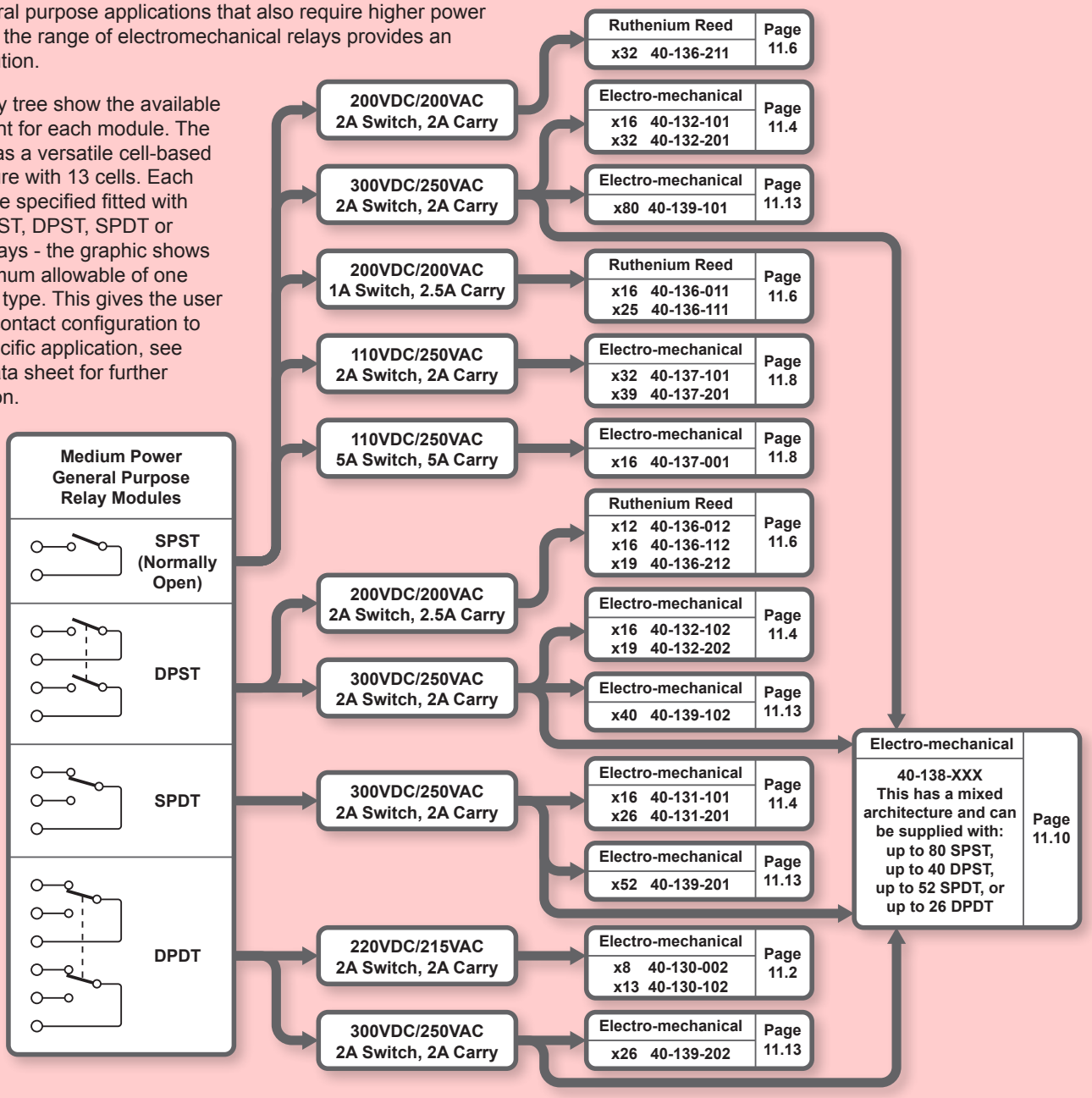
40-130 DPDT
Relay Module

This range of Pickering Interfaces relay modules offers higher current ratings in a single 3U slot. Relays are available in SPST, DPST and DPDT configurations. The relay solutions have been carefully chosen to ensure a long service life. All the D-type connectors used are fully supported by the range of Pickering Interfaces cable and connector accessories to simplify system integration.

Reed relay versions use high quality sputtered ruthenium relays that exhibit excellent contact performance under low and medium level switching conditions.

For general purpose applications that also require higher power handling, the range of electromechanical relays provides an ideal solution.

The family tree show the available relay count for each module. The 40-138 has a versatile cell-based architecture with 13 cells. Each cell can be specified fitted with either SPST, DPST, SPDT or DPDT relays - the graphic shows the maximum allowable of one particular type. This gives the user a mixed contact configuration to suit a specific application, see the full data sheet for further information.



40-130
DPDT Relay Module

- 8 or 13 DPDT Electro-mechanical Relays Per Module
- Switch up to 220VDC/125VAC, 2A with 60W Max Power
- Operating Speed <3ms
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

Pickering Interfaces 40-130 DPDT Relay Modules are suitable for applications where ordinary reed relay modules require additional current/voltage capacity. The 40-130 is suitable for voltages up to 220VDC/125VAC and current handling to 2A it is available in a choice of 8 and 13 relay versions. Connections are made via a front panel mounted 50 or 78 pin D-Type connector.

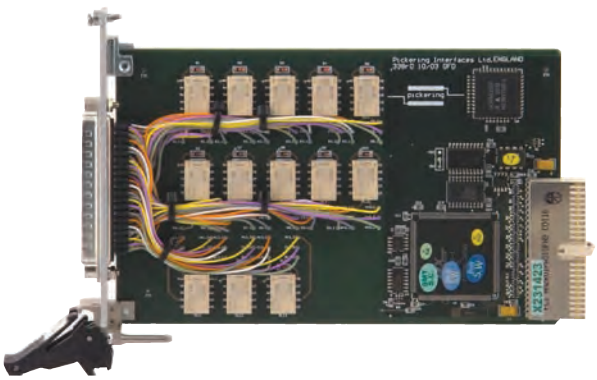
Applications for the 40-130 include changeover switching action where 2 wires must be switched simultaneously (e.g. signal and ground), also it can be configured as a polarity switching module (see below). It will also find many applications in Telecom test for switching POTS, ISDN or xDSL telephony signals. Bandwidth for most configurations is 50MHz.

40-130 Range Description:

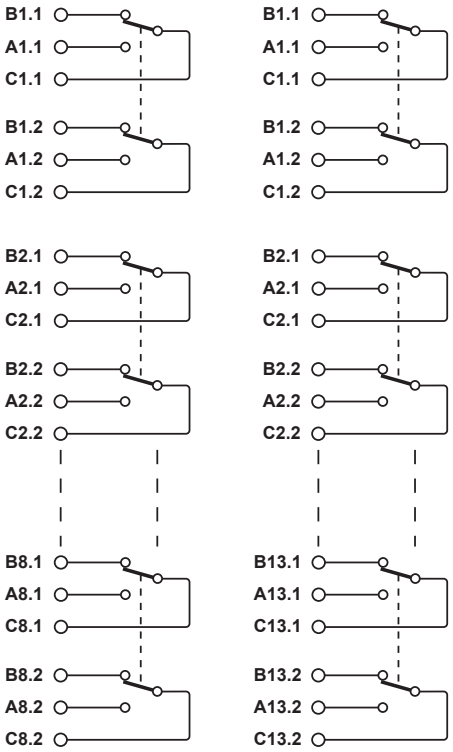
40-130-002	8 x DPDT Relays.
40-130-102	13 x DPDT Relays.

Power Relay Type

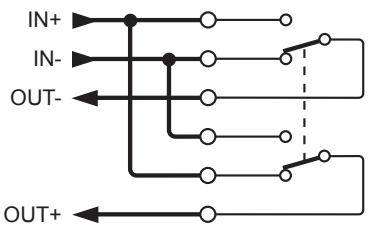
The 40-130 is fitted with electro-mechanical 2A relays with gold clad silver alloy contacts.



PCB Layout of 40-130 Module



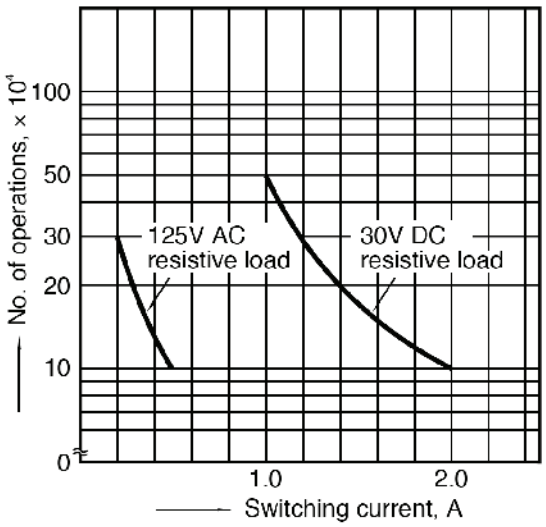
Schematic of 40-130 DPDT Relay Module
Both 8 and 13 Switch Versions Are Shown



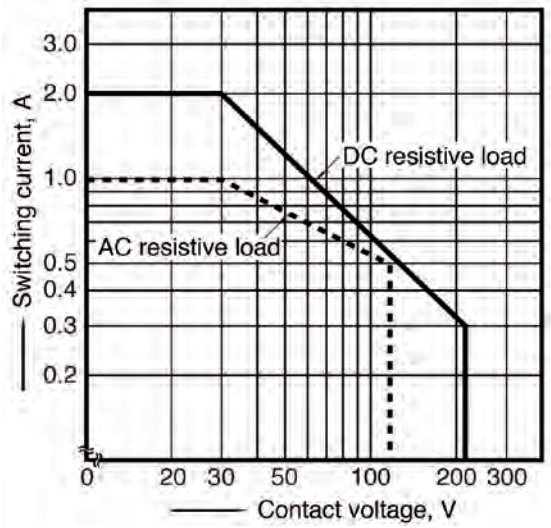
Example of Polarity Switching Using DPDT Relays

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Gold Clad Silver Alloy
Max Switch Voltage:	220VDC/125VAC
Max Switch Current: Max Carry Current: Max Power:	2A (DC resistive) 1A (AC resistive) 2A 60W
Initial Path Resistance On: Off: Differential Thermal Offset:	 <150mΩ $>10^9$Ω <5µV
Bandwidth:	>50MHz
Operate Time: Release Time:	3ms 2ms.
Expected Life (operations) Low power load: Medium power load: Full power load:	 $>1x10^8$ $>2x10^5$ (1A, 30VDC) $>1x10^5$ (2A, 30VDC)



40-130 Current/Operating Life Curve



40-130 Current/Voltage Curve

Power Requirements

+3.3V	+5V	+12V	-12V
0	520mA (typ 400mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel D-Type connectors as follows:-

40-130-002 50-Way D-Type male connector
40-130-102 78-Way D-Type male connector

Product Order Codes

8 x DPDT Relay Module	**40-130-002**
13 x DPDT Relay Module	**40-130-102**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-130 range are as follows:

91-100-037 kit for 40-130-002
91-100-037 kit for 40-130-102

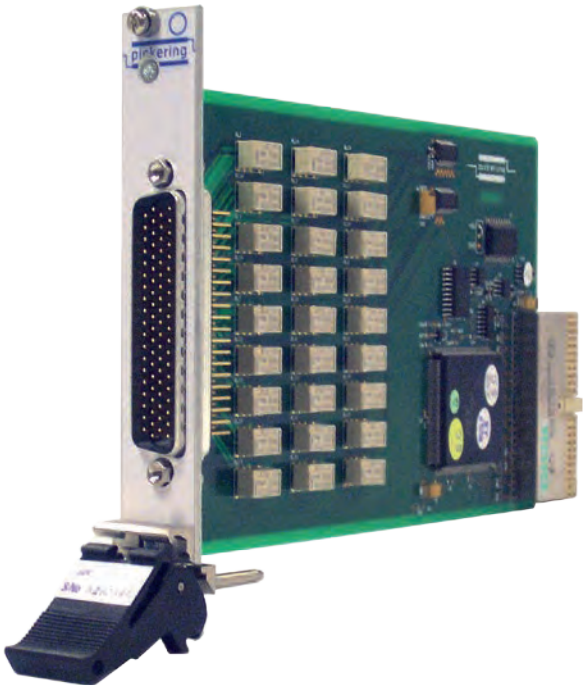
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-130 please refer to the **90-006D** 78-way D Type and **90-004D** 50-way D Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-131/132
General Purpose 2A Relay Module

- Low Cost Relay Module For Medium Power Switching Applications
- Up to 32 Electro-mechanical Relays Per Module
- Choice of SPST, SPDT or DPST Contact Configurations
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Operating Speed <3ms
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



Pickering Interfaces 40-131/132 is a range of low cost, general purpose electro-mechanical relay modules. They are capable of switching voltages up to 300VDC/250VAC and current up to 2A.

They are suitable for use where reed relay based switching modules do not have sufficient voltage or current carrying capability. Applications include the switching of medium power AC and DC loads, or slave switching larger relays, contactors or solenoids.

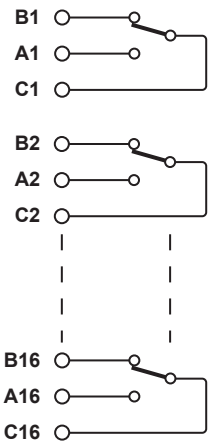
For all versions except the 40-131-001, connections are made to the module via a front panel mounted 78-pin male D-Type connector. The 40-131-001 uses a 50-pin male D-Type connector.

The 40-131/132 modules are available with three different contact configurations and up to 32 relays per module. The range is as follows:

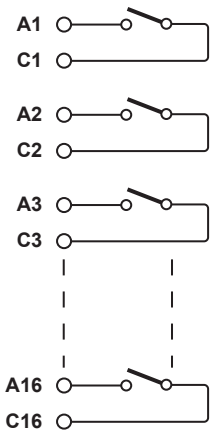
40-131-001/101	16 x SPDT Relays.
40-131-201	26 x SPDT Relays.
40-132-101	16 x SPST Relays.
40-132-201	32 x SPST Relays.
40-132-102	16 x DPST Relays.
40-132-202	19 x DPST Relays.

Supported by eBIRST

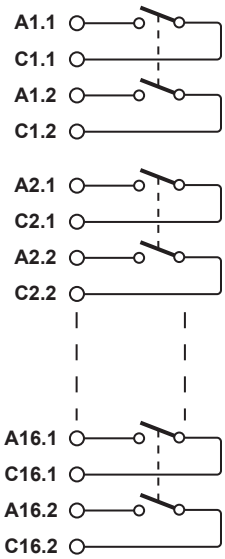
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Schematic of 40-131-001/101
16xSPDT Relay Module



Schematic of 40-132-101
16xSPST Relay Module



Schematic of 40-132-102
16xDPST Relay Module

Power Relay Type

The 40-131 and 40-132 are fitted with electro-mechanical 2A relays, gold clad silver alloy.

Power Requirements

+3.3V	+5V	+12V	-12V
0	520mA (typ 400mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 160g (40-131-101/201)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Front Panel Connectors:

40-131-001: 50-way male D-type connector.
40-131-101: 78-way male D-type connector.
40-131-201: 78-way male D-type connector.
40-132-101: 78-way male D-type connector.
40-132-201: 78-way male D-type connector.
40-132-102: 78-way male D-type connector.
40-132-202: 78-way male D-type connector.

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Initial Path Resistance - On:	<500mΩ
Path Resistance - Off:	$>10^9$Ω
Thermal Offset:	<10µV
Bandwidth:	25MHz nominal
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)
	$>1x10^5$ (0.1A 300VDC)

Product Order Codes

16 x SPDT Relay Module, 50-way D-type	**40-131-001**
16 x SPDT Relay Module, 78-way D-type	**40-131-101**
26 x SPDT Relay Module, 78-way D-type	**40-131-201**
16 x SPST Relay Module, 78-way D-type	**40-132-101**
32 x SPST Relay Module, 78-way D-type	**40-132-201**
16 x DPST Relay Module, 78-way D-type	**40-132-102**
19 x DPST Relay Module, 78-way D-type	**40-132-202**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
40-131-001	**93-005-001**	**Not Required**
40-131-101/201	**93-006-001**	**Not Required**
40-132	**93-006-001**	**Not Required**

Spare Relay Kits

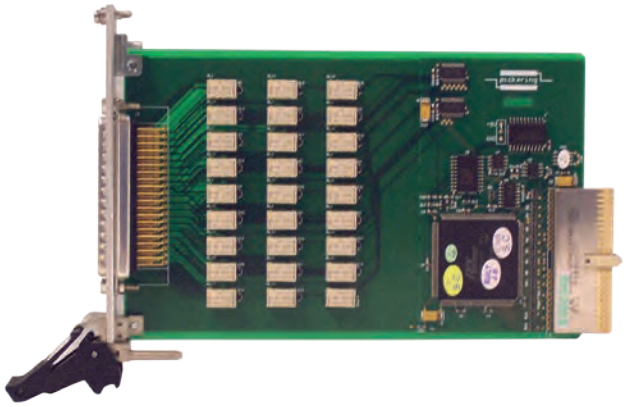
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-131/132 series please refer to the **90-006D** 78-way D Type and **90-005D** 50-way D Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-131 2 Amp Relay Module PCB View

40-136
Power Ruthenium Reed Relay Module

- From 12 to 32 Power Reed Relays Per Module
- SPST and DPST Configurations
- Ruthenium Reed Relays Suitable For Low Level Signals
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Switch up to 200V, 1A with 2.5A Carry Current, 40W Max Power
- Fast Operating Speed 250µs Typical
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

Pickering Interfaces 40-136 Power Ruthenium Reed Relay Modules are suitable for applications where ordinary reed relay modules require additional current/voltage capacity. The 40-136 is suitable for voltage up to 200V and current to 2.5A. Available in Normally Open (SPST & DPST) configurations. Connections are made via a front panel mounted 50 or 78 pin D-Type connector.

Power Reed Relay Range Description

40-136-011	16 x SPST 2.5A Power Ruthenium Reed Relays.
40-136-111	25 x SPST 2.5A Power Ruthenium Reed Relays.
40-136-211	32 x SPST 2A Power Ruthenium Reed Relays.
40-136-012	12 x DPST 2.5A Power Ruthenium Reed Relays.
40-136-112	16 x DPST 2A Power Ruthenium Reed Relays.
40-136-212	19 x DPST 2A Power Ruthenium Reed Relays.

Relay Type

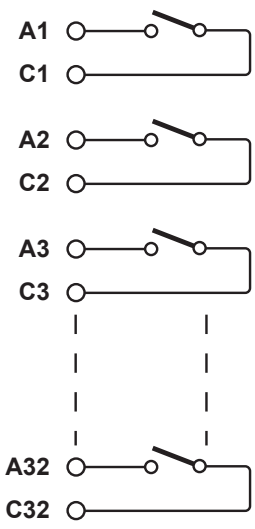
All of the reed relays used in our PXI modules are manufactured by our sister company Pickering Electronics (www.pickeringrelay.com). Pickering reed relays offer very high reliability (over 10^9 operations) with maximum switching performance,

The 40-136 is fitted with Power Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

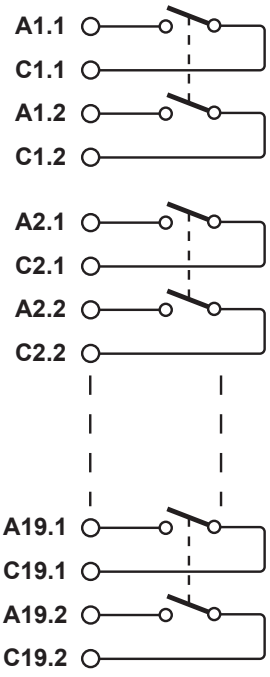
Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Schematic For The 40-136-211 Power Ruthenium Reed Relay Module



Schematic For The 40-136-212 Power Ruthenium Reed Relay Module

40-136 Ruthenium Reed Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	200V
Max Power: Max Switch Current: Max Carry Current: Max Carry Current:	40W 1A 2A (-211, -112 & -212) 2.5A (-011, -111 & -012)
Initial On Path Resistance: Off Path Resistance: Thermal Offset:	<250mΩ $>10^9$Ω <10µV
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	480mA (typ 400mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 220g (40-136-111/211)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via a front panel D-Type connectors as follows:-

40-136-011	50-Way D-Type male connector
40-136-111	50-Way D-Type male connector
40-136-211	78-Way D-Type male connector
40-136-012	50-Way D-Type male connector
40-136-112	78-Way D-Type male connector
40-136-212	78-Way D-Type male connector

For pin outs please refer to the operating manual.

Product Order Codes

16 x SPST, Power Ruthenium Reed Relays	**40-136-011**
25 x SPST, Power Ruthenium Reed Relays	**40-136-111**
32 x SPST, Power Ruthenium Reed Relays	**40-136-211**
12 x DPST, Power Ruthenium Reed Relays	**40-136-012**
16 x DPST, Power Ruthenium Reed Relays	**40-136-112**
19 x DPST, Power Ruthenium Reed Relays	**40-136-212**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
40-136-011/012/111	**93-005-001**	**Not Required**
40-136-112/211/212	**93-006-001**	**Not Required**

Spare Relay Kits

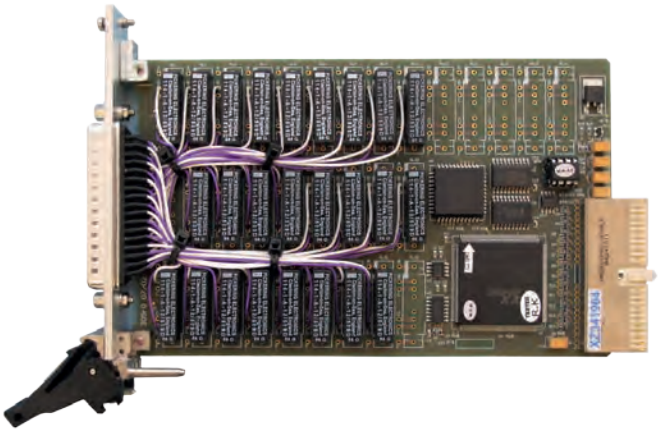
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-136-011/111/211	**91-100-036**
40-136-012/112/212	**91-100-051**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

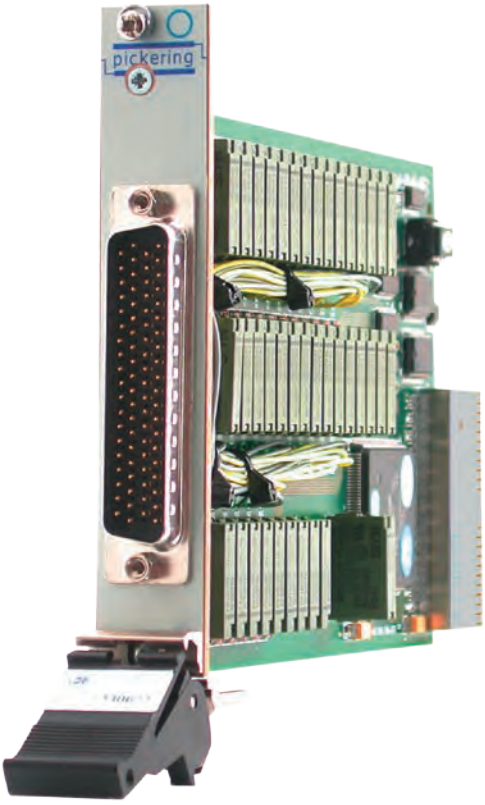
For connection accessories for the 40-136 series please refer to the **90-006D** 78-way D Type and **90-005D** 50-way D Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

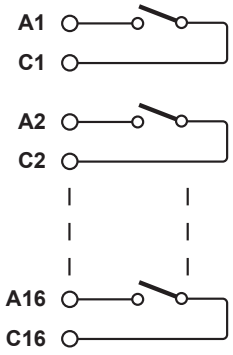


PCB View of the 40-136 Power Relay Module

40-137
High Density Power Relay Module

- SPST Switch Configuration
- 16 Relay Version Switches 5A
- Higher Density 32 & 39 Relay Versions Switch 2A
- Hot Switch to 110VDC/250VAC
- Cold Switch to 400VDC/250VAC
- 150W/1250VA Max Power For 16 Relay Version
- 90W/500VA Max Power For 32/39 Relay Versions
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty





40-137-001 (16 x SPST)
5A Power Relay Module

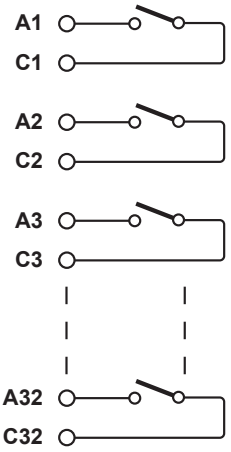
Pickering Interfaces 40-137 Power Relay Modules are suitable for applications requiring power relay switching with high density.

They feature current handling up to 5A and 110VDC/250VAC voltage rating, they are configured as Single Pole Single Throw (SPST). Connections are made via front panel mounted 37 or 78-pin D-Type connector.

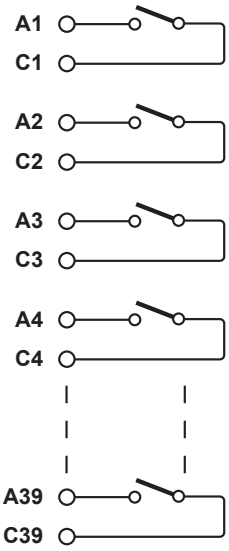
Typical applications will be found in Automotive, Aerospace and Power Cell Testing applications.

Power Relay Type

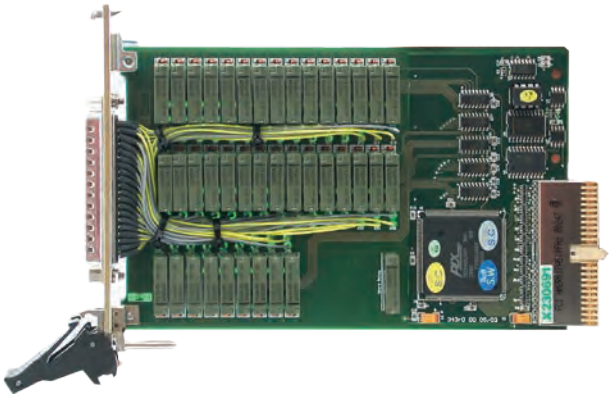
The 40-137 is fitted with electro-mechanical power relays with gold clad silver alloy contacts. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.



40-137-101 (32 x SPST)
2A Power Relay Module



40-137-201 (39 x SPST)
2A Power Relay Module



PCB View of the 40-137 HD Power Relay Module

Specification - 40-137-001 (16 x SPST, 5A)

Contact Type:	Gold clad silver alloy
Cold Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	110VDC/250VAC
Maximum Power:*	150W/1250VA
Min. Switching Capacity:	10mA, 5VDC
Typical Pulse Capability:	Cold Switch 10A for 100ms under low duty cycle conditions (please contact sales office for further advice)
Initial Path Resistance, On:	<250mΩ
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>2x10^7$
At Max. Switch Capacity:	$>5x10^4$ (5A 250VAC, 5A 30VDC) $>1x10^5$ (3A 250VAC, 3A 30VDC)

Specification - 40-137-101/201 (32/39 x SPST, 2A)

Contact Type:	Gold clad silver alloy
Cold Switching Capacity	
Maximum Current:	2A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity	
Maximum Current:	2A
Maximum Voltage:	110VDC/250VAC
Maximum Power:*	90W/500VA
Min. Switching Capacity:	100µA, 100mVDC
Initial Path Resistance, On:	<250mΩ
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>2x10^7$
At Max. Switch Capacity:	$>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.1A (typ 400mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-137-001)
3D models for all versions in a variety of popular file formats are available on request.

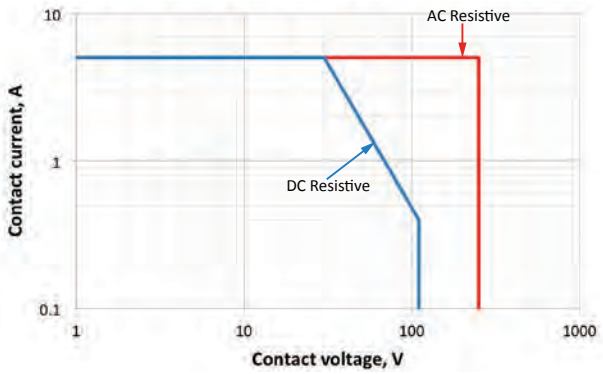
Connectors

PXI bus via 32-bit P1/J1 backplane connector.

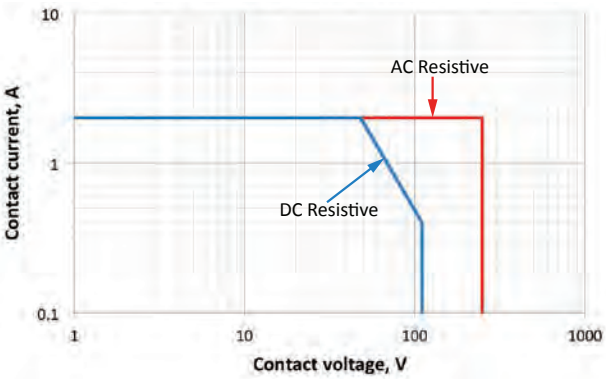
Signals via a front panel D-Type connectors as follows:-

40-137-001 37-Way D-Type male connector
40-137-101 78-Way D-Type male connector
40-137-201 78-Way D-Type male connector

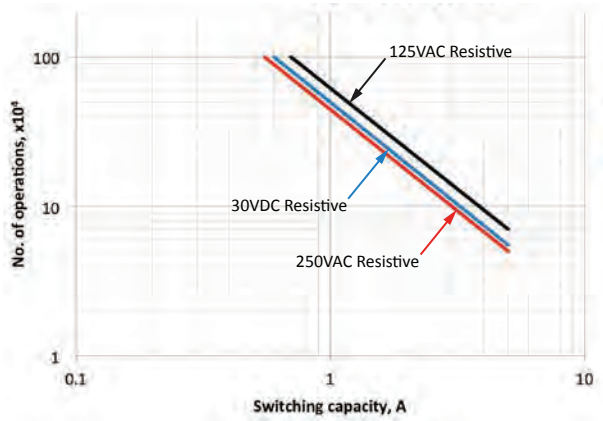
For mating connectors and cable assemblies please refer to separate datasheets.



40-137-001 (16 x SPST, 5A) Current/Voltage Curve



40-137-101/201 (32/39 x SPST, 2A) Current/Voltage Curve



40-137 Current/Operating Life Curve

Product Order Codes

16 x SPST 5A Power Relay Module	**40-137-001**
32 x SPST 2A Power Relay Module	**40-137-101**
39 x SPST 2A Power Relay Module	**40-137-201**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the 40-137 range is as follows:

Kit 20 (part no. 91-100-020) for 40-137-001/101/201

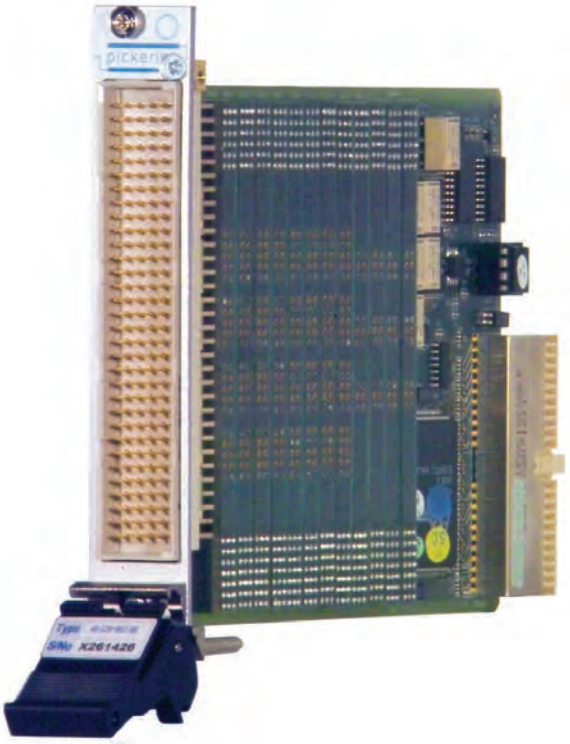
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-137 series please refer to the **90-006D** 78-way D-Type and **90-007D** 37-way D Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-138
High Density 2A Versatile Relay Module

- **VERSATILE CELL-BASED DESIGN ALLOWS SLOT-SAVING HIGH DENSITY MIXED CONFIGURATIONS**
- **Mixed Relay Configurations With Any Combination of SPST, DPST, SPDT & DPDT**
- **Maximum Current 2A Hot or Cold Switching**
- **Switch up to 300VDC/250VAC and up to 60W Max Power**
- **Reduced Cost Partially Populated Versions Available**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **3 Year Warranty**



The 40-138 2A Relay Series is suitable for applications requiring medium power switching with high density. Featuring 2A current capacity and voltages to 300VDC/250VAC, the 40-138 provides a broad selection of mixed relay types for greater flexibility.

The module consists of 13 cells which can be specified as empty or populated with one relay type. The available types are:

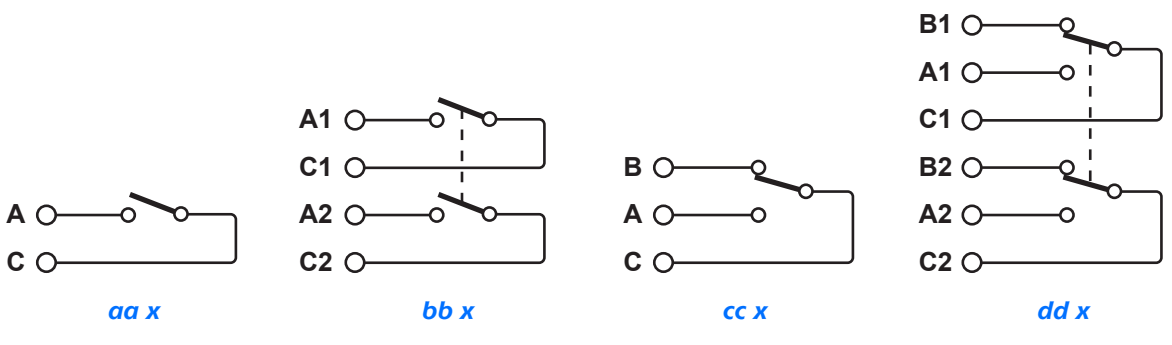
* **SPST** (Single Pole Single Throw) - 6 per cell.
* **DPST** (Double Pole Single Throw) - 3 per cell.
* **SPDT** (Single Pole Double Throw) - 4 per cell.
* **DPDT** (Double Pole Double Throw) - 2 per cell.

The permissible arrangement of cells is shown is the configuration example overleaf.

Mixed configurations are very useful for high density and/or low cost applications where optimum usage must be made of all relays, and where there are very few PXI slots available. The 40-138 can be used for replacing legacy VXI or custom switch cards where mixed relay types have been deployed. If a configuration is required with only one switch type, please refer to the data sheet for the 40-139. This offers high density low cost solutions with 2 Amp electro-mechanical relays.

Connections are made via a front panel mounted 160 way DIN 41612 high density connector. Pickering also provide a wide range of connector and cabling solutions, refer to Pickering's "Interconnection Catalog" or visit our web site.

Typical applications will be found in Automotive, Aerospace, Military and Power Cell Testing applications.



40-138 Versatile Mixed Relay Module
***aa* x SPST, *bb* x DPST, *cc* x SPDT, *dd* x DPDT**

40-138 Mixed Relay Configurator

When ordering a configuration of mixed relays, each cell can be set to be populated by SPST, DPST, SPDT or DPDT. The part number is in the form **40-138-aa-bb-cc-dd** where:

aa is the number of SPST relays (multiples of 6)
bb is the number of DPST relays (multiples of 3)
cc is the number of SPDT relays (multiples of 4)
dd is the number of DPDT relays (multiples of 2)

For further assistance consult the Operating Manual, web site or contact sales office.

Relay Type	Cells 1 to 13	Cell 13 custom build†
SPST	6 per cell	8
DPST	3 per cell	4
SPDT	4 per cell	4
DPDT	2 per cell	2

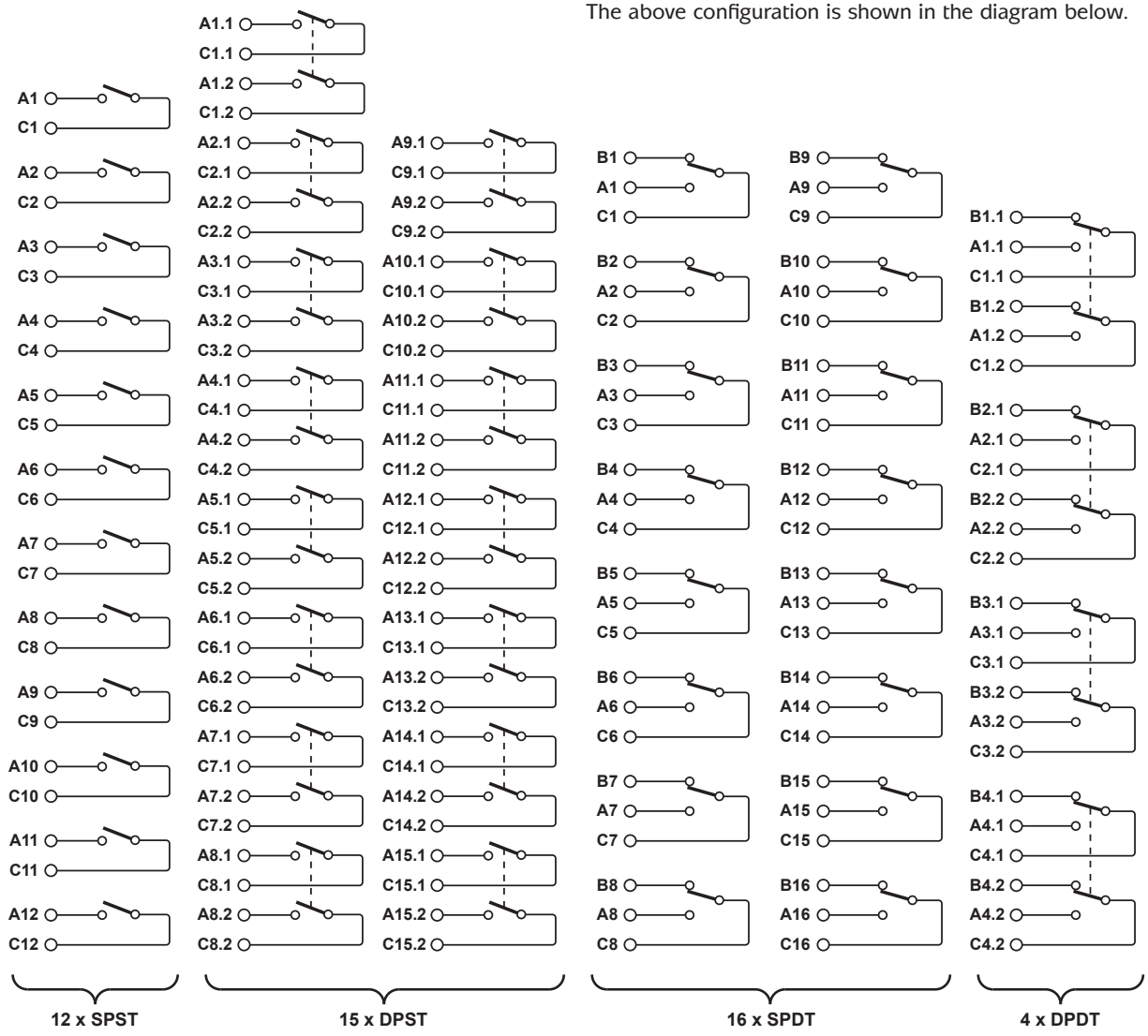
† Note: Cell 13 is configured as the same size as other cells except on custom builds.

40-138 Mixed Relay Configuration Example

A typical mixed relay example is shown in the following table where the specified configuration is; 12 x SPST, 15 x DPST, 16 x SPDT and 4 x DPDT. This corresponds to the order code: **40-138-12-15-16-4.** SPST switches are always installed in the lowest cell number and DPDT are always installed in the highest populated cell number. For further assistance please contact sales office.

Relay Type	Cell 1	Cell 2	Cell 3	Cell 4	Cell 5	Cell 6	Cell 7	Cell 8	Cell 9	Cell 10	Cell 11	Cell 12	Cell 13	Total
SPST	6	6	6	6	6	6	6	6	6	6	6	6	8	12
DPST	3	3	3	3	3	3	3	3	3	3	3	3	4	15
SPDT	4	4	4	4	4	4	4	4	4	4	4	4	4	16
DPDT	2	2	2	2	2	2	2	2	2	2	2	2	2	4

The above configuration is shown in the diagram below.



Schematic Diagram for the 40-138 Module With an Example Mixed Relay Configuration (40-138-12-15-16-4)

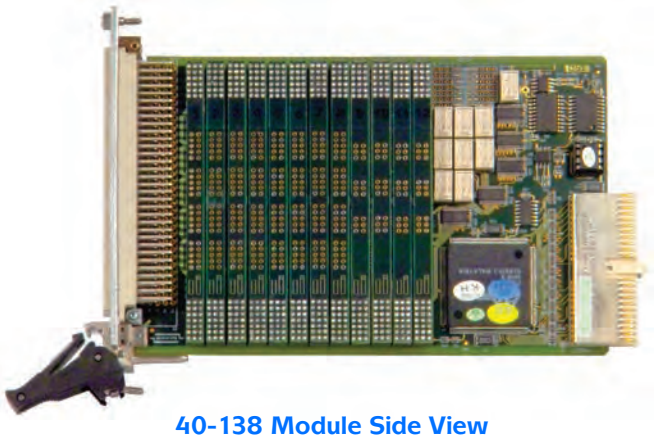
Relay Type & Maintenance

40-138 series modules are fitted with electro-mechanical signal relays, palladium-ruthenium, gold covered contacts.

The module is of a single circuit board construction and uses through hole relays (not SMT relays) so field maintenance is greatly simplified. In addition a **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Switch Specification (all versions)

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance	
On:	< 500mΩ(1A measurement condition) < 600mΩ (10mA measurement condition)
Off:	> 10^9Ω
Minimum Voltage:	100µV
Thermal Offset:	< 10µV
Operate Time:	< 3ms
Expected Life (operations)	
Very low power signal load:	> 10^8
Low power load (2W):	> $1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	> $5x10^6$ (1A, 30VDC)
Full power load (60W):	> $1x10^5$ (2A, 30VDC) > $1x10^5$ (0.1A, 300VDC)



40-138 Module Side View

Power Requirements

+3.3V	+5V	+12V	-12V
0	2.6A max (80 relays energised)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 160-Way DIN 41612 male connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Mixed Relay Configuration Order Codes

Part numbers are in the form:
40-138-aa-bb-cc-dd

Where:
aa is the number of SPST
bb is the number of DPST
cc is the number of SPDT
dd is the number of DPDT

Please note that these configurations are shipped with product codes in the form of '40-138-XXX', where 'XXX' contains digits reflecting the specific manufacturing build.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kit for the 40-138 range is as follows:

91-100-001 kit for 40-138-XXX
(where XXX are three digits that correspond to the specific manufacturing build of the module)

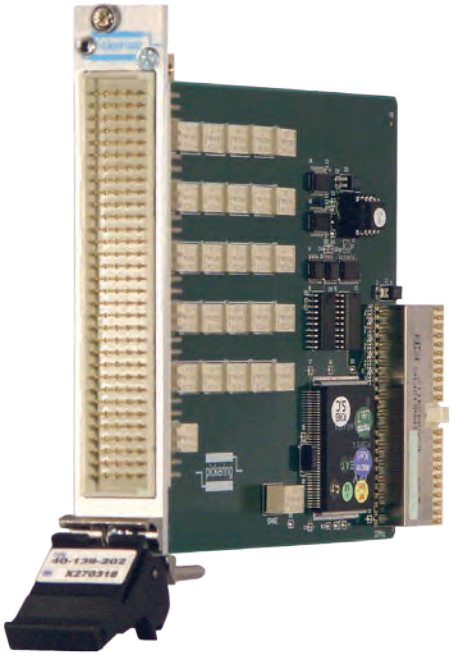
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-138 series please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-139
High Density 2A Relay Module

- High Density Electro-mechanical Relay Module
- 80 x SPST, 40 x DPST, 52 x SPDT or 26 x DPDT Configurations
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



The 40-139 2A Relay Series is suitable for applications requiring medium power switching with high density.

Featuring 2A current capacity and voltages to 300VDC/250VAC, available configurations are:

* **80 x SPST** (Single Pole Single Throw).
* **40 x DPST** (Double Pole Single Throw).
* **52 x SPDT** (Single Pole Double Throw).
* **26 x DPDT** (Double Pole Double Throw).

Connections are made via a front panel mounted 160 way DIN 41612 high density connector. Pickering also provide a wide range of connector and cabling solutions, refer to Pickering's "Interconnection Catalog" or visit our web site.

Typical applications will be found in Automotive, Aerospace, Military and Power Cell Testing applications

Alternative Slot-Saving High Density Mixed Configuration Relay Module:

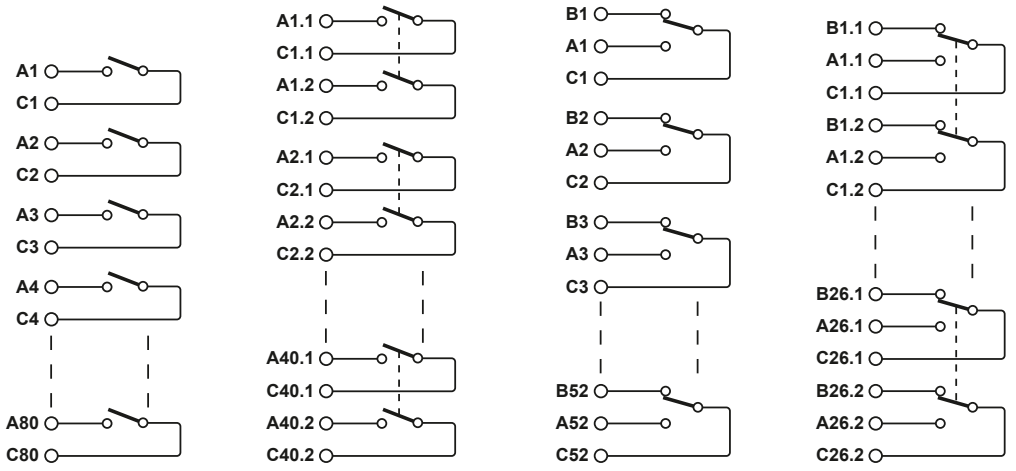
- **40-138** - Custom Solutions from a mix of SPST, DPST, SPDT & DPDT Relays

Alternative Lower Density 2A Relay Modules:

- **40-132** - 16 or 32 x SPST Relays
- **40-137** - 39 x SPST Relays
- **40-132** - 16 or 19 x DPST Relays
- **40-131** - 16 or 26 x SPDT Relays
- **40-130** - 8 or 13 x DPDT Relays

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



80 x SPST | 40 x DPST | 52 x SPDT | 26 x DPDT

40-139 High Density Relay Module Configurations

Relay Type & Maintenance

40-139 series modules are fitted with electro-mechanical signal relays, palladium-ruthenium, gold covered contacts.

The module is of a single circuit board construction and uses through hole relays (not SMT relays) so field maintenance is greatly simplified. In addition a **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Switch Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance, On:	< 350mΩ 150mΩ typical (1A measurement condition)
Initial Path Resistance, Off:	> 10^9Ω
Minimum Voltage:	100µV
Thermal Offset:	< 10µV
Operate Time:	< 3ms
Expected Life (operations)	
Very low power signal load:	> 10^8
Low power load (2W):	> $1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	> $5x10^6$ (1A, 30VDC)
Full power load (60W):	> $1x10^5$ (2A, 30VDC) > $1x10^5$ (0.1A, 300VDC)

RF Specification

Bandwidth (-3dB):	70MHz (40-139-101) 60MHz (40-139-102) 70MHz (40-139-201) 70MHz (40-139-202)
Crosstalk (typical):	-90dB at 10kHz -70dB at 100kHz -50dB at 1MHz -30dB at 10MHz
Isolation (typical):	90dB at 10kHz 70dB at 100kHz 50dB at 1MHz 30dB at 10MHz

Power Requirements

+3.3V	+5V	+12V	-12V
0	2.6A max (80 relays energised)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-139-101)
180g (40-139-201)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 160-Way DIN 41612 male connector, for pin outs please refer to the operating manual.
We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Product Order Codes

80 x SPST, 2A Relay Module	**40-139-101**
40 x DPST, 2A Relay Module	**40-139-102**
52 x SPDT, 2A Relay Module	**40-139-201**
26 x DPDT, 2A Relay Module	**40-139-202**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
All Types	**93-002-001**	**93-002-410**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

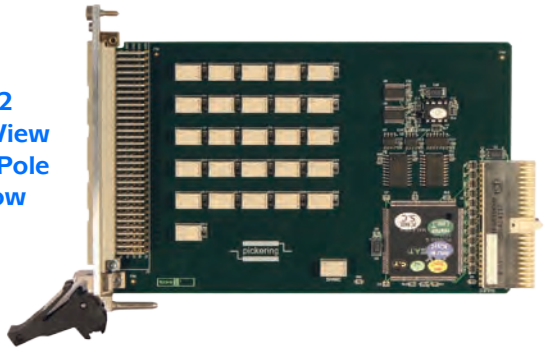
Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

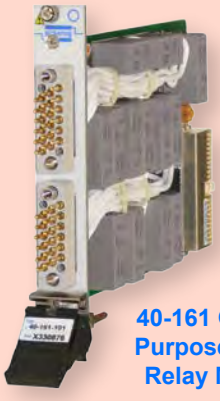
For connection accessories for the 40-139 series please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-139-202 Module Side View (26 x Double Pole Double Throw Relays)



General Purpose: High Power Relays

- Electromechanical Relays With Current Ratings to 40A
- Solid State Relays With Current Ratings to 30A
- SPST, DPST and SPDT Versions
- High Capacity Connectors
- One or Two 3U PXI Slot Modules
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

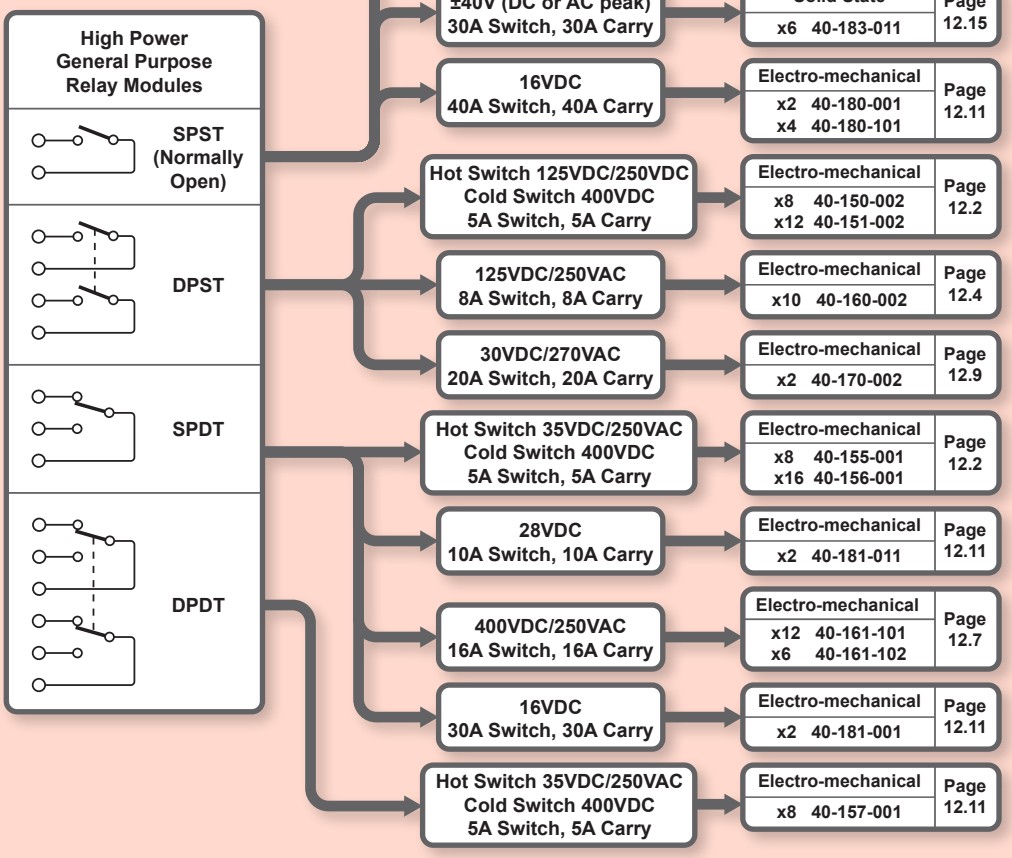


40-161 General Purpose Power Relay Module

40-170 General Purpose High Power Relay Module

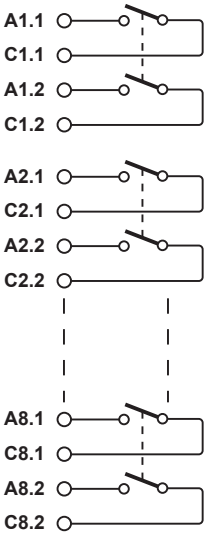
Pickering's high power switching modules provide a range of high current handling relays suited for high power applications. Each module uses a connector that has been carefully suited for the intended application and is fully supported by Pickering Interfaces range of cable and connector accessories.

Lower current versions require one 3U PXI slot, but the highest current versions occupy two slots. The modules can be used to switch heavy AC or DC loads, and the highest current versions are particularly suitable for automotive test. High power switches are also available in multiplexer and matrix configurations.

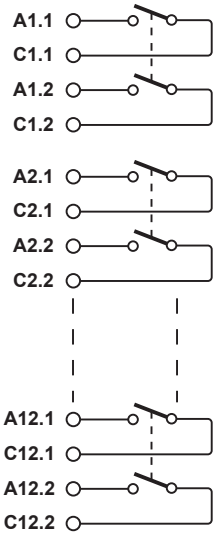


40-150/151/155/156/157
Power Relay Module

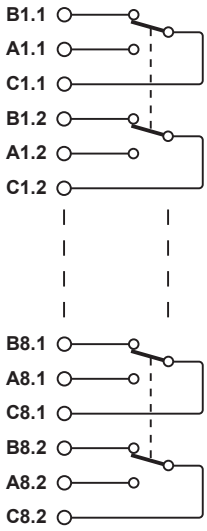
- 8 or 12 x DPST Power Relays Per Module
- 8 or 16 x SPDT Power Relays Per Module
- 8 x DPDT Power Relays Per Module
- Hot Switch up to 250 Volts AC, 5A
- Cold Switch up to 400VDC/400VAC Peak
- Maximum Power Handling 175W/1250VA
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



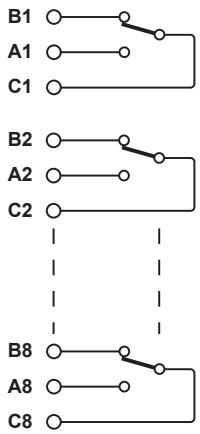
40-150-002
(8 x DPST)



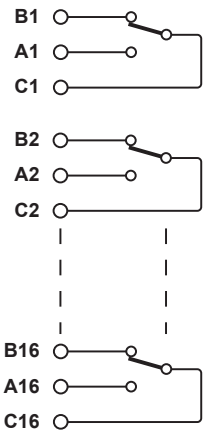
40-151-002
(12 x DPST)



40-157-001
(8 x DPDT)



40-155-001
(8 x SPDT)



40-156-001
(16 x SPDT)

Pickering Interfaces have a range of power switching PXI modules, available in relay, matrix or multiplexer configurations. Connections are made via a front panel 37 or 50-way D-Type male connectors.

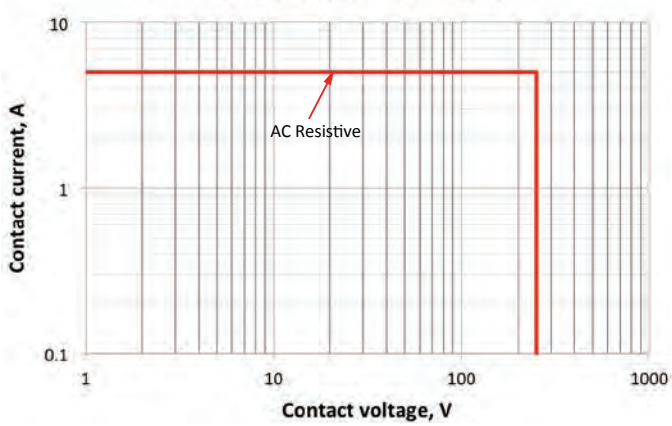
40-150/151 modules have 8xDPST or 12xDPST power relays, suitable for switching inductive/capacitive loads up to 5A at 250VAC. 40-155/156 modules have 8xSPDT or 16xSPDT power relays and 40-157 is configured as 8xDPDT.

Power relay modules are intended for switching heavy AC or DC loads or for slave switching large external relays, contactors and solenoids.

The 40-150 series of power relay module are suitable for applications requiring switching of either mains voltage or DC current.

Power Relay Type

The 40-150/151/155/156/157 are fitted with electro-mechanical power relays, gold-flash over silver alloy. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.



40-155/156/157 (SPDT & DPDT) Current/Voltage Curve

Switching Specification - 40-150/151 (DPST)

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	125VDC/250VAC
Maximum Power:*	175W/1250VA
Min. Switching Capacity:	10mA, 5VDC
Initial Path Resistance, On:	<250mΩ
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>5x10^7$
At Max. Switch Capacity:	$>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Switching Specification - 40-155/156/157 (SPDT & DPDT)

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	35VDC/250VAC
Maximum Power:*	175W/1250VA
Min. Switching Capacity:	10mA, 5VDC
Initial Path Resistance, On:	<250mΩ
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>20MHz
Operate Time:	8ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>5x10^6$
At Max. Switch Capacity:	$>5x10^4$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

+3.3V	+5V	+12V	-12V
0	360mA (typ 280mA)	0	0

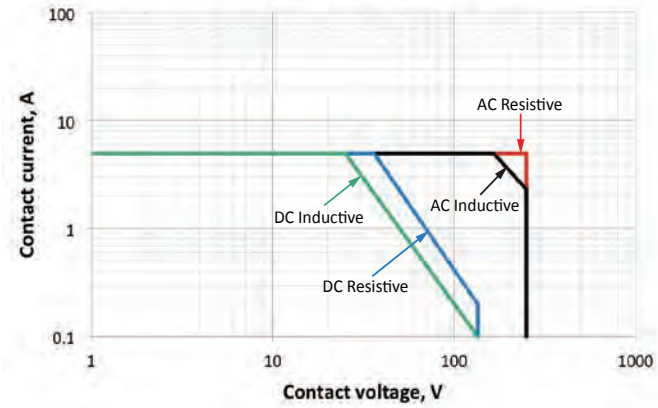
Connectors

PXI bus via 32-bit P1/J1 backplane connector.

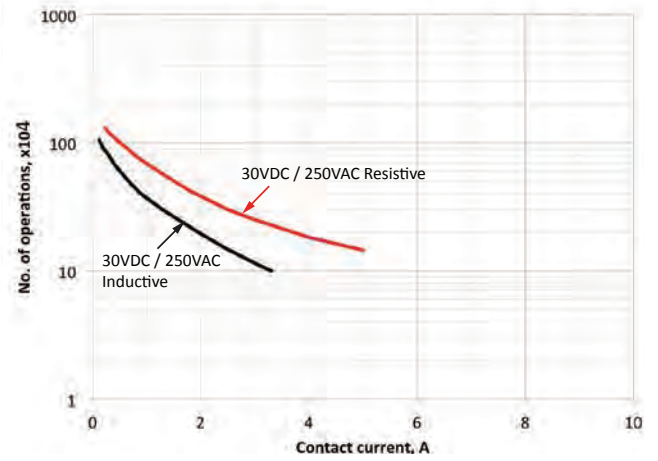
40-150 and 40-155: front panel 37-pin male D-type.
40-151, 40-156 and 40-157: front panel 50-pin male D-type.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 220g (40-151-002)
240g (40-156-001)
3D models for all versions in a variety of popular file formats are available on request.



40-150/151 (DPST) Current/Voltage Curve



40-150/151 (DPST) Current/Operating Life Curve

Product Order Codes

8 x DPST Power Relay Module	**40-150-002**
12 x DPST Power Relay Module	**40-151-002**
8 x SPDT Power Relay Module	**40-155-001**
16 x SPDT Power Relay Module	**40-156-001**
8 x DPDT Power Relay Module	**40-157-001**

Mating Connectors & Cabling

For connection accessories for the 40-150 series please refer to the **90-007D** 37-way D-type and **90-005D** 50-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-150 range are as follows:

91-100-052 kit for 40-150-002
91-100-052 kit for 40-151-002
91-100-049 kit for 40-155-001
91-100-049 kit for 40-156-001
91-100-049 kit for 40-157-001

For further assistance, please contact your local Pickering sales office.

40-160
Power Relay Module

- 10 x SPST, 20 x SPST & 10 x DPST Options
- Hot Switch up to 125VDC/250VAC
- Cold Switch up to 400VDC/250VAC
- SPST Version: Switch 10A with 300W/2500VA Maximum Power
- DPST Version: Switch 8A with 240W/2000VA Maximum Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-160 module has a choice of 10 x SPST, 20 x SPST or 10 x DPST Power Relays, suitable for switching inductive/capacitive loads up to 10A at 250VAC.

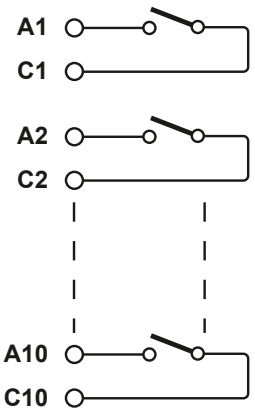
Power Relay Modules are intended for switching heavy AC or DC loads or for slaving up to large external relays, contactors and solenoids.

It is suitable for applications requiring switching of either mains voltage or DC current.

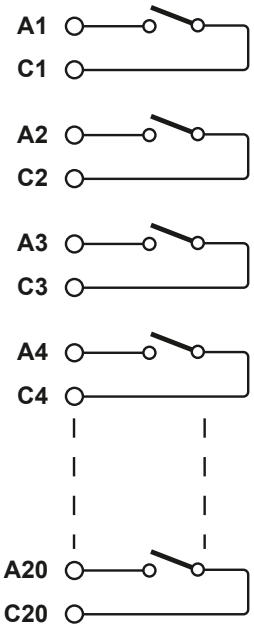
Power Relay Type

The 40-160 is fitted with electro-mechanical power relays, gold-flash over silver alloy. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.

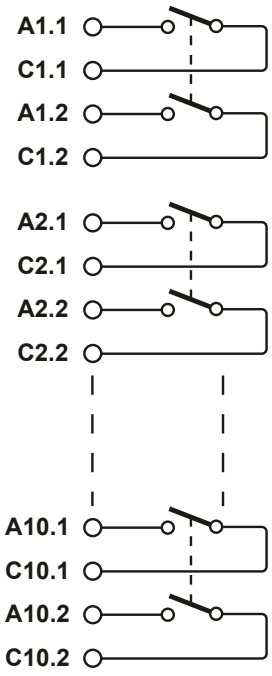
20 Way Power Connector, type 40-960-020



Schematic of 40-160-001 Relay Module 10 x SPST



Schematic of 40-160-003 Relay Module 20 x SPST



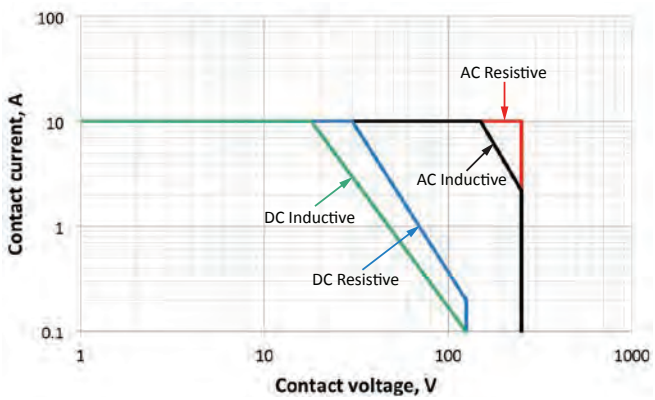
Schematic of 40-160-002 Relay Module 10 x DPST

Switching Specification - 40-160-001 & 40-160-003 (SPST)

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 10A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 10A 125VDC/250VAC 300W/2500VA 10mA, 5VDC
Maximum Continuous Switch Path Loading:	 500A² (Example allowed conditions – 5 Channels at 10A or 20 Channels at 5A, please contact sales office for any further advice)
Max Standoff Voltage: Initial Path Resistance, On: Path Resistance, Off:	400VDC <50mΩ $>10^9$Ω
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load † Mechanical Life: At Max. Switch Capacity:	 $>5x10^7$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

† Note: As switch life deteriorates rapidly when hot switching signals above 30VDC, it is advisable to only cold switch above this level.



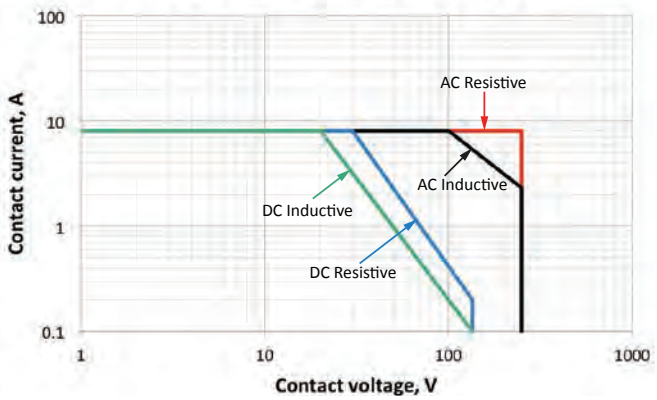
40-160-001/003 (SPST) Current/Voltage Curve

Switching Specification - 40-160-002 (DPST)

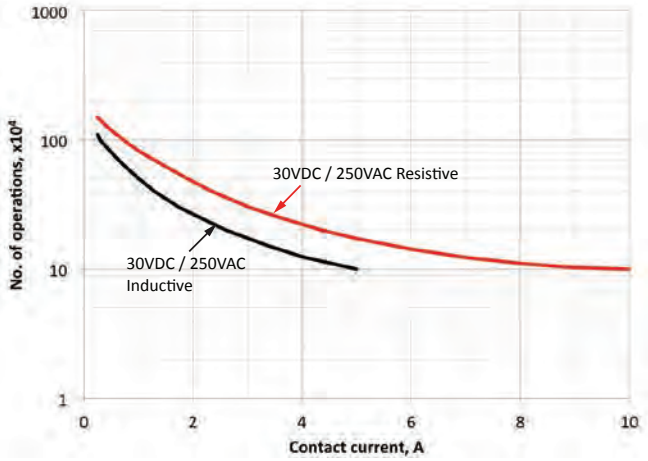
Contact Type:	Gold flash over silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 8A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 8A 125VDC/250VAC 240W/2000VA 10mA, 5VDC
Maximum Continuous Switch Path Loading:	 500A² (Example allowed conditions – 7 Channels at 8A or 20 Channels at 5A, please contact sales office for any further advice)
Max Standoff Voltage: Initial Path Resistance, On: Path Resistance, Off:	400VDC <50mΩ $>10^9$Ω
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load † Mechanical Life: At Max. Switch Capacity:	 $>5x10^7$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

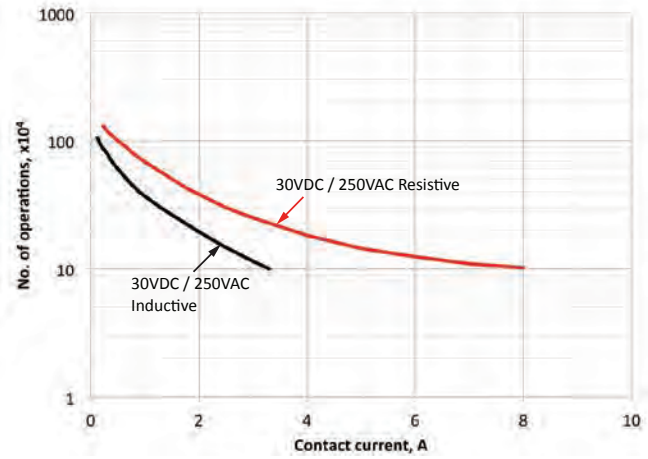
† Note: As switch life deteriorates rapidly when hot switching signals above 30VDC, it is advisable to only cold switch above this level.



40-160-002 (DPST) Current/Voltage Curve



40-160-001/003 (SPST) Current/Operating Life Curve



40-160-002 (DPST) Current/Operating Life Curve

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.2A	16.6mA per relay	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 240g (40-160-001)
280g (40-160-002)
300g (40-160-003)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Front Panel Connectors:
40-160-001: 20-way male GMCT connector.
40-160-002: 2 x 20-way male GMCT connectors.
40-160-003: 2 x 20-way male GMCT connectors.

Product Order Codes

10 x SPST, 10A Power Relay Module	**40-160-001**
20 x SPST, 10A Power Relay Module	**40-160-003**
10 x DPST, 8A Power Relay Module	**40-160-002**

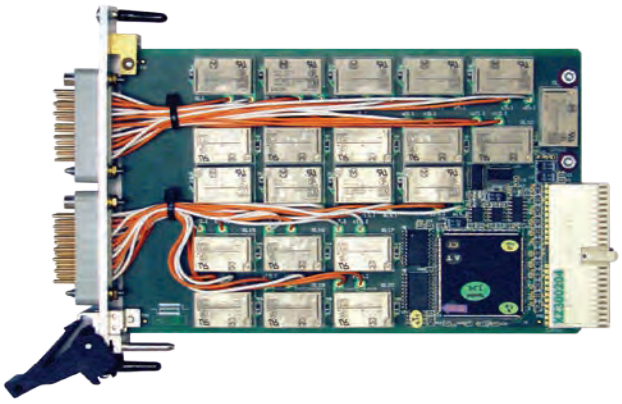
Mating Connectors & Cabling

For connection accessories for the 40-160 please refer to the **90-014D** 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-160 range are as follows:
91-100-071 Relay Kit 71 for 40-160-001 & 40-160-003
91-100-052 Relay Kit 52 for 40-160-002
For further assistance, please contact your local Pickering sales office.



Side View of 40-160-003
20 x SPST Power Relay Module

40-161
16A Power Relay Module

- High Density, High Current Switching
- 16 x SPST, 12 x SPST, 10 x SPST, 12 x SPDT and 6 x SPDT Options
- 16A Maximum Switch Current
- Switch up to 300VDC or 250VAC
- 448W/4000VA Maximum Power
- 400VDC Standoff Voltage
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

20-Way 16 Amp Power Connector

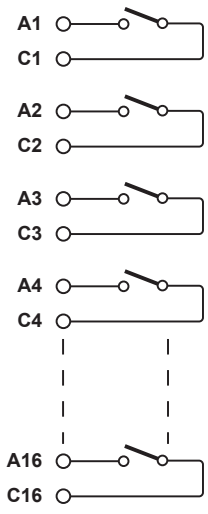
The 40-161 module has a choice of 16 x SPST, 12 x SPST, 10 x SPST, 12 x SPDT and 6 x SPDT Power Relays, suitable for switching loads up to 16A at 250VAC.

Power Relay Modules are intended for switching heavy AC or DC loads or for the slave switching of large external relays, contactors and solenoids.

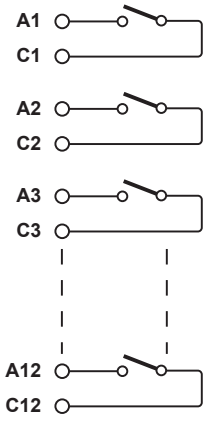
The 40-161 is ideal for switching up to 16A in both AC and DC applications.

Power Relay Type

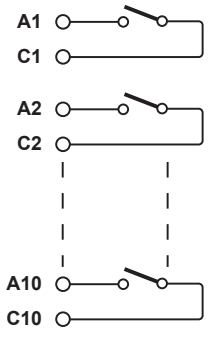
The 40-161 is fitted with electro-mechanical power relays with silver alloy contacts. A Spare Relay is included with each module to facilitate easy maintenance with minimum down time.



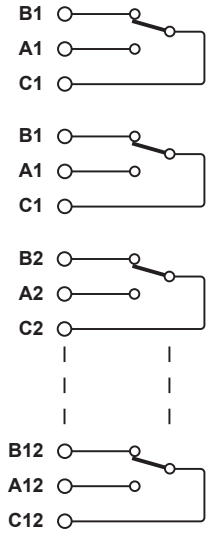
Schematic for 40-161-001 Relay Module 16 x SPST



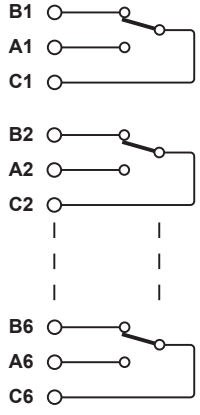
Schematic for 40-161-002 Relay Module 12 x SPST



Schematic for 40-161-003 Relay Module 10 x SPST



Schematic for 40-161-101 Relay Module 12 x SPDT



Schematic for 40-161-102 Relay Module 6 x SPDT

Switching Specification

Relay Type:	Electro-mechanical Power Relay
Contact Type:	Silver Alloy (AgNi)
Cold Switching Capacity	
Maximum Current:	16A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity (Resistive Load)	
Maximum Current:	16A
Maximum Voltage:	300VDC/250VAC
Maximum Power:	448W/4000VA
Minimum Switching Capacity:	100mA, 12V
Maximum Continuous Total Switch Path Loading:	$1536A^2$ *(Example allowed conditions - 6 channels at 16A)
Module Thermal Time Constant:	4 minutes typical
For information on module loading & pulsed currents please visit: **Pickering's Wiki page on module current capacity**	
Maximum Standoff Voltage:	400VDC
Initial Path Resistance, On:	<20mΩ (12mΩ typical)
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>20MHz
Typical Operate Time:	10ms
Expected Life (operations)	
Mechanical Endurance	
DC Coil:	$>3x10^7$
Maximum Switch Capacity (Resistive Load)	
16A @ 250VAC (4000VA):	$1x10^5$
8A @ 30VDC (240W):	$>1x10^5$ (NC/NO Contacts, Frequency of Operation 0.1Hz, Duty Cycle 90%)
16A @ 28VDC (448W):	$>1x10^5$ (NC/NO Contacts, Frequency of Operation 0.1Hz, Duty Cycle 90%)

* $1536A^2 = \Sigma I^2$, the sum of the squares of the current in each relay.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.3A max	0	0

Mechanical Characteristics

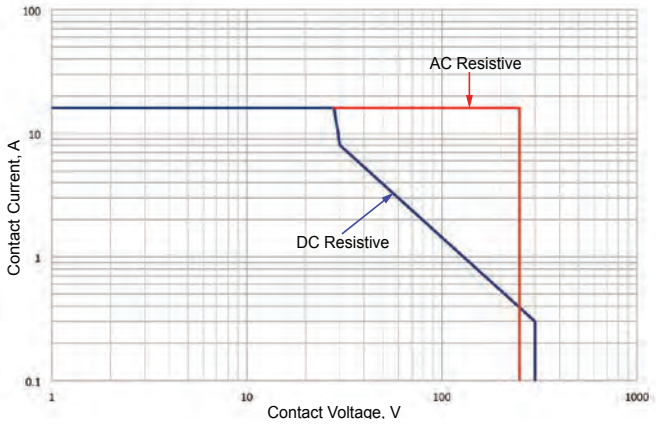
Single slot 3U PXI (CompactPCI card).
Module weight: 0.480kg maximum
3D models for all versions in a variety of popular file formats are available on request.

Connectors

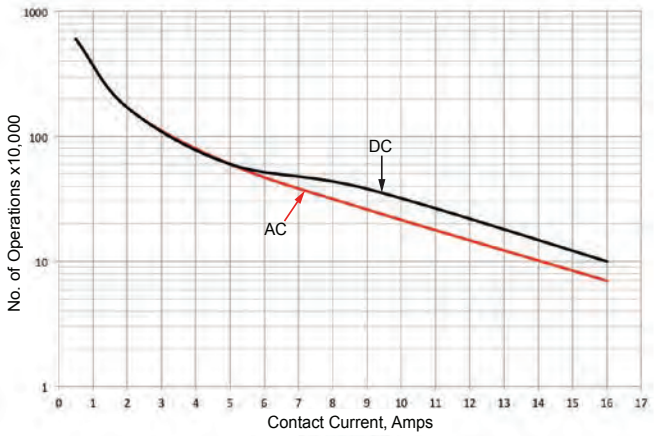
PXI bus via 32-bit P1/J1 backplane connector.

Front Panel Connectors:

40-161-001: 2 x 20 way male GMCT connectors.
40-161-002: 2 x 20 way male GMCT connectors.
40-161-003: 1 x 20 way male GMCT connector.
40-161-101: 2 x 20 way male GMCT connectors.
40-161-102: 1 x 20 way male GMCT connector.



40-161 Maximum Switching Capacity



40-161 Operations Versus Hot Switch Current at Rated Power

Product Order Codes

16 x SPST, 16A Power EMR Module	**40-161-001**
12 x SPST, 16A Power EMR Module	**40-161-002**
10 x SPST, 16A Power EMR Module	**40-161-003**
12 x SPDT, 16A Power EMR Module	**40-161-101**
6 x SPDT, 16A Power EMR Module	**40-161-102**

Mating Connectors & Cabling

For connection accessories for the 40-161 please refer to the **90-014D** 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-161 range are as follows:

91-100-092 Spare Relay Kit for 40-161-001/002/003
91-100-091 Spare Relay Kit for 40-161-101/102

For further assistance, please contact your local Pickering sales office.

40-170
High Power Relay Module

- 2 x SPST 30Amp Power Relays
- 2 x DPST 20Amp Power Relays
- Switch up to 30VDC/250VAC
- 2 Slot PXI Module
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

Model 40-170 is available either as 2 x SPST High Power Relays, suitable for switching inductive/capacitive loads up to 30A at 250VAC or as 2 x DPST switching up to 20A.

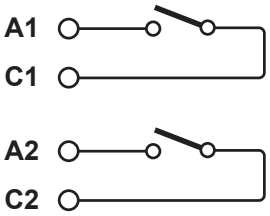
Power Relay Modules are intended for switching heavy AC or DC loads or for slaving up to large external relays, contactors and solenoids.

The 40-170 Power Relay Module is suitable for applications requiring switching of either AC mains voltage or DC voltage.

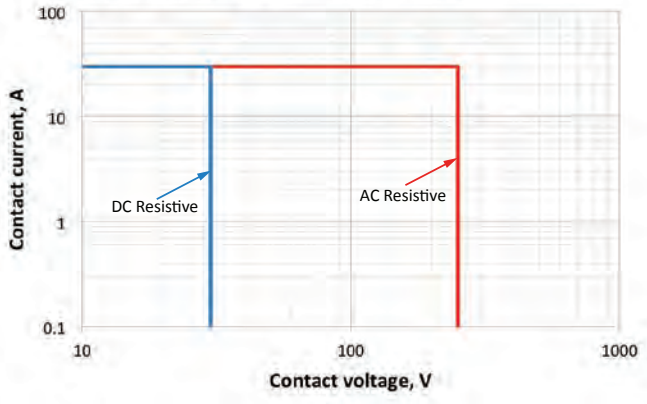
Pickering Interfaces have a range of power switching PXI modules, available in relay, matrix or multiplexer configurations.

Power Relay Type

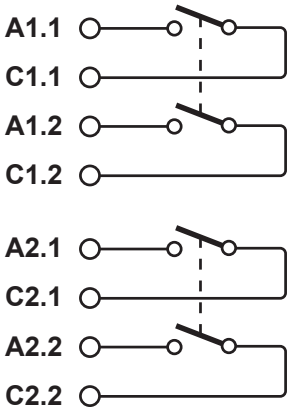
The 40-170 is fitted with electro-mechanical power relays, with silver alloy contact material.



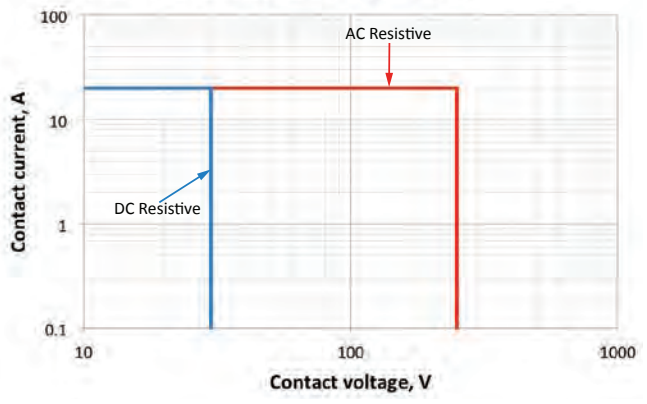
Schematic of 40-170-001 Power Module – 2 x SPST



40-170-001 (SPST) Current/Voltage Curve



Schematic of 40-170-002 Power Module – 2 x DPST



40-170-002 (DPST) Current/Voltage Curve

40-170-001 (SPST) Switching Specification

Contact Type:	Silver Alloy
Cold Switching Capacity	
Maximum Current:	30A
Maximum Voltage:	30VDC/250VAC R.M.S.
Hot Switching Capacity	
Maximum Current:	30A
Maximum Voltage:	30VDC/250VAC R.M.S.
Maximum Power:*	900W/7500VA
Minimum Switching Capacity:	100mA, 5VDC
Maximum Standoff Voltage:	600VDC
Initial Path Resistance, On:	100mΩ
Path Resistance, Off:	>1x10^{8}Ω
Bandwidth (50Ω)	10MHz
Operate Time:	30ms typical
Expected Life (operations)	
- resistive load	
Mechanical Life:	>1x10^7 (DC), >5x10^6 (AC)
At Maximum Switch Capacity:	>1x10^5

* For variation of maximum hot switching capacity of voltage with current refer to plot.

40-170-002 (DPST) Switching Specification

Contact Type:	Silver Alloy
Cold Switching Capacity	
Maximum Current:	20A
Maximum Voltage:	30VDC/250VAC R.M.S.
Hot Switching Capacity	
Maximum Current:	20A
Maximum Voltage:	30VDC/250VAC R.M.S.
Maximum Power:*	600W/5000VA
Minimum Switching Capacity:	100mA, 5VDC
Maximum Standoff Voltage:	600VDC
Initial Path Resistance, On:	100mΩ
Path Resistance, Off:	>1x10^{8}Ω
Bandwidth (50Ω)	10MHz
Operate Time:	30ms typical
Expected Life (operations)	
- resistive load	
Mechanical Life:	>1x10^7 (DC), >5x10^6 (AC)
At Maximum Switch Capacity:	>1x10^5

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

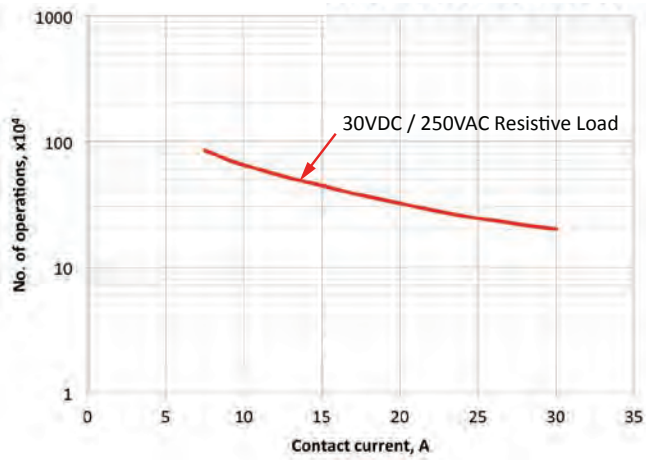
+3.3V	+5V	+12V	-12V
0	200mA	340mA	0

Mechanical Characteristics

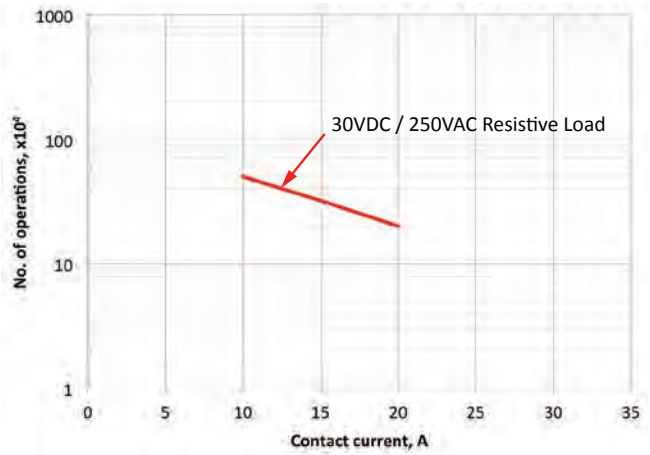
Double slot 3U PXI (CompactPCI card).
Module weight: 400g (40-170-001)
420g (40-170-002)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
Signals via a front panel high power 8-way male D-Type.



40-170-001 (SPST) Current/Operating Life Curve



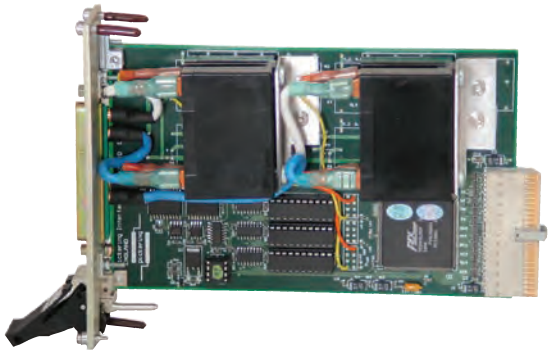
40-170-002 (DPST) Current/Operating Life Curve

Product Order Codes

2 x SPST 30A Power Relays	**40-170-001**
2 x DPST 20A Power Relays	**40-170-002**

Mating Connectors & Cabling

For connection accessories for the 40-170 please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.



Side View Of 40-170 Power Relay Module

40-180/181
Very High Power Automotive D.C. Relay Modules

- Very High Power Relay Module Available in 4 x SPST, 2 x SPST and 2 x SPDT Formats
- Available in 20 Amp and 40 Amp Versions
- Capable of Switching up to 14 Volts DC For Automotive Test Applications
- 28 Volt DC Version Suitable for Truck Applications
- 2 Slot PXI Module
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

Models 40-180/181 are High Power Relay Modules available with 2 SPST, 4 SPST or 2 SPDT contacts. They are capable of switching inductive/capacitive loads up to 40A at 14VDC or 20A at 28VDC The product range is as follows:

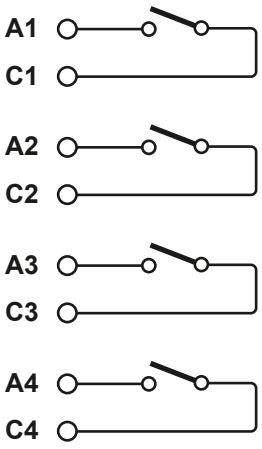
40-180-001	2 x SPST 40A 14VDC
40-180-011	2 x SPST 20A 28VDC
40-180-101	4 x SPST 40A 14VDC
40-180-111	4 x SPST 20A 28VDC
40-181-001	2 x SPDT 40A/30A 14VDC
40-181-011	2 x SPDT 20A/10A 28VDC

The 40-180/181 High Power Relay Modules are suitable for switching heavy loads or for slaving large external relays, contactors and solenoids. In particular these relay modules are designed for automotive test applications requiring the switching of DC voltage at high current. The 28V version is suitable for truck system test applications.

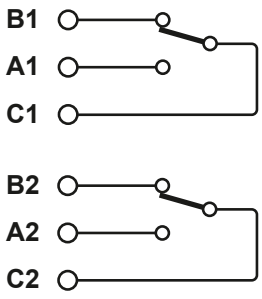
The Module is fully compliant with PXI and cPCI specifications and occupies two 3U slot positions. Connection to the relays is made via a front panel high power D-type connector.

Power Relay Type

The 40-180/181 are fitted with electro-mechanical power relays, with silver alloy contact material.



40-180 Very High Power
4 x SPST Relay Module



40-181 Very High Power
2 x SPDT Relay Module

Switching Specification 14 Volt Versions

Contact Type:	Silver Alloy
Cold Switching Capacity	
Maximum Current (N.O. Contacts):	40A
Maximum Current (N.C. Contacts):	30A
Hot Switching Capacity	
Maximum Current (N.O. Contacts):	40A
Maximum Current (N.C. Contacts):	30A
Maximum Voltage:	14VDC
Maximum Power:*	560W
Minimum Switching Capacity:	1A, 12VDC
Max Standoff Voltage:	500VDC
Initial Path Resistance - On:	15mΩ
Path Resistance - Off:	>20MΩ
Bandwidth (50Ω)	10MHz
Operate Time:	15ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>1x10^6$
At Maximum Switch Capacity:	$>5x10^4$

Switching Specification 28 Volt Versions

Contact Type:	Silver Alloy
Cold Switching Capacity	
Maximum Current (N.O. Contacts):	20A
Maximum Current (N.C. Contacts):	10A
Hot Switching Capacity	
Maximum Current (N.O. Contacts):	20A
Maximum Current (N.C. Contacts):	10A
Maximum Voltage:	28VDC
Maximum Power:*	560W
Minimum Switching Capacity:	1A, 24VDC
Max Standoff Voltage:	500VDC
Initial Path Resistance - On:	15mΩ
Path Resistance - Off:	>20MΩ
Bandwidth (50Ω)	10MHz
Operate Time:	15ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>1x10^6$
At Maximum Switch Capacity:	$>5x10^4$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

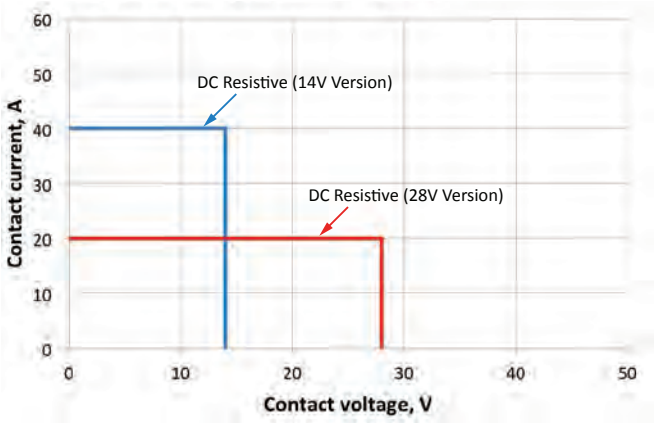
+3.3V	+5V	+12V	-12V
0	150mA typ.	500mA typ.	TBA

Mechanical Characteristics

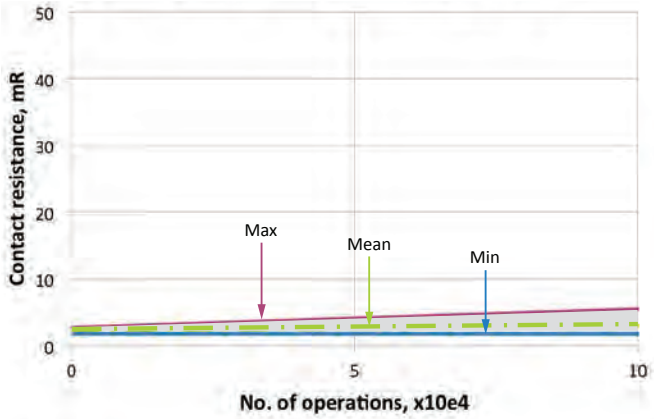
Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector.
Front panel connector: High Power 8-way male D-Type.



Maximum Switching Capability Switching a Resistive Load (curve is for N.O. contact only, N.C. contact has reduced performance)



Change in Contact Resistance for Number of Operations (at full current capacity switching an Inductive load)

Product Order Codes

2 x SPST 40A, 14VDC Power Relay Module	**40-180-001**
2 x SPST 20A, 28VDC Power Relay Module	**40-180-011**
4 x SPST 40A, 14VDC Power Relay Module	**40-180-101**
4 x SPST 20A, 28VDC Power Relay Module	**40-180-111**
2 x SPDT 40A, 14VDC Power Relay Module	**40-181-001**
2 x SPDT 20A, 28VDC Power Relay Module	**40-181-011**

Mating Connectors & Cabling

For connection accessories for the 40-180 series please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-182
10A Solid State SPST Switch

- 6 x SPST Switches in 2 PXI Slots
- 3 x SPST Switches in 1 PXI Slot
- 10 Amp Rating at 200 Volts
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-182 supports 6 off high current SPST switches into two PXI slots or 3 off high current SPST switches into one PXI slot. Each SPST switch uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each SPST switch can support 10A of continuous current and switch up to 200V signals. The switch can sustain inrush currents in excess of 50A. AC or DC signals can be switched since the switch is polarity insensitive.

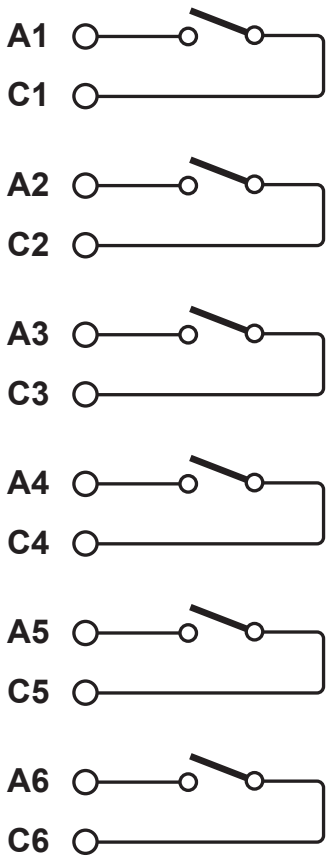
The 40-182 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Relay Type

The 40-182 is fitted with solid state MOSFET switches

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf



40-182-011 6-Channel SPST Switch Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±200V (DC or AC peak)
Continuous Switch Current:	10A
Peak Current:	50A for 200µs
Max Total Module Current:	6 channels each carrying 10A †
Initial Path Resistance - On:	60mΩ at 25°C typical
Rise/Fall Time:	<12µs typical
Operate Time:	20µs on, 20µs off
Recommended Maximum Cycle Rate (on, then off):	150 operations/sec
Expected Life (operations):	Indefinite when used within ratings

† The capacity of the module to carry 10A on all channels is chassis dependent and dependent on the number of high power modules fitted to the chassis. Specification reflects test conditions in a Pickering PXI chassis. Refer to supplier for chassis cooling capacity, restrict average RMS current over 5 minute period to 7A per channel for chassis meeting the minimum PXI recommendations.

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	560mA	0	0

Mechanical Characteristics

Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

6-Channel 10A Solid State SPST Switch: 40-182-011
3-Channel 10A Solid State SPST Switch: 40-182-012

Note: The 40-182-011 supersedes the 40-182-001 and the 40-182-012 supersedes the 40-182-002. The new and old versions are functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Product	Test Tool	Adaptor	Termination
All Types	93-005-001	93-005-236	93-012-103

Mating Connectors & Cabling

For connection accessories for the 40-182 please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-182-012 3-Channel SPST Switch

40-183
30A Solid State SPST Switch

- 6 x SPST Switches in 2 PXI Slots
- 30 Amp Rating at 40 Volts
- 40 Amp With Single Relay Closure
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-183 supports 6 off high current SPST switches into two slots of PXI chassis. Each SPST switch uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each SPST switch can support 30A of continuous current and switch up to 40V signals. The module can support 40A continuous operation for a single relay closure. The switches can sustain inrush currents in excess of 120A. AC or DC signals can be switched since the switch is polarity insensitive.

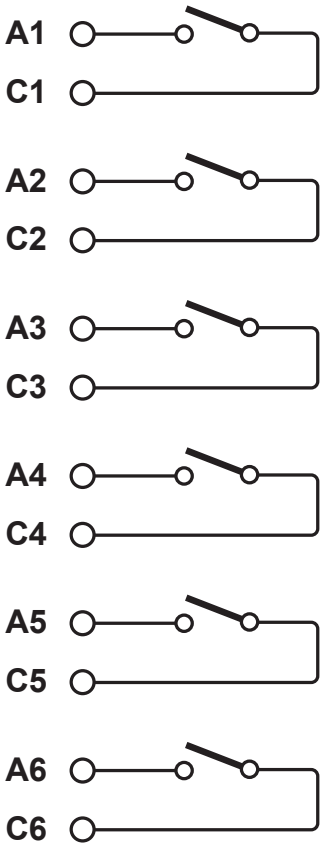
The 40-183 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Relay Type

The 40-183 is fitted with solid state MOSFET switches.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf



40-183 6-Channel SPST Switch Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±40V (DC or AC peak)
Continuous Switch Current:	30A continuous, 40A continuous with single relay per module closed
Peak Current:	120A for 200µs
Max Total Module Current:	6 channels each carrying 30A †
Initial Path Resistance - On:	6mΩ at 25˚C typical
Leakage Current (at ±40V):	<1µA at 25˚C and switch cold, <250µA at max temperature immediately after switch has carried maximum current for >10 minutes.
Rise/Fall Time:	40µs/140µs (typical)
Operate Time:	250µs
Max Operating Speed at nominal load:	60 operations/sec
Expected Life (operations):	Indefinite when used within ratings

† The capacity of the module to carry 30A on all channels is chassis dependent and dependent on the number of high power modules fitted to the chassis. Specification reflects test conditions in a Pickering PXI chassis. Refer to supplier for chassis cooling capacity, restrict average RMS current over 5 minute period to 25A per channel for chassis meeting the minimum PXI recommendations.

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	350mA	0	0

Mechanical Characteristics

Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via 2 front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

6-Channel 30A Solid State SPST Switch: 40-183-011

Note: The 40-183-011 supersedes the 40-183-001 which is functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below.
For more information see **eBIRST**.

Product	Test Tool	Adaptor	Termination
All Types	**93-005-001**	**93-005-236**	**93-012-103**

Mating Connectors & Cabling

For connection accessories for the 40-183 please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-184
25A Solid State SPST Switch

- 6 x SPST Switches in 2 PXI Slots
- 3 x SPST Switches in 1 PXI Slot
- 25 Amp Rating at 100 Volts
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-184 supports 6 off high current SPST switches into two PXI slots or 3 off high current SPST switches into one PXI slot. Each SPST switch uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each SPST switch can support 25A of continuous current and switch up to 100V signals. The switch can sustain inrush currents of up to 90A. AC or DC signals can be switched since the switch is polarity insensitive.

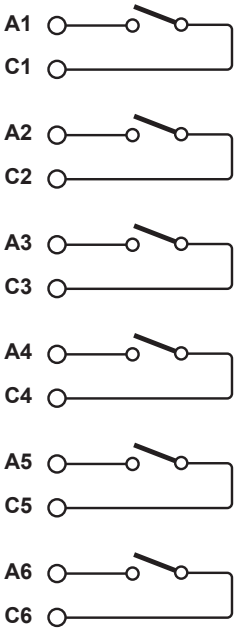
The 40-184 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Relay Type

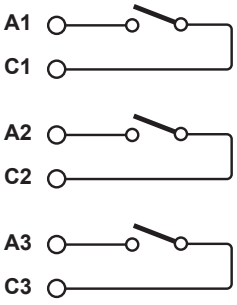
The 40-184 is fitted with solid state MOSFET switches.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf



40-184-001 6-Channel SPST Switch Schematic Diagram.



40-184-002 3-Channel SPST Switch Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Default Relay State:	Open with or without power applied
Max Switch Voltage:	±100V (DC or AC peak)
Continuous Switch Current:	25A, all channels simultaneously
Peak Current:	90A for 200µs
Max Total Module Current:	6 channels each carrying 25A
Initial Path Resistance - On:	<40mΩ at 25°C typical
Leakage Current:	<1µA at 25°C
Rise/Fall Time:	<5µs typical
Operate Time:	20µs
Maximum Operating Speed:	1845 cycles / sec (100VDC, 1.3A) 1848 cycles / sec (25VDC, 25A)
Expected Life (operations):	Indefinite when used within ratings

Power Requirements

+3.3V	+5V	+12V	-12V
300mA	550mA	0	0

Mechanical Characteristics

40-184-001: Double slot 3U PXI (CompactPCI card).
40-184-002: Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

40-184-001: Signals via 2 front panel mounted 8-way male power D-type connectors.
40-184-002: Signals via 1 front panel mounted 8-way male power D-type connector.

For pin outs please refer to the operating manual.

Product Order Codes

6-Channel 25A 100V Solid State SPST: 40-184-001
3-Channel 25A 100V Solid State SPST: 40-184-002

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below.
For more information see **eBIRST**.

Product	Test Tool	Adaptor	Termination
All Types	93-005-001	93-005-236	93-012-103

Mating Connectors & Cabling

For connection accessories for the 40-184 please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-184-002 3-Channel SPST Switch

40-185
1.5A Solid State SPST Switch

- 6 x SPST Switches in 2 PXI Slots
- 3 x SPST Switches in 1 PXI Slot
- 1.5 Amp Rating at 400 Volts
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-185 supports 6 off high current SPST switches into two PXI slots or 3 off high current SPST switches into one PXI slot. Each SPST switch uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each SPST switch can support 1.5A of continuous current and switch up to 400V signals. The switch can sustain inrush currents in excess of 20A. AC or DC signals can be switched since the switch is polarity insensitive.

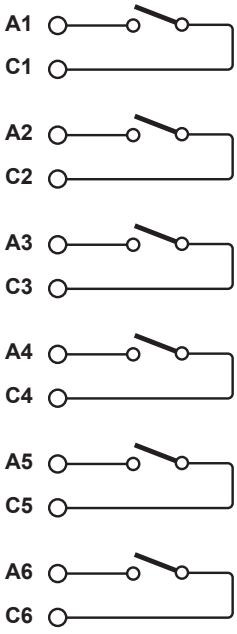
The 40-185 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Relay Type

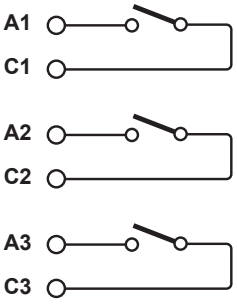
The 40-185 is fitted with solid state MOSFET switches

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf



40-185-001 6-Channel SPST Switch Schematic Diagram.



40-185-002 3-Channel SPST Switch Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±400V (DC or AC peak)
Continuous Switch Current:	1.5A
Peak Current:	20A for 200µs
Max Total Module Current:	6 channels each carrying 1.5A
Initial Path Resistance - On:	1.8Ω at 25°C typical
Rise/Fall Time:	<5µs typical
Operate Time:	20µs
Recommended Maximum Cycle Rate (on, then off):	10 operations/sec
Expected Life (operations):	Indefinite when used within ratings

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	560mA	0	0

Mechanical Characteristics

Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via 2 front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

6-Channel 1.5A 400V Solid State SPST: 40-185-001
3-Channel 1.5A 400V Solid State SPST: 40-185-002

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below.
For more information see **eBIRST**.

Product	Test Tool	Adaptor	Termination
All Types	93-005-001	93-005-236	93-012-103

Mating Connectors & Cabling

For connection accessories for the 40-185 please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-185-002 3-Channel SPST Switch

High Voltage Switching

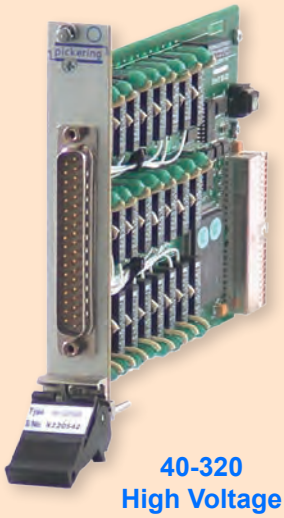
- Hot Switching Up To 750VDC or 750VAC peak
- Cold Switching Up To 1000VDC or 1000VAC peak
- Uncommitted Relay, Matrix and Multiplexer Configurations Available
- Electro-Mechanical Relay Versions For Hot or Cold Current Switching Up To 5A
- High Voltage D-Type Connector
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

The 40-310/320 high voltage range of switching modules provides solutions for uncommitted relay and multiplexer applications that need to switch voltages up to 1000V. They are suited for hot or cold switching applications up to 10W and 0.5A with a rating of 13mA at their maximum operating voltage. The 40-330/331/332 switch modules can switch up to 1000V and also have a hot or cold switching current rating of 5A.

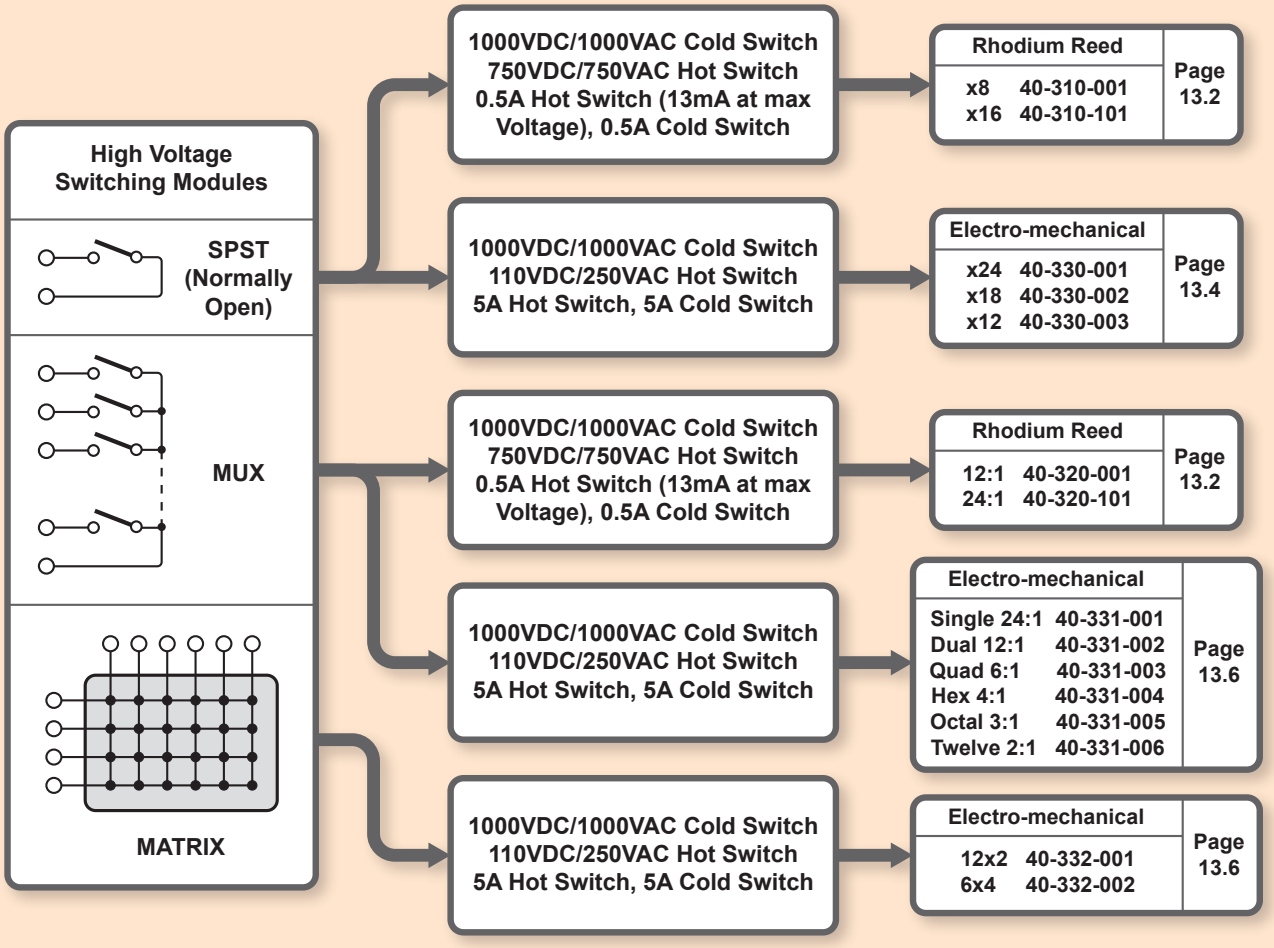
All these modules use high voltage D-type connectors which are fully supported by Pickering Interfaces cable and connector accessory range.

The design ensures the modules can withstand high common mode voltages and a protective safety cover is used to shield the switching components.

40-330 High Voltage Relay Module



40-320 High Voltage Multiplexer Module



40-310/320
High Voltage Relay/Multiplexer

- **INDUSTRY'S HIGHEST VOLTAGE PXI SWITCH MODULES**
- **Model 40-310: 8 or 16 x High Voltage SPST Reed Relays**
- **Model 40-320: 12 or 24 Channel High Voltage Multiplexer**
- **Hot Switch up to 750VDC or 750VAC peak, 10W Max Power**
- **Cold Switch up to 750VDC/750VAC peak Working Voltage (1000VDC/1000VAC peak Typical)**
- **Dry Reed Switch Contacts With RFI Suppression for Long Life**
- **Operating Speed <0.5ms**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **3 Year Warranty**

The 40-310/320 Range of High Voltage Switching Modules will hot switch up to 750V peak and cold switch up to 1000V peak in either general purpose relay (40-310) or multiplexer (40-320) configurations.

These modules contain high quality reed relays with switching ratings comfortably higher than the 40-310/320 specification.

Applications for the 40-310/320 series modules include; circuit board isolation testing, relay testing, semiconductor breakdown monitoring and cable harness insulation testing.

RFI Suppression

The 40-310/320 High Voltage switching modules include RFI suppression that extend the contact life of the relays in hot switching applications and control surges caused by high voltage transients in cold switching applications. The suppressors ensure safe operation of the modules when connected to the high voltage source through cable assemblies that might otherwise generate additional transients or RFI problems.

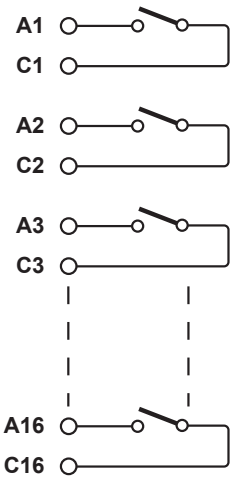
The suppression components result in reduced bandwidth and slightly higher path resistance compared to standard designs (please refer to Switching Specification table on page 2).

Please note, it is good practice to keep high voltage switching modules away from more sensitive units to minimize crosstalk.

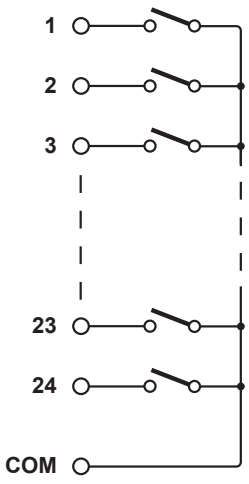
Relay Type

The 40-310 and 40-320 are fitted with high quality Rhodium relays specifically designed for very high voltage switching and are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

The design uses through hole leaded style relays to ensure easy replacement with no special tools required. A spare relay is fitted to each module to enable easy servicing.



40-310: 8 or 16 x SPST High Voltage Reed Relays



40-320: 12 or 24 Channel High Voltage Multiplexer

High Voltage Switching Specification

Switch Type:	Rhodium Reed
Max Hot Switching Voltage: Max Cold Switching Voltage:	750VDC/750VAC peak 750VDC/750VAC peak Working (1000VDC/ 1000VAC peak Typical)
Max Power: Max Hot Switch Current: Max Cold Switch Current:	10W 0.5A (13mA at max switch volts) 0.5A
Initial Path Resistance On (single module): Off (single module): Bandwidth:	 <3Ω $>1x10^{10}Ω$ 250kHz
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life Low power load: Full power load:	 $>1x10^{8}$ operations $>5x10^{6}$ operations

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 240g (40-310-101)
3D models for all versions in a variety of popular file formats are available on request.

Power Requirements

+3.3V	+5V	+12V	-12V
0	400mA (280mA typ)	0	0

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 37-Way male D-type, high voltage connector.

Product Order Codes

8 x SPST High Voltage Reed Relays	**40-310-001**
16 x SPST High Voltage Reed Relays	**40-310-101**
12 Channel High Voltage Multiplexer	**40-320-001**
24 Channel High Voltage Multiplexer	**40-320-101**

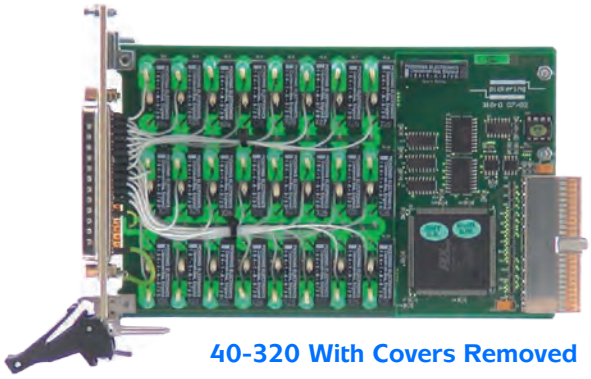
Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-310 range are as follows:
91-100-033 kit for 40-310-001/101
91-100-033 kit for 40-320-001/101
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-310/320 please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-320 With Covers Removed

40-320 With Covers In Place

Overview of "Hot" & "Cold" Switching Techniques

"Hot" Switching is used to switch the load with the high voltage source applied. Hot Switching may generate considerable RFI, both within the switching module and on all interconnection wiring. Care must be taken to suppress or shield all cabling.
Note that any precaution which adds extra capacitance to an incoming cable should be taken with great care, even a very small capacitance at high voltages can cause very large current inrushes to the switch resulting in possible switch weld and excessive RFI.
The 40-310/320 modules include extensive built-in RFI suppression circuits that minimize RFI and surge problems.

"Cold" Switching – The Preferred Option for Reliability & Long Life.
With cold switching, the relay is operated before the high voltage source is connected. The maximum carry current is then much greater and there will also be much less stress on the reed relays, resulting in improved reliability and life.
Most high voltage sources include a soft start facility which will reduce the likelihood of generating RFI or temporary over-voltages.
High voltage switching modules are often used for isolation testing applications (e.g. cable, transformer or semiconductor isolation tests), here cold switching is nearly always the preferred option in order to reduce the risk of high voltage transients that may cause premature breakdown.

40-330
SPST High Voltage Power Relay Module

- 12, 18 or 24 SPST Relays per Module
- Cold Switch up to 750VDC/750VAC peak Working Voltage (1000VDC/1000VAC peak Typical)
- Hot Switch up to 110VDC/250VAC
- 5A Hot Switching Current
- Maximum Power 150W/1250VA
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

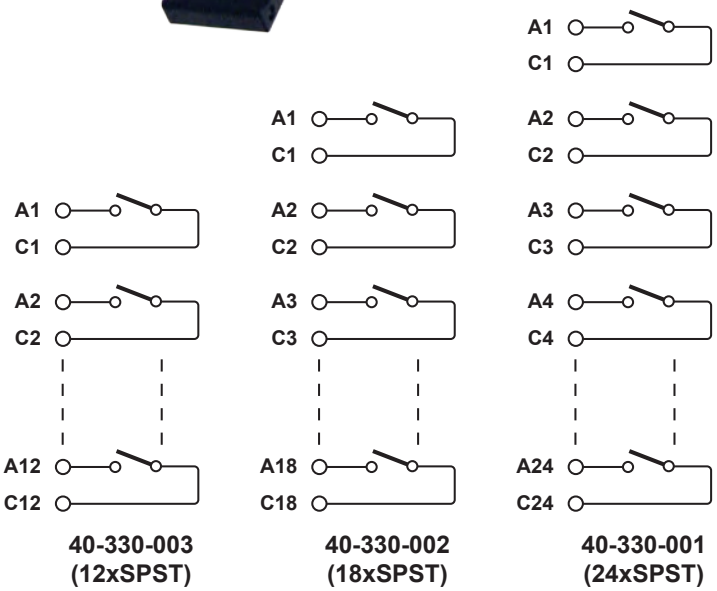
The Pickering Interfaces 40-330 High Voltage Power Relay Module is suitable for applications requiring high voltage power relay switching with high density.

It features current handling up to 5A, 1000VDC/1000VAC peak cold switching and 110VDC/250VAC hot switching. It is configured as a bank of 12, 18 or 24 separate Single Pole Single Throw (SPST) relays. Connections are made via a front panel mounted 50-pin (24xSPST) or 37-pin (18 and 12xSPST) high voltage D-Type connector.

Typical applications will be found in Automotive, Aerospace and Power Cell Testing applications.

Power Relay Type

The 40-330 is fitted with electro-mechanical power relays with gold clad silver alloy contacts. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.



Switching Diagrams for the 40-330 High Voltage Power Relay Module

Overview of "Hot" & "Cold" Switching Techniques

"Hot" Switching is used to switch the load with the high voltage source applied. Hot Switching may generate considerable RFI, both within the switching module and on all interconnection wiring. Care must be taken to suppress or shield all cabling.

Note that any precaution which adds extra capacitance to an incoming cable should be taken with great care, even a very small capacitance at high voltages can cause very large current inrushes to the switch resulting in possible switch weld and excessive RFI.

The 40-330 module includes extensive built-in RFI suppression circuits that minimize RFI and surge problems.

"Cold" Switching – The Preferred Option for Reliability & Long Life.

With cold switching, the relay is operated before the high voltage source is connected. The maximum carry current is then much greater and there will also be much less stress on the reed relays, resulting in improved reliability and life.

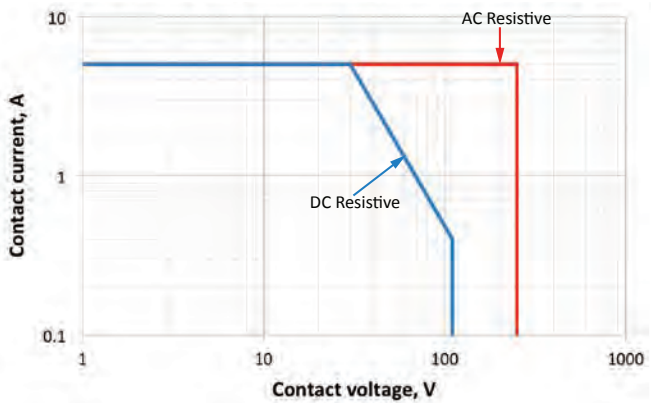
Most high voltage sources include a soft start facility which will reduce the likelihood of generating RFI or temporary over-voltages.

High voltage switching modules are often used for isolation testing applications (e.g. cable, transformer or semiconductor isolation tests), here cold switching is nearly always the preferred option in order to reduce the risk of high voltage transients that may cause premature breakdown.

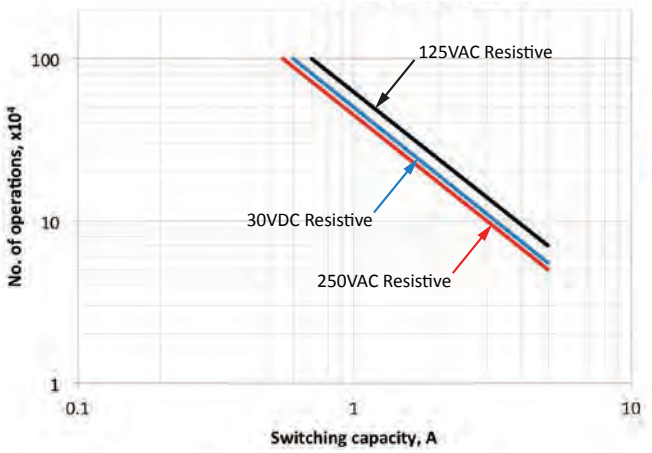
Switching Specification

Contact Type:	Gold clad silver alloy
Cold Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	750VDC/750VAC peak working (1000VDC/1000VAC peak typical)
Hot Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	110VDC/250VAC
Maximum Power:*	150W/1250VA
Min. Switching Capacity:	10mA, 5VDC
Initial Path Resistance, On:	<50mΩ (30mΩ typical)
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	5MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>2x10^7$
At Max. Switch Capacity:	$>5x10^4$ (5A 250VAC, 5A 30VDC) $>1x10^5$ (3A 250VAC, 3A 30VDC)

* For variation of maximum hot switching capacity of voltage with current refer to plot.



Current/Voltage Curve



Current/Operating Life Curve

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.75A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector.

Front panel connector:

50-Way male D-type, high voltage (40-330-001)
37-Way male D-type, high voltage (40-330-002)
37-Way male D-type, high voltage (40-330-003)

Product Order Codes

24xSPST High Voltage Power Relay Module	**40-330-001**
18xSPST High Voltage Power Relay Module	**40-330-002**
12xSPST High Voltage Power Relay Module	**40-330-003**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the 40-330 module range is as follows:

91-100-020 Relay Kit 20 for 40-330-001/002/003

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-330 please refer to the **90-005D** 50-way D-type and the **90-007D** 37-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-331/332
High Voltage Power Multiplexer & Matrix Modules

- Multiplexer With Single 24:1, Dual 12:1, Quad 6:1, Hex 4:1, Octal 3:1 or Twelve 2:1 Formats
- Matrix With 12x2 or 6x4 Configurations
- Cold Switch up to 750VDC/750VAC peak Working Voltage (1000VDC/1000VAC peak Typical)
- Hot Switch up to 110VDC/250VAC
- 5A Hot Switching Current
- Maximum Power 150W/1250VA
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

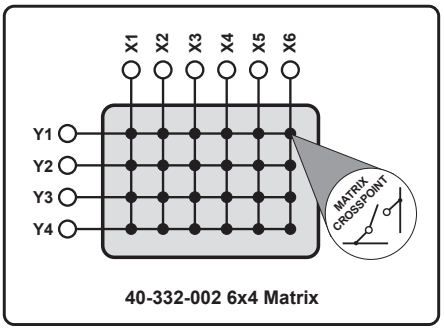
The Pickering Interfaces 40-331/332 High Voltage Power Multiplexer and Matrix Modules are suitable for applications requiring high voltage power relay switching with high density.

They feature current handling up to 5A, 1000VDC/1000VDC peak cold switching and 110VDC/250VAC hot switching. The 40-331 is available as a single 24:1, dual 12:1, quad 6:1, hex 4:1, octal 3:1 or twelve 2:1 multiplexer, and the 40-332 is available in 12x2 or 6x4 matrix configurations. Connections are made via a front panel mounted 37 pin high voltage D-Type connector.

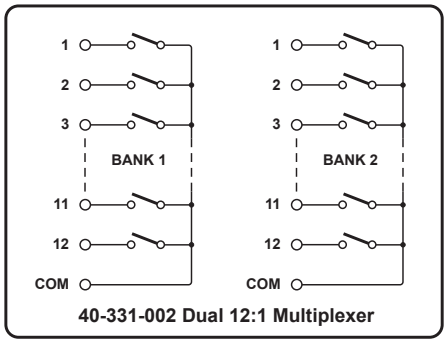
Typical applications will be found in Automotive, Aerospace and Power Cell Testing applications.

Power Relay Type

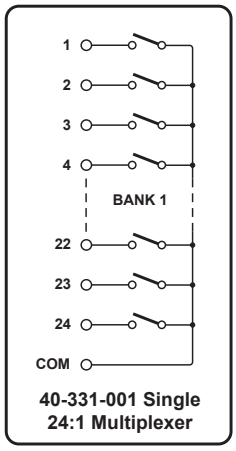
The 40-331/332 is fitted with electro-mechanical power relays with gold clad silver alloy contacts. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.



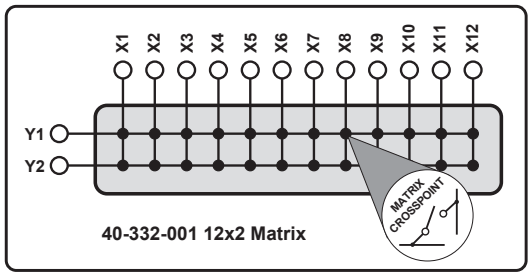
40-332-002 6x4 Matrix



40-331-002 Dual 12:1 Multiplexer

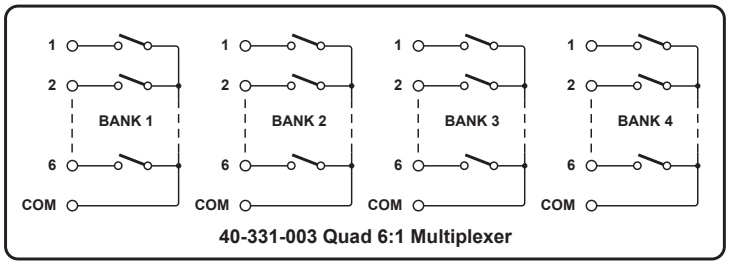


40-331-001 Single 24:1 Multiplexer



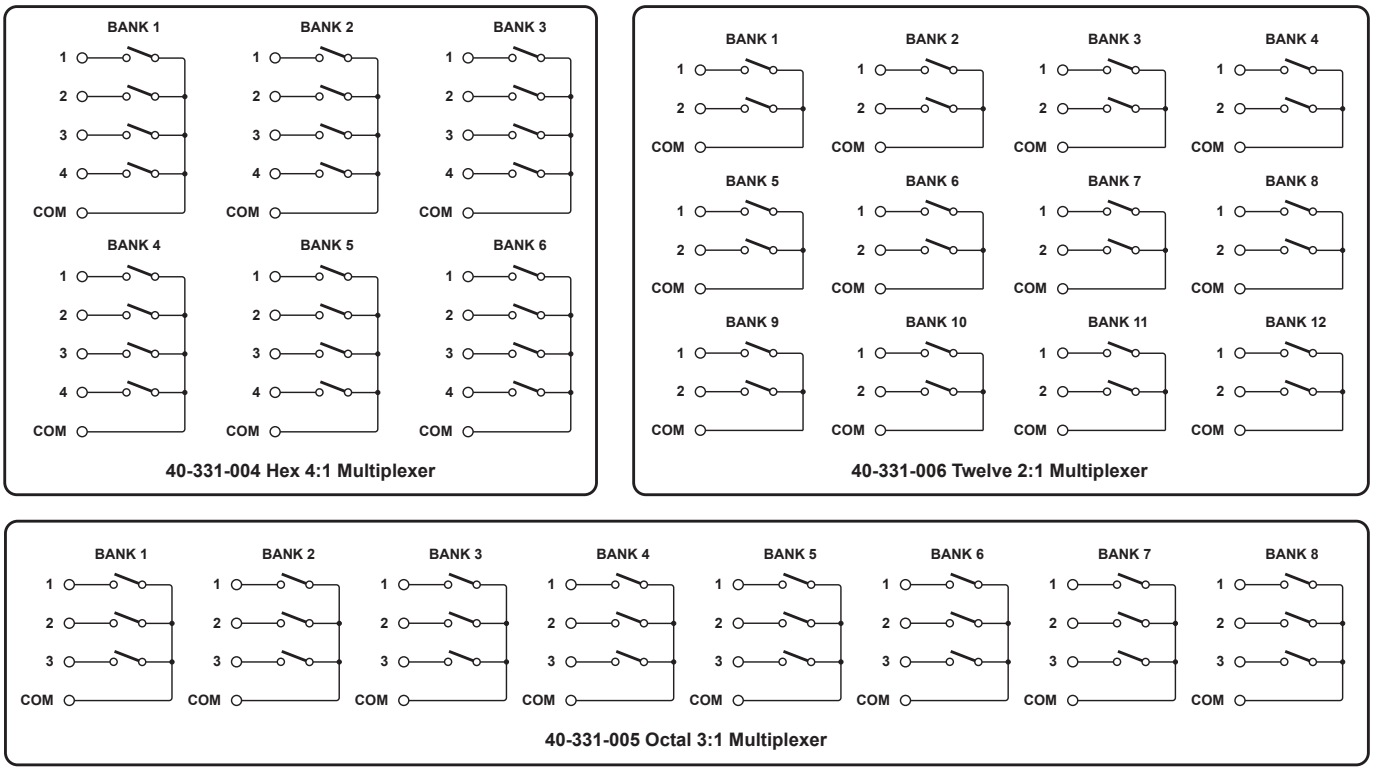
40-332-001 12x2 Matrix

Switching Diagrams for the 40-332 High Voltage Power Matrix



40-331-003 Quad 6:1 Multiplexer

Switching Diagrams for the 40-331-001/002/003 High Voltage Power Multiplexers



Switching Diagrams for the 40-331-004/005/006 High Voltage Power Multiplexers

Overview of "Hot" & "Cold" Switching Techniques

"Hot" Switching is used to switch the load with the high voltage source applied. Hot Switching may generate considerable RFI, both within the switching module and on all interconnection wiring. Care must be taken to suppress or shield all cabling.

Note that any precaution which adds extra capacitance to an incoming cable should be taken with great care, even a very small capacitance at high voltages can cause very large current inrushes to the switch resulting in possible switch weld and excessive RFI.

The 40-331/332 modules include extensive built-in RFI suppression circuits that minimize RFI and surge problems.

"Cold" Switching – The Preferred Option for Reliability & Long Life.

With cold switching, the relay is operated before the high voltage source is connected. The maximum carry current is then much greater and there will also be much less stress on the reed relays, resulting in improved reliability and life.

Most high voltage sources include a soft start facility which will reduce the likelihood of generating RFI or temporary over-voltages.

High voltage switching modules are often used for isolation testing applications (e.g. cable, transformer or semiconductor isolation tests), here cold switching is nearly always the preferred option in order to reduce the risk of high voltage transients that may cause premature breakdown.

Switching Specification

Contact Type:	Gold clad silver alloy
Cold Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	750VDC/750VAC peak working (1000VDC/1000VAC peak typical)
Hot Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	110VDC/250VAC
Maximum Power:*	150W/1250VA
Min. Switching Capacity:	10mA, 5VDC
Initial Path Resistance, On:	<200mΩ
Path Resistance, Off:	$>10^9$Ω
Bandwidth:†	5MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>2x10^7$
At Max. Switch Capacity:	$>5x10^4$ (5A 250VAC, 5A 30VDC) $>1x10^5$ (3A 250VAC, 3A 30VDC)

* For variation of maximum hot switching capacity of voltage with current refer to plot.

† Bandwidth represents 3dB insertion loss in a 50Ω system.

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.75A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). 3D models for all versions in a variety of popular file formats are available on request.

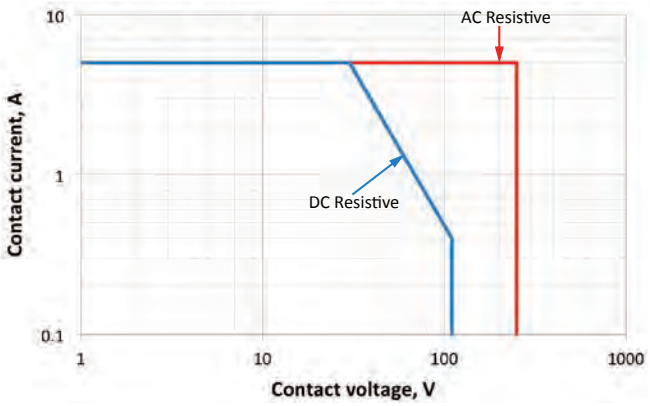
Connectors

PXI bus via 32-bit P1/J1 backplane connector.

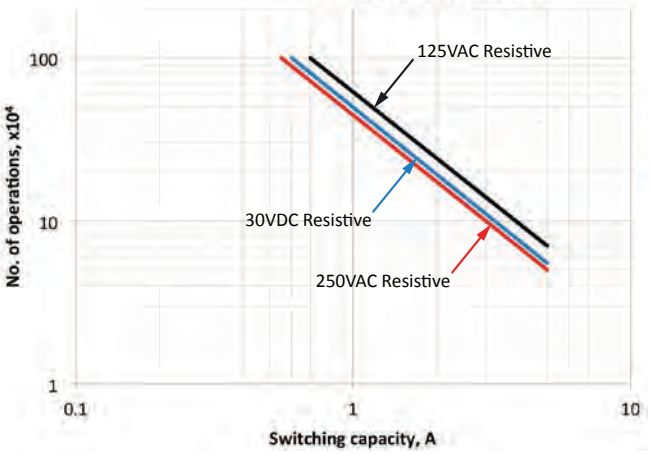
Signals via front panel 37-Way male D-type, high voltage connector.

Mating Connectors & Cabling

For connection accessories for the 40-331/332 modules please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Current/Voltage Curve



Current/Operating Life Curve

Product Order Codes

Single 24:1 High Voltage Power Multiplexer	**40-331-001**
Dual 12:1 High Voltage Power Multiplexer	**40-331-002**
Quad 6:1 High Voltage Power Multiplexer	**40-331-003**
Hex 4:1 High Voltage Power Multiplexer	**40-331-004**
Octal 3:1 High Voltage Power Multiplexer	**40-331-005**
Twelve 2:1 High Voltage Power Multiplexer	**40-331-006**
12x2 High Voltage Power Matrix	**40-332-001**
6x4 High Voltage Power Matrix	**40-332-002**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the 40-331/332 modules is as follows:

91-100-020 Relay Kit 20 for 40-331-001/002/003/004/005/006

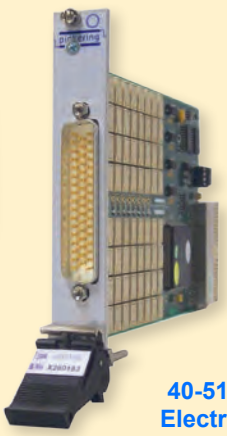
91-100-020 Relay Kit 20 for 40-332-001/002

For further assistance, please contact your local Pickering sales office.

Matrix: Low Density

- Ruthenium Reed Relay Versions For Maximum Signal Performance
- Electro-mechanical Relay Versions For Current Handling up to 2 Amps
- Single and Dual Matrix Configurations
- 50Ω, 50MHz Screened Reed Versions
- Expansion Capability Across Multiple Cards
- Fast Operating Speed <500µs for Reed Versions, <3ms for Electromechanical Versions
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-510 Reed Relay Matrix Module



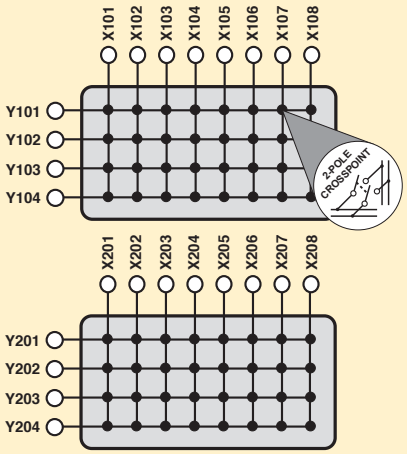
40-515 Electro-Mechanical Relay Matrix Module

Pickering Interfaces offers a comprehensive range of low density matrix modules that use either ruthenium reed relays or electromechanical relays. They are a cost effective solution for applications that require relatively small matrices in the PXI format.

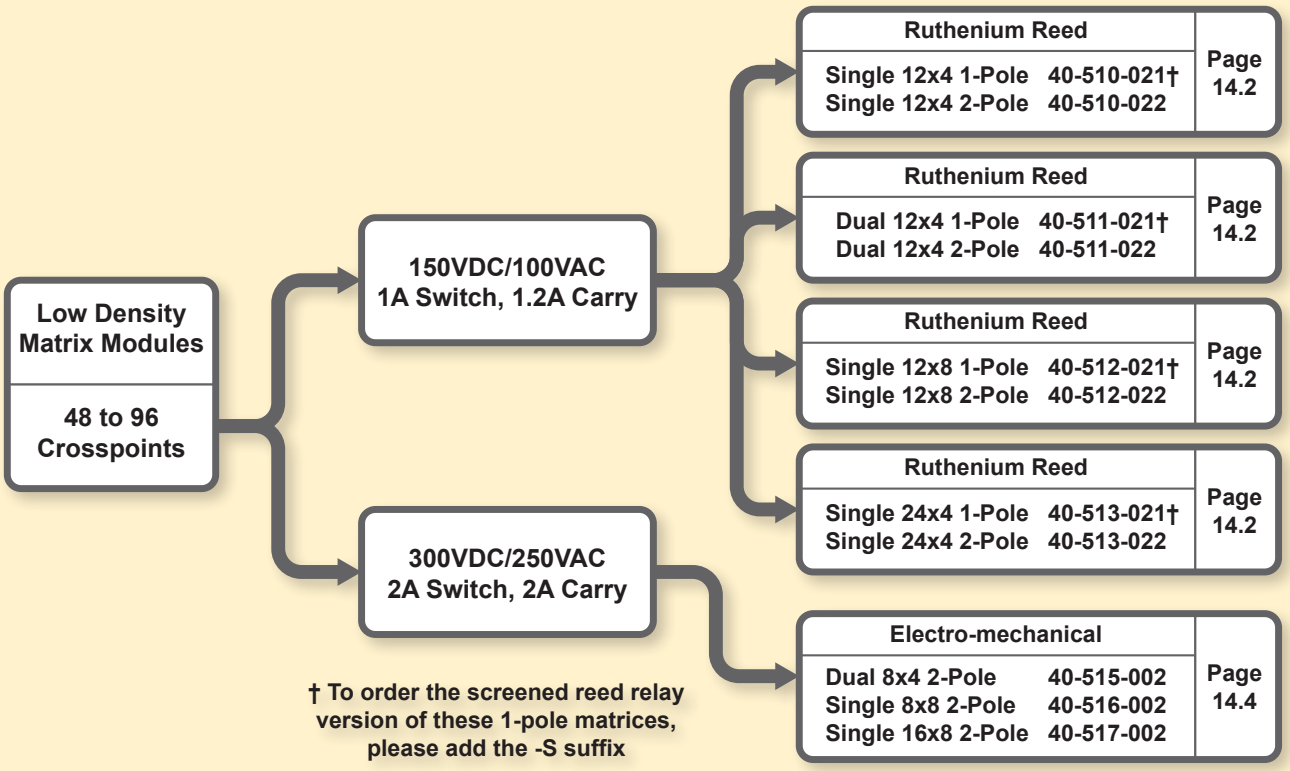
The matrices can be expanded by connecting together multiple modules, but Pickering recommend that users look at the higher density modules that involve less user configuration.

All the reed relay versions use high quality sputtered ruthenium relays that exhibit excellent contact performance under low and medium level switching conditions. For general purpose applications that also require higher power handling, the range of electromechanical relays provides an ideal solution.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.



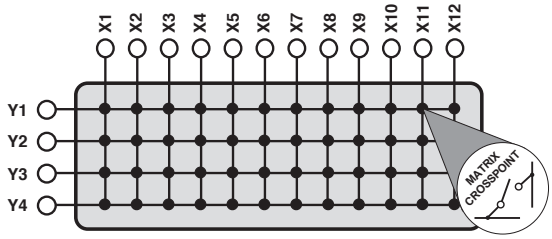
Example Matrix Configuration: Dual 8x4 with 2-pole contacts (40-515)



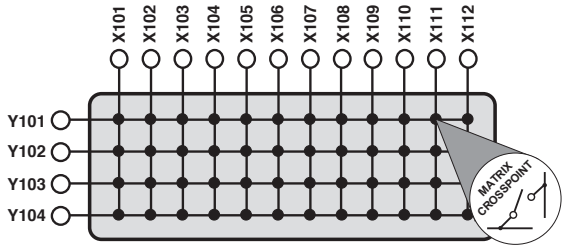
† To order the screened reed relay version of these 1-pole matrices, please add the -S suffix

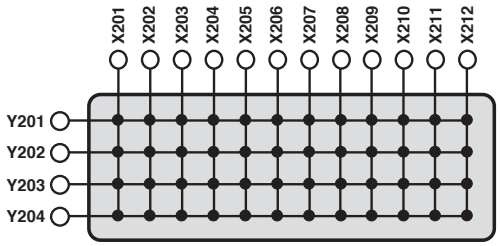
40-510/511/512/513
Matrix Module

- Reed Relay Matrix Module
- 12x4, Dual 12x4, 24x4 or 12x8
- 1-Pole, 2-Pole or Screened Versions
- Large Matrices Built Using Multiple Modules
- Screened 50Ω Option with 50MHz Bandwidth
- Uses High Reliability Pickering Reed Relays For Maximum Performance
- Fast Operating Speed < 500µs
- Switch up to 150Volts, 1.2A with 20W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



40-510 Matrix 12x4





40-511 Matrix Dual 12x4

The 40-510 series of matrix modules feature a wide range of selectable switching configurations (12x4, dual 12x4, 12x8 and 24x4). Typical applications include signal routing in ATE and data acquisition systems.

Available reed relay formats are 1-pole, 2-pole and 1-Pole screened. The screened version is suitable for switching signals up to 50MHz. Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI moodules.

Relay Type

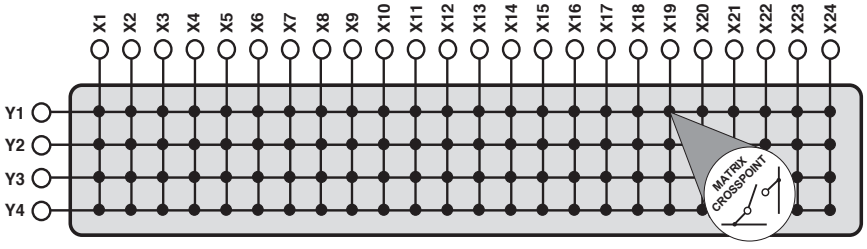
All 40-510 series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

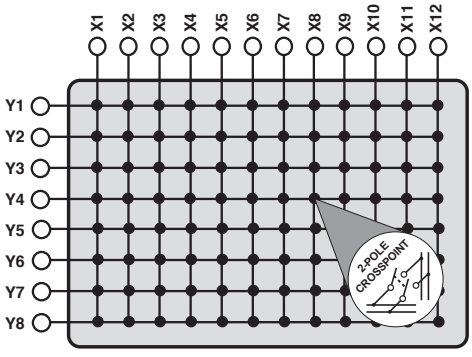
All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-513 Matrix 24x4



40-512 Matrix 12x8 2-pole
(each line is a 2 wire connection)

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1A 1.2A
Initial Path Resistance On (single module): Off (single module): Differential Thermal Offset:	 <600mΩ (40-510/511) <1000mΩ (40-512) <800mΩ (40-513) $>10^9$Ω <15µV
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

Isolation and Crosstalk (screened reed versions)

Crosstalk	@1MHz:	62dB (typical)
	@10MHz:	42dB (typical)
	@25MHz:	40dB (typical)
Isolation	@1MHz:	65dB (typical)
	@10MHz:	49dB (typical)
	@25MHz:	45dB (typical)

Power Requirements

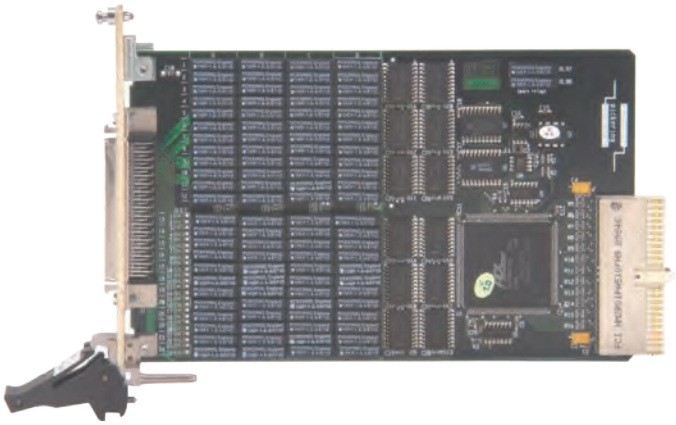
+3.3V	+5V	+12V	-12V
0	400mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 280g (40-513-021)
260g (40-513-022)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 68-Way female SCSI style micro-D connector, pin outs are in the operating manual.



PCB Layout for the 40-510 Matrix Module

Product Order Codes

Single 12x4 Matrix, 1-Pole	**40-510-021**
Single 12x4 Matrix, 2-Pole	**40-510-022**
Dual 12x4 Matrix, 1-Pole	**40-511-021**
Dual 12x4 Matrix, 2-Pole	**40-511-022**
Single 12x8 Matrix, 1-Pole	**40-512-021**
Single 12x8 Matrix, 2-Pole	**40-512-022**
Single 24x4 Matrix, 1-Pole	**40-513-021**
Single 24x4 Matrix, 2-Pole	**40-513-022**

Options
–S All 1-pole versions are available with screened reed relays (e.g. 40-512-021-S)

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**93-006-401**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-510-021	**91-100-003**
40-510-021-S	**91-100-011**
40-510-022	**91-100-008**
40-511-021	**91-100-003**
40-511-021-S	**91-100-011**
40-511-022	**91-100-008**
40-512-021	**91-100-003**
40-512-021-S	**91-100-011**
40-512-022	**91-100-008**
40-513-021	**91-100-003**
40-513-021-S	**91-100-011**
40-513-022	**91-100-008**

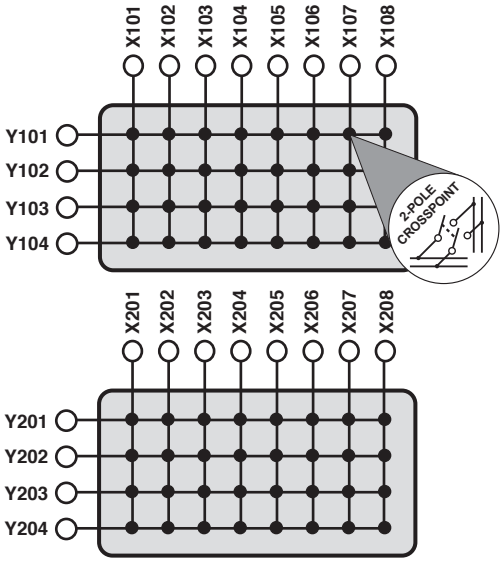
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

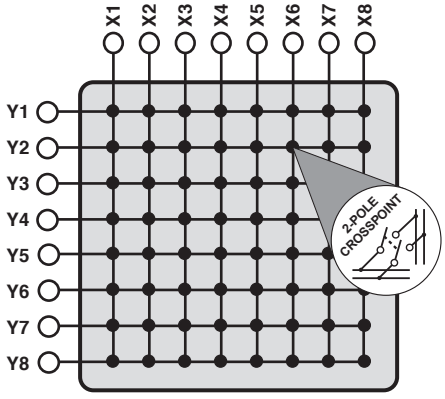
For connection accessories for the 40-510 series please refer to the **90-015D** 68-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-515/516/517
2 Amp 2 Pole Matrix Module

- 2-Pole Switch Matrix
- Available in 8x8, 16x4 or Dual 8x4 Formats
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical 2-Pole Relays
- Operating Speed Less Than 3ms
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



40-515 Matrix Dual 8x4 2-Pole
(each line is a 2 wire connection)



40-516 Matrix 8x8 2-Pole
(each line is a 2 wire connection)

The 40-515/516/517 2 Amp, 2-Pole Matrix Modules form part of the System 40 PXI Programmable Switching system. Each module consists of a matrix of 64 2-pole electro-mechanical relays under the control of a PXI/PCI interface. The matrix configuration is dependant upon the model number, this is as follows:

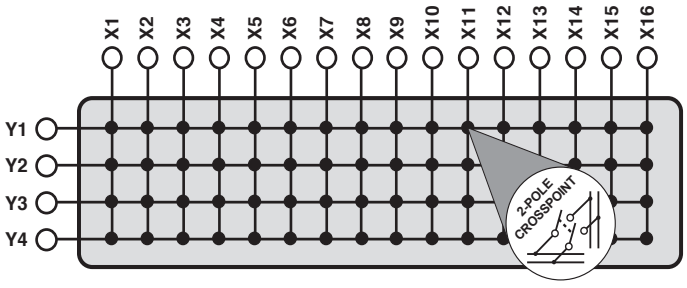
40-515 Dual 8x4 2-Pole Matrix
40-516 Single 8x8 2-Pole Matrix
40-517 Single 16x4 2-Pole Matrix

These modules are designed for switching medium voltage/power signals in test applications where reed relays do not have sufficient rating. They are also suitable for telecoms applications where send and return signals need to be switched simultaneously.

All modules use 2-pole electro-mechanical relays with palladium-ruthenium, gold-plated, bifurcated contacts for maximum reliability and long operational life. Each contact has a maximum carry and switching current of 2 Amps. The maximum voltage is 300VDC/250VAC with a maximum power rating of 60W/62.5VA.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-517 Matrix 16x4 2-Pole
(each line is a 2 wire connection)

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	<600mΩ
Initial Off Path Resistance:	>10^9Ω
Minimum Voltage	100µV
Differential Thermal Offset:	<10µV
Operate Time:	<3ms
Expected Life (Operations)	
Very low power load:	>$1x10^8$
Low power load:	>$1.5x10^7$ (0.1A 20VDC)
Medium power load:	>$5x10^6$ (1A 30VDC)
Full power load:	>$1x10^5$ (2A 30VDC)
	>$1x10^5$ (0.1A 300VDC)

Bandwidth

Typical Bandwidth	25MHz

Power Requirements

+3.3V	+5V	+12V	-12V
0	155mA (Nominal) 1.54A (Maximum)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector
Front panel connector: 50-way male D-type

Product Order Codes

Dual 8x4 Matrix Module, 2-pole (2A, 60W)	**40-515-002**
8x8 Matrix Module, 2-pole (2A, 60W)	**40-516-002**
16x4 Matrix Module, 2-pole (2A, 60W)	**40-517-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-005-001**	**Not Required**

Spare Relay Kits

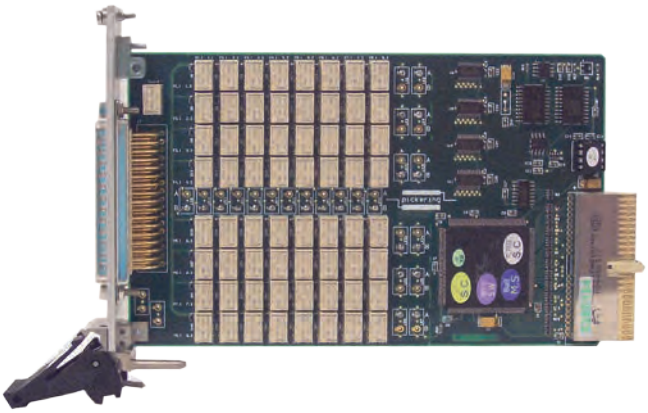
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

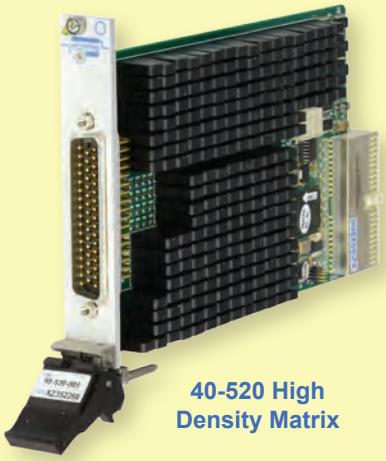
For connection accessories for the 40-515/516/517 please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB Layout for the 40-515 Matrix Module

Matrix: Medium Density

- Ruthenium Reed Relay Versions For Maximum Signal Performance
- Single and Dual Matrix Configurations
- 50Ω, 50MHz Screened Reed Version
- Expansion Capability Across Multiple Cards
- Fast Operating Speed <500µs
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments
- Built-In Diagnostics - BiRST™ Availble on Selected Modules



40-520 High Density Matrix

40-518A 2-Amp 2-Pole Matrix

Medium Density Matrix Modules

64 to 256 Crosspoints

- 300VDC/250VAC 2A Switch, 2A Carry
- 150VDC/100VAC 0.5A Switch, 1A Carry
- 150VDC/100VAC 1A Switch, 1.2A Carry

Electro-mechanical		Page
Single 42x4 1-Pole	40-505-001	15.2
Single 32x6 1-Pole	40-506-001	
Single 25x8 1-Pole	40-507-001	
Single 18x12 1-Pole	40-508-001	
Single 14x16 1-Pole	40-509-001	

Electro-mechanical with BiRST		Page
Single 16x8 2-Pole	40-518A-002	15.5
Single 32x4 2-Pole	40-519A-002	

Electro-mechanical		Page
34x4 With Loop-Thru	40-525A-001	15.18
16x4 With Loop-Thru	40-525A-002	

Electro-mechanical with BiRST		Page
Single 64x2 1-Pole	40-527-001	15.21
Single 32x4 1-Pole	40-528A-001	
Single 16x8 1-Pole	40-529A-001	

Ruthenium Reed		Page
Single 24x8 1-Pole	40-521-021	15.12
Single 24x8 2-Pole	40-521-022	

Ruthenium Reed		Page
Single 16x16 1-Pole	40-520-001	15.7
Single 16x12 1-Pole	40-520-101	
Single 12x12 1-Pole	40-520-102	
Single 8x12 1-Pole	40-520-103	
Single 32x8 1-Pole	40-520-201	
Single 24x8 1-Pole	40-520-202	
Single 16x8 1-Pole	40-520-203	
Single 8x8 1-Pole	40-520-204	
Dual 16x8 1-Pole	40-520-205	
Dual 12x8 1-Pole	40-520-206	
Dual 8x8 1-Pole	40-520-207	
Single 32x6 1-Pole	40-520-301	
Single 24x6 1-Pole	40-520-302	
Dual 16x6 1-Pole	40-520-303	
Dual 24x6 1-Pole	40-520-304	
Single 32x4 1-Pole	40-520-401	
Single 24x4 1-Pole	40-520-402	
Single 16x4 1-Pole	40-520-403	
Dual 16x4 1-Pole	40-520-404	
Dual 12x4 1-Pole	40-520-405	
Dual 16x2 1-Pole	40-520-501	
Single 32x2 1-Pole	40-520-502	

Ruthenium Reed		Page
Dual 12x8 1-Pole	40-522-021	15.14
Dual 12x8 2-Pole	40-522-022	

Ruthenium Reed		Page
Single 44x4 1-Pole	40-523-021†	15.16
Single 44x4 2-Pole	40-523-022	

Ruthenium Reed		Page
Single 46x4 1-Pole	40-524-021	15.16

† To order the screened reed relay version of this 1-pole matrix, please add the -S suffix

Pickering Interfaces offers a comprehensive range of medium density matrix modules that use ruthenium reed relays. They are a cost effective solution for applications that require mid range matrices in the PXI format.

The matrices can be expanded by connecting together multiple modules, but Pickering recommend that users look at the higher density modules that involve less user configuration.

All versions use high quality sputtered ruthenium reed relays that exhibit excellent contact performance under low and medium level switching conditions.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

Selected modules are supplied with Built In Relay Self Test. This provides a quick way of finding switch path failures down to a specific relay without the use of any external test equipment.

40-505/506/507/508/509
2 Amp 1-Pole Matrix Modules

- Medium Density Matrix With 224 Crosspoints
- 42x4, 32x6, 25x8, 18x12 and 14x16 Options
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical Relays
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-505/506/507/508/509 are a range of medium density matrix modules able to switch up to 2 Amps or 300VDC/250VAC. They are constructed using high quality electro-mechanical relays for high switching confidence.

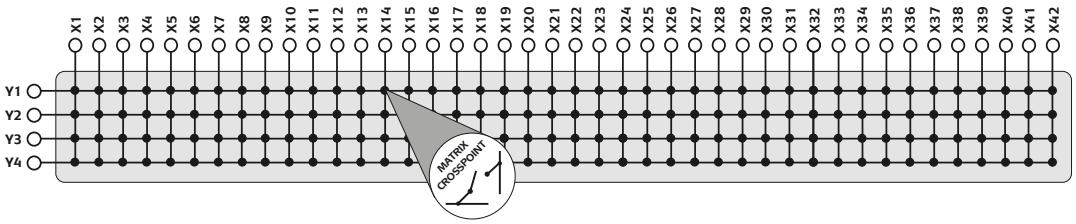
The matrix configuration is dependent on the model as follows:

40-505	42x4, 1-Pole Matrix
40-506	32x6, 1-Pole Matrix
40-507	25x8, 1-Pole Matrix
40-508	18x12, 1-Pole Matrix
40-509	14x16, 1-Pole Matrix

The modules are designed for switching medium voltage and power signals. The user signal connection is via a robust 160-pin DIN 41612, 78-pin D-type or 50-pin D-Type connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.

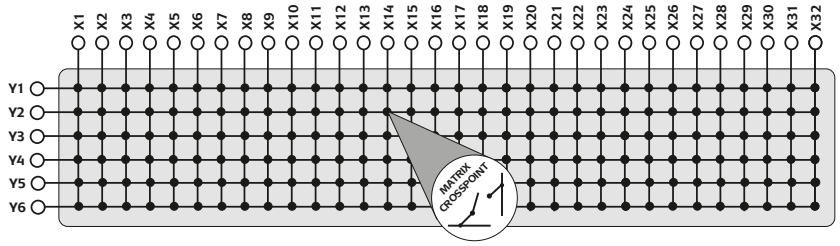
Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



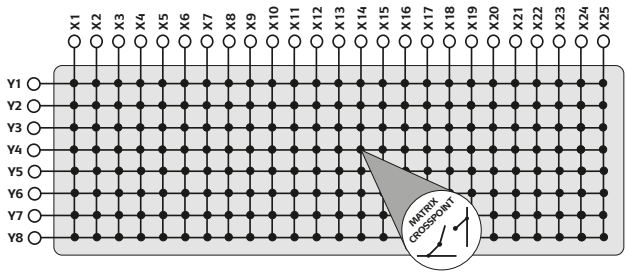
40-505-001 42x4 Matrix Switching Diagram

The 40-505 supports 4 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to Y2, Y3 or Y4) are not permitted by the driver.



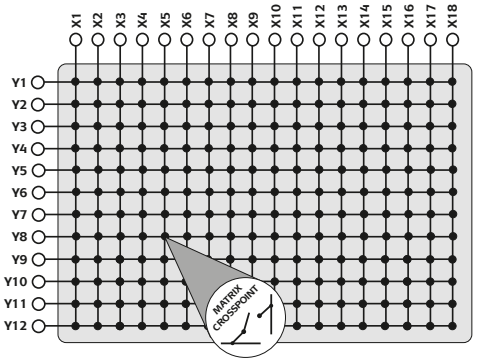
40-506-001 32x6 Matrix Switching Diagram

The 40-506 supports 6 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y6) are not permitted by the driver.



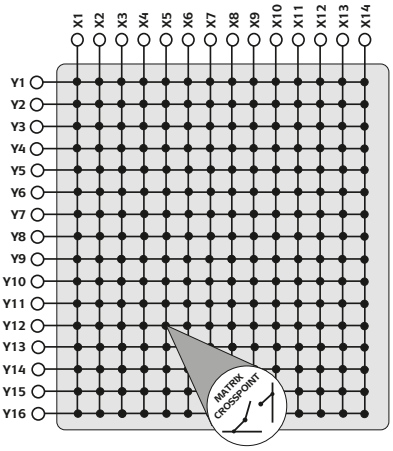
40-507-001 25x8 Matrix Switching Diagram

The 40-507 supports 8 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y8) are not permitted by the driver.



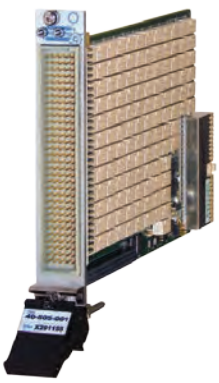
40-508-001 18x12 Matrix Switching Diagram

The 40-508 supports 12 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y12) are not permitted by the driver.



40-509-001 14x16 Matrix Switching Diagram

The 40-509 supports 7 concurrent switch paths for X to X or 14 concurrent Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y16) are not permitted by the driver.



40-505-001
42x4 Matrix

40-506-001
32x6 Matrix

40-507-001
25x8 Matrix

40-508-001
18x12 Matrix

40-509-001
14x16 Matrix

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered, Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power: Max Switch Current: Max Continuous Carry Current: Max Pulsed Carry Current Example (for a single switch path):	62.5VA, 60W 2A 2A 6A for 100ms (up to 10% duty cycle)
Max Continuous Total Switch Path Loading: †	16W (Example allowed conditions – 11 channels at 2A, please contact sales office for further advise)
Initial On Path Resistance: Off Path Resistance: Thermal Offset:	<0.35Ω $>10^9$Ω 10µV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	42 (40-505) 32 (40-506) 25 (40-507) 18 (40-508) 14 (40-509)
Operate Time:	6.5ms
Expected Life (Operations) Very low power load: Low power load: Medium power load: Full power load:	 $>1x10^8$ $>1.5x10^7$ (0.1A 20VDC) $>5x10^6$ (1A 30VDC) $>1x10^5$ (2A 30VDC)

† Significantly higher total switch path loading is possible when using Pickering 40-922/923A PXI & 60-102B/103B LXI chassis', please contact sales office for details.

RF Specification

Bandwidth (-3dB) typical	**40-505**	10MHz
	40-506	10MHz
	40-507	15MHz
	40-508	15MHz
	40-509	15MHz

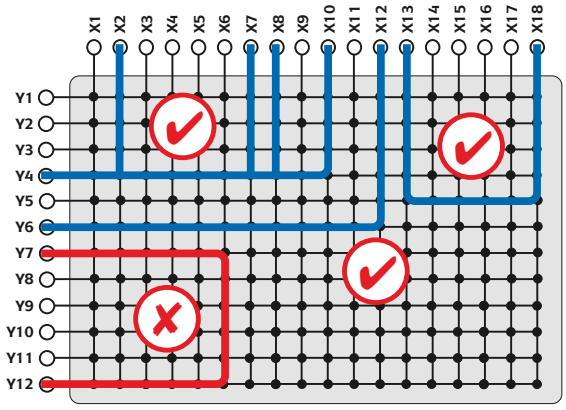
		10kHz	100kHz	1MHz	10MHz
Crosstalk (typical)	**40-505**	-95dB	-75dB	-55dB	-35dB
	40-506	-75dB	-60dB	-40dB	-20dB
	40-507	-70dB	-55dB	-40dB	-20dB
	40-508	-80dB	-65dB	-45dB	-25dB
	40-509	-80dB	-65dB	-45dB	-25dB
Isolation (typical)	**40-505**	95dB	80dB	65dB	50dB
	40-506	90dB	75dB	60dB	45dB
	40-507	90dB	75dB	60dB	45dB
	40-508	85dB	70dB	55dB	40dB
	40-509	90dB	75dB	55dB	40dB

Power Requirements

	+3.3V	+5V	+12V	-12V
40-505	70mA	400mA	0	0
40-506	70mA	310mA	0	0
40-507	70mA	240mA	0	0
40-508	70mA	240mA	0	0
40-509	70mA	135mA	0	0

Matrix Functionality

The 40-509 permits 7 concurrent X to X paths or 14 concurrent Y to X paths, the 40-505, 40-506, 40-507 and 40-508 permit 4, 6, 8 and 12 concurrent X to X or X to Y paths respectively. As shown in the figure below, X to Y connections (e.g. X15 to Y7) and X to X connections (e.g. X18 to X27) are permitted, also any number of X connections can be connected to to the Y axis (e.g. X2, X8, X9 & X12 to Y5). However, the driver prevents the connection of Y axis connections together (e.g. Y10 to Y15).



Allowable Signal Paths For The 40-508 Matrix

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: ≈ 400g

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector
Front panel connector:	160-way male DIN 41612 (40-505-001) 78-way male D-type (40-506-001) 78-way male D-type (40-507-001) 50-way male D-type (40-508-001) 50-way male D-type (40-509-001)

Product Order Codes

42x4 Matrix Module, 1-pole (2A, 60W)	**40-505-001**
32x6 Matrix Module, 1-pole (2A, 60W)	**40-506-001**
25x8 Matrix Module, 1-pole (2A, 60W)	**40-507-001**
18x12 Matrix Module, 1-pole (2A, 60W)	**40-508-001**
14x16 Matrix Module, 1-pole (2A, 60W)	**40-509-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
40-505	**93-002-001**	**93-002-410**
40-506/507	**93-006-001**	**Not Required**
40-508/509	**93-005-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-505/506/507/508/ 509 modules please refer to the **90-001D** 160-way DIN 41612, **90-006D** 78-way D-Type and **90-005D** 50-way D-Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-518A/519A
2 Amp 2 Pole Matrix Module

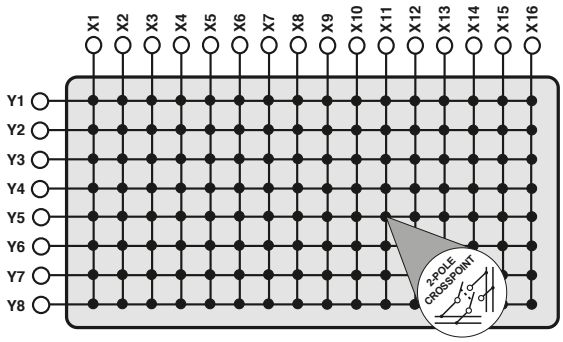
- High Density Single-Slot 3U PXI 2A Matrices With 128 Crosspoints
- 2-Pole 32x4 and 16x8 Options
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical 2-Pole Relays
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

The 40-518A and 40-519A 2 Amp, 2-Pole Matrix Modules form part of the System 40 PXI Programmable Switching system. Each module consists of a matrix of 128 2-pole electro-mechanical relays under the control of a PXI/PCI interface. The matrix configuration is dependant upon the model number, this is as follows:

40-518A-002 16x8 2-Pole Matrix
40-519A-002 32x4 2-Pole Matrix

These modules are designed for switching medium voltage/power signals in test applications where reed relays do not have sufficient rating. They are also suitable for telecoms applications where send and return signals need to be switched simultaneously.

Both modules use 2-pole electro-mechanical relays with palladium-ruthenium, gold-plated, bifurcated contacts for maximum reliability and long operational life. Each contact has a maximum carry and switching current of 2 Amps. The maximum voltage is 300VDC/250VAC with a maximum power rating of 60W/62.5VA.



40-518A Matrix 16x8 2-Pole
(each line is a 2 wire connection)

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, chances are the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST**.

Supported by eBIRST

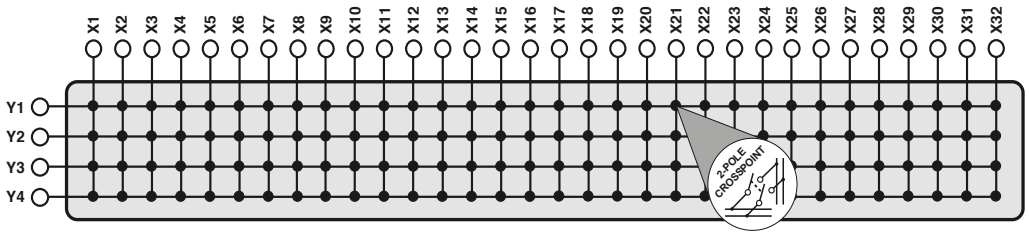
As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

The 40-518A/519A are part of Pickering's family of High Density, 128 crosspoint, BIRST enabled EMR PXI matrices, the range is as follows:

- **40-527-001** - 64x2 1-Pole, 2 Amp Matrix
- **40-528-001** - 32x4 1-Pole, 2 Amp Matrix
- **40-529-001** - 16x8 1-Pole, 2 Amp Matrix

Also available from Pickering is a range of Very High Density, 256 crosspoint EMR PXI matrices, also fitted with BIRST:

- **40-582-001** - 16x16 2-Pole, 2 Amp Matrix
- **40-584-001** - 128x2 1-Pole, 2 Amp Matrix
- **40-585-001** - 64x4 1-Pole, 2 Amp Matrix
- **40-586-001** - 32x8 1-Pole, 2 Amp Matrix
- **40-587-001** - 16x16 1-Pole, 2 Amp Matrix



40-519A Matrix 32x4 2-Pole (each line is a 2 wire connection)

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	<500mΩ
Initial Off Path Resistance:	>10^9Ω
Minimum Voltage	100µV
Differential Thermal Offset:	<10µV
Operate Time:	<3ms
Expected Life (Operations)	
Very low power load:	>$1x10^8$
Low power load:	>$1.5x10^7$ (0.1A 20VDC)
Medium power load:	>$5x10^6$ (1A 30VDC)
Full power load (60W):	>$1x10^5$ (2A 30VDC)
	>$1x10^5$ (0.1A 300VDC)

Bandwidth

Bandwidth	>10MHz

Power Requirements

+3.3V	+5V	+12V	-12V
100mA (typical)	400mA (typical)	50mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector
Front panel connector: 78-way male D-type

NOTE: The pinout for the 40-518A differs from the 40-518, see the user manual for details (the 40-519A and 40-519 have the same pinout).

Product Order Codes

16x8 Matrix Module, 2-pole with BIRST	**40-518A-002**
32x4 Matrix Module, 2-pole with BIRST	**40-519A-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

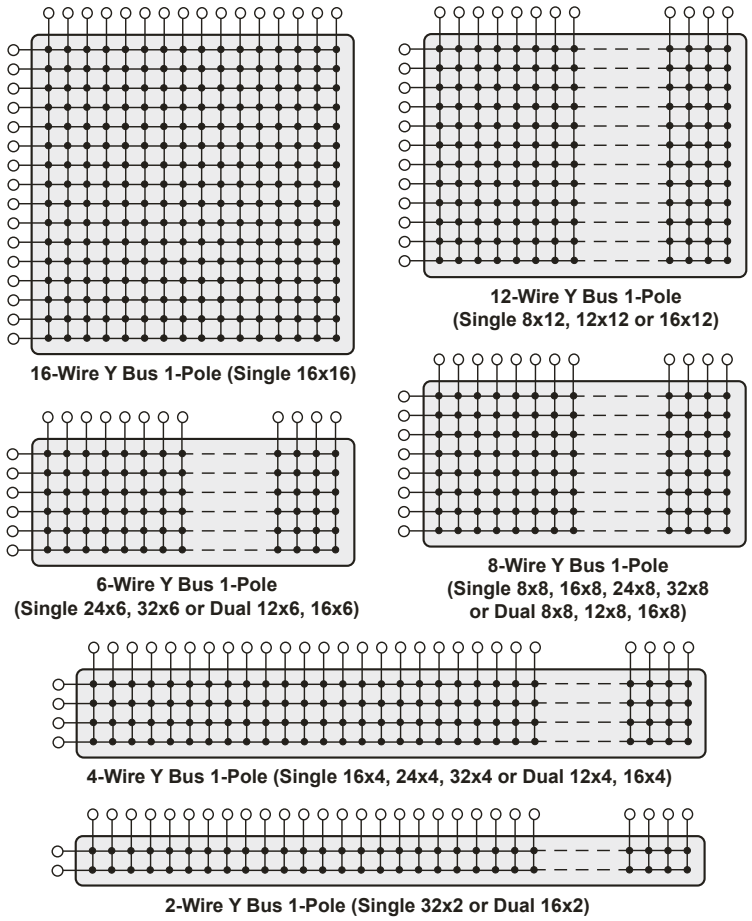
Mating Connectors & Cabling

For connection accessories for the 40-518A/519A please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-520
High Density Matrix Module

- High Density Reed Relay Matrix Module
- Low/Medium Density Options For Smaller Requirements
- 22 Different Matrix Configurations With Up To 256 Crosspoints
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed of 500µs
- Switch up to 150Volts, 1A with 15W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST Test Tool
- 3 Year Warranty

The 40-520 is a high density reed relay matrix with 22 different configurations. Typical applications include signal routing in ATE and data acquisition systems. The user signal connection is via a robust 50-pin D-Type connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.



40-520 High Density Matrix Range Overview

Relay Type

The 40-520 module is fitted with high quality reed relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability. A **Spare Reed Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics: **www.pickeringrelay.com**

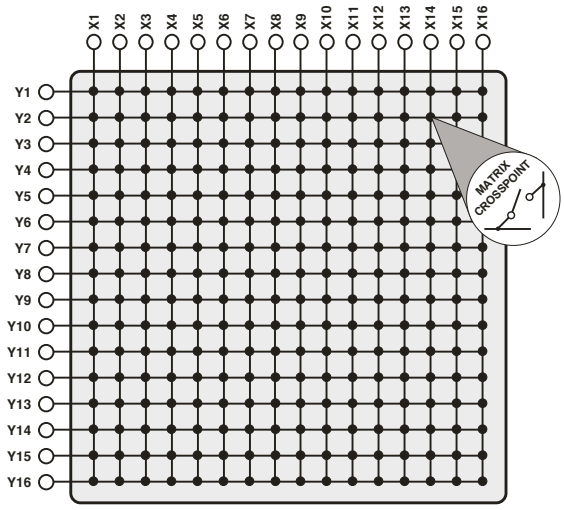
Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

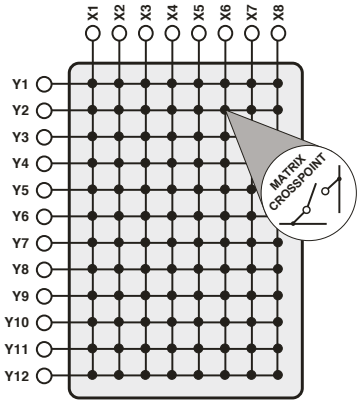
If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST**.

Supported by eBIRST

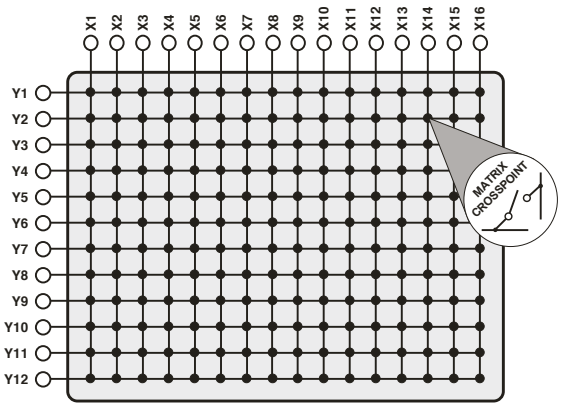
As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



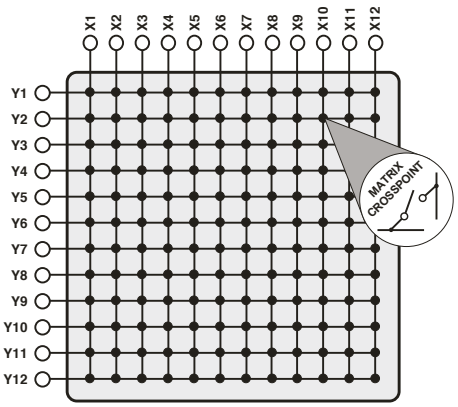
40-520-001 Single 16x16 1-Pole Matrix



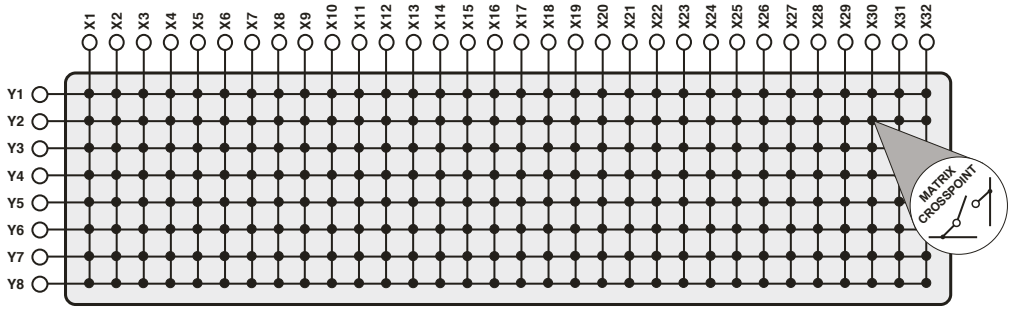
40-520-103 Single
8x12 1-Pole Matrix



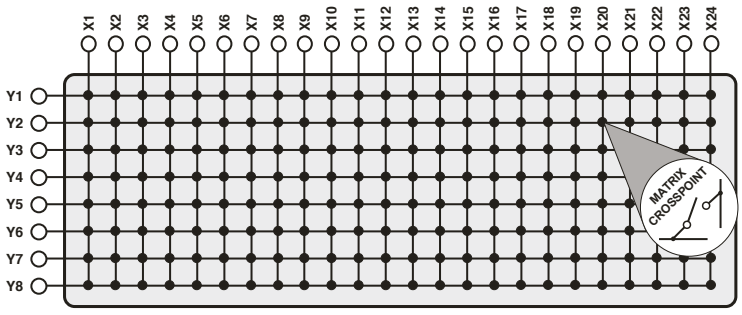
40-520-101 Single 16x12 1-Pole Matrix



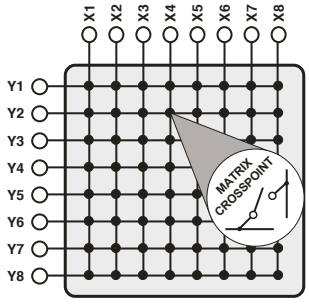
40-520-102 Single 12x12 1-Pole Matrix



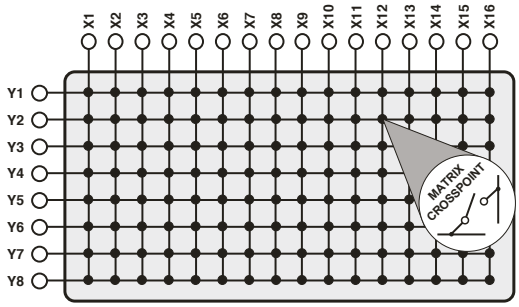
40-520-201 Single 32x8 1-Pole Matrix



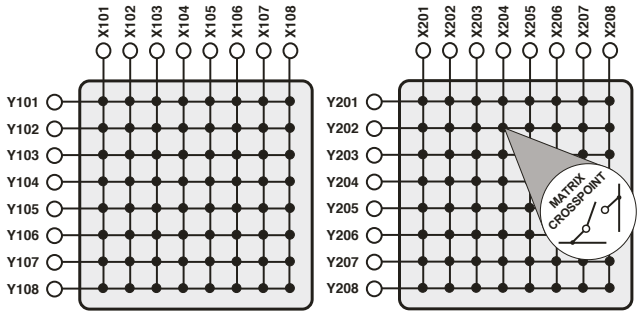
40-520-202 Single 24x8 1-Pole Matrix



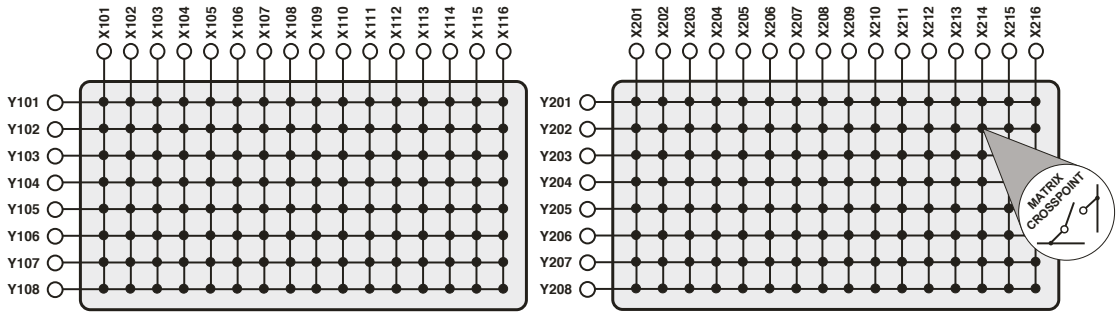
40-520-204 Single 8x8 1-Pole Matrix



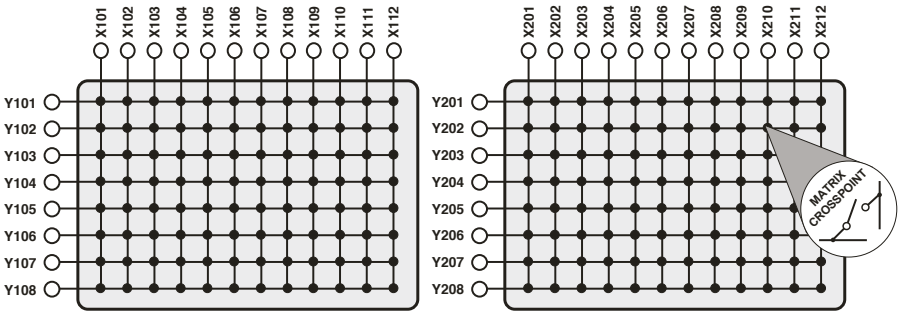
40-520-203 Single 16x8 1-Pole Matrix



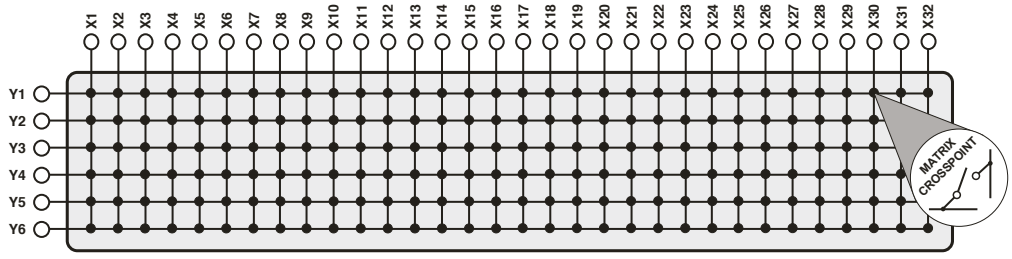
40-520-207 Dual 8x8 1-Pole Matrix



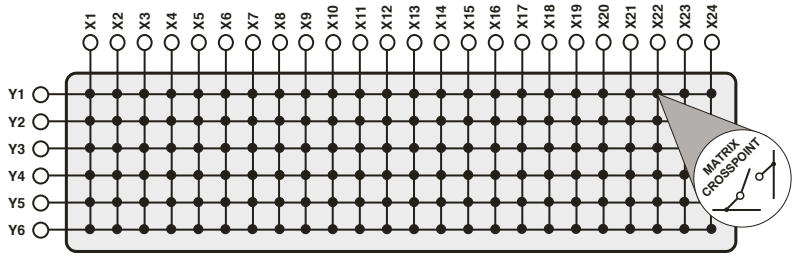
40-520-205 Dual 16x8 1-Pole Matrix



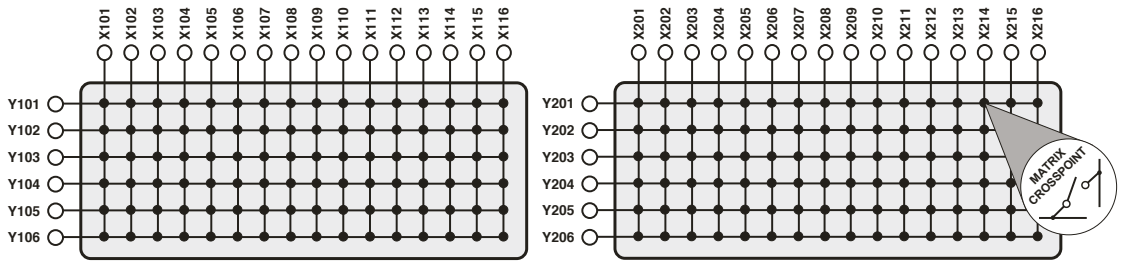
40-520-206 Dual 12x8 1-Pole Matrix



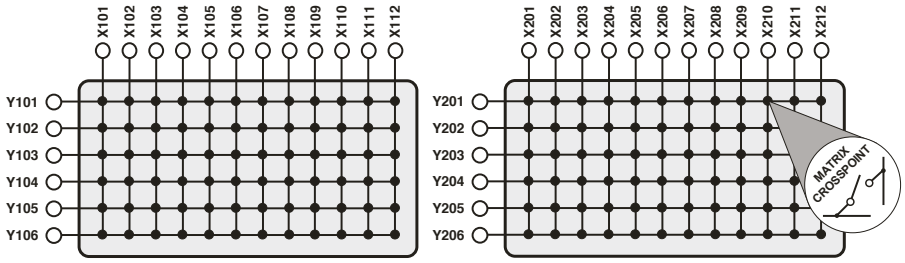
40-520-301 Single 32x6 1-Pole Matrix



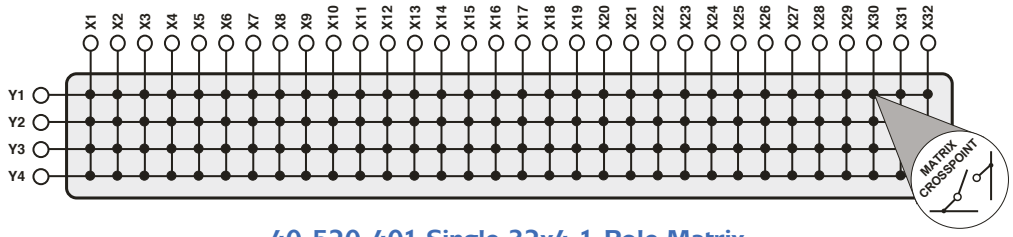
40-520-302 Single 24x6 1-Pole Matrix



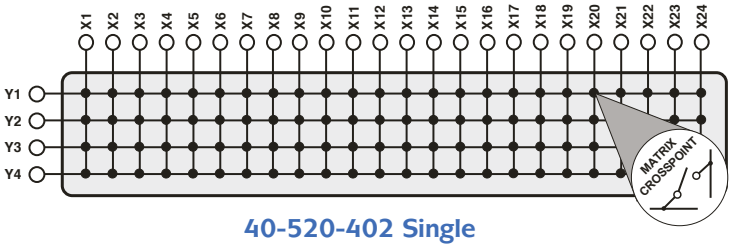
40-520-303 Dual 16x6 1-Pole Matrix



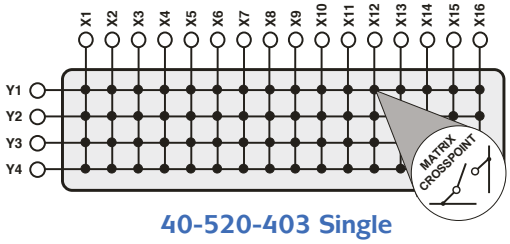
40-520-304 Dual 12x6 1-Pole Matrix



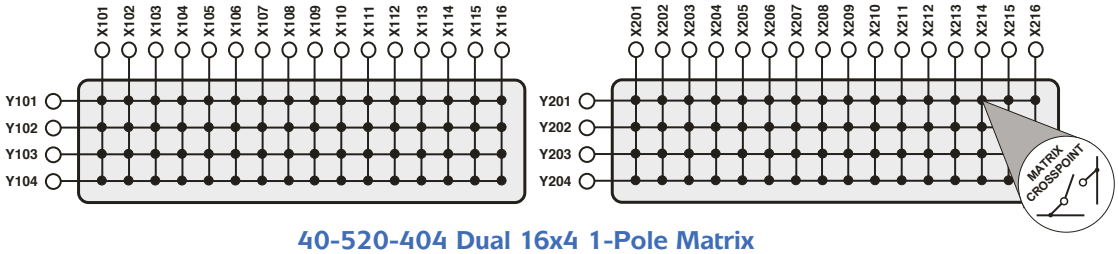
40-520-401 Single 32x4 1-Pole Matrix



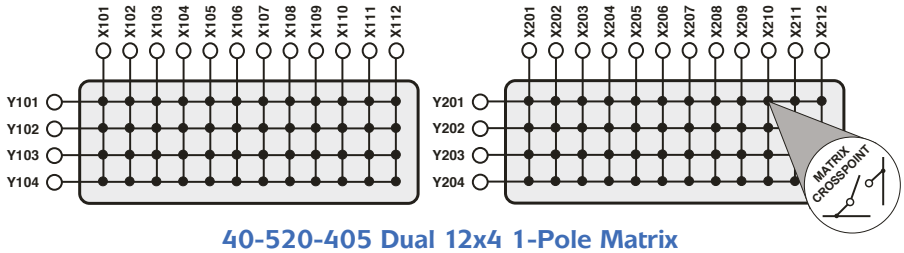
40-520-402 Single
24x4 1-Pole Matrix



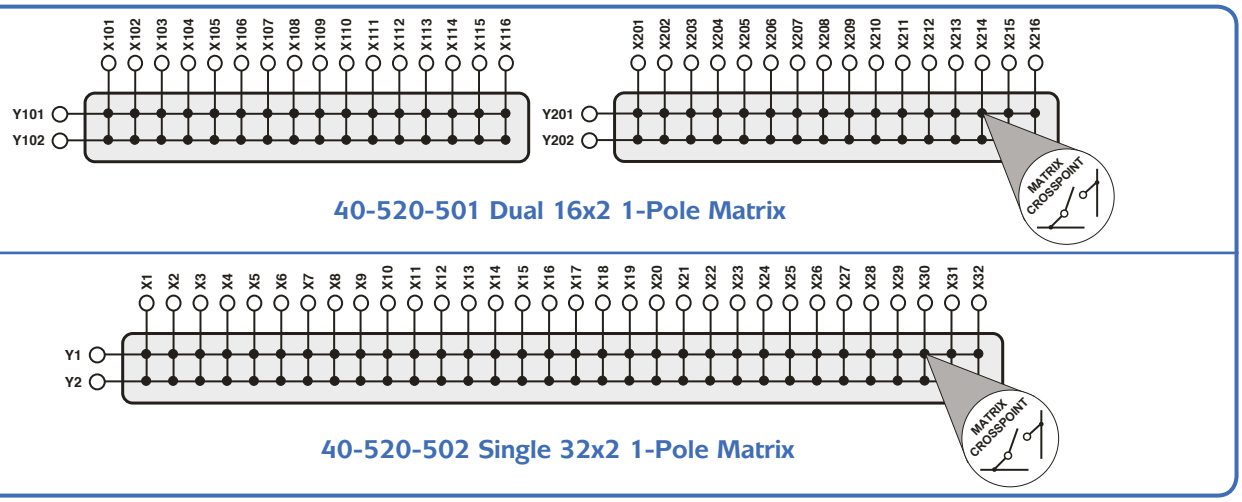
40-520-403 Single
16x4 1-Pole Matrix



40-520-404 Dual 16x4 1-Pole Matrix



40-520-405 Dual 12x4 1-Pole Matrix



40-520-501 Dual 16x2 1-Pole Matrix

40-520-502 Single 32x2 1-Pole Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	15W/15VA 1A 1.2A
Initial Path Resistance, On: Initial Path Resistance, Off: Thermal Offset:	<550mΩ, 300mΩ typical $>10^9$Ω <35µV
Typical Operate Time:	0.5ms
Expected Life:	$1x10^9$ ops (low power load) $>5x10^6$ ops (full power load)

RF Specification

Bandwidth (-3dB):	25MHz	
Crosstalk (typical):	10kHz: 100kHz: 1MHz: 10MHz	-75dB -65dB -40dB -25dB
Isolation (typical):	10kHz 100kHz: 1MHz: 10MHz:	75dB 65dB 35dB 20dB

Pickering Electronics State-Of-The-Art Reed Relays

This matrix module is constructed using Series 115 Reed Relays manufactured by our sister company Pickering Electronics.

For further information please visit **www.pickeringrelay.com**

Power Requirements

+3.3V	+5V	+12V	-12V
200mA	2.6A	40mA	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 323g
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel mounted 50-pin male D-type connector.

Product Order Codes

Single 16x16 Matrix Module, 1-Pole	**40-520-001**
Single 16x12 Matrix Module, 1-Pole	**40-520-101**
Single 12x12 Matrix Module, 1-Pole	**40-520-102**
Single 8x12 Matrix Module, 1-Pole	**40-520-103**
Single 32x8 Matrix Module, 1-Pole	**40-520-201**
Single 24x8 Matrix Module, 1-Pole	**40-520-202**
Single 16x8 Matrix Module, 1-Pole	**40-520-203**
Single 8x8 Matrix Module, 1-Pole	**40-520-204**
Dual 16x8 Matrix Module, 1-Pole	**40-520-205**
Dual 12x8 Matrix Module, 1-Pole	**40-520-206**
Dual 8x8 Matrix Module, 1-Pole	**40-520-207**
Single 32x6 Matrix Module, 1-Pole	**40-520-301**
Single 24x6 Matrix Module, 1-Pole	**40-520-302**
Dual 16x6 Matrix Module, 1-Pole	**40-520-303**
Dual 12x6 Matrix Module, 1-Pole	**40-520-304**
Single 32x4 Matrix Module, 1-Pole	**40-520-401**
Single 24x4 Matrix Module, 1-Pole	**40-520-402**
Single 16x4 Matrix Module, 1-Pole	**40-520-403**
Dual 16x4 Matrix Module, 1-Pole	**40-520-404**
Dual 12x4 Matrix Module, 1-Pole	**40-520-405**
Dual 16x2 Matrix Module, 1-Pole	**40-520-501**
Single 32x2 Matrix Module, 1-Pole	**40-520-502**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-005-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-097**

For further assistance, please contact your Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-520 module please refer to the **90-005D** 50-pin D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-521
High Density Matrix Module

- High Density Reed Relay Matrix Module
- 1-Slot PXI (CompactPCI) Module
- 24x8 Matrix
- 1-Pole or 2-Pole or Versions
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <500µs
- Switch up to 150Volts with 10W Max Power
- Max Switch Current 1A Cold or 0.5A Hot
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

Model 40-521 ultra high density matrix module is configured as a 24x8, available in a choice of 1-pole and 2-pole reed relay formats.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. For example, 7 PXI modules will form a 168x8 Matrix, a total of 1344 crosspoints in a 7-slot PXI Chassis.

Relay Type

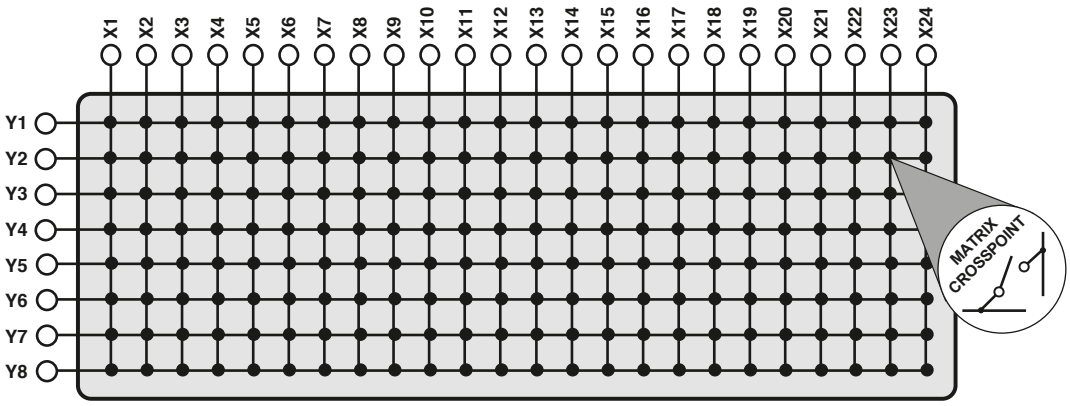
All 40-521 series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics: www.pickeringrelay.com

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-521 24x8 Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 1.0A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset: Differential Thermal Offset:	 <1200mΩ (typically 800mΩ) $>10^9$Ω <20µV (1-pole) <10µV (2-pole)
Operate Time: Release Time:	<1ms, 0.5ms typical <1ms, 0.5ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	1A (280mA typ)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 96-Way male SCSI style micro-D connector.

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics

For further information please visit: www.pickeringrelay.com

Product Order Codes

Single 24x8 Matrix Module, 1-Pole	**40-521-021**
Single 24x8 Matrix Module, 2-Pole	**40-521-022**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-521-021	**91-100-018**
40-521-022	**91-521-012**

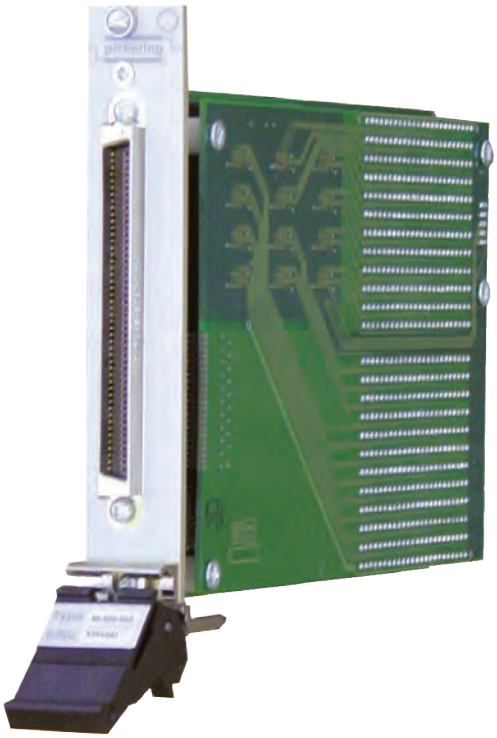
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-521 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-522
High Density Matrix Module

- High Density Reed Relay Matrix Module
- 1-Slot PXI (CompactPCI) Module
- Dual 12x8 Matrix
- 1-Pole or 2-Pole Versions
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <500µs
- Switch up to 150Volts, 1.25A with 20W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



The 40-522 module is configured as a dual 12x8 matrix and is available in 1-pole and 2-pole reed relay formats.

Typical applications include signal routing in ATE and data acquisition systems. The two banks may be used for operating a 4-wire measurement system (bank 1 for source, bank 2 for measure).

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Relay Type

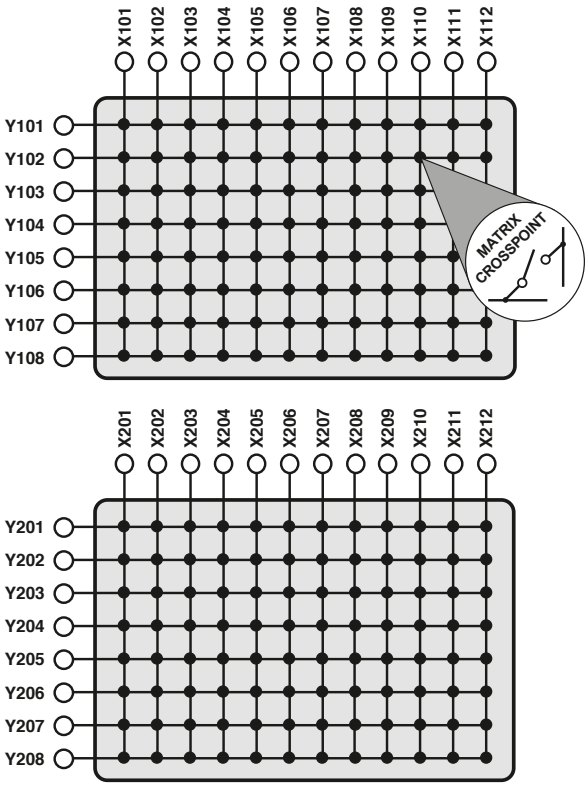
All 40-522 series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

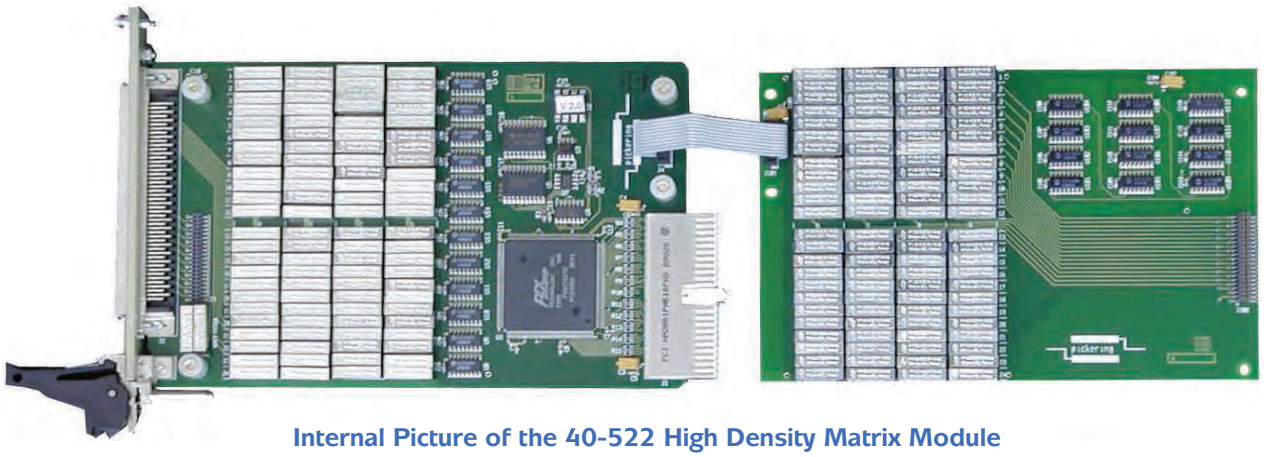
All reed relays are manufactured by our sister company Pickering Electronics: www.pickeringrelay.com

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-522 Dual 12x8 Matrix



Internal Picture of the 40-522 High Density Matrix Module

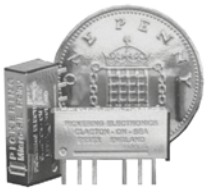
Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.25A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <900mΩ $>10^9$Ω <5µV
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using Series 109 Reed Relays manufactured by our sister company Pickering Electronics.

These are the smallest double pole reed relays currently available (the picture shows two 109-2-A-12/2D reed relays together with a British 1 pence coin, shown actual size). For further information please visit www.pickeringrelay.com



Power Requirements

+3.3V	+5V	+12V	-12V
0	400mA (280mA typ)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 96-Way male SCSI style micro-D connector..

Product Order Codes

Dual 12x8 Matrix Module, 1-Pole	**40-522-021**
Dual 12x8 Matrix Module, 2-Pole	**40-522-022**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-522-021	**91-100-003**
40-522-022	**91-100-008**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-522 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-523/524
High Density Matrix Module

- High Density Reed Relay Matrix Module
- 1-Slot PXI (CompactPCI) Module
- 44x4 Matrix
- 1-Pole, 2-Pole or Screened Versions
- 46x4 Matrix Option For 1-Pole Switching
- Large Matrices Built Using Multiple Modules
- Screened 50Ω Option with 50MHz Bandwidth
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <500µs
- Switch up to 150 Volts, 1.25A with 20W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-523 high density matrix module is configured as a 44x4. Available reed relay formats are 1-pole, 2-pole and 1-Pole screened. The screened version is suitable for switching coaxial signals up to 50MHz. Model 40-524 is a similar matrix available as a single pole 46x4.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering 10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. 6 PXI modules will form a 264x4 Matrix.

Relay Type

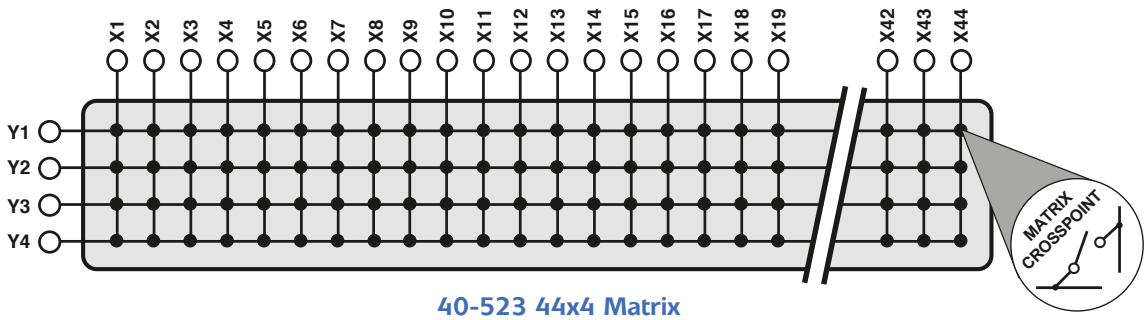
All 40-523/524 series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics: www.pickeringrelay.com

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-523 44x4 Matrix

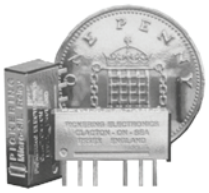
Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.25A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <1200mΩ (40-523) <1000mΩ (40-524) $>10^9$Ω <5µV
Operate Time: Release Time:	<0.5ms, 0.25ms typical <0.5ms, 0.25ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using Series 109 Reed Relays manufactured by our sister company Pickering Electronics.

These are the smallest double pole reed relays currently available (the picture shows two 109-2-A-12/2D reed relays together with a British 1 pence coin, shown actual size). For further information please visit www.pickeringrelay.com



Power Requirements

+3.3V	+5V	+12V	-12V
0	400mA (280mA typ)	0	0

Width and Dimensions

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 96-Way male SCSI style micro-D connector.

Product Order Codes

44x4 Matrix Module, 1-Pole	**40-523-021**
44x4 Matrix Module, 1-Pole Screened	**40-523-021-S**
44x4 Matrix Module, 2-Pole	**40-523-022**
46x4 Matrix Module, 1-Pole	**40-524-021**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-523-021	**91-100-003**
40-523-021-S	**91-100-011**
40-523-022	**91-100-008**
40-524-021	**91-100-030**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-523/524 modules please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-525A
Signal Insertion and Monitor Matrix

- 34x4 or 16x4 Matrix With Isolation Relays
- Allows Signal Insertion Between UUT and Test Equipment Connections
- Easy Monitoring of UUT to Test Equipment Connections
- Allows Simulation of Broken Connection
- Can Be Used For Fault Insertion
- 2A Hot or Cold Switching
- Switch up to 220VDC/150VAC and up to 60W Max Power
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-525A is a matrix with switched pass thru connections on both X and Y axis. It is available in 34x4 or 16x4 formats and can be used for signal insertion and monitoring purposes on connections between the UUT and test system.

Each pass thru connection from LX to X can be open or closed to allow the programmatic disconnection of the signal to check the response of the UUT.

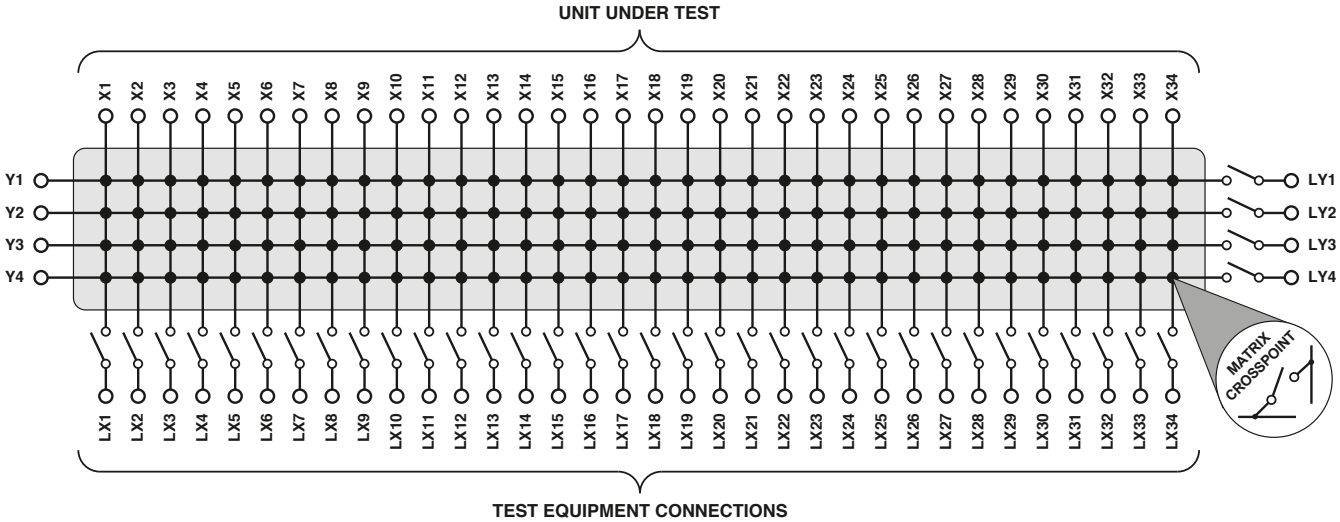
The matrix can be used to connect test equipment, such as a DMM or scope, to monitor the pass thru signals via Y connections while the LY connections can be used to insert a fault condition or insert external signals. When external signals are injected the LX connections can be opened and the LY connections closed.

The matrix size can be expanded by linking Y connections across multiple modules. Larger matrices can be created with switched isolation relays if connected by the LY connections.

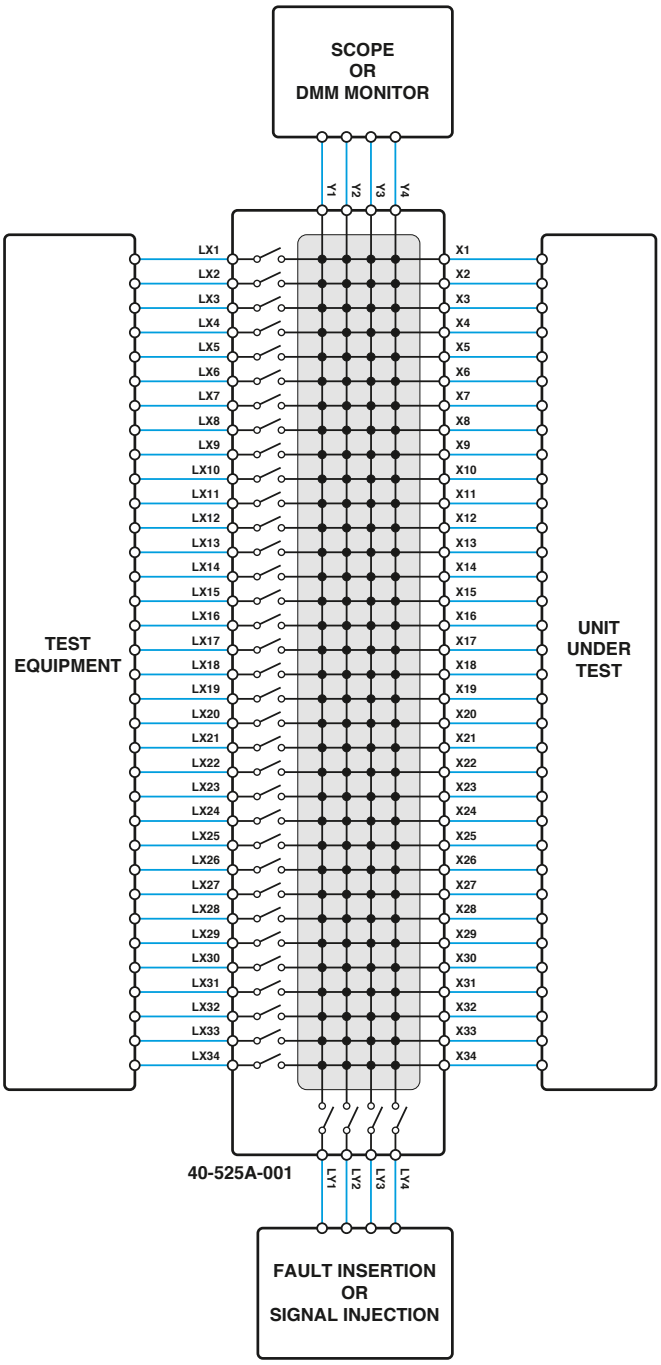
The 40-525A uses high quality electro-mechanical relays capable of switch currents up to 2A and voltages up 220VDC/150VAC.

Supported by eBIRST

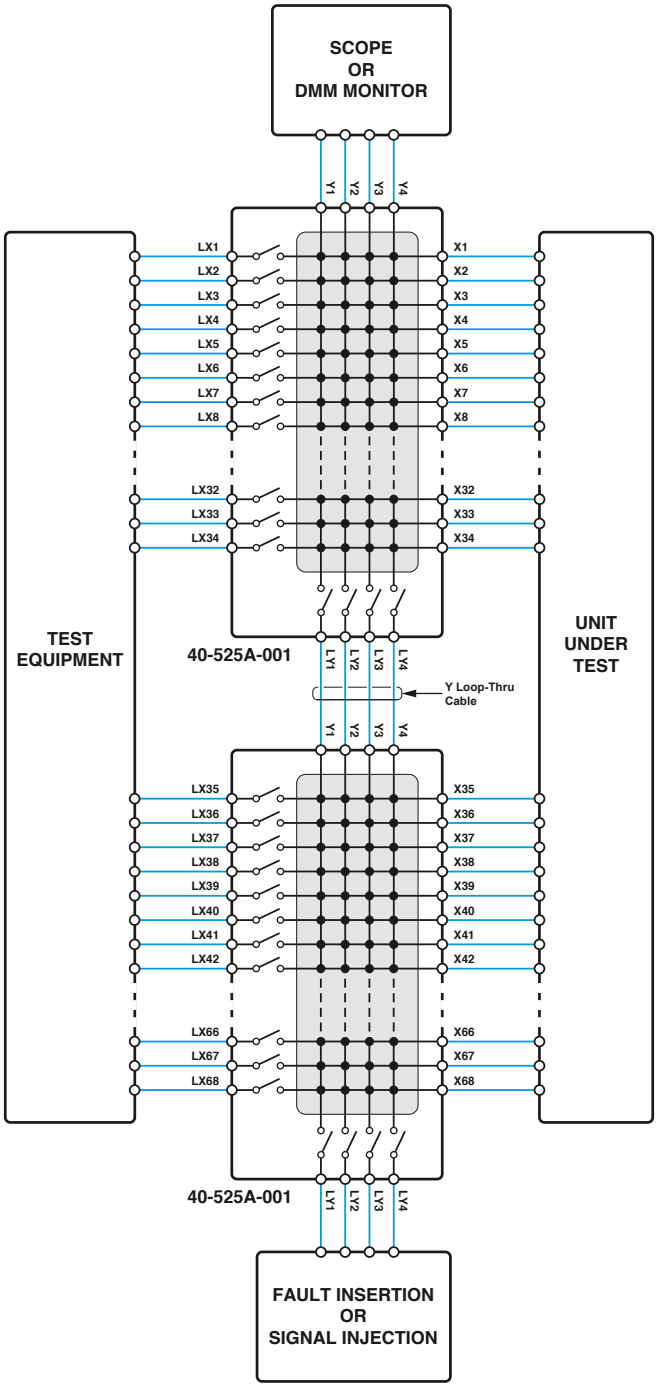
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-525A-001 Matrix Schematic: 34 X-channels and 4 Y-channels with loop-thru switching



Using the 40-525A-001 34x4 Signal Insertion and Monitor Matrix in a Typical Test Application



Cascading two 40-525A-001 34x4 Matrices to Create a 68x4 Matrix For Larger Test Applications

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	220VDC/150VAC
Max Power: Max Switch Current: Max Carry Current:	62.5VA/60W 2A 2A
Initial Path Resistance - On: Path Resistance - Off: Minimum Voltage: Thermal Offset:	<500mΩ $>10^9$Ω 100µV <5µV per relay
Typical Operate Time:	3ms
Expected Life (operations) Very low power signal load: Low power load (2W): Medium power load (30W): Full power load (60W):	 $>1x10^8$ $>1.5x10^7$ (0.1A 20VDC) $>5x10^6$ (1A 30VDC) $>1x10^5$ (2A 30VDC)

Bandwidth

Bandwidth:	10MHz (40-525A-001)

Relay Type

The 40-525A is fitted with high quality electro-mechanical relays, Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	typically <500mA	0	0

Width and Dimensions

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel connector: 78-way male D-type

Product Order Codes

34x4 Signal Insertion and Monitor Matrix	**40-525A-001**
16x4 Signal Insertion and Monitor Matrix	**40-525A-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

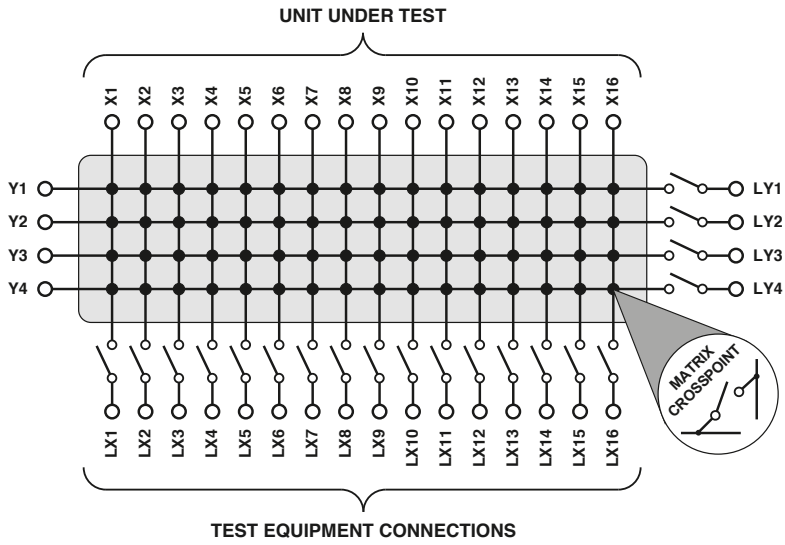
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-525A module please refer to the **90-006D** 78-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-525A-002 Matrix Schematic: 16 X-channels and 4 Y-channels with loop-thru switching

40-527/528A/529A
2 Amp 1-Pole High Density Matrix Modules

- High Density Single-Slot 3U PXI 2A Matrices With 128 Crosspoints
- 64x2, 32x4 and 16x8 Options
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical 1-Pole Relays
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

The 40-527, 40-528A and 40-529A are PXI single pole matrices each supporting 128 crosspoints. All models use electro-mechanical relays.

The matrix configuration is dependent on model as follows:

40-527	64x2 1-Pole Matrix
40-528A	32x4 1-Pole Matrix
40-529A	16x8 1-Pole Matrix

The modules are designed for switching medium voltage and power signals. The user signal connection is via a robust 78, 50 or 37-pin D-Type connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.

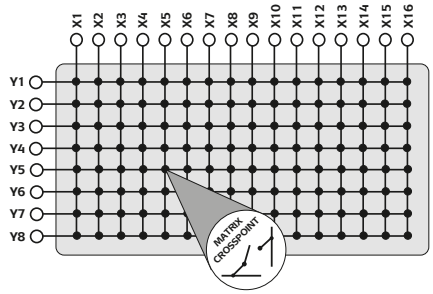
Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

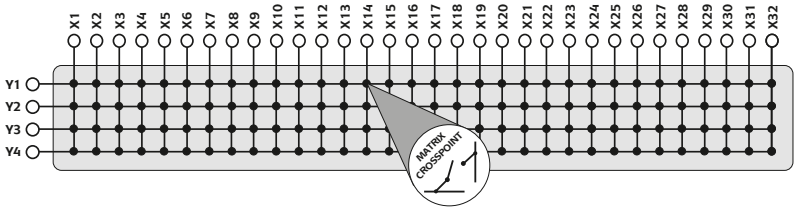
If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST**.

Supported by eBIRST

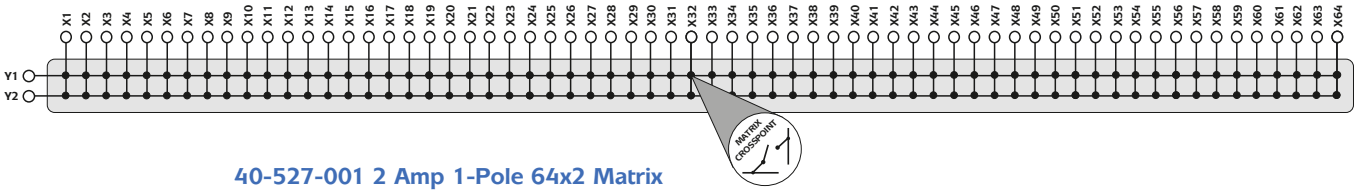
As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-529A-001 2 Amp 1-Pole 16x8 Matrix



40-528A-001 2 Amp 1-Pole 32x4 Matrix



40-527-001 2 Amp 1-Pole 64x2 Matrix

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	500mΩ
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	<5µV
Max Number of Simultaneously Closed Crosspoints:	100
Operate Time:	<3ms
Expected Life (Operations)	
Very low power load:	$>1x10^8$
Low power load:	$>1.5x10^7$ (0.1A 20VDC)
Medium power load:	$>5x10^6$ (1A 30VDC)
Full power load:	$>1x10^5$ (2A 30VDC) $>1x10^5$ (0.1A 300VDC)

Bandwidth

Bandwidth:	15MHz (40-529A-001)

Power Requirements

+3.3V	+5V	+12V	-12V
130mA (typical)	500mA (typical) 1A (max)	70mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector
Front panel connector:	78-way male D-type (40-527-001) 50-way male D-type (40-528A-001) 37-way male D-type (40-529A-001)

Product Order Codes

64x2 Matrix Module, 1-pole (2A, 60W)	**40-527-001**
32x4 Matrix Module, 1-pole (2A, 60W)	**40-528A-001**
16x8 Matrix Module, 1-pole (2A, 60W)	**40-529A-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
40-527	**93-006-001**	**Not Required**
40-528A	**93-005-001**	**Not Required**
40-529A	**93-005-001**	**93-005-418**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-527/528A/529A modules please refer to the **90-006D** 78-way D-type, **90-005D** 50-way D-type and **90-007D** 37-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-527-001
64x2 Matrix

40-528A-001
32x4 Matrix

40-529A-001
16x8 Matrix

Matrix: High Density

- Ruthenium Reed Versions for Max Signal Performance
- Solid State Version for High Speed & Long Life
- Single and Dual Matrix Configurations
- Partially Populated Configurations Available
- Expansion Capability Across Multiple Cards
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments
- Built-In Diagnostics - BiRST™ Availble on Selected Modules

40-584
2-Amp 1-Pole
VHD Matrix

40-500
Very High
Density
Solid State
Matrix

High Density Matrix Modules

256 to 528 Crosspoints

† To order the screened reed relay version of these 1-pole matrices, please add the -S suffix

- ±60V (DC or AC peak) 0.5A Carry, 1.5A Surge
- ±100V (DC or AC peak) 0.15A Carry, 0.35A Surge
- 150VDC/100VAC 1A Switch, 1A Carry
- 150VDC/100VAC 0.5A Switch, 0.5A Carry
- 300VDC/250VAC 2A Switch, 2A Carry

Solid State	Single 64x4 1-Pole 40-500-001	Page 16.2
Solid State	Single 64x4 1-Pole 40-501-001	Page 16.4
Ruthenium Reed	Single 32x8 1-Pole 40-530-021	Page 16.6
Electro-mechanical	Single 33x8 2-Pole 40-581-002	Page 16.28
Ruthenium Reed	Single 64x4 1-Pole 40-533B-021 Single 64x4 2-Pole 40-533B-022 Single 64x2 1-Pole 40-534B-031 Single 64x2 2-Pole 40-534B-032	Page 16.10
Ruthenium Reed	Single 32x8 1-Pole 40-531-021† Single 32x8 2-Pole 40-531-022 Dual 16x8 1-Pole 40-532-021† Dual 16x8 2-Pole 40-532-022	Page 16.8
Ruthenium Reed	Dual 32x4 1-Pole 40-534A-021† Dual 32x4 2-Pole 40-534A-022	Page 16.12
Ruthenium Reed	Single 92x4 1-Pole 40-535-021 Dual 44x4 1-Pole 40-536-021 Single 44x8 1-Pole 40-537-021	Page 16.14
Ruthenium Reed	Single 55x8 1-Pole 40-538-021	Page 16.16
Ruthenium Reed	Single 132x4 1-Pole 40-540-021 Single 66x8 1-Pole 40-541-021 Single 33x16 1-Pole 40-542-021	Page 16.18
Electro-mechanical	Single 85x4 1-Pole 40-575-001 Single 66x6 1-Pole 40-576-001 Single 50x8 1-Pole 40-577-001 Single 36x12 1-Pole 40-578-001 Single 28x16 1-Pole 40-579-001	Page 16.23
Electro-mechanical with BiRST	Single 32x8 2-Pole 40-580-001	Page 16.26
Electro-mechanical with BiRST	Single 16x16 2-Pole 40-582-001	Page 16.32
Electro-mechanical with BiRST	Single 64x4 2-Pole 40-583-001	Page 16.34
Electro-mechanical with BiRST	Single 128x2 1-Pole 40-584-001 Single 64x4 1-Pole 40-585-001 Single 32x8 1-Pole 40-586A-001 Single 16x16 1-Pole 40-587A-001	Page 16.36

Pickering Interfaces offers a comprehensive range of high density matrix modules that use ruthenium reed relays. They are a cost effective solution for applications that require high density matrices in the PXI format. Expansion to even larger matrices is possible by connecting together multiple modules.

Any high density matrix is available in partially populated configurations giving a cost effective solution for specific applications. Please consult the sales office for details.

Reed relay versions use high quality sputtered ruthenium reeds that exhibit excellent contact performance under low and medium level switching conditions.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

Selected modules are supplied with Built In Relay Self Test. This provides a quick way of finding switch path failures down to a specific relay without the use of any external test equipment.

40-500
Solid State Very High Density Matrix

- Solid State 1-Pole Matrix
- High Density 64x4 Configuration
- 0.5A Hot or Cold Switching
- 1.5A Crosspoint Inrush Current
- ±60 Volt Rating
- 3A Y Bus Rating
- Fast Switch Operation and Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-500 is a very high density matrix using solid state switching configured as a 64x4 1-pole matrix in a single slot 3U PXI module.

It is ideal for applications requiring fast operation and a long service life with frequent switch operations at high currents and voltages. Since the design is based on solid state relays the matrix has no wear out mechanism.

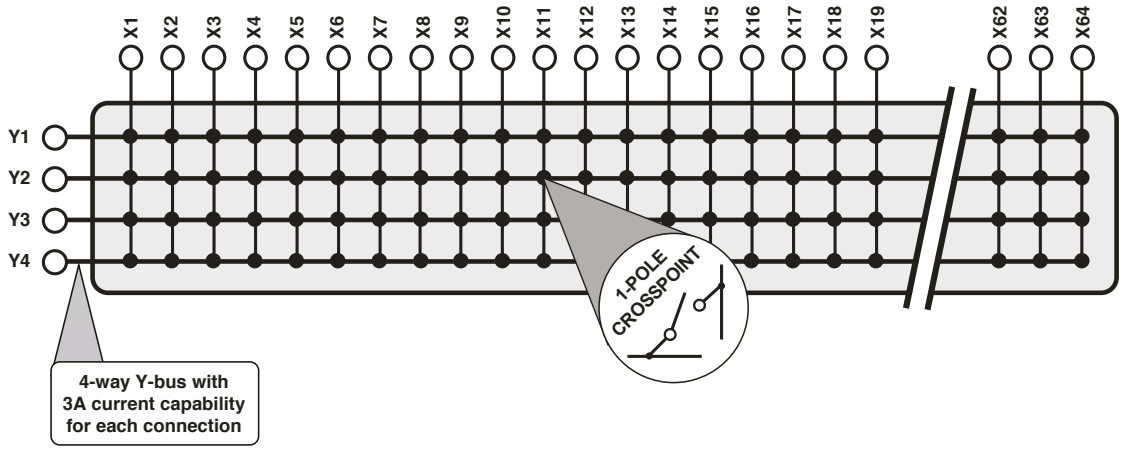
Each matrix crosspoint can switch currents up to 0.5A and can sustain an inrush current of 1.5A for 100ms, allowing the matrix to be used with capacitive loads. The Y-bus has been designed to carry 3A on each bus, permitting the matrix to be used with multiple crosspoints working at their maximum current at the same time. The module can hot switch voltages up to 60V at full rated current and is suitable for AC or DC operation.

Applications for the 40-500 include routing signals for data acquisition systems or for the slave switching of high current relays. The 40-500 can be used for low current low voltage applications where cost, speed, zero contact bounce and the ability to withstand frequent operation is essential.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Pickering Interfaces is able to offer PXI solid state switching solutions in a variety of configurations. If you have a different requirement for solid state switching contact your local sales office for a quotation.



Switching Diagram for the 40-500 Very High Density Matrix

Switching Characteristics

Switch Type	Solid State Switch
Max Switch Voltage:	±60V (AC peak or DC)
Max Crosspoint Current:	0.5A continuous 1.5A for 100ms
Max Y Bus Current:	3A continuous for each bus
Initial Path Resistance - On: Switch Leakage Capacitance: Leakage Current (off state):	0.9Ω (Y to X) 2.5nF (single Y to X) <4µA at 60V
Turn On Time: Turn Off Time:	<400µs <200µs
Matrix Bandwidth:	2MHz typical (one crosspoint)

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.9 A typical (64 closures)	0	0

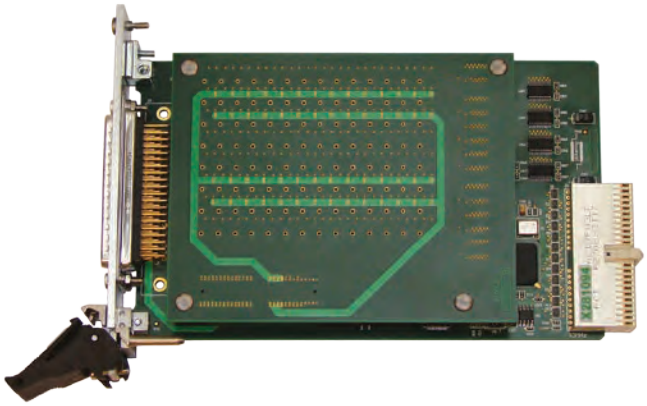
Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 78-way D-type male connector, for pin outs please refer to the operating manual.



Side View of the 40-500 Matrix Module

Product Order Codes

Solid State Very High Density Matrix	**40-500-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Mating Connectors & Cabling

Examples of connectors and cabling for the 40-500 are:

40-960-078	78-way D Subminiature solder connector
40-970-078-1M	Cableform, 78-way D Subminiature Female to Female, 3A, 1m Length
40-965-078	Connector Block, Shielded, 78-way D Subminiature Module Mounted

Mating Connectors & Cabling

For connection accessories for the 40-500 module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-501
Solid State Very High Density Matrix

- Solid State 1-Pole Matrix
- High Density 64x4 Configuration
- 150mA Hot or Cold Switching
- 350mA Crosspoint Inrush Current
- 100 Volt Rating
- 3A Y Bus Rating
- Fast Switch Operation and Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-501 is a very high density matrix using solid state switching configured as a 64x4 1-pole matrix in a single slot 3U PXI module. The 40-501 is pin and software compatible with the 40-500 higher current, lower voltage solid state 64x4 matrix.

It is ideal for applications requiring fast operation and a long service life with frequent switch operations at high currents and voltages. Since the design is based on solid state relays the matrix has no wear out mechanism.

Each matrix crosspoint can switch currents up to 150mA and can sustain an inrush current of 350mA for 10ms, allowing the matrix to be used with capacitive loads. The Y-bus has been designed to carry 3A on each bus, permitting the matrix to be used with multiple crosspoints working at their maximum current at the same time. The module can hot switch voltages up to 100V at full rated current and is suitable for AC or DC operation.

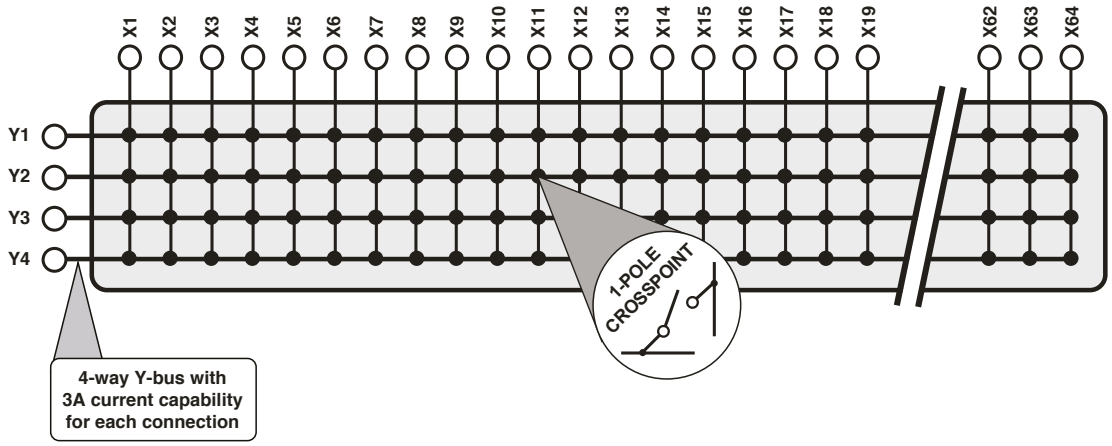
Applications for the 40-501 include routing signals for data acquisition systems or for the slave switching of high current relays. The 40-501 can be used for low current low voltage applications where cost, speed, zero contact bounce and the ability to withstand frequent operation is essential.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Pickering's Range of High Density Solid State Matrices			
Model No.	**Matrix Size**	**Current Rating**	**Voltage Rating**
40-500	64x4	500mA	60V
40-501	64x4	150mA	100V

Pickering Interfaces is able to offer PXI solid state switching solutions in a variety of configurations. If you have a different requirement for solid state switching contact your local sales office for a quotation.



Switching Diagram for the 40-501 Very High Density Matrix

Switching Characteristics

Switch Type	Solid State Switch
Max Switch Voltage:	100V (AC peak or DC)
Max Crosspoint Current:	150mA continuous 350mA for 10ms
Max Y Bus Current:	3A continuous for each bus
Initial Path Resistance - On: Switch Leakage Capacitance: Leakage Current (off state):	<8Ω, typically 5Ω (Y to X) 1.6nF (single Y to X) <1µA at 100V
Turn On Time: Turn Off Time:	<400µs <200µs
Matrix Bandwidth:	2MHz typical (one crosspoint)
Max Number of Simultaneously Closed Crosspoints:	67

Power Requirements

+3.3V	+5V	+12V	-12V
6mA	0.9 A typical (67 closures)	0	0

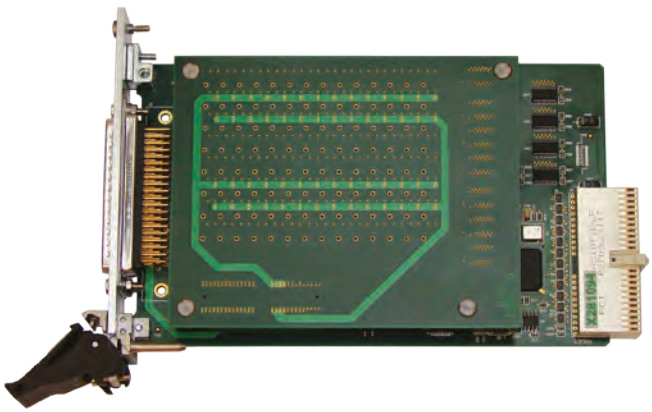
Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 78-way D-type male connector, for pin outs please refer to the operating manual.



Side View of the 40-501 Matrix Module

Product Order Codes

Solid State Very High Density Matrix	**40-501-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Mating Connectors & Cabling

For connection accessories for the 40-501 module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-530
Ultra High Density Matrix Module

- Ultra High Density Reed Relay Matrix With 256 Crosspoints
- 1-Pole 32x8 Matrix
- 1-Slot PXI (CompactPCI) Module
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <1000µs
- Switch up to 150 Volts with 20W Max Power
- Max Current 1A Cold or Hot Switching
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

Model 40-530 very high density matrix module is configured as a 32x8 single pole matrix.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering 10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. For example, 7 PXI modules will form a 224x8 Matrix, a total of 1792 crosspoints in a 7-slot PXI Chassis. For applications that require a very large number of crosspoints, Pickering's range of versatile BRIC matrix modules should be considered.

Relay Type

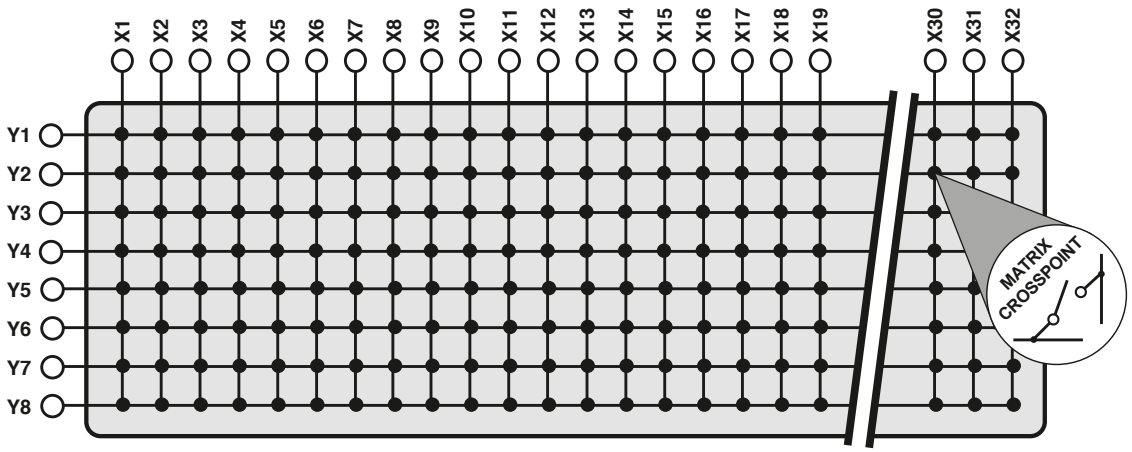
40-530 modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics: www.pickeringrelay.com

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



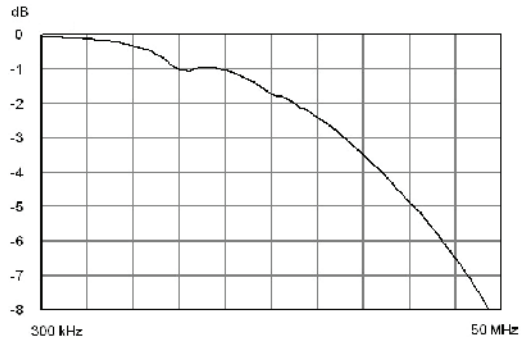
40-530 Single Pole 32x8 Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.0A
Initial Path Resistance On (Single Module): Off (Single Module):	 <500mΩ $>10^9$Ω
Operate Time: Release Time:	<1ms, 0.5ms typical <1ms, 0.5ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

RF Specification - In a 50Ω System

Bandwidth (-3dB):	30MHz	(40-530-021)
Crosstalk (typical):	10kHz: 100kHz: 1MHz 10MHz: 25MHz 50MHz	-90dB -65dB -35dB -24dB -23dB -19dB
Isolation (typical):	10kHz: 100kHz: 1MHz 10MHz: 25MHz 50MHz	90dB 85dB 70dB 51dB 37dB 21dB



Insertion Loss Plot For 40-530-021 (typical worst case)

Power Requirements

+3.3V	+5V	+12V	-12V
0	1A (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 96-way male SCSI style micro-D connector.

Product Order Codes

Single 32x8 Matrix Module, 1-Pole	**40-530-021**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

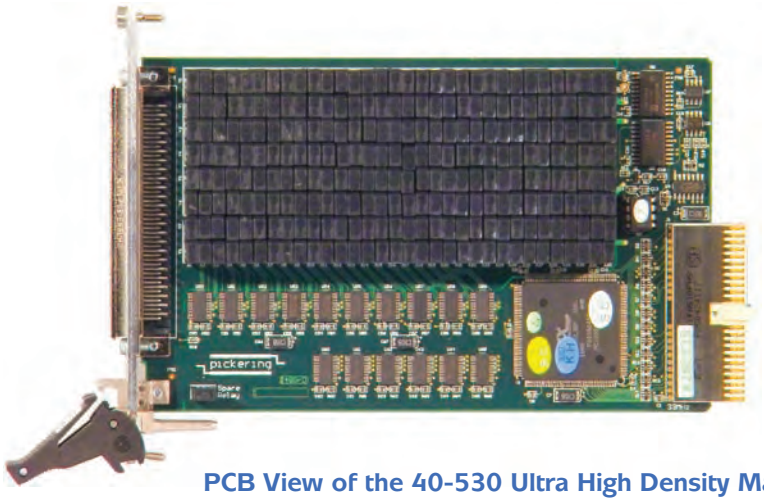
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-019**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

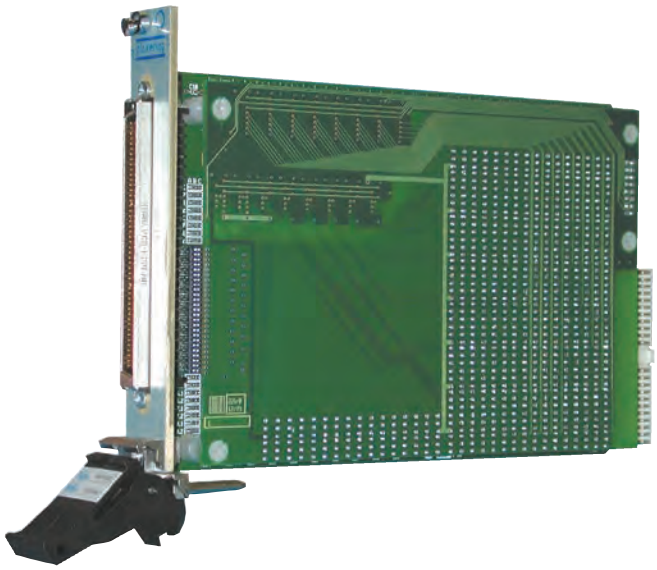
For connection accessories for the 40-530 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB View of the 40-530 Ultra High Density Matrix Module

40-531/532
Ultra High Density Matrix Module

- Ultra High Density Reed Relay Matrix With 256 Crosspoints
- Model 40-531: 32x8 Matrix
- Model 40-532: Dual 16x8 Matrix
- 1-Slot PXI (CompactPCI) Module
- 1-Pole, 2-Pole or Screened Versions
- Large Matrices Built Using Multiple Module
- Screened 50Ω Option with 50MHz Bandwidth
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <1000µs
- Switch up to 150 Volts with 10W Max Power
- Max Switch Current 0.5A Cold or 0.5A Hot
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



Supported by eBIRST

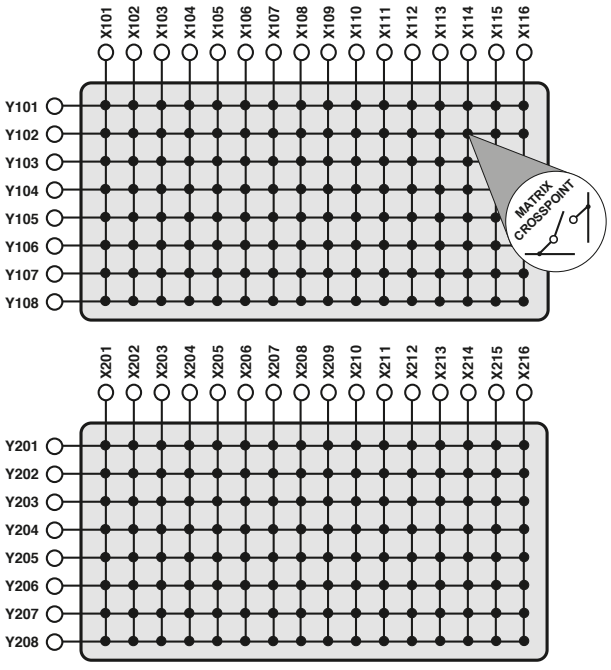
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Model 40-531 very high density matrix module is configured as a 32x8, while the 40-532 module is configured as a Dual 16x8. Both modules are available in a choice of reed relay formats: 1-pole, 2-pole and 1-Pole screened. The screened version is suitable for switching coaxial signals up to 50MHz.

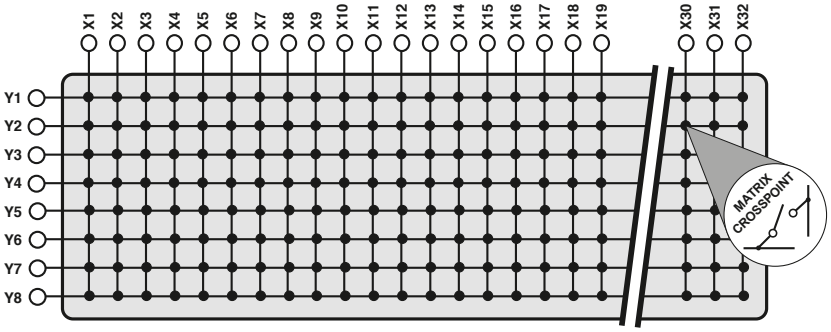
Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering 10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. For example, 7 PXI modules will form a 224x8 Matrix, a total of 1792 crosspoints in a 7-slot PXI Chassis.

Note: For a lower cost alternative to the 40-531-021 Single 32x8 1Pole Matrix, the 40-530-021 should be considered. As well as being a more cost effective solution, it has a higher switching current capability and the same connector pin-out. See the 40-530 data sheet for details.



40-532 Dual 16x8 Matrix



40-531
32x8 Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <1200mΩ $>10^9$Ω <20µV
Operate Time: Release Time:	<1ms, 0.5ms typical <1ms, 0.5ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

RF Specification 40-531-021-S (In a 50Ω System)

Bandwidth (-3dB):	50MHz	(40-531-021-S)
Crosstalk (typical):	10kHz: 100kHz: 1MHz 10MHz: 25MHz 50MHz	-90dB -70dB -50dB -35dB -34dB -19dB
Isolation (typical):	10kHz: 100kHz: 1MHz 10MHz: 25MHz 50MHz	90dB 75dB 55dB 39dB 38dB 23dB

Relay Type

All 40-531/532 series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.
All reed relays are manufactured by our sister company Pickering Electronics: www.pickeringrelay.com

Power Requirements

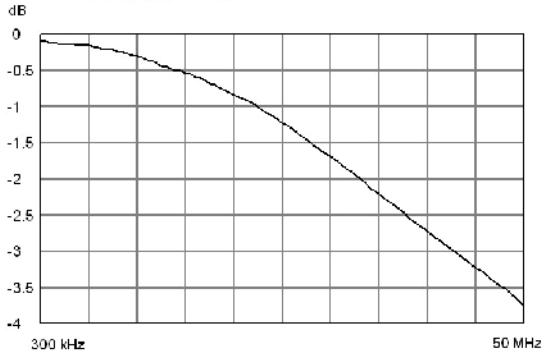
+3.3V	+5V	+12V	-12V
0	1A (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 400g (40-531-021)
460g (40-531-022-S)
380g (40-532-022)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 96-way male SCSI style micro-D connector.



Insertion Loss Plot For 40-530-021 (typical worst case)

Product Order Codes

Single 32x8 Matrix Module, 1-Pole	**40-531-021**
Single 32x8 Matrix Module, 2-Pole	**40-531-022**
Dual 16x8 Matrix Module, 1-Pole	**40-532-021**
Dual 16x8 Matrix Module, 2-Pole	**40-532-022**

Options
–S 1-pole versions are available with screened reed relays (e.g. 40-532-021-S)

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-531-021	**91-100-018**
40-531-021-S	**91-100-016**
40-531-022	**91-100-012**
40-532-021	**91-100-018**
40-532-021-S	**91-100-016**
40-532-022	**91-100-012**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-531/532 modules please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-533B
Ultra High Density Matrix Module

- Ultra High Density Reed Relay Matrix With Up To 256 Crosspoints
- Configured as a 64x4 or 64x2 Matrix
- 1-Pole and 2-Pole Versions
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- 0.5ms Typical Operating Speed
- Switch Up To 1A, 150VDC/100VAC With 15W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

The 40-533B ultra high density matrix module is configured as 64x4 or 64x2 and is available in a choice of 1-pole and 2-pole reed relay formats.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Pickering Electronics State-of-the-Art Reed Relays

The 40-533B is constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics. For further information please visit: www.pickeringrelay.com

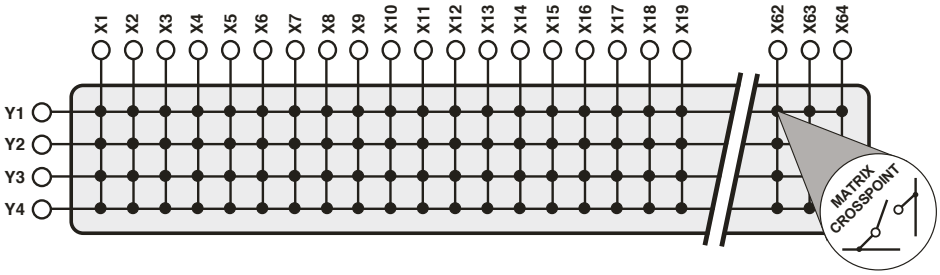
Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

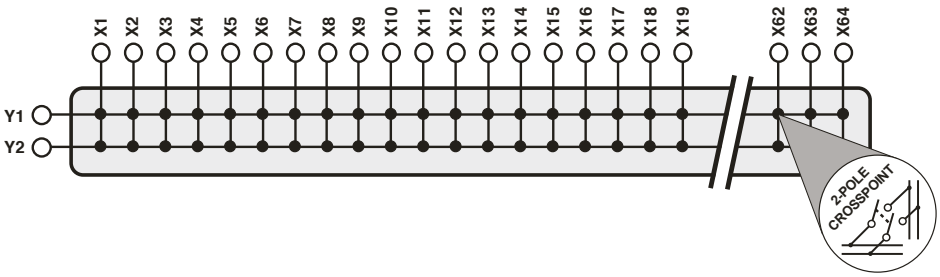
If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST.**

Supported by eBIRST

As an alternative to BIRST this module is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-533B 64x4
1-Pole Matrix



40-533B 64x2
2-Pole Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	15W 1A 1A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset: Differential Thermal Offset (2-Pole Versions):	 <750mΩ $>10^9$Ω <40µV <10µV
Typical Operate Time:	0.5ms
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

RF Specification

Bandwidth (-3dB):	>10MHz	
Crosstalk (typical):	10kHz: 100kHz: 1MHz:	70dB 60dB 35dB
Isolation (typical):	100kHz: 1MHz: 10MHz:	85dB 55dB 35dB

Relay Type

All 40-533B series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
100mA (typical)	400mA (typical)	50mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 420g (40-533B-022)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 200-way female LFH connector.

Product Order Codes

64x4 1 Amp Matrix, 1-Pole	**40-533B-021**
64x4 1 Amp Matrix, 2-Pole	**40-533B-022**
64x2 1 Amp Matrix, 1-Pole	**40-533B-031**
64x2 1 Amp Matrix, 2-Pole	**40-533B-032**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-533B-021/031	**91-100-097**
40-533B-022/032	**91-100-098**

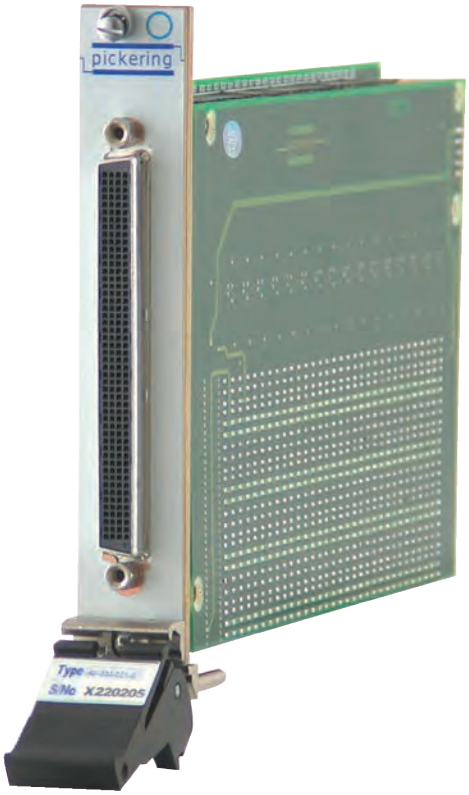
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-533B modules please refer to the **90-002D** 200-way LFH Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-534A
Ultra High Density Matrix Module

- Ultra High Density Reed Relay Matrix With 256 Crosspoints
- Configured as a Dual 32x4 Matrix
- 1 Slot PXI (CompactPCI) Module
- 1-Pole, 2-Pole or 1-Pole Screened Versions
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <1000µs
- Switch up to 150VDC/100VAC with 10W Max Power
- Max Switch Current 0.5A
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



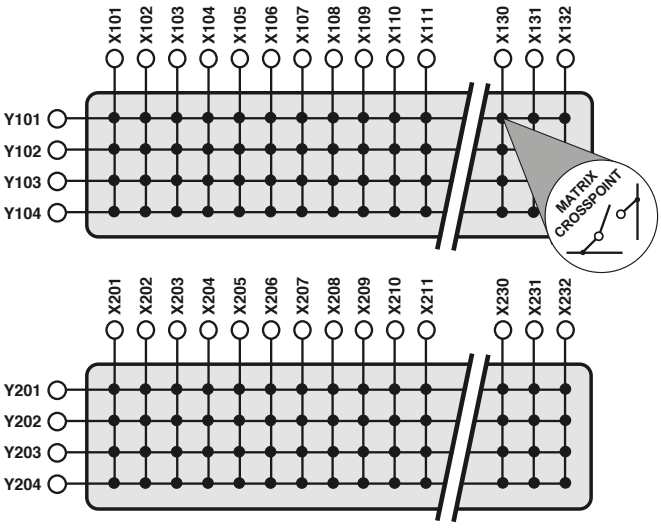
The 40-534A ultra high density matrix module is configured as a dual 32x4 matrix and is available in a choice of reed relay formats: 1-pole, 2-pole and 1-pole screened.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and stable contact resistance.

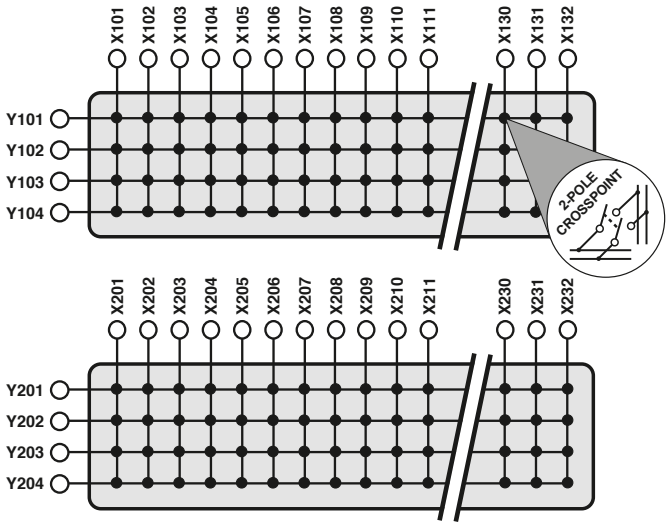
Larger matrices may be constructed by daisy chaining the common signals from multiple modules. For example, 7 off 40-534A modules will form a dual 224x4 Matrix, a total of 1792 crosspoints in an 8-slot PXI Chassis. Using our 18-slot chassis you can build a dual 544x4 matrix, a total of 4352 crosspoints.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-534A-021 Dual 1-Pole 32x4 Matrix



40-534A-022 Dual 2-Pole 32x4 Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <1Ω $>10^9$Ω <5µV
Operate Time: Release Time:	<1ms, 0.5ms typical <1ms, 0.5ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

Relay Type

All 40-534A series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	400mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 420g (40-534A-022)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 200 way female LFH connector.

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics. For further information please visit:
www.pickeringrelay.com

Product Order Codes

Dual 32 x 4 Matrix Module, 1 Pole	**40-534A-021**
Dual 32 x 4 Matrix Module, 2 Pole	**40-534A-022**

Options

–S 1 pole version is available with screened reed relays (e.g. 40-534A-021-S)

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

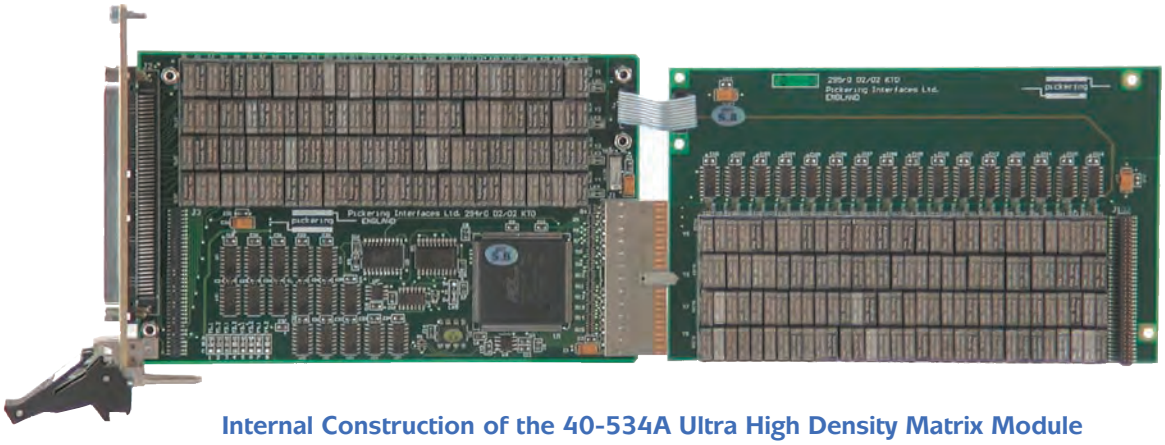
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-534A-021	**91-100-018**
40-534A-021-S	**91-100-016**
40-534A-022	**91-100-012**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

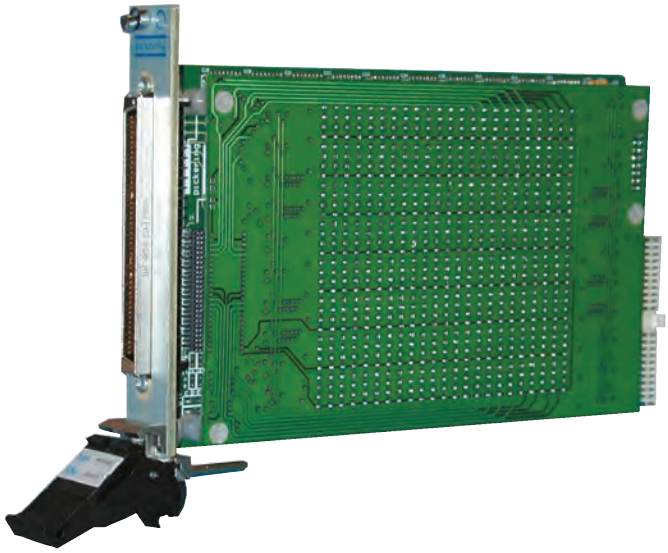
For connection accessories for the 40-534A modules please refer to the **90-002D** 200 way LFH Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Internal Construction of the 40-534A Ultra High Density Matrix Module

40-535/536/537
Ultra High Density Matrix Module

- Ultra High Density Reed Relay Matrix Modules With Up To 368 Crosspoints
- Model 40-535: 92x4 Matrix
- Model 40-536: Dual 44x4 Matrix
- Model 40-537: 44x8 Matrix
- 1-Slot PXI (CompactPCI) Module
- 1-Pole Switching
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <1000µs
- Switch up to 150 Volts with 10W Max Power
- Max Switch Current 0.5A
- VISA, IVI & KernelDrivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



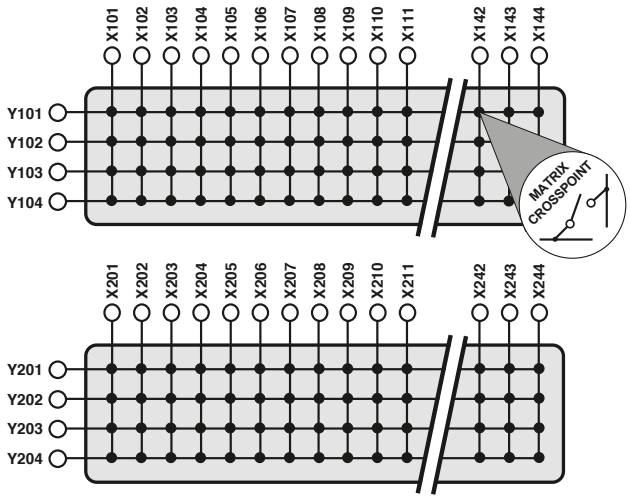
The 40-535 ultra high density matrix module is configured as a Single 92x4 reed relay matrix, 1-pole switching. Model 40-536 is configured as a Dual 44x4 reed relay matrix with 1-pole switching, while model 40-537 is configured as a 44x8 reed relay matrix with 1-pole switching.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering 10^9 operations to give maximum switching confidence with long life and stable contact resistance.

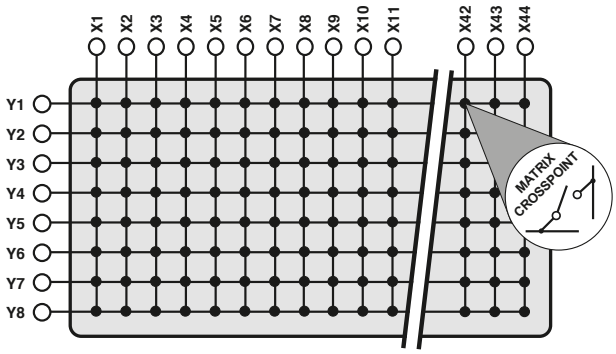
Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. For example, 7 PXI modules (92x4) will form a 644x4 Matrix, a total of 2576 crosspoints in an 8-slot PXI Chassis. An 18-slot chassis gives a capacity of 6256 crosspoints.

Supported by eBIRST

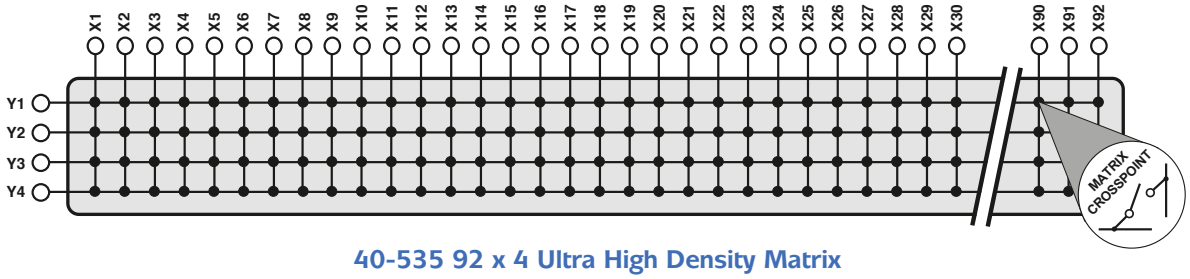
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-536 Dual 44 x 4 Ultra High Density Matrix



40-537 44 x 8 Ultra High Density Matrix



40-535 92 x 4 Ultra High Density Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <1000mΩ $>10^9$Ω <5µV
Operate Time: Release Time:	<1ms, 0.5ms typical <1ms, 0.5ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

Relay Type

All 40-535/536/537 series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics. For further information please visit:

www.pickeringrelay.com

Power Requirements

+3.3V	+5V	+12V	-12V
0	800mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 380g (40-536-021)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 96-way male SCSI style micro-D connector.

Product Order Codes

Single 92x4 Matrix, Module 1-Pole	**40-535-021**
Dual 44x4 Matrix, Module 1-Pole	**40-536-021**
Single 44x8 Matrix, Module 1-Pole	**40-537-021**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

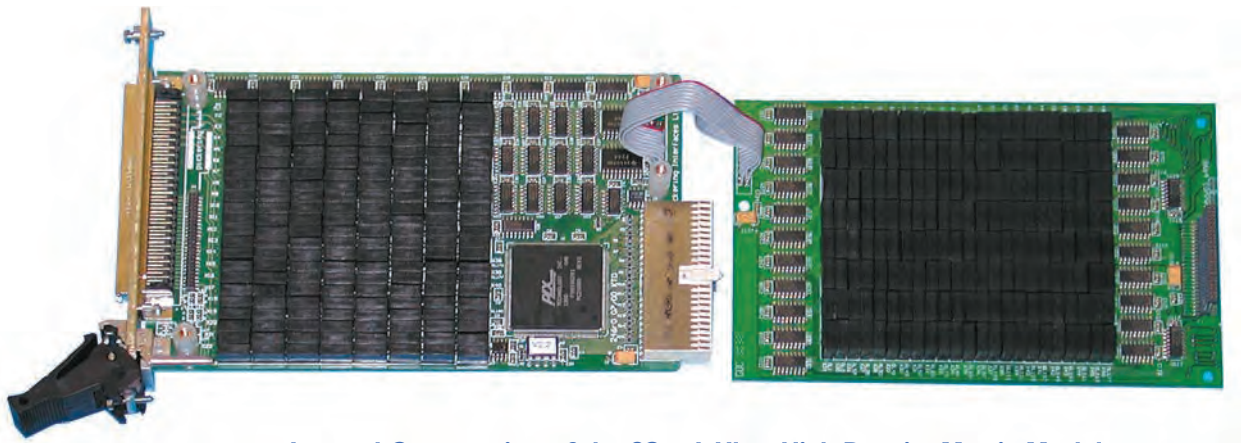
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-535-021	**91-100-006**
40-536-021	**91-100-006**
40-537-021	**91-537-009**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-535/536/537 modules please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Internal Construction of the 92 x 4 Ultra High Density Matrix Module

40-538
Ultra High Density Matrix Module

- Ultra High Density Reed Relay Matrix Module With 440 Crosspoints
- 55x8 1-Pole Matrix
- 1-Slot PXI (CompactPCI) Module
- Large Matrices Built Using Multiple Modules
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Fast Operating Speed <1000µs
- Switch up to 150 Volts with 10W Max Power
- Max Switch Current 0.5A
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-538 ultra high density matrix module is configured as a Single 55x8 reed relay matrix, 1-pole switching.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. For example, 7 PXI modules (55x8) will form a 385x8 Matrix, a total of 3080 crosspoints in an 8-slot PXI Chassis. An 18-slot chassis gives a capacity of 7480 crosspoints.

Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Relay Type

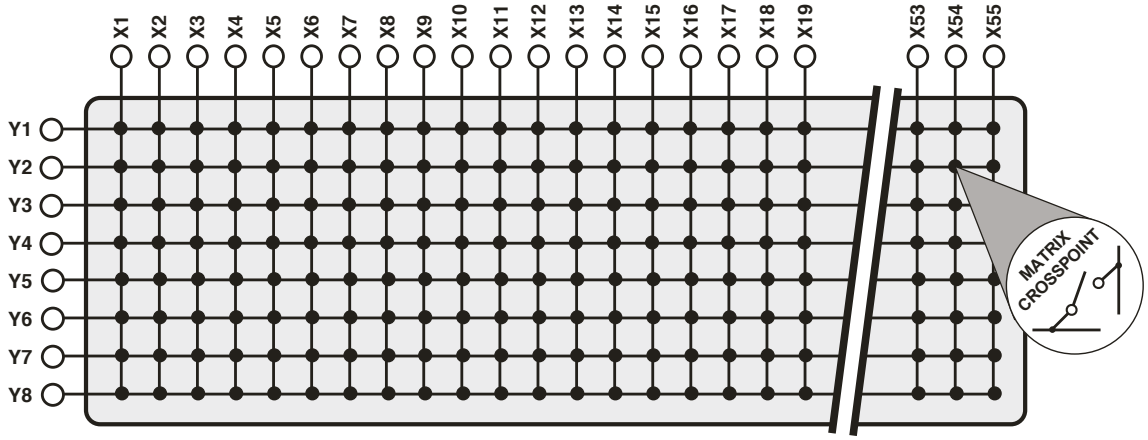
All 40-538 series modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics: www.pickeringrelay.com

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-538 55 x 8 Matrix

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <1Ω $>10^9$Ω <10µV
Operate Time: Release Time:	<1ms, 0.5ms typical <1ms, 0.5ms typical
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>5x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	800mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 400g

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 96-way male SCSI style micro-D connector.

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics. For further information please visit: www.pickeringrelay.com

Product Order Codes

Single 55x8 Matrix, 1-Pole	**40-538-021**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

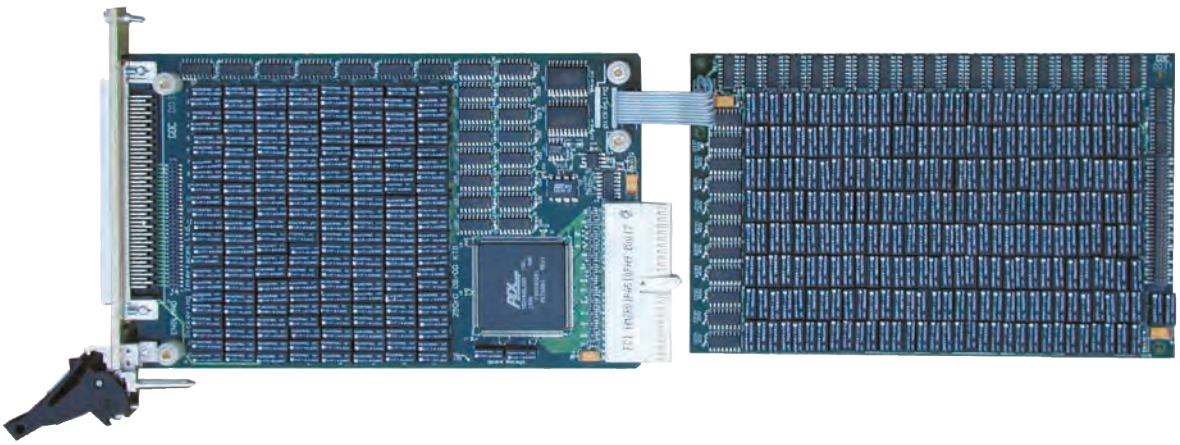
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-009**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-538 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Internal Construction of the 55 x 8 Ultra High Density Matrix Module (440 Relays)

40-540/541/542
Ultra High Density Matrix Module

- **WORLD'S HIGHEST DENSITY SINGLE-SLOT 3U PXI REED RELAY MATRIX MODULE WITH 528 CROSSPOINTS**
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Minimize Cost Using Partially Populated Configurations - Available for All Models
- Switch up to 150 Volts, 0.5A with 10W Max Power
- Fast Operating Speed <300µs
- VISA/IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Ease of Maintenance & Repair Through the Use of Leaded Relays
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The World's highest density single slot PXI Reed Relay Matrix Module, the 40-540/541/542 ultra high density matrix is available as a 132x4, 66x8 or 33x16 reed relay matrix with 1-pole switching.

Typical applications include signal routing in Functional ATE and data acquisition systems. These PXI matrix modules are constructed using high reliability Sputtered Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. However, for applications that require a very large matrix, Pickering's BRIC™ modules are best suited - see the last page of this data sheet for details

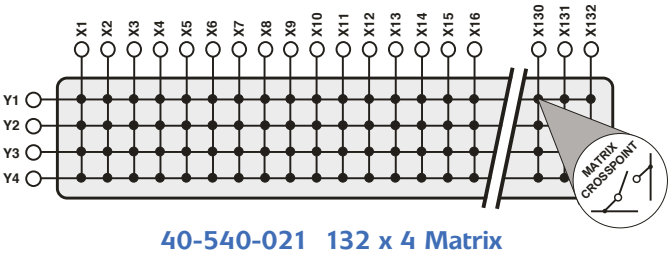
Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Relay Type

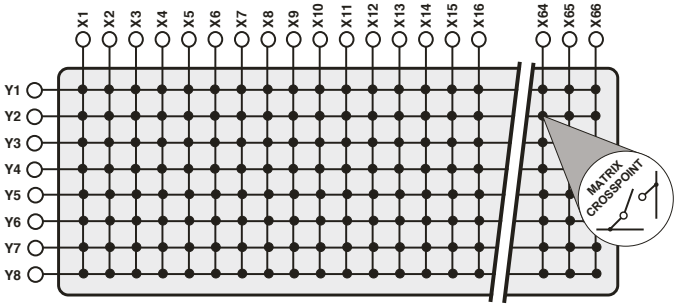
All 40-540/541/542 modules are fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability. **Spare Reed Relays** are built onto the circuit board to facilitate easy maintenance with minimum downtime. All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Supported by eBIRST

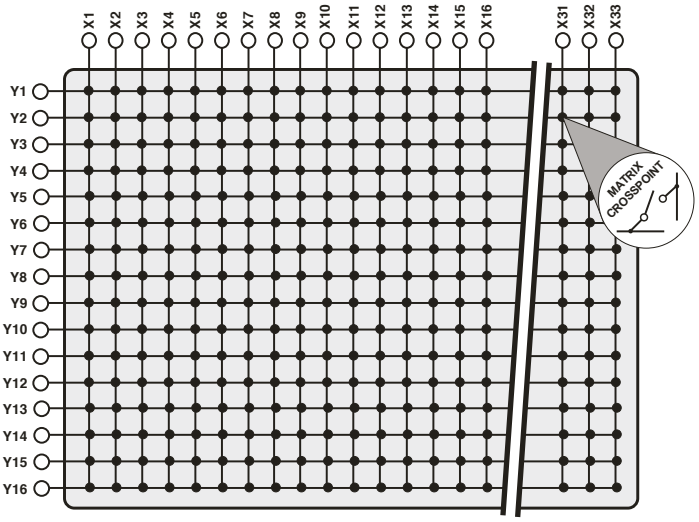
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-540-021 132 x 4 Matrix



40-541-021 66 x 8 Matrix



40-542-021 33 x 16 Matrix

ORDERING SPECIFIC MATRIX CONFIGURATIONS

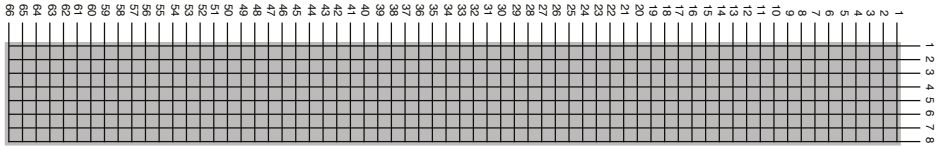
The 40-540, 40-541 and 40-542 may be ordered partially populated to a specific matrix configuration (if volumes dictate), the diagrams show some example configurations.

The illustrations right show:

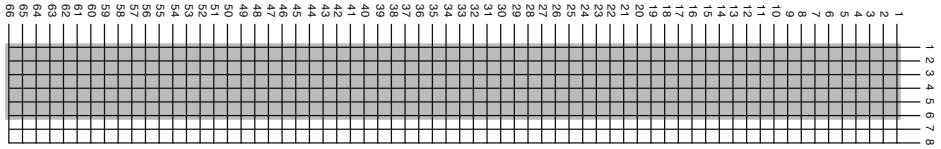
(1) A 40-540 fully populated 132x4 matrix.
(2) A 40-540 partially populated 132x2 matrix.
(3) A 40-540 partially populated 100x4 matrix.

The illustrations below show:

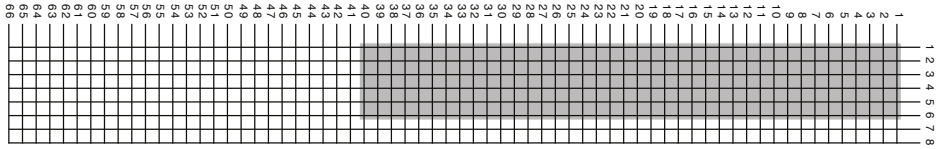
(1) A 40-541 fully populated 66x8 matrix.
(2) A 40-541 partially populated 66x6 matrix.
(3) A 40-541 partially populated 40x6 matrix.
(4) A 40-542 fully populated 33x16 matrix.
(5) A 40-542 partially populated 25x16 matrix.
(6) A 40-542 partially populated 33x12 matrix.



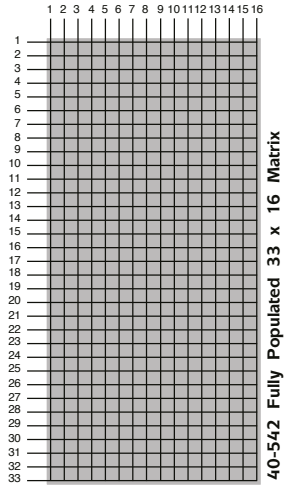
40-541 Fully Populated 66 x 8 Matrix



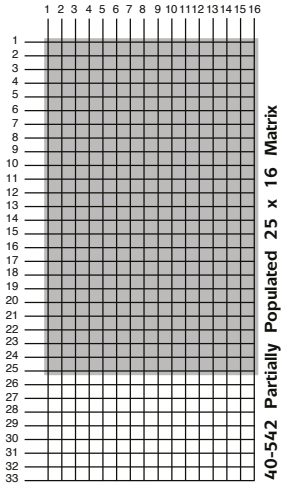
40-541 Partially Populated 66 x 6 Matrix



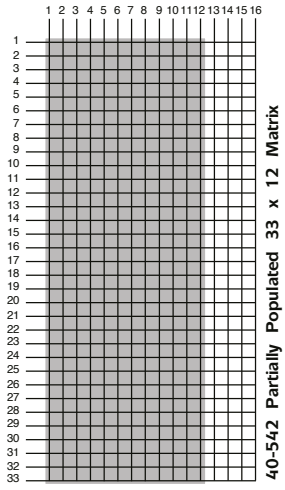
40-541 Partially Populated 40 x 6 Matrix



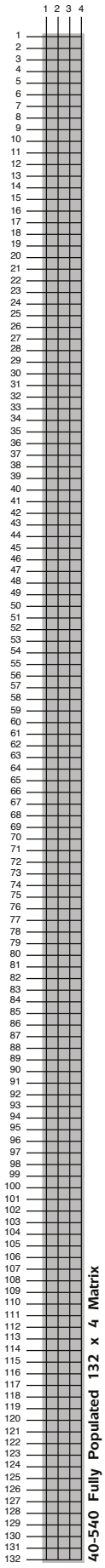
40-542 Fully Populated 33 x 16 Matrix



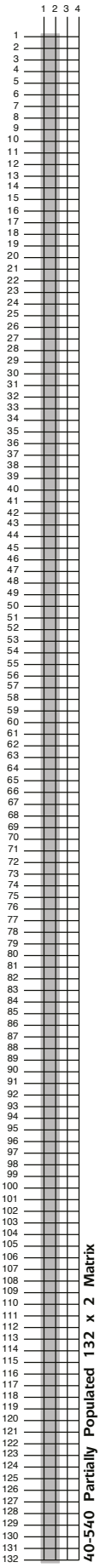
40-542 Partially Populated 25 x 16 Matrix



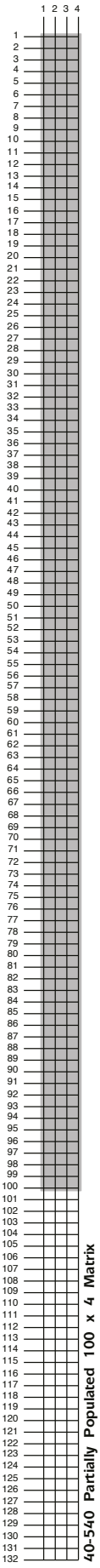
40-542 Partially Populated 33 x 12 Matrix



40-540 Fully Populated 132 x 4 Matrix



40-540 Partially Populated 132 x 2 Matrix



40-540 Partially Populated 100 x 4 Matrix

HIGH DENSITY MATRIX PRODUCT COMPARISON

Advantages Over Competing PXI High Density Matrix Solutions		
	40-540/541/542 Matrix	**Competing PXI High Density Matrix**
World's Highest Density 3U 1-Slot PXI Matrix	Yes	No
Reed relay type	Instrumentation Quality Sputtered Ruthenium Reed Relays.	Lower Cost Rhodium Reed Relays.
Simple relay replacement	Easy to replace Pickering leaded reed relays.	"Challenging" to replace surface mount reed relays.
Matrix orderable in lower capacity versions	Yes - Just specify X and Y limits. You pay for just what you need.	No - You pay full price every time whatever your needs.
Upgrade matrix at any time	Yes - Fast turnaround factory upgrade.	No
Terminal block required	No - Just use standard commercial connectors.	Required to configure matrix and offer strain relief.
Robust direct connection to PXI matrix front panel	Yes	Terminal block usually required.
Maximum number of simultaneously operated relays	100	40
Spare relays conveniently located within PXI module	Yes	No
Relay count tracking	No - Because Pickering provide a Full Matrix Diagnostic Tool - eBIRST.	Yes - But this method is unreliable†
Diagnostic Tool available	Yes	No
Switch 150 Volts DC	Yes	No
Predictable Bandwidth	Yes	No - Significantly reduced where an external terminal block is required for configuration
Wide selection of screened cable assemblies	Yes	No
Fully LXI Compliant	Yes (using 60-102B/103B Chassis)	No

† Counting relay operations as a way of anticipating failure may prove very misleading, since it takes no account of the relay load (over 95% of reed relay failures are due to excessive loads). Expected life for a reed relay will vary by a factor of up to 1000, dependant upon load type (ranging from $>10^9$ operations for low power loads to $>1x10^6$ operations for high power loads).

40-540/541/542 ULTRA HIGH DENSITY MATRIX SPECIFICATIONS

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Initial Path Resistance On (Single Module): Off (Single Module):	 <1Ω $>10^9$Ω
Operate Time: Release Time:	<300µs <300µs
Maximum number of simultaneously operated relays:	135 (40-540) 100 (40-541/542)
Expected Life, low power load: Expected Life, full power load:	$>10^9$ operations $>1x10^6$ operations

RF Specification - In a 50Ω System

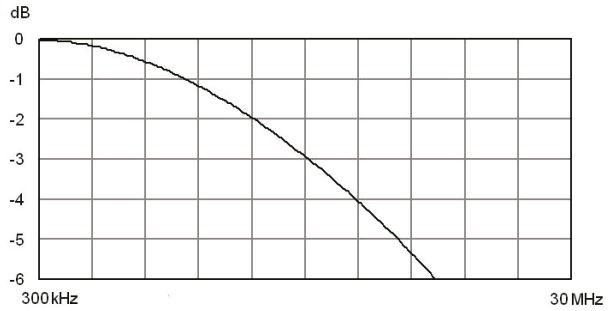
Bandwidth (-3dB):	15MHz 20MHz 25MHz	(40-540-021) (40-541-021) (40-542-021)
Crosstalk (typical):	10kHz: 100kHz: 1MHz 10MHz	-90dB -75dB -55dB -35dB
Isolation (typical):	10kHz: 100kHz: 1MHz 10MHz	90dB 85dB 70dB 60dB

Pickering Electronics State-Of-The-Art Reed Relays

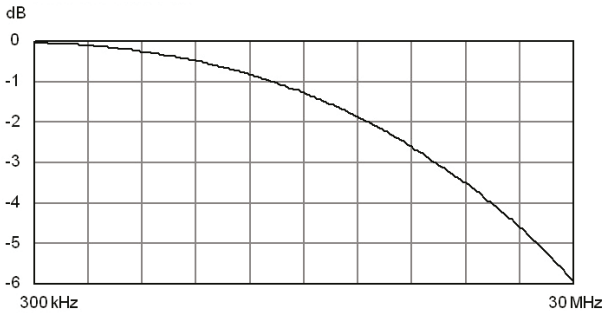
PXI Matrix modules are constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics.

Sputtered Ruthenium Reed Relays offer maximum performance, they are hermetically sealed and offer a very stable, long life relay contact (typically 10^9 operations) with very fast operate time. Alternative types such as electro-mechanical armature relays or non-instrumentation grade reed relays are lower cost but do not offer the consistent contact resistance, long life, fast switching speed and low level switching capability of a reed relay.

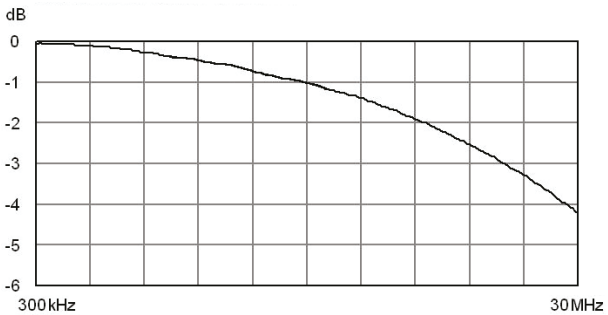
All of the reed relays used in our matrix switching modules are manufactured by Pickering Electronics, these offer maximum switching performance. Please visit the Reed Relay web site at www.pickeringrelay.com for further information.



Insertion Loss Plot For 40-540-021 (typical worst case)



Insertion Loss Plot For 40-541-021 (typical worst case)



Insertion Loss Plot For 40-542-021 (typical worst case)

Power Requirements

+3.3V	+5V	+12V	-12V
0	800mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 400g (40-542-021)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI Bus: 32-bit P1/J1 backplane connector.

Front Panel Signal Connectors:
132x4 Matrix (40-540-021): 200-way female LFH
66x8 Matrix (40-541-021): 96-way male SCSI style micro-D
33x16 Matrix (40-542-021): 68-way male SCSI style micro-D

Product Order Codes

Ultra High Density PXI Matrix Module	
Single 132x4 Matrix, 1-Pole	40-540-021
Single 66x8 Matrix, 1-Pole	40-541-021
Single 33x16 Matrix, 1-Pole	40-542-021

Partially populated versions

These are available by specifying the X and Y size in the product code, for example:
40-540-021-100x4 (100x4 1-pole matrix).

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
40-540	93-002-001	Not Required	Not Required
40-541	93-002-001	93-002-226	93-016-103
40-542	93-006-001	93-006-401	Not Required

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	91-100-006 & 91-100-010

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-540/541/542 modules please refer to the **90-002D** 200-way LFH, **90-016D** 96-way SCSI style micro-D and **90-015D** 68-way SCSI style micro-D Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-575/576/577/578/579
2 Amp 1-Pole UHD Matrix Modules

- **HIGHEST DENSITY SINGLE-SLOT 3U PXI 2A MATRICES WITH UP TO 448 CROSSPOINTS**
- 84x4, 64x6, 50x8, 36x12 and 28x16 Options
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical Relays
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-575/576/577/578/579 are a range of high density matrix modules able to switch up to 2 Amps or 300VDC/250VAC. They are constructed using high quality electro-mechanical relays for high switching confidence.

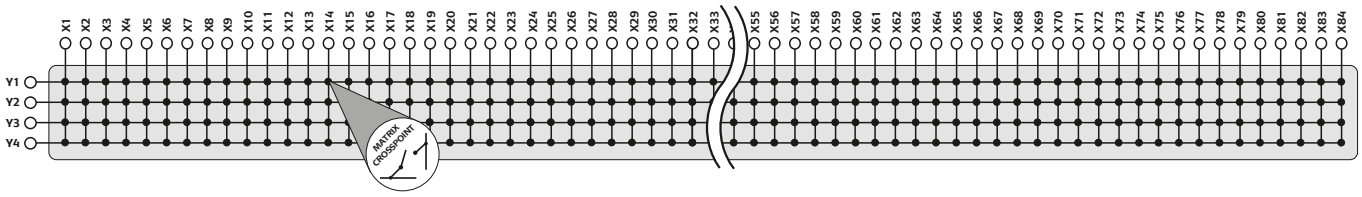
The matrix configuration is dependent on the model as follows:

40-575	84x4, 1-Pole Matrix
40-576	64x6, 1-Pole Matrix
40-577	50x8, 1-Pole Matrix
40-578	36x12, 1-Pole Matrix
40-579	28x16, 1-Pole Matrix

The modules are designed for switching medium voltage and power signals. The user signal connection is via a robust 160-pin DIN 41612, 78-pin D-type or 50-pin D-Type connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.

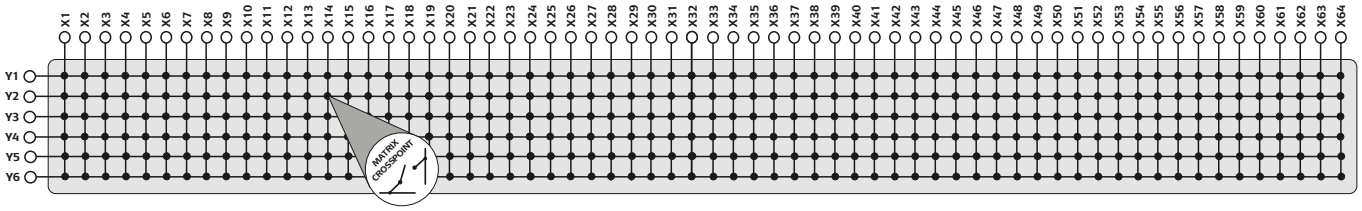
Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



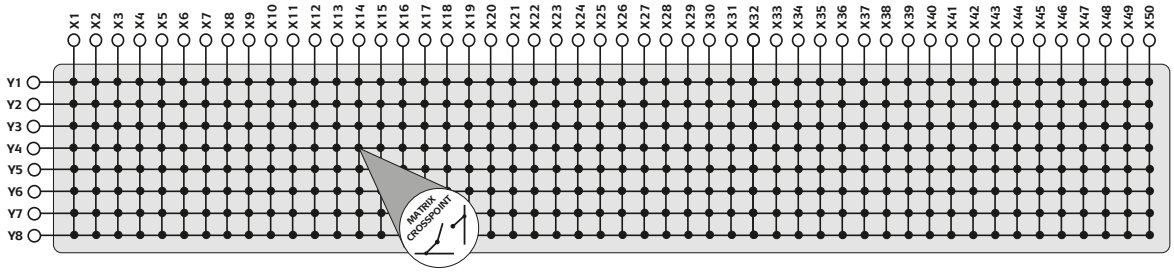
40-575-001 84x4 Matrix Switching Diagram

The 40-575 supports 4 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to Y2, Y3 or Y4) are not permitted by the driver.



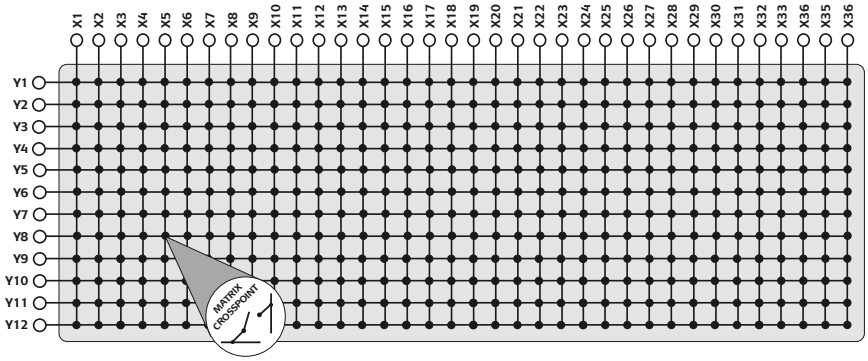
40-576-001 64x6 Matrix Switching Diagram

The 40-576 supports 6 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y6) are not permitted by the driver.



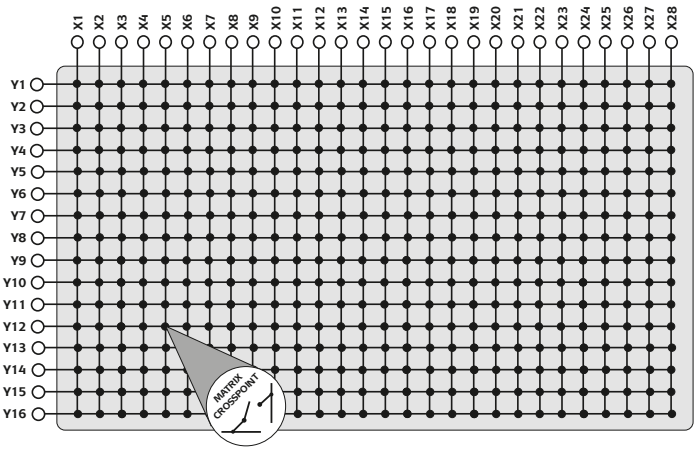
40-577-001 50x8 Matrix Switching Diagram

The 40-577 supports 8 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y8) are not permitted by the driver.



40-578-001 36x12 Matrix Switching Diagram

The 40-578 supports 12 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y12) are not permitted by the driver.



40-579-001 28x16 Matrix Switching Diagram

The 40-579 supports 14 concurrent switch paths for X to X or 16 concurrent Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y16) are not permitted by the driver.

40-575-001
84x4 Matrix

40-576-001
64x6 Matrix

40-577-001
50x8 Matrix

40-578-001
36x12 Matrix

40-579-001
28x16 Matrix

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered, Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power: Max Switch Current: Max Continuous Carry Current: Max Pulsed Carry Current Example (for a single switch path):	62.5VA, 60W 2A 2A 6A for 100ms (up to 10% duty cycle)
Max Continuous Total Switch Path Loading: †	16W (Example allowed conditions – 11 channels at 2A, please contact sales office for further advise)
Initial On Path Resistance: Off Path Resistance: Thermal Offset:	<0.35Ω >10^9Ω 10µV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	84 (40-575) 64 (40-576) 50 (40-577) 36 (40-578) 28 (40-579)
Operate Time:	6.5ms
Expected Life (Operations) Very low power load: Low power load: Medium power load: Full power load:	 >$1x10^8$ >$1.5x10^7$ (0.1A 20VDC) >$5x10^6$ (1A 30VDC) >$1x10^5$ (2A 30VDC)

† Significantly higher total switch path loading is possible when using Pickering 40-922/923A PXI & 60-102B/103B LXI chassis', please contact sales office for details.

RF Specification

Bandwidth (-3dB) typical	40-575	10MHz
	40-576	10MHz
	40-577	10MHz
	40-578	15MHz
	40-579	15MHz

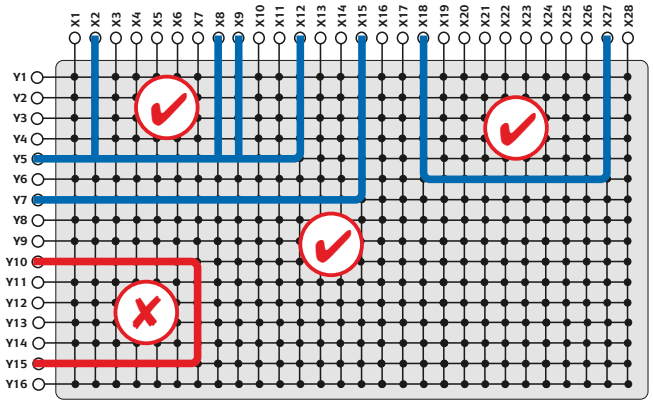
		10kHz	100kHz	1MHz	10MHz
Crosstalk (typical)	40-575	-80dB	-60dB	-40dB	-20dB
	40-576	-70dB	-50dB	-30dB	-15dB
	40-577	-75dB	-60dB	-40dB	-20dB
	40-578	-70dB	-55dB	-35dB	-15dB
	40-579	-70dB	-50dB	-35dB	-15dB
Isolation (typical)	40-575	85dB	70dB	55dB	40dB
	40-576	60dB	45dB	30dB	15dB
	40-577	85dB	70dB	55dB	40dB
	40-578	70dB	50dB	35dB	20dB
	40-579	70dB	55dB	35dB	20dB

Power Requirements

	+3.3V	+5V	+12V	-12V
40-575	110mA	750mA	0	0
40-576	110mA	600mA	0	0
40-577	110mA	475mA	0	0
40-578	110mA	345mA	0	0
40-579	110mA	270mA	0	0

Matrix Functionality

The 40-579 permits 14 concurrent X to X paths or 16 concurrent Y to X paths, the 40-575, 40-576, 40-577 and 40-578 permit 4, 6, 8 and 12 concurrent X to X or X to Y paths respectively. As shown in the figure below, X to Y connections (e.g. X15 to Y7) and X to X connections (e.g. X18 to X27) are permitted, also any number of X connections can be connected to to the Y axis (e.g. X2, X8, X9 & X12 to Y5). However, the driver prevents the connection of Y axis connections together (e.g. Y10 to Y15).



Allowable Signal Paths For The 40-579 Matrix

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: ≈ 410g

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector
Front panel connector:	160-way male DIN 41612 (40-575) 78-way male D-type (40-576/577) 50-way male D-type (40-578/579)

Product Order Codes

84x4 Matrix Module, 1-pole (2A, 60W)	**40-575-001**
64x6 Matrix Module, 1-pole (2A, 60W)	**40-576-001**
50x8 Matrix Module, 1-pole (2A, 60W)	**40-577-001**
36x12 Matrix Module, 1-pole (2A, 60W)	**40-578-001**
28x16 Matrix Module, 1-pole (2A, 60W)	**40-579-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
40-575	**93-002-001**	**93-002-410**
40-576/577	**93-006-001**	**Not Required**
40-578/579	**93-005-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

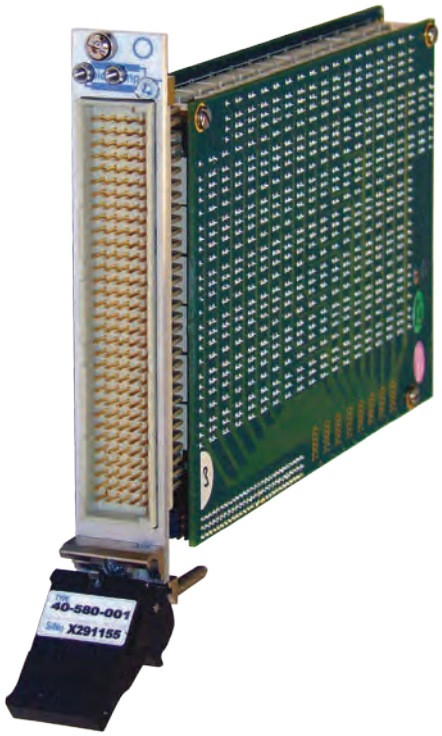
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-575/576/577/578/579 modules please refer to the **90-001D** 160-way DIN 41612, **90-006D** 78-way D-Type and **90-005D** 50-way D-Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-580
2-Pole 32x8 Matrix Module

- High Density Single-Slot 3U PXI 2-Pole Matrix With 256 Crosspoints
- Configured as a 32x8 Matrix
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical 2-Pole Relays
- VISA/IVI Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty



The 40-580 is a 256 crosspoint PXI matrix with dual pole switching. The module consists of a 32x8 matrix of 2-pole electro-mechanical relays with 2A current handling.

The module is designed for switching medium voltage and power signals, typical applications include signal routing in ATE and data acquisition systems. The user signal connection is via a robust 160-pin DIN 41612 connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, chances are the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST**.

Supported by eBIRST

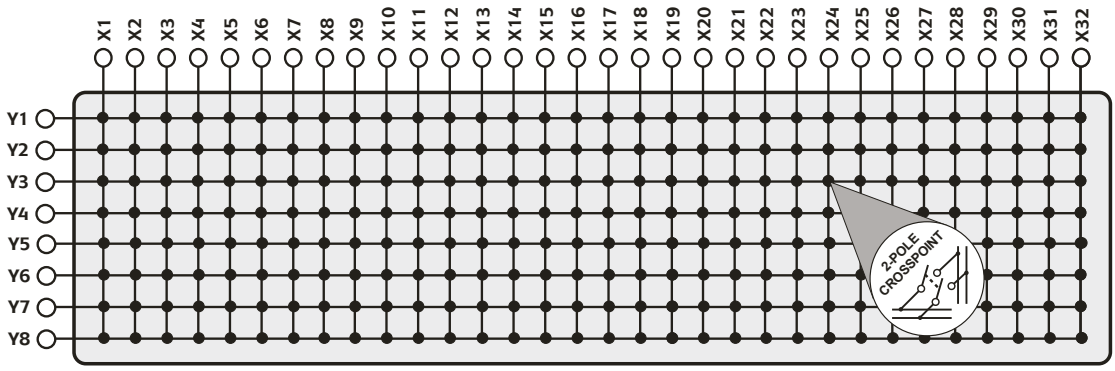
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

The 40-580 is part of Pickering's family of Very High Density, 256 crosspoint, BIRST enabled PXI matrices, the range is as follows:

- **40-582-001** - 16x16 2-Pole, 2 Amp Matrix
- **40-583-001** - 64x4 2-Pole, 2 Amp Matrix
- **40-584-001** - 128x2 1-Pole, 2 Amp Matrix
- **40-585-001** - 64x4 1-Pole, 2 Amp Matrix
- **40-586-001** - 32x8 1-Pole, 2 Amp Matrix
- **40-587-001** - 16x16 1-Pole, 2 Amp Matrix

Also available from Pickering is a range of High Density, 128 crosspoint PXI matrices, also fitted with BIRST:

- **40-527-001** - 64x2 1-Pole, 2 Amp Matrix
- **40-528-001** - 32x4 1-Pole, 2 Amp Matrix
- **40-529-001** - 16x8 1-Pole, 2 Amp Matrix



Switching Diagram for 40-580-001 2-Pole 32x8 Matrix (each line represents a 2-pole connection)

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	500mΩ
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	<5µV
Max Number of Simultaneously Closed Crosspoints:	100
Operate Time:	3ms
Expected Life (Operations)	
Very low power load:	$>1x10^8$
Low power load:	$>1.5x10^7$ (0.1A 20VDC)
Medium power load:	$>5x10^6$ (1A 30VDC)
Full power load:	$>1x10^5$ (2A 30VDC) $>1x10^5$ (0.1A 300VDC)

Bandwidth

Typical Bandwidth	10 MHz

Power Requirements

+3.3V	+5V	+12V	-12V
130mA (typical)	500mA (typical) 1A (max)	70mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector
Front panel connector:	160-pin male DIN 41612

Product Order Codes

32x8 Matrix Module, 2-pole (2A, 60W)	**40-580-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-401**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

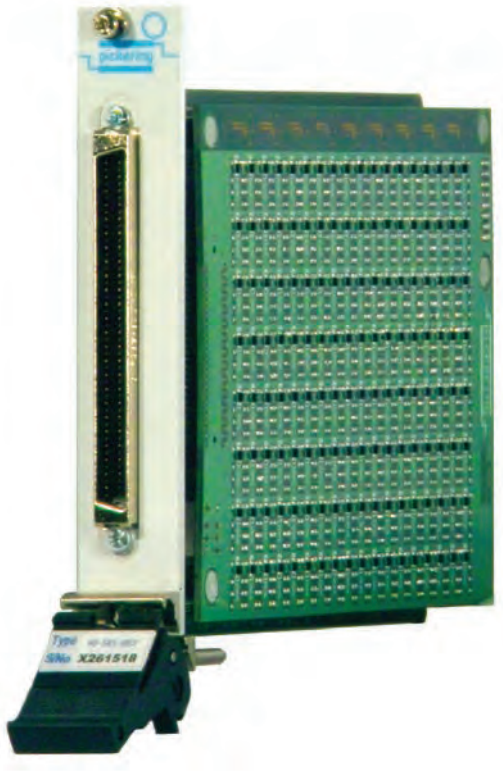
Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-580 module please refer to the **90-001D** 160-pin DIN 41612 Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-581
Ultra High Density 2-Pole Matrix Module



- **WORLD'S HIGHEST DENSITY SINGLE-SLOT 3U PXI 2-POLE MATRIX MODULE WITH 264 CROSSPOINTS**
- 33x8, 2-Pole Matrix
- Maximum Current 1A Hot or Cold Switching
- Switch up to 150 Volts, with 60W Max Power
- Very Cost Competitive
- Partially Populated Configurations Available & Are Future Upgradable - Minimizing Cost
- Designed With Leaded Relays for Ease of Maintenance & Repair
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The World's highest density 2-pole single slot 3U PXI Matrix Module, the 40-581 has 264 crosspoints configured as a 2-pole 33x8 matrix. The use of high density electro-mechanical relays means that the 40-581 is a low cost high density matrix solution with current handling up to 1 Amp.

The 40-581 module is suitable for matrix applications where two signals are required to be switched simultaneously, for example send and return signals in a telecoms system. It is also suitable for applications where reed relay based matrices do not have sufficient power handling capability.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. However, for applications that require a very large matrix, Pickering's BRIC™ modules - offering an integrated solution - maybe better suited.

Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

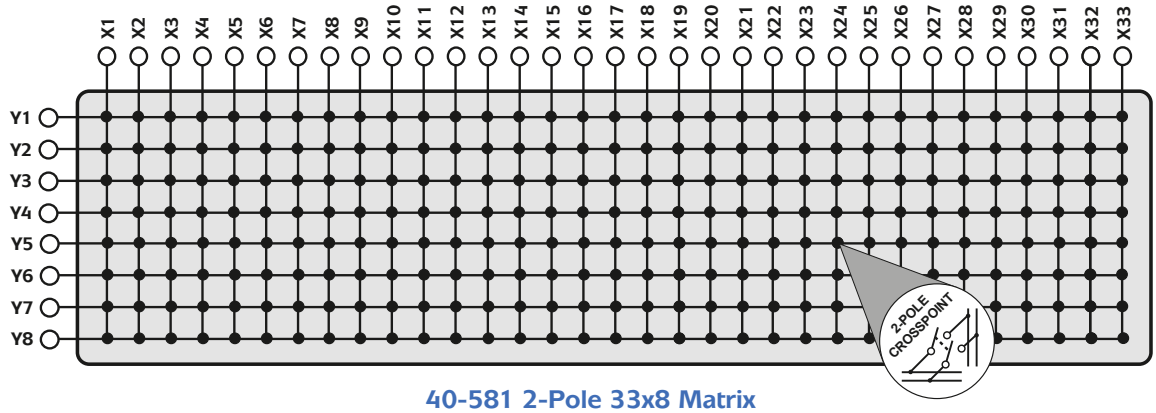
Choice of Signal Relay Types

40-581 module is fitted with **Electro-mechanical Relays** (Palladium-Ruthenium, Gold covered) offering good general purpose performance, switching times of 3ms and are lower cost than instrumentation grade reed relays. Overall they offer a good general purpose choice.

Reed Relays (Sputtered Ruthenium Type) which are designed solely for high-end instrumentation applications are used in all Pickering's reed relay based matrix modules. They offer very long life up to 1000 million operations, fast operate time of 0.25ms and exceptional low level switching performance. Reed Relays are hermetically sealed to ensure consistent and stable contact resistance with long life. All of the reed relays used in our PXI modules are manufactured by our sister company Pickering Electronics (www.pickeringrelay.com).

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-581 2-Pole 33x8 Matrix

ORDERING SPECIFIC MATRIX CONFIGURATIONS

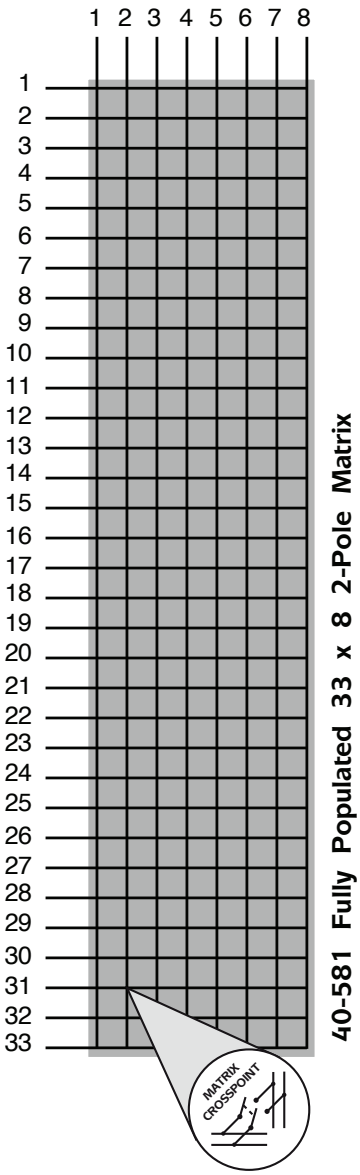
The 40-581 may be ordered partially populated to a specific matrix configuration. The diagrams show some example configurations. A module can be factory populated as required, and updates to increase capacity can be added at any time in the future (on a return to factory basis).

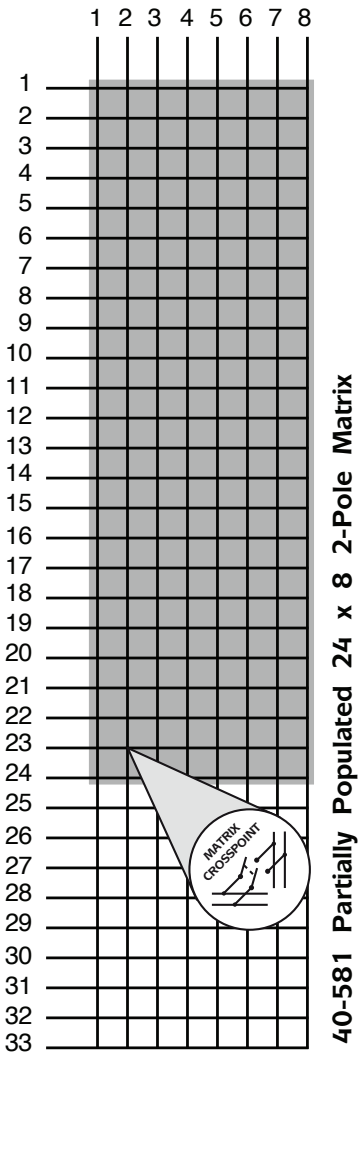
The illustrations below show:

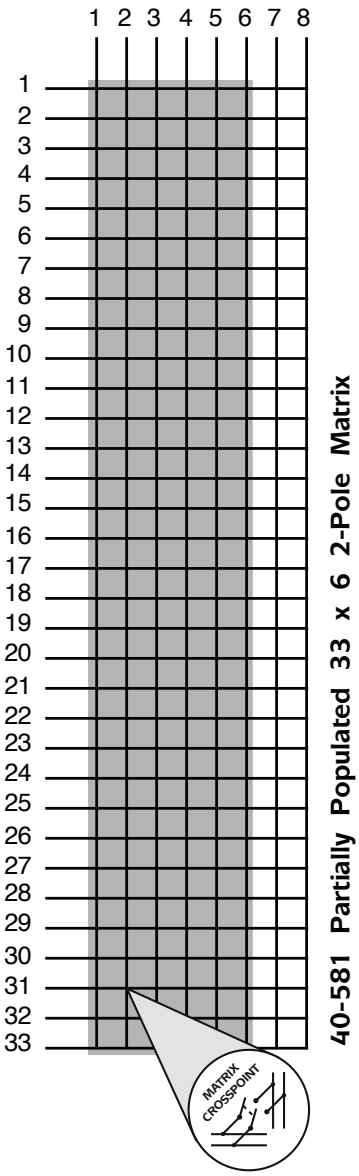
(1) A 40-581 fully populated 33x8 matrix.

(2) A 40-581 partially populated 24x8 matrix.

(3) A 40-581 partially populated 33x6 matrix.







HIGH DENSITY MATRIX PRODUCT COMPARISON

Advantages Over Competing PXI High Density Matrix Solutions		
	40-581 Matrix	**Competing PXI High Density Matrix**
World's Highest Density 2-Pole 3U 1-Slot PXI Matrix	Yes	No
Switch 1A Switch 150Volts DC Switch 60W	Yes Yes Yes	No No No
Simple relay replacement	Easy to replace leaded relays.	"Challenging" to replace surface mount relays.
Matrix orderable in lower capacity versions	Yes - Just specify X and Y limits. You pay for just what you need.	No - You pay full price every time whatever your needs.
Upgrade matrix at any time	Yes - Fast turnaround factory upgrade.	No
Terminal block required	No - Just use standard commercial connectors.	Required to configure matrix and offer strain relief.
Robust direct connection to PXI matrix front panel	Yes	Terminal block usually required.
Spare relay conveniently located within PXI module	Yes	No
Relay count tracking	No - Because Pickering provide a Full Matrix Diagnostic Tool the PI-MXT, 90-100.	Yes - But this method is unreliable†
Diagnostic Tool available	Yes	No
DC path resistance	<700mΩ	1000mΩ
Wide selection of screened cable assemblies	Yes	No
LXI Support	Yes (using 60-102/103 Chassis)	No

† Counting relay operations as a way of anticipating failure may prove very misleading, since it takes no account of the relay load (over 95% of relay failures are due to excessive loads). Expected life for a relay will vary by a factor of >1000, dependant upon load type (ranging from $>10^8$ operations for low power loads to $>10^5$ operations for high power loads).

40-581 ULTRA HIGH DENSITY MATRIX SPECIFICATIONS

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-ruthenium, Gold Covered Bifurcated contact
Max Switching Voltage:	150VDC/100VAC
Max Power:	60W/62.5VA
Max Switch Current:	1A
Max Carry Current:	1A
Max Pulsed Current Example:	2A for 100ms (up to 10% duty cycle)
Initial Path Resistance - On	<700mΩ (typical 400mΩ) (1A measurement condition)
Path Resistance - Off	$>10^9\Omega$
Differential Thermal Offset:	<10µV
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1 \times 10^8$
Low power load (2W):	$>1.5 \times 10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5 \times 10^6$ (1A 30VDC)
Full power load (60W):	$>1 \times 10^5$ (1A 60VDC)

Relay Type

The 40-581 module is fitted with high density electro-mechanical signal relays with palladium-ruthenium gold covered contacts. The module uses leaded relays (not SMT types) so in-field maintenance is greatly simplified. In addition a **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). 3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 96-way male SCSI style micro-D connector.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1A (typ 380mA)	0	0

Product Order Codes

Single 33 x 8 Matrix, 2 Pole	**40-581-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

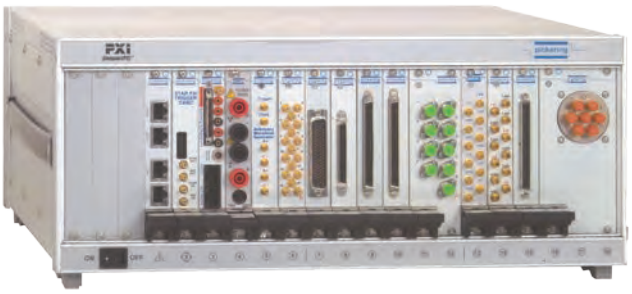
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-581 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

PXI OR LXI?

Pickering Interfaces supports the PXI standard through its range of PXI chassis and supports the LXI standard through its 60-102/103 LXI chassis. This allows its wide range of Matrix, BRIC™ and other switching modules to be supplied in a form suitable for control via PXI or LXI.



Pickering's 40-918 18-Slot PXI Chassis

Pickering's 60-102 7-Slot LXI Chassis

PXI

- Switching system appears as an extension of controller's PCI bus.
- Supports instrument and switching functions from multiple vendors in a single chassis.
- Very fast data transfer for instrumentation.

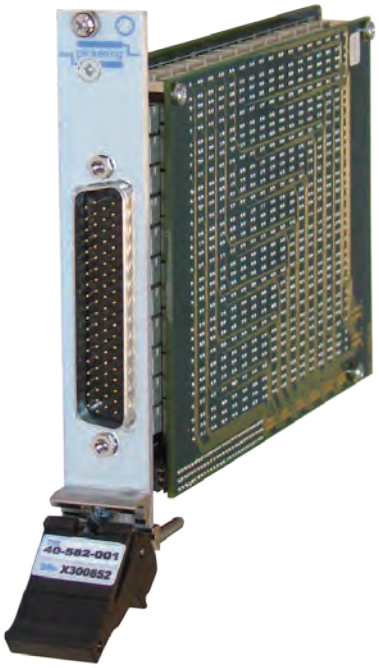
LXI

- Provides standardized control of switching via Ethernet.
- Makes control at a distance simple through industry standard interfacing with no additional plug in cards or a system controller.
- Simple power up and down behavior.
- Resilient system behavior to unpredictable events.
- Wide range of supported Matrix, BRIC™ and other switching modules available.

For more information on Pickering's PXI and LXI chassis, please refer to the full data sheets, available for download from our web site - www.pickeringtest.com

40-582
2-Pole 16x16 Matrix Module

- High Density Single-Slot 3U PXI 2-Pole Matrix With 256 Crosspoints
- Configured as a 16x16 Matrix
- Maximum Current 2A Hot or Cold Switching
- Switch up to 150VDC/100VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical 2-Pole Relays
- VISA/IVI Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

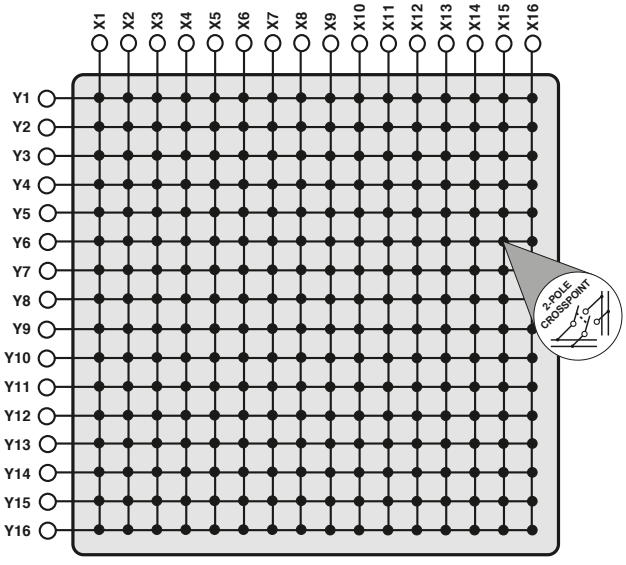


The 40-582 is a 256 crosspoint PXI matrix with dual pole switching. The module consists of a 16x16 matrix of 2-pole electro-mechanical relays with 2A current handling.

The module is designed for switching medium voltage and power signals, typical applications include signal routing in ATE and data acquisition systems. The user signal connection is via a robust 78-pin D-Type connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.



Switching Diagram for 40-582-001
2-Pole 16x16 Matrix
(each line represents a 2-pole connection)

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, chances are the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST**.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

The 40-582 is part of Pickering's family of Very High Density, 256 crosspoint, BIRST enabled PXI matrices, the range is as follows:

- **40-584-001** - 128x2 1-Pole, 2 Amp Matrix
- **40-585-001** - 64x4 1-Pole, 2 Amp Matrix
- **40-586-001** - 32x8 1-Pole, 2 Amp Matrix
- **40-587-001** - 16x16 1-Pole, 2 Amp Matrix

Also available from Pickering is a range of High Density, 128 crosspoint PXI matrices, also fitted with BIRST:

- **40-527-001** - 64x2 1-Pole, 2 Amp Matrix
- **40-528-001** - 32x4 1-Pole, 2 Amp Matrix
- **40-529-001** - 16x8 1-Pole, 2 Amp Matrix

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	150VDC/100VAC
Max Power:	60W/62.5VA
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	500mΩ
Off Path Resistance:	$>10^9\Omega$
Differential Thermal Offset:	<5µV
Max Number of Simultaneously Closed Crosspoints:	100
Operate Time:	3ms
Expected Life (Operations)	
Very low power load:	$>1x10^8$
Low power load:	$>1.5x10^7$ (0.1A 20VDC)
Medium power load:	$>5x10^6$ (1A 30VDC)
Full power load:	$>1x10^5$ (2A 30VDC)

Bandwidth

Typical Bandwidth	10 MHz

Power Requirements

+3.3V	+5V	+12V	-12V
130mA (typical)	500mA (typical) 1A (max)	70mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel connector: 78-pin male D-type

Product Order Codes

16x16 Matrix Module, 2-pole (2A, 60W) **40-582-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

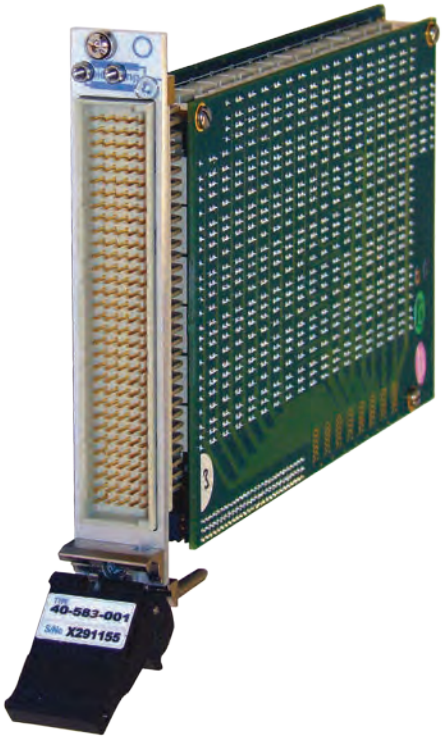
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-582 module please refer to the **90-006D** 78-pin D Type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-583
2-Pole 64x4 Matrix Module

- High Density Single-Slot 3U PXI 2-Pole Matrix With 256 Crosspoints
- Configured as a 64x4 Matrix
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical 2-Pole Relays
- VISA/IVI Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty



The 40-583 is a 256 crosspoint PXI matrix with dual pole switching. The module consists of a 64x4 matrix of 2-pole electro-mechanical relays with 2A current handling.

The module is designed for switching medium voltage and power signals, typical applications include signal routing in ATE and data acquisition systems. The user signal connection is via a robust 160-pin DIN 41612 connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, chances are the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST**.

Supported by eBIRST

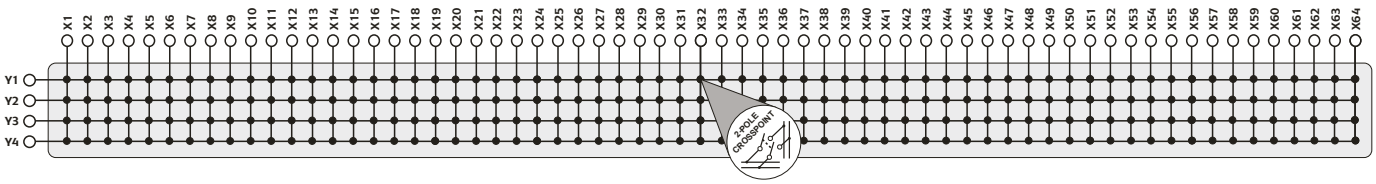
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

The 40-583 is part of Pickering's family of Very High Density, 256 crosspoint, BIRST enabled PXI matrices, the range is as follows:

- **40-580-001** - 32x8 2-Pole, 2 Amp Matrix
- **40-582-001** - 16x16 2-Pole, 2 Amp Matrix
- **40-584-001** - 128x2 1-Pole, 2 Amp Matrix
- **40-585-001** - 64x4 1-Pole, 2 Amp Matrix
- **40-586-001** - 32x8 1-Pole, 2 Amp Matrix
- **40-587-001** - 16x16 1-Pole, 2 Amp Matrix

Also available from Pickering is a range of High Density, 128 crosspoint PXI matrices, also fitted with BIRST:

- **40-527-001** - 64x2 1-Pole, 2 Amp Matrix
- **40-528-001** - 32x4 1-Pole, 2 Amp Matrix
- **40-529-001** - 16x8 1-Pole, 2 Amp Matrix



Switching Diagram for 40-583-001 2-Pole 64x4 Matrix
(each line represents a 2-pole connection)

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	500mΩ
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	<5µV
Max Number of Simultaneously Closed Crosspoints:	100
Operate Time:	3ms
Expected Life (Operations)	
Very low power load:	$>1x10^8$
Low power load:	$>1.5x10^7$ (0.1A 20VDC)
Medium power load:	$>5x10^6$ (1A 30VDC)
Full power load:	$>1x10^5$ (2A 30VDC) $>1x10^5$ (0.1A 300VDC)

Bandwidth

Typical Bandwidth	10 MHz

Power Requirements

+3.3V	+5V	+12V	-12V
130mA (typical)	500mA (typical) 1A (max)	70mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector
Front panel connector:	160-pin male DIN 41612

Product Order Codes

64x4 Matrix Module, 2-pole (2A, 60W)	**40-583-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-401**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-583 module please refer to the **90-001D** 160-pin DIN 41612 Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-584/585/586A/587A
2 Amp 1-Pole VHD Matrix Modules

- **HIGH DENSITY SINGLE-SLOT 3U PXI 2A MATRICES WITH 256 CROSSPOINTS**
- 128x2, 64x4, 32x8 and 16x16 Options
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Uses Gold-Plated Contact Electro-mechanical Relays
- VISA/IVI Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

The 40-584, 40-585, 40-586A and 40-587A are PXI single pole matrices each supporting 256 crosspoints. All models use electromechanical relays.

The matrix configuration is dependent on model as follows:

40-584	128x2 1-Pole Matrix
40-585	64x4 1-Pole Matrix
40-586A	32x8 1-Pole Matrix
40-587A	16x16 1-Pole Matrix

The modules are designed for switching medium voltage and power signals. The user signal connection is via a robust 78, 50 or 37-pin D-Type or 160-pin DIN 41612 connector that is fully supported by the wide range of Pickering Interfaces cable and connector accessories.

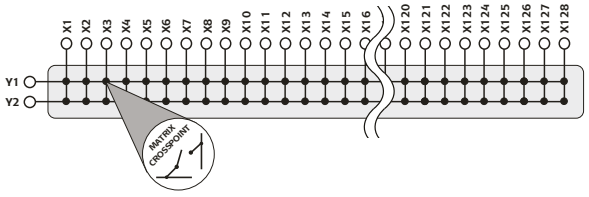
Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

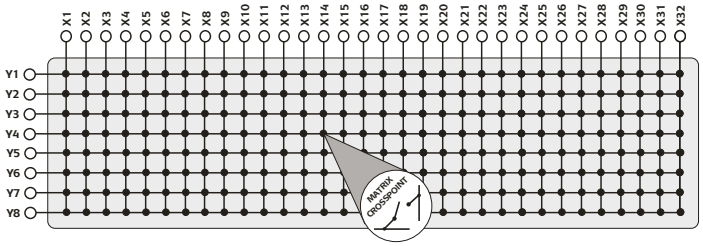
If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained within the module's operating manual. For general information see **BIRST**.

Supported by eBIRST

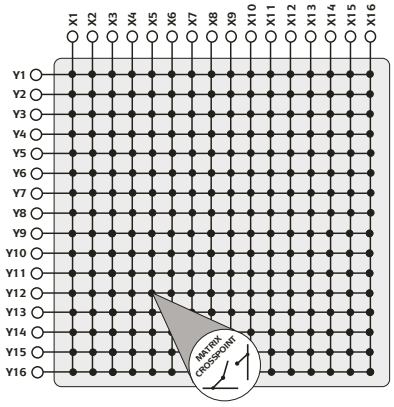
As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



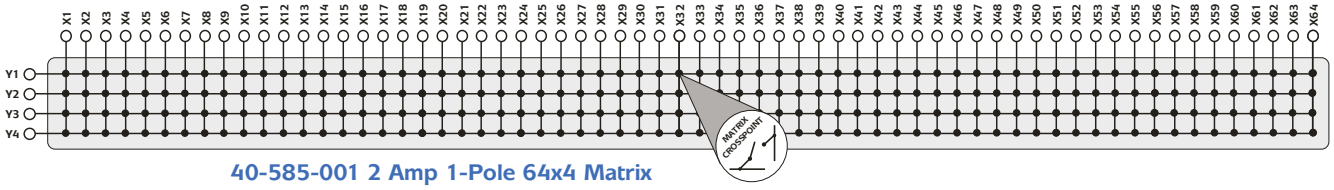
40-584-001 2 Amp 1-Pole 128x2 Matrix



40-586A-001 2 Amp 1-Pole 32x8 Matrix



40-587A-001 2 Amp 1-Pole 16x16 Matrix



40-585-001 2 Amp 1-Pole 64x4 Matrix

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	500mΩ
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	<5µV
Max Number of Simultaneously Closed Crosspoints:	129 (40-584) 100 (40-585/586A/587A)
Operate Time:	<3ms
Expected Life (Operations)	
Very low power load:	$>1x10^8$
Low power load:	$>1.5x10^7$ (0.1A 20VDC)
Medium power load:	$>5x10^6$ (1A 30VDC)
Full power load:	$>1x10^5$ (2A 30VDC) $>1x10^5$ (0.1A 300VDC)

Bandwidth

Bandwidth:	4MHz (40-584-001) 15MHz (40-587A-001)

Power Requirements

+3.3V	+5V	+12V	-12V
130mA (typical)	500mA (typical) 1.3A (max)	70mA (typical)	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 340g (40-586A-001)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel connector: 160-way male DIN 41612 (40-584-001)
78-way male D-type (40-585-001)
50-way male D-type (40-586A-001)
37-way male D-type (40-587A-001)

Product Order Codes

128x2 Matrix Module, 1-pole (2A, 60W)	**40-584-001**
64x4 Matrix Module, 1-pole (2A, 60W)	**40-585-001**
32x8 Matrix Module, 1-pole (2A, 60W)	**40-586A-001**
16x16 Matrix Module, 1-pole (2A, 60W)	**40-587A-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
40-584	**93-002-001**	**93-002-410**
40-585	**93-006-001**	**Not Required**
40-586A	**93-005-001**	**Not Required**
40-587A	**93-005-001**	**93-005-418**

Spare Relay Kits

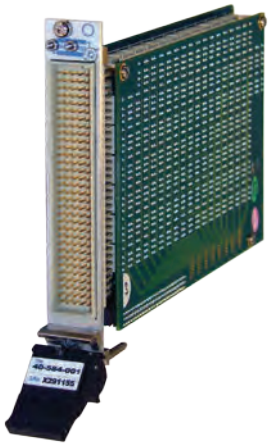
Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

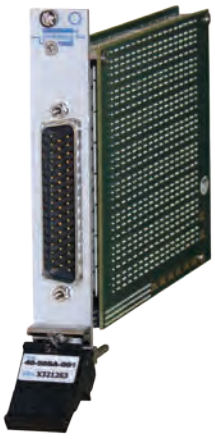
Mating Connectors & Cabling

For connection accessories for the 40-584/585/586A/587A modules please refer to the **90-001D** 160-way DIN 41612, **90-006D** 78-way D-Type, **90-005D** 50-way D-Type and **90-007D** 37-way D-Type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-584-001
128x2 Matrix

40-585-001
64x4 Matrix



40-586A-001
32x8 Matrix

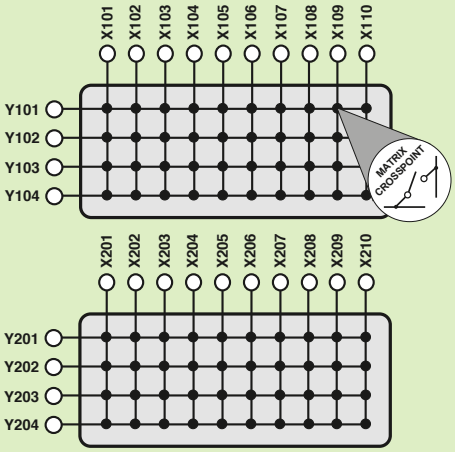
40-587A-001
16x16 Matrix

Matrix: High Power

- Electro-mechanical Relays With Current Ratings of 2A and 5A and Switching Up To 250VAC
- Solid State Relays With Current Ratings of 10A and 30A and Switching Up To 200V AC/DC
- Single and Dual Matrix Configurations
- 1 or 2-Pole Switching Configurations
- Expansion Capability Across Multiple Cards
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-550 Power Matrix Module

40-555-011 30A Solid State Matrix



Example Matrix Configuration: Dual 10x4 (40-546)

These power matrix modules provide matrices with higher current and power ratings than the high density versions. They are designed for the switching of AC or DC loads or for controlling large relay or solenoid systems. The electro-mechanical relay based versions have ratings from 2A to 5A, occupy a single slot and are ideal for power applications. Solid state versions have ratings of 10A and 30A, occupy two PXI slots and are suitable for automotive and avionics test applications.

Each module uses connectors supported by the Pickering cable accessory range and relays have been carefully selected to ensure long service life under demanding load conditions.

Power Matrix Modules

12 to 80 Crosspoints

110VDC/250VAC 2A Max Current	Electro-mechanical	Single 10x4 1-Pole 40-545-001 Dual 10x4 1-Pole 40-546-001 Single 10x8 1-Pole 40-547-001 Single 20x4 1-Pole 40-548-001	Page 17.2
110VDC/250VAC 5A Max Current	Electro-mechanical	Single 16x4 1-Pole 40-549-001 Single 8x8 1-Pole 40-549-002 Dual 8x4 1-Pole 40-549-003 Single 8x4 1-Pole 40-549-004	Page 17.4
125VDC/250VAC 5A Max Current	Electro-mechanical	Single 8x4 2-Pole 40-550-002	Page 17.6
125VDC/250VAC 10A Max Current	Electro-mechanical	Single 8x4 1-Pole 40-551-001 8x4 with Loop-Thru 40-551-101 Single 8x2 1-Pole 40-551-002 Single 4x4 1-Pole 40-551-003	Page 17.8
±200V (DC or AC peak) 10A Max Current	Solid State High Power	Single 6x2 1-Pole 40-553-011	Page 17.14
400VDC/250VAC 16A Max Current	Electro-mechanical	Single 4x4 1-Pole 40-552-001 Single 8x2 1-Pole 40-552-002 4x4 with Loop-Thru 40-552-011 8x2 with Loop-Thru 40-552-012	Page 17.11
±40V (DC or AC peak) 30A Max Current	Solid State High Power	Single 6x2 1-Pole 40-554-011	Page 17.16
	Solid State High Power	Single 8x2 1-Pole 40-555-011	Page 17.18

40-545/546/547/548
High Density Power Matrix Module

- Single Slot PXI 3U High Density Power Matrix Module
- Available in the Following Configurations: 10x4, Dual 10x4, 10x8 and 20x4
- 2 Amp Switching
- 110VDC/250VAC, 90W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

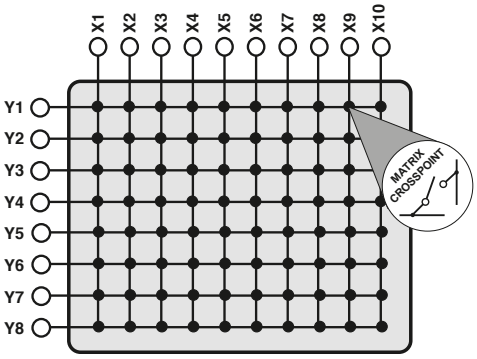
The 40-545 series of High Density Power Matrix Modules is available in a choice of configurations:-

40-545	10x4 matrix, mechanical relays, 1-pole.
40-546	Dual 10x4 matrix, mechanical relays, 1-pole.
40-547	10x8 matrix, mechanical relays, 1-pole.
40-548	20x4 matrix, mechanical relays, 1-pole.

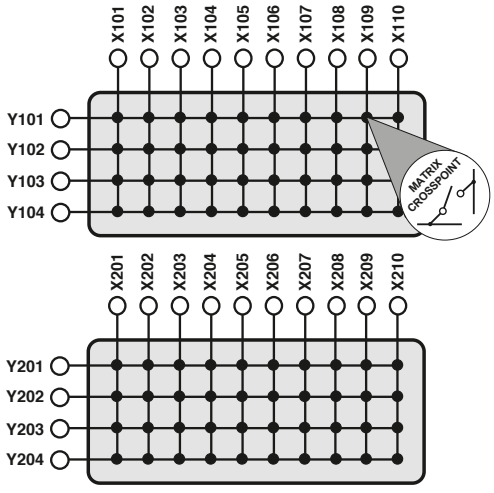
Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. For example 7 PXI modules (20x4) will form a 140x4 Matrix, a total of 560 crosspoints in an 8-slot PXI Chassis. A 14-slot chassis gives a 260x4 Matrix with a total capacity of 1040 crosspoints.

Typical applications include power routing in Functional ATE systems, specifically automotive electronics, for example testing of Engine Management Units.

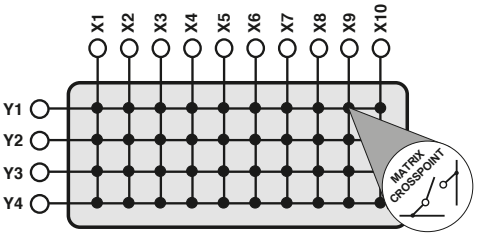
Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.



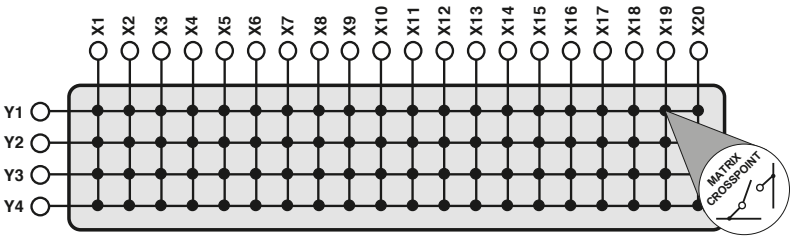
40-547 10x8 Power Matrix



40-546 Dual 10x4 Power Matrix



40-545 10x4 Power Matrix

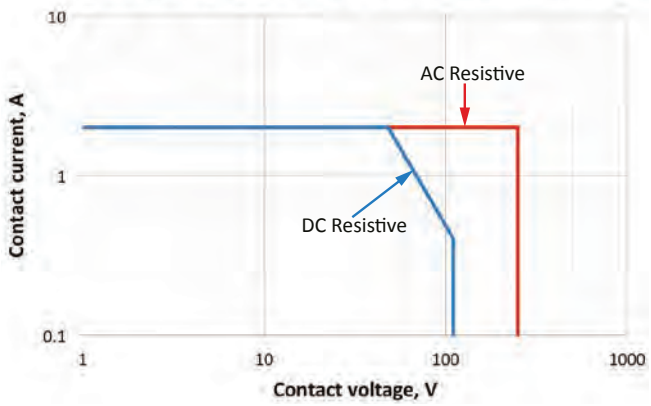


40-548 20x4 Power Matrix

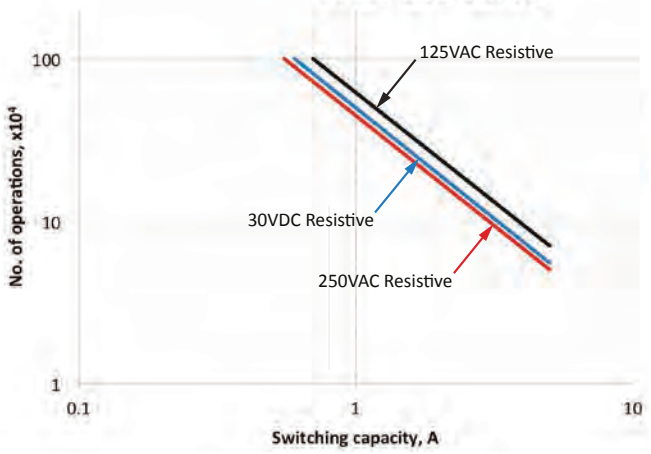
Switching Specification

Contact Type:	Gold clad silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 2A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 2A 110VDC/250VAC 90W/500VA 100µA, 100mVDC
Initial Path Resistance, On: Path Resistance, Off: Thermal Offset:	<300mΩ $>10^9$Ω <20µV
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 $>2x10^7$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.



Current/Voltage Curve



Current/Operating Life Curve

Power Relay Type

The 40-545 is fitted with electro-mechanical power relays, gold clad silver alloy. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	2.1A† (400mA typ)	0	0

†This is maximum with all 80 relays operated

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel 37-way male D-Type connector.

Product Order Codes

10x4 Power Matrix Module, 1-Pole	**40-545-001**
Dual 10x4 Power Matrix Module, 1-Pole	**40-546-001**
10x8 Power Matrix Module, 1-Pole	**40-547-001**
20x4 Power Matrix Module, 1-Pole	**40-548-001**

Support Products

Self-Test Diagnostic Tool (PI-MXT)

The 40-548 module is compatible with Pickering's 90-100 PI-MXT test tool. This enables all switch paths to be automatically tested so that faulty relays can be easily identified. The tool consists of a Windows executable program and an adapter for the specific module, a user supplied multimeter capable of 4-wire resistance measurement is also required.

The PI-MXT test adapter required for the 40-548 is as follows:

90-100-129 supports 40-548-001

For further details on the PI-MXT tool, please refer to the 90-100 data sheet and user manual available from the Pickering website.

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kits for the 40-548 range are as follows:

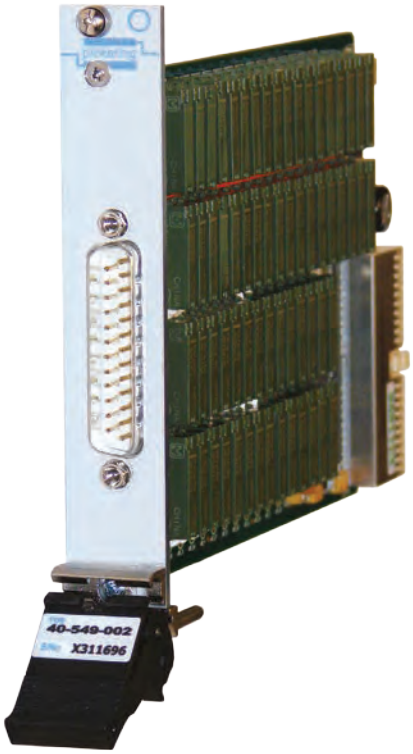
91-100-020 Relay Kit 20 for 40-545-001
91-100-020 Relay Kit 20 for 40-546-001
91-100-020 Relay Kit 20 for 40-547-001
91-100-020 Relay Kit 20 for 40-548-001

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-545/546/547/548 modules please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-549
5A Power EMR Matrix Module



- High Density, High Current Switching
- 1-Pole Power Matrix Available in Single 16x4, Single 8x8, Dual 8x4 and Single 8x4 Formats
- 5A Current Rating With 150W/1250VA Maximum Power
- Hot Switch to 110VDC/250VAC, Cold Switch to 400VDC/250VAC
- High Quality Electro-mechanical Relays
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

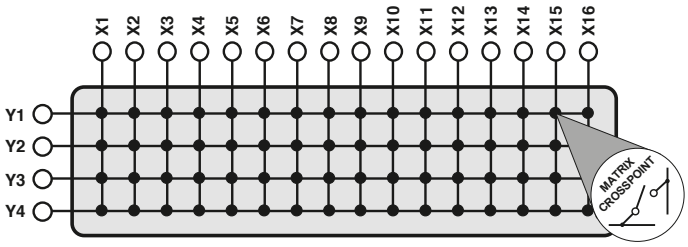
The 40-549 is a single pole power matrix module, suitable for switching inductive/capacitive loads up to 5A with 110VDC/250VAC hot switching and 400VDC/250VAC cold switching. It is available in single 16x4, single 8x8, dual 8x4 or single 8x4 configurations. Connections are made via a front panel 25 way D-type male connector.

Power Matrix Modules are intended for switching heavy AC or DC loads or for slaving large external relays, contactors and solenoids.

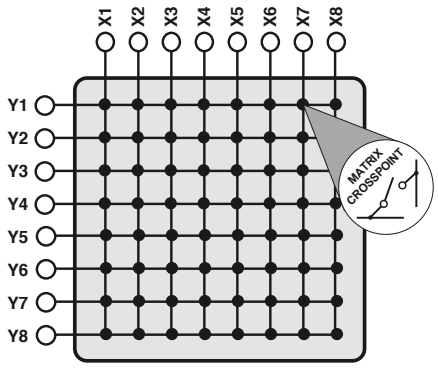
The module is suitable for applications requiring switching of either mains voltage or DC current.

Power Relay Type

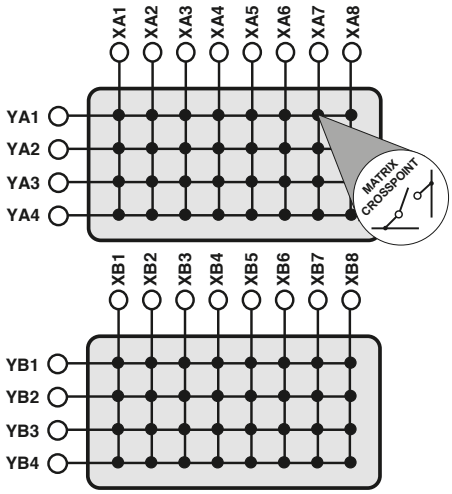
The 40-549 is fitted with electro-mechanical power relays with gold clad silver alloy contacts.



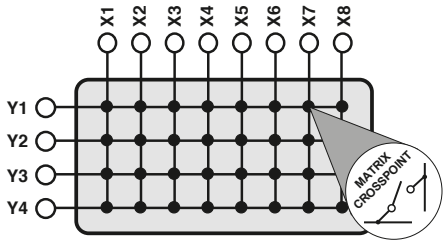
40-549-001 16x4 Power Matrix



40-549-002 8x8 Power Matrix



40-549-003 Dual 8x4 Power Matrix



40-549-004 8x4 Power Matrix

Switching Specification

Contact Type:	Gold clad silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage: Typical Pulse Capability:	 5A 400VDC/250VAC Cold Switch 10A for 100ms under low duty cycle conditions (please contact sales office for further advice)
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Minimum Switching Capacity:	 5A 110VDC/250VAC 150W/1250VA 10mA, 5VDC †
Initial On Path Resistance: Off Path Resistance:	<150mΩ (60mΩ typical) $>10^9$Ω
Bandwidth (3dB insertion loss into 50Ω typically better than): Crosstalk (channel to channel typically better than): Isolation (open channel typically better than): 	20MHz -70dB @ 100kHz -55dB @ 1MHz -24dB @ 10MHz 75dB @ 100kHz 60dB @ 1MHz 20dB @ 10MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 $>2x10^7$ $>5x10^4$ (5A 250VAC, 5A 30VDC) $>1x10^5$ (3A 250VAC, 3A 30VDC)

* For variation of maximum hot switching capacity of voltage with current refer to plot.

† Hot switching at/beyond the levels specified is recommended for optimal contact resistance stability. These values can change due to factors such as switching frequency, environmental conditions & desired reliability level.

Power Requirements

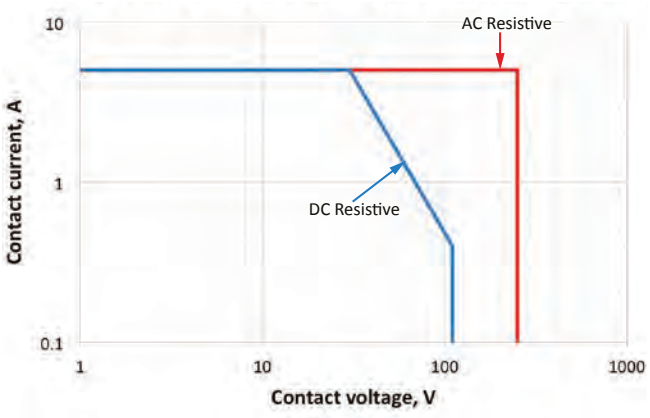
+3.3V	+5V	+12V	-12V
0	1.5A	30mA	0

Mechanical Characteristics

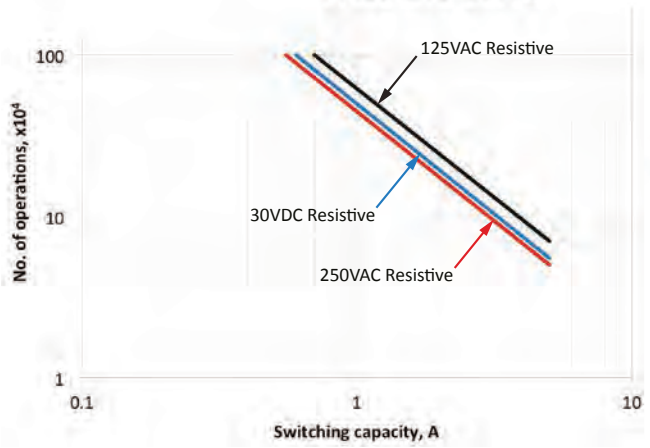
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Matrix connections via front panel 25-way male D-type connector.



40-549 Current/Voltage Plot



40-549 Current/Operating Life Plot

Product Order Codes

5A Power EMR 1-Pole Matrix, Single 16x4	**40-549-001**
5A Power EMR 1-Pole Matrix, Single 8x8	**40-549-002**
5A Power EMR 1-Pole Matrix, Dual 8x4	**40-549-003**
5A Power EMR 1-Pole Matrix, Single 8x4	**40-549-004**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-549 is as follows:

91-100-020 Relay Kit 20 for 40-549-001/002/003/004

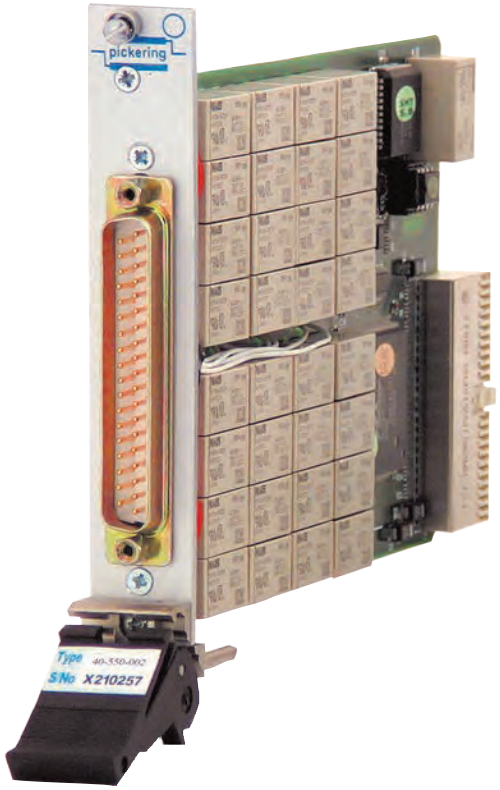
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-549 module please refer to the **90-008D** 25-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-550
Power Matrix Module

- Double Pole 8x4 Power Matrix
- 5A Current Rating With 150W/1250VA Maximum Power
- Hot Switch to 125VDC/250VAC, Cold Switch to 400VDC/250VAC
- Special Version For Heavy Current/Low Duty Cycle Power Switching Type 40-550-902
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



Pickering Interfaces have a range of power switching PXI modules, available in relay, matrix or multiplexer configurations. Connections are made via a front panel 37-way D-Type male connector or two 20-way GMCT male connectors.

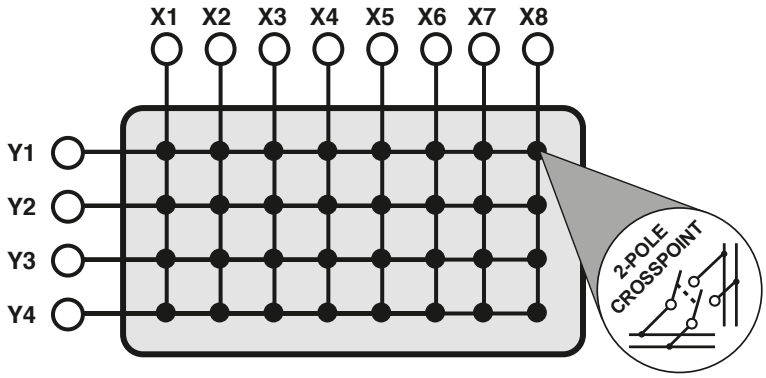
Model 40-550-001 is an 8x4 Power Matrix, suitable for switching inductive/capacitive loads up to 5A at 250VAC.

Power Matrix Modules are intended for switching heavy AC or DC loads or for slaving up to large external relays, contactors and solenoids.

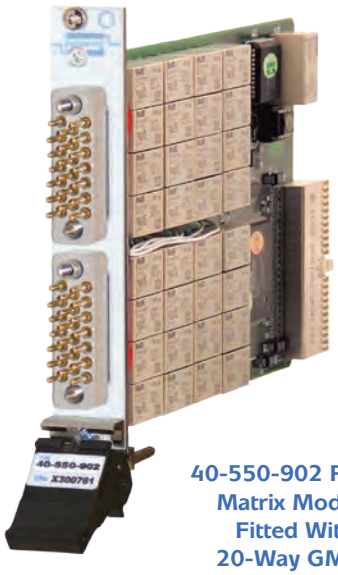
The 40-550 Power Relay Module is suitable for applications requiring switching of either mains voltage or direct current.

Power Relay Type

The 40-550 is fitted with electro-mechanical power relays, gold-flash over silver alloy. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.



Schematic of 40-550 Double Pole Power Matrix Module



40-550-902 Power Matrix Module Fitted With 20-Way GMCT Connectors

Switching Specification

Contact Type:	Gold flashed silver alloy
Cold Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity	
Maximum Current:	5A
Maximum Voltage:	125VDC/250VAC
Maximum Power:*	150W/1250VA
Min. Switching Capacity:	10mA, 5VDC
Initial Path Resistance, On:	<250mΩ
Path Resistance, Off:	$>10^9\Omega$
Thermal Offset:	<20µV
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>5x10^7$
At Max. Switch Capacity:	$>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Additional Switching Specification (40-550-902)

The 40-550-902 is a special variant designed for cold switching of very high currents at low duty cycle, e.g. 40A for 3ms (1% duty cycle).
For further details please contact factory
Initial On Path Resistance: <200mΩ
This module is fitted with higher capacity connectors and internal cabling.

Power Requirements

+3.3V	+5V	+12V	-12V
0	360mA (280mA typ)	0	0

Mechanical Characteristics

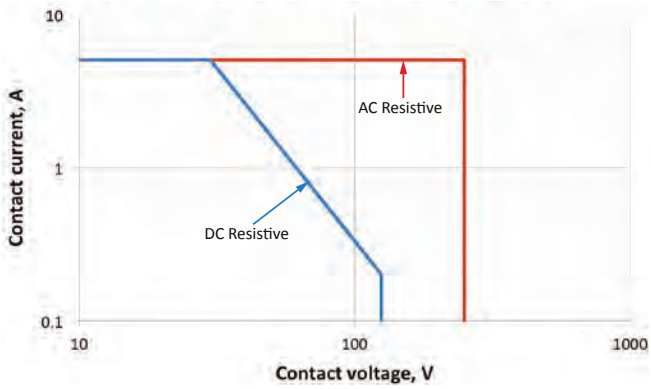
Single slot 3U PXI (CompactPCI card).
Module weight: 300g (40-550-002)
300g (40-550-902)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

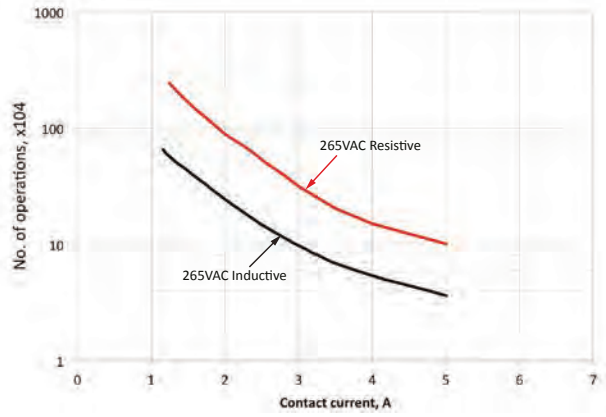
PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel 37-way male D-Type connector (except 40-550-902 which uses 2 x GMCT 20-way male connectors).

Mating Connectors & Cabling

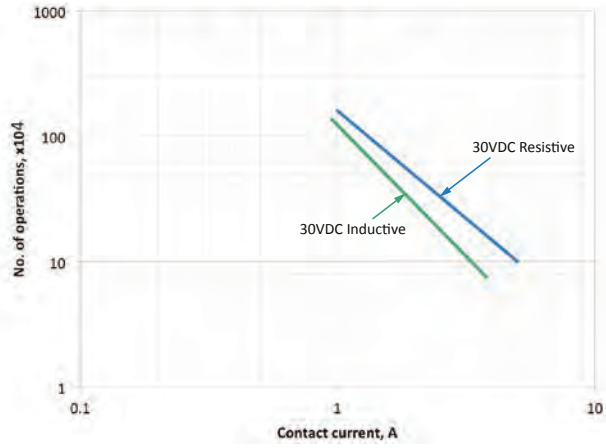
For connection accessories for the 40-550 please refer to the 90-007D 37-way D-type and 90-014D 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.



40-550 Current/Voltage Curve



40-550 AC Operating Life Curve



40-550 DC Operating Life Curve

Product Order Codes

8x4 Power Matrix, 2-Pole, D-type conn.	**40-550-002**
8x4 Power Matrix, 2-Pole, 2xGMCT	**40-550-902**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-550 range are as follows:

91-100-032 Relay Kit 32 for 40-550-002
91-100-032 Relay Kit 32 for 40-550-902

For further assistance, please contact your local Pickering sales office.

40-551
10A Power EMR Matrix Module

- High Density, High Current Switching
- 1-Pole Power Matrix Available in 8x4, 8x2 and 4x4 Formats
- 8x4 Version Available With X and Y Loop-Thru Connections For Simple Expansion
- 10A Current Rating With 300W/2500VA Maximum Power
- Hot Switch to 125VDC/250VAC, Cold Switch to 400VDC/250VAC
- High Quality Electro-mechanical Relays
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-551 is a single pole power matrix module, suitable for switching inductive/capacitive loads up to 10A with 125VDC/250VAC hot switching and 400VDC/250VAC cold switching. The matrix is available in 8x4, 8x2 and 4x4 formats, also an 8x4 version is available with X and Y loop-thru connections. Loop-thru allows simple expansion between adjacent 40-551 modules, so for example 16x4 or 8x8 matrices can easily be created.

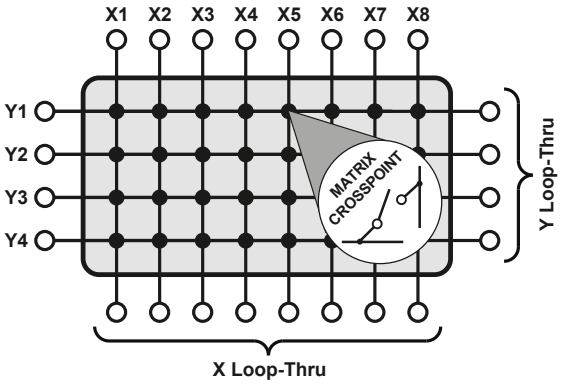
X and Y Connections are made via a 20-way GMCT plug, the 8x4 module with loop-thru has an additional 20-way GMCT plug for module-to-module connection.

Power Matrix Modules are intended for switching heavy AC or DC loads or for slaving large external relays, contactors and solenoids.

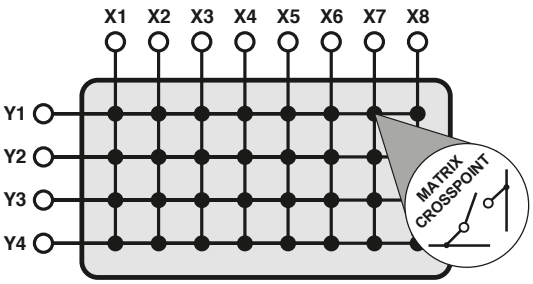
The module is suitable for applications requiring switching of either mains voltage or direct current.

Power Relay Type

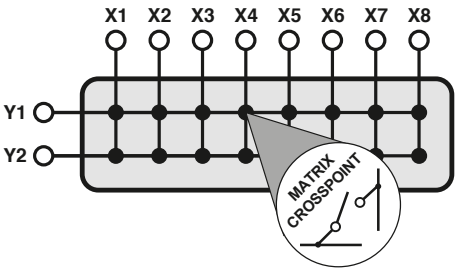
The 40-551 is fitted with electro-mechanical power relays, gold-flash over silver alloy.



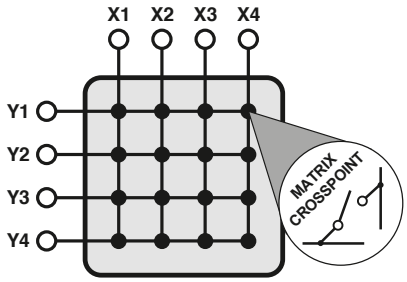
40-551-101 8x4 Power Matrix
With X and Y Loop-Thru



40-551-001 8x4 Power Matrix



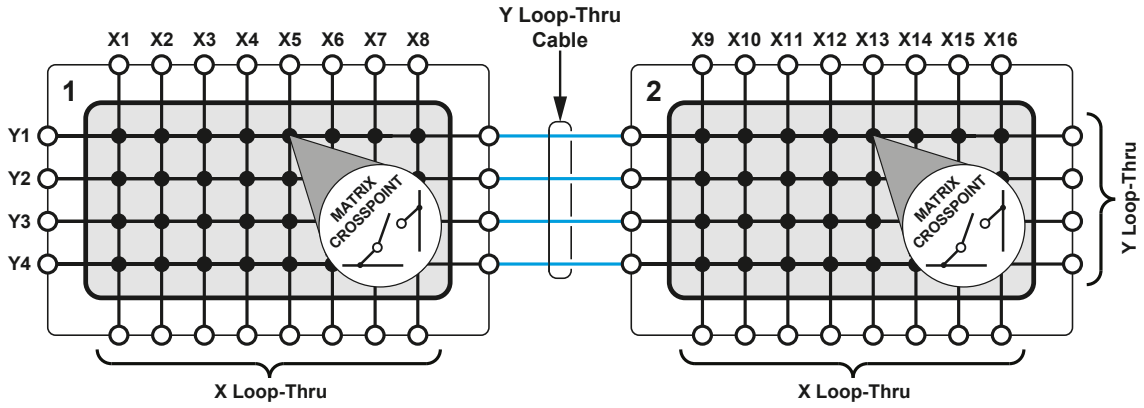
40-551-002 8x2 Power Matrix



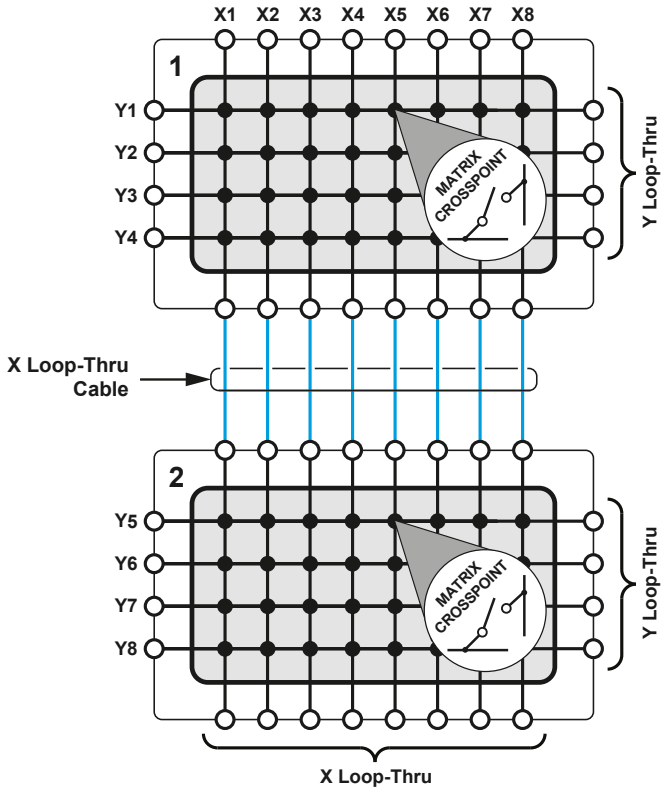
40-551-003 4x4 Power Matrix

Matrix Expansion

The 40-551-101 may be expanded to larger matrix sizes using cabling to daisy-chain the X and Y signals.
The first illustration below shows two 40-551-101 8x4 matrices connected as a 16x4 matrix using a GMCT to GMCT cable wired with Y to Y connections. The second illustration shows two 40-551-101 8x4 matrices connected as an 8x8 matrix using a GMCT to GMCT cable wired with X to X connections.



Schematic Diagram of two 40-551-101 matrices connected as a single 16x4 1-pole matrix, using a custom loop-thru cable wired for Y to Y connections.



Schematic Diagram of two 40-551-101 matrices connected as a single 8x8 1-pole matrix, using a custom loop-thru cable wired for X to X connections.

Switching Specification

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity	
Maximum Current:	10A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity	
Maximum Current:	10A
Maximum Voltage:	125VDC/250VAC
Maximum Power:*	300W/2500VA
Minimum Switching Capacity:	10mA, 5VDC †
Initial On Path Resistance:	<100mΩ (40mΩ typical)
Off Path Resistance:	$>10^9\Omega$
Bandwidth (3dB insertion loss into 50Ω typically better than):	13.5MHz
Crosstalk (channel to channel typically better than):	-60dB @ 100kHz -42dB @ 1MHz -20dB @ 10MHz
Isolation (open channel typically better than):	60dB @ 100kHz 44dB @ 1MHz 10dB @ 10MHz
Operate Time:	10ms typical
Expected Life (operations)	
Mechanical Life:	$>5x10^7$
At Max Hot Switch Capacity:	$>1x10^5$

† Hot switching at/beyond the levels specified is recommended for optimal contact resistance stability. These values can change due to factors such as switching frequency, environmental conditions & desired reliability level.

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

+3.3V	+5V	+12V	-12V
0	70mA	0.5A	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

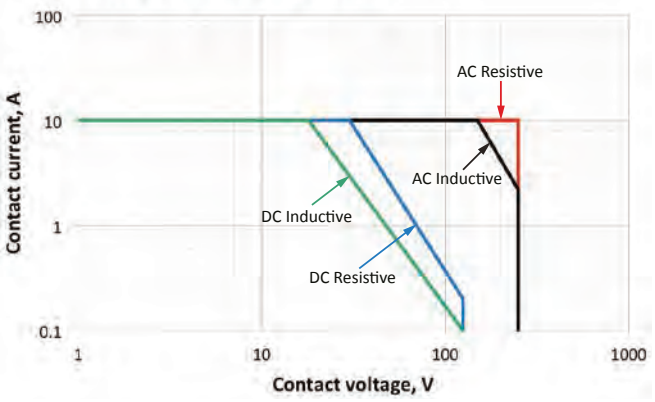
PXI bus via 32-bit P1/J1 backplane connector.

40-551 - all versions: X and Y matrix connections via a front panel 20-way male GMCT connector.

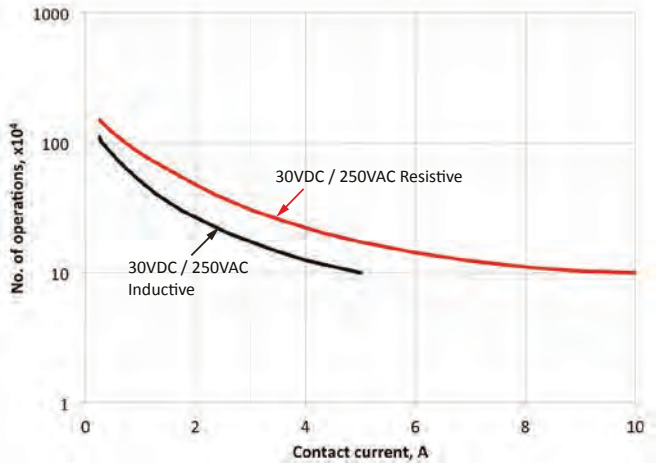
40-551-101: X and Y loop-thru connections via a second front panel 20-way male GMCT connector.

Mating Connectors & Cabling

For connection accessories for the 40-551 module please refer to the 90-014D 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.



40-551 Current/Voltage Plot



40-551 Current/Operating Life Plot

Product Order Codes

10A Power EMR Matrix, 1-Pole 8x4	**40-551-001**
10A Power EMR Matrix, 1-Pole 8x4 With X and Y Loop-Thru	**40-551-101**
10A Power EMR Matrix, 1-Pole 8x2	**40-551-002**
10A Power EMR Matrix, 1-Pole 4x4	**40-551-003**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the 40-551 range is as follows:

91-100-071 Relay Kit 71 for 40-551-001/101/002/003

For further assistance, please contact your local Pickering sales office.

20 Way GMCT Power Connector, type 40-960-020

40-552
16 Amp Power Matrix Module

- High Density, High Current Switching
- Optional Loop-Thru Connections
- 4x4 or 8x2 1-Pole Matrix
- 16A Maximum Switch Current
- Switch up to 300VDC or 250VAC
- 448W/4000VA Maximum Power
- 400VDC Standoff Voltage
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

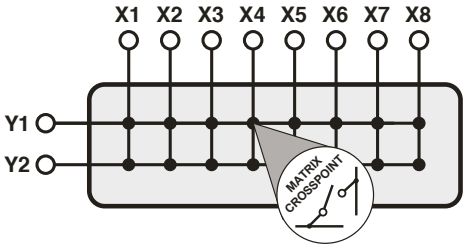
20-Way 16 Amp
Power Connector

The 40-552 module has a choice of 4x4 1-pole and 8x2 1-pole Power Matrices, suitable for switching loads up to 16A at 250VAC.

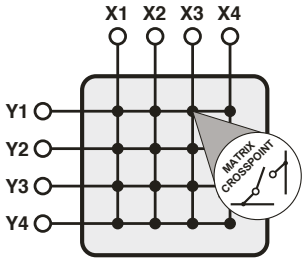
Power Matrix Modules are intended for switching heavy AC or DC loads or for the slave switching of large external relays, contactors and solenoids.

Power Relay Type

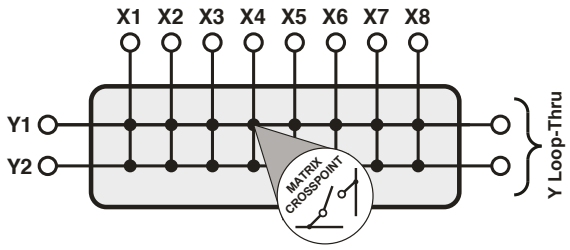
The 40-552 is fitted with electro-mechanical power relays with silver alloy contacts. A Spare Relay is included with each module to facilitate easy maintenance with minimum down time.



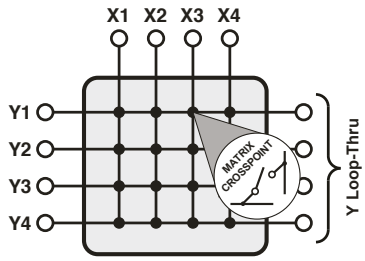
40-552-002 Matrix 8x2 1-Pole



40-552-001 Matrix 4x4 1-Pole



40-552-012 Matrix 8x2 1-Pole
With Y Loop-Thru



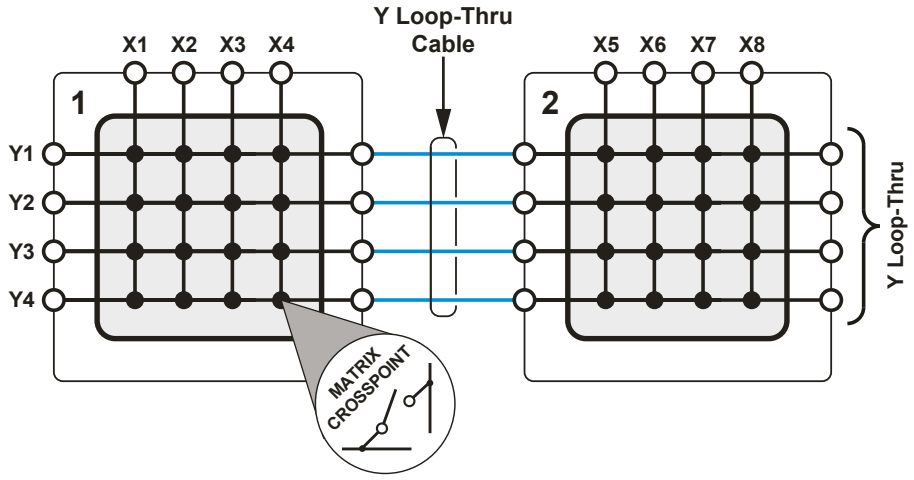
40-552-011 Matrix 4x4 1-Pole
With Y Loop-Thru

Matrix Expansion

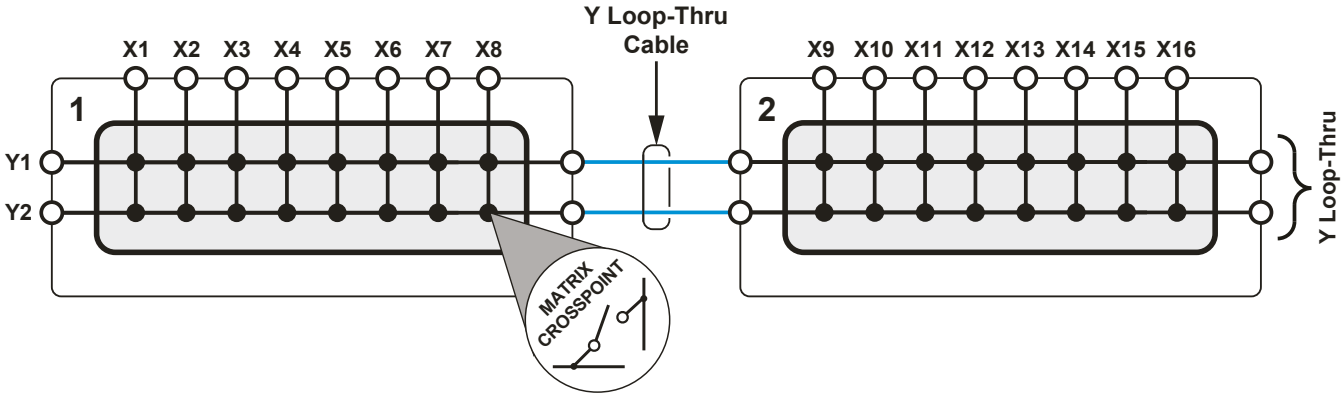
The 40-552 may be expanded to larger matrix sizes using cabling to daisy-chain the Y signals.

The first illustration below shows two 40-552-011 4x4 matrices connected as an 8x4 matrix using a GMCT to GMCT cable wired with Y to Y connections. The second illustration shows two 40-552-012 8x2 matrices connected as a 16x2 matrix using a GMCT to GMCT cable wired with Y to Y connections.

Pickering Interfaces is able to design and supply custom cables incorporating loop-thru connections that interface to the connectors of a user's test system. Please contact your local Pickering sales office with your requirements.



Schematic Diagram of two 40-552-011 matrices connected as a single 8x4 1-pole matrix, using the loop-thru connection for linking Y to Y.



Schematic Diagram of two 40-552-012 matrices connected as a single 16x2 1-pole matrix, using the loop-thru connection for linking Y to Y.

Switching Specification

Relay Type:	Electro-mechanical Power Relay
Contact Type:	Silver Alloy (AgNi)
Cold Switching Capacity	
Maximum Current:	16A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity (Resistive Load)	
Maximum Current:	16A
Maximum Voltage:	300VDC/250VAC
Maximum Power:	448W/4000VA
Minimum Switching Capacity:	100mA, 12V
Maximum Continuous Total Switch Path Loading:	Can carry 16A on all matrix paths at the same time
Module Thermal Time Constant:	4 minutes typical
Maximum Standoff Voltage:	400VDC
Initial Path Resistance, On:	<30mΩ (12mΩ typical)
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>8MHz
Typical Operate Time:	10ms
Expected Life (operations)	
Mechanical Endurance:	$>3x10^7$
Maximum Switch Capacity (Resistive Load)	
16A @ 250VAC (4000VA):	$1x10^5$
8A @ 30VDC (240W):	$>1x10^5$ (NC/NO Contacts, Frequency of Operation 0.1Hz, Duty Cycle 90%)
16A @ 28VDC (448W):	$>1x10^5$ (NC/NO Contacts, Frequency of Operation 0.1Hz, Duty Cycle 90%)

Power Requirements

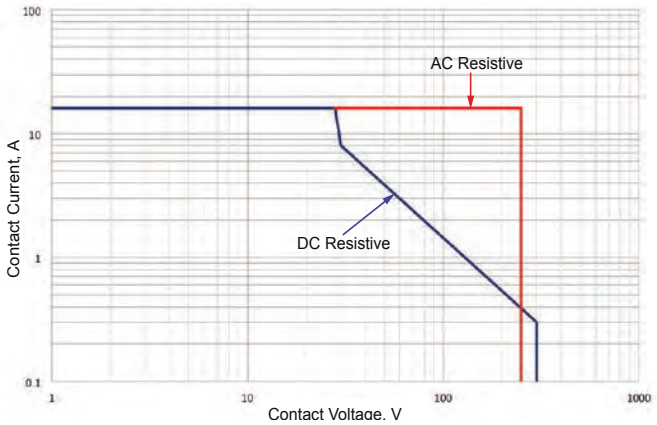
+3.3V	+5V	+12V	-12V
0	1.4A max	0	0

Mechanical Characteristics

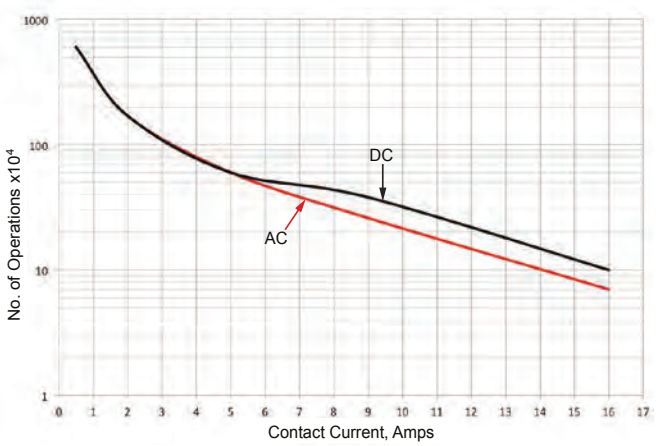
Single slot 3U PXI (CompactPCI card).
Module weight: 420g typical
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Front Panel Connector: 20-way male GMCT.



40-552 Maximum Switching Capacity



40-552 Operations Versus Hot Switch Current at Rated Power

Product Order Codes

Matrix Modules	
4x4, 1-Pole 16A Power Matrix	**40-552-001**
8x2, 1-Pole 16A Power Matrix	**40-552-002**
Matrix Modules With Y Loop-Thru Option	
4x4, 1-Pole 16A Power Matrix with Y LT	**40-552-011**
8x2, 1-Pole 16A Power Matrix with Y LT	**40-552-012**

Mating Connectors & Cabling

For connection accessories for the 40-552 please refer to the **90-014D** 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-552 range are as follows:

91-100-092 Spare Relay Kit for 40-552

For further assistance, please contact your local Pickering sales office.

40-553
10A Solid State Matrix

- 6x2 Power Matrix
- 10 Amp Rating at 200 Volts
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

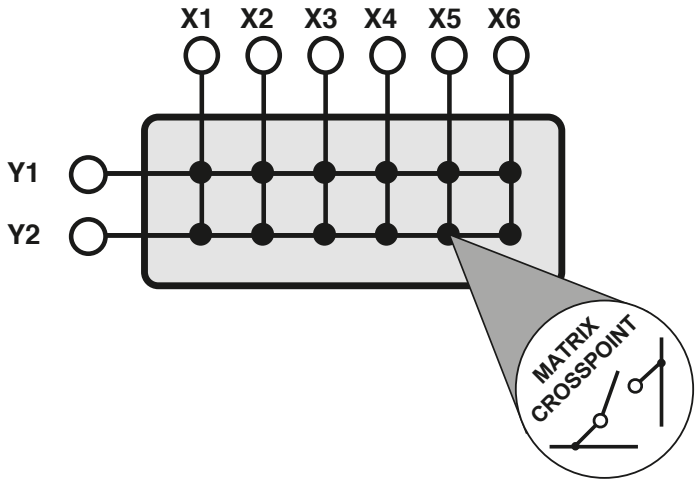
The 40-553 is a high current matrix available in a 6x2 configuration occupying two slots of PXI chassis. Each matrix crosspoint uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each matrix switching path can support 10A of continuous current and switch up to 200V signals. The switches can sustain inrush currents in excess of 50A. AC or DC signals can be switched since the switch is polarity insensitive.

The 40-553 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-553 Solid State 6x2 Matrix Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±200V (DC or AC peak)
Continuous Crosspoint Current:	10A
Peak Current:	50A for 200µs
Max Y-Bus Current:	40A
Path Resistance - On:	75mΩ at 25°C typical
Rise/Fall Time:	20µs typical
Operate Time:	70µs on, 120µs off
Recommended Maximum Cycle Rate (on, then off):	150 operations/sec
Expected Life (operations):	Indefinite when used within ratings

Relay Type

The 40-553 is fitted with solid state MOSFET switches

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	700mA	0	0

Mechanical Characteristics

Dual slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via two front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

6x2 10A Solid State Matrix: 40-553-011

Note: The 40-553-011 supersedes the 40-553-001 which is functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
All Types	**93-005-001**	**93-005-236**	**93-012-103**

Mating Connectors & Cabling

For connection accessories for the 40-553 module please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-554
30A Solid State Matrix

- 6x2 Power Matrix
- 30 Amp Rating at 40 Volts
- 40 Amp Rating For Single Relay Closure
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

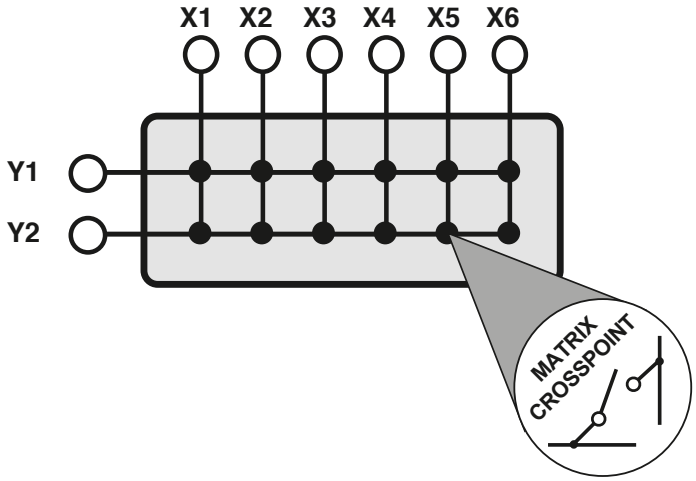
The 40-554 is a high current matrix available in a 6x2 configuration occupying two slots of PXI chassis. Each matrix crosspoint uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each matrix switching path can support 30A of continuous current and switch up to 40V signals. The matrix can support 40A continuous operation for a single relay closure. The switches can sustain inrush currents in excess of 120A. AC or DC signals can be switched since the switch is polarity insensitive.

The 40-554 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-554 Solid State 6x2 Matrix Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±40V (DC or AC peak)
Continuous Crosspoint Current:	30A continuous, 40A continuous with single relay per module closed
Peak Current:	120A for 200µs
Max Y-Bus Current:	40A
Path Resistance - On:	6mΩ at 25˚C typical
Leakage Current (at ±40V):	<1µA at 25˚C and switch cold, <250µA at max temperature immediately after switch has carried maximum current for >10 minutes.
Rise/Fall Time:	40µs/140µs (typical)
Operate Time:	250µs
Max Operating Speed at nominal load:	60 operations/sec
Expected Life (operations):	Indefinite when used within ratings

Relay Type

The 40-554 is fitted with solid state MOSFET switches

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	350mA	0	0

Mechanical Characteristics

Dual slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via two front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

6x2 30A Solid State Matrix: 40-554-011

Note: The 40-554-011 supersedes the 40-554-001 which is functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
All Types	**93-005-001**	**93-005-236**	**93-012-103**

Mating Connectors & Cabling

For connection accessories for the 40-554 module please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-555
30A Solid State Matrix

- 8x2 Power Matrix
- 30 Amp Rating at 40 Volts
- 40 Amp Rating For Single Relay Closure
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

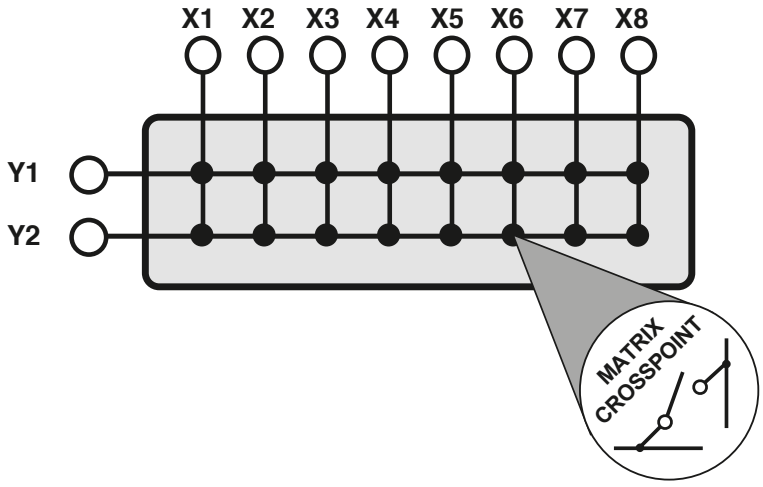
The 40-555 is a high current matrix available in an 8x2 configuration occupying two slots of PXI chassis. Each matrix crosspoint uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each matrix switching path can support 30A of continuous current and switch up to 40V signals. The matrix can support 40A continuous operation for a single relay closure. The switches can sustain inrush currents in excess of 120A. AC or DC signals can be switched since the switch is polarity insensitive.

The 40-555 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-555 Solid State 8x2 Matrix Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±40V (DC or AC peak)
Continuous Crosspoint Current:	30A continuous †, 40A continuous with single relay per module closed
Peak Current:	120A for 200µs
Max Y-Bus Current:	40A
Path Resistance - On:	6mΩ at 25˚C typical
Leakage Current (at ±40V):	<1µA at 25˚C and switch cold, <250µA at max temperature immediately after switch has carried maximum current for >10 minutes.
Rise/Fall Time:	8µs (typical)
Operate Time:	250µs
Max Operating Speed at nominal load:	60 operations/sec
Expected Life (operations):	Indefinite when used within ratings

† The capacity of the module to carry 30A on all channels is chassis dependent and dependent on the number of high power modules fitted to the chassis. Specification reflects test conditions in a Pickering PXI chassis. Refer to supplier for chassis cooling capacity, restrict average RMS current over 5 minute period to 25A per channel for chassis meeting the minimum PXI recommendations.

Relay Type

The 40-555 is fitted with solid state MOSFET switches

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	1400mA	0	0

Mechanical Characteristics

Dual slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via two front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

8x2 30A Solid State Matrix: 40-555-011

Note: The 40-555-011 supersedes the 40-555-001 which is functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-005-001**	**93-005-236**	**93-012-103**

Mating Connectors & Cabling

For connection accessories for the 40-555 module please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Matrix: Large Modules

- Integrated PXI Matrix Modules With Built In Analog Bus
- Fully Scalable Matrix Solution
- Partially Populated Configurations Available
- High Reliability Instrument Grade Reed Relay Versions
- Solid State Versions
- Low Cost Of System Integration
- Wide Range of Fully Configured Y Bus Architectures
- Ratings up to 150 Volts, 1 Amp and 20W
- Isolation Switches Maximize Bandwidth
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments
- Built-In Diagnostics - BiRST™

Pickering Interfaces range of BRIC Large Matrix Modules offers integrated solutions for matrix assemblies. The use of high density packaging and integrated backplanes enables a large matrix to be implemented with no user configuration or special matrix expansion kits. These matrices use thru-hole relays (not surface mount), therefore they can be serviced using standard de-soldering tools simplifying repair and reducing down time.

All reed relay matrices use high quality sputtered ruthenium relays that exhibit excellent contact performance under low and medium level switching conditions.

The modules are ideal for applications requiring a large matrix, they are programmed as a single matrix entity, saving user integration and software investment. The integrated design ensures high matrix performance with high signal bandwidth and fewer system implementation errors.

Large matrices with 8 Y connections are also available in solid state versions. These exhibit high switching speed with a very long service life and are suitable for low current applications such as data acquisition.

The 40-560A BRIC range is available in 3 mechanical sizes occupying 2, 4 or 8 PXI slots, and with 3 different electrical characteristics. Versions are available with 1 pole, 2 pole and 1 pole screened architectures.

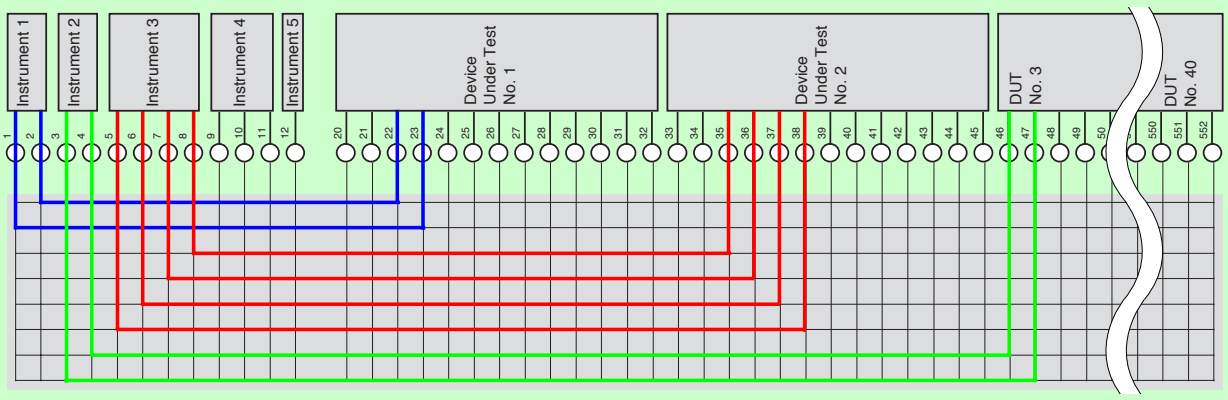
Any large matrix is available in partially populated configurations giving a cost effective solution for specific applications. Please consult the sales office for details.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

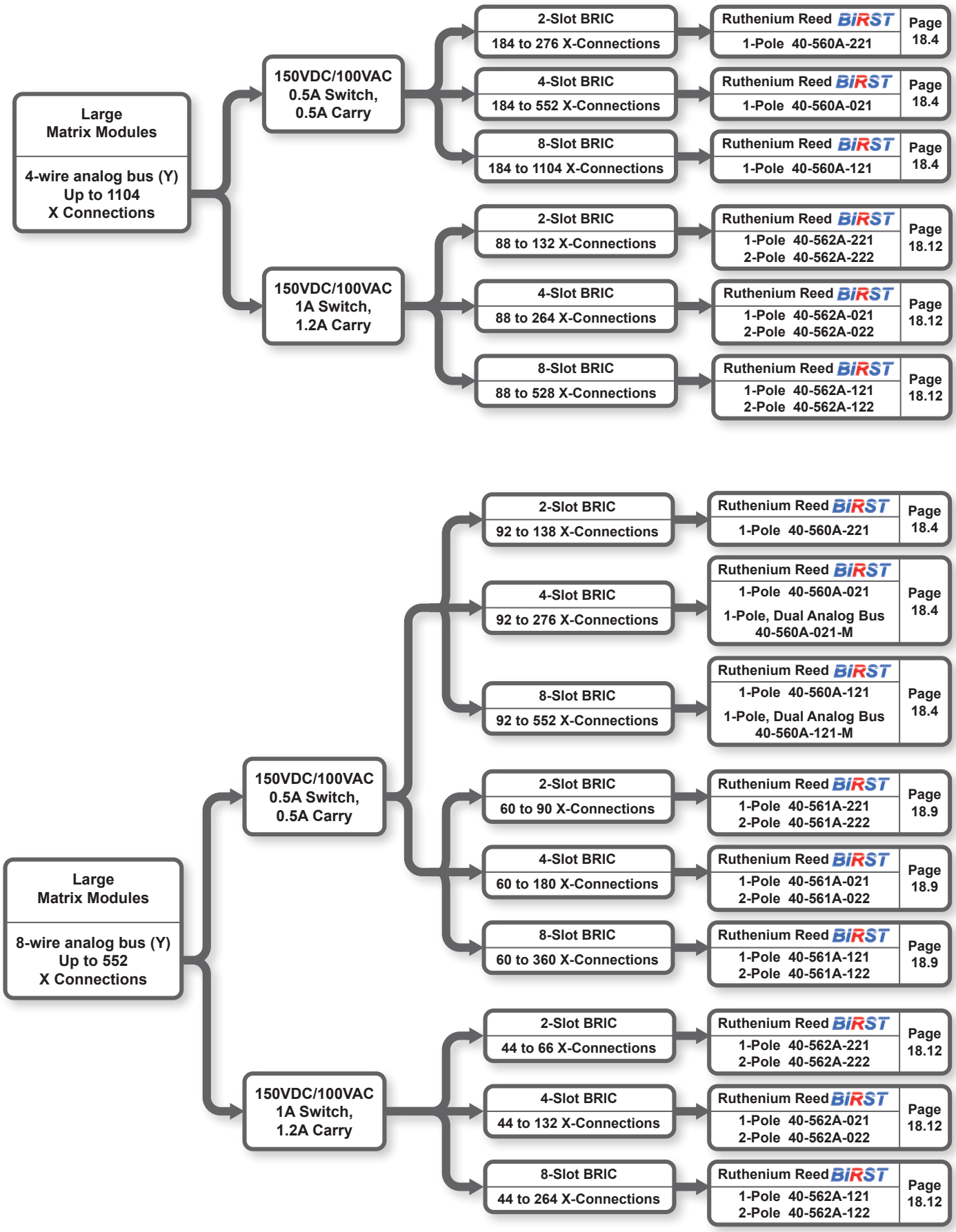
These BRIC modules are now supplied with Built In Relay Self Test. This provides a quick way of finding switch path failures down to a specific relay without the use of any external test equipment.

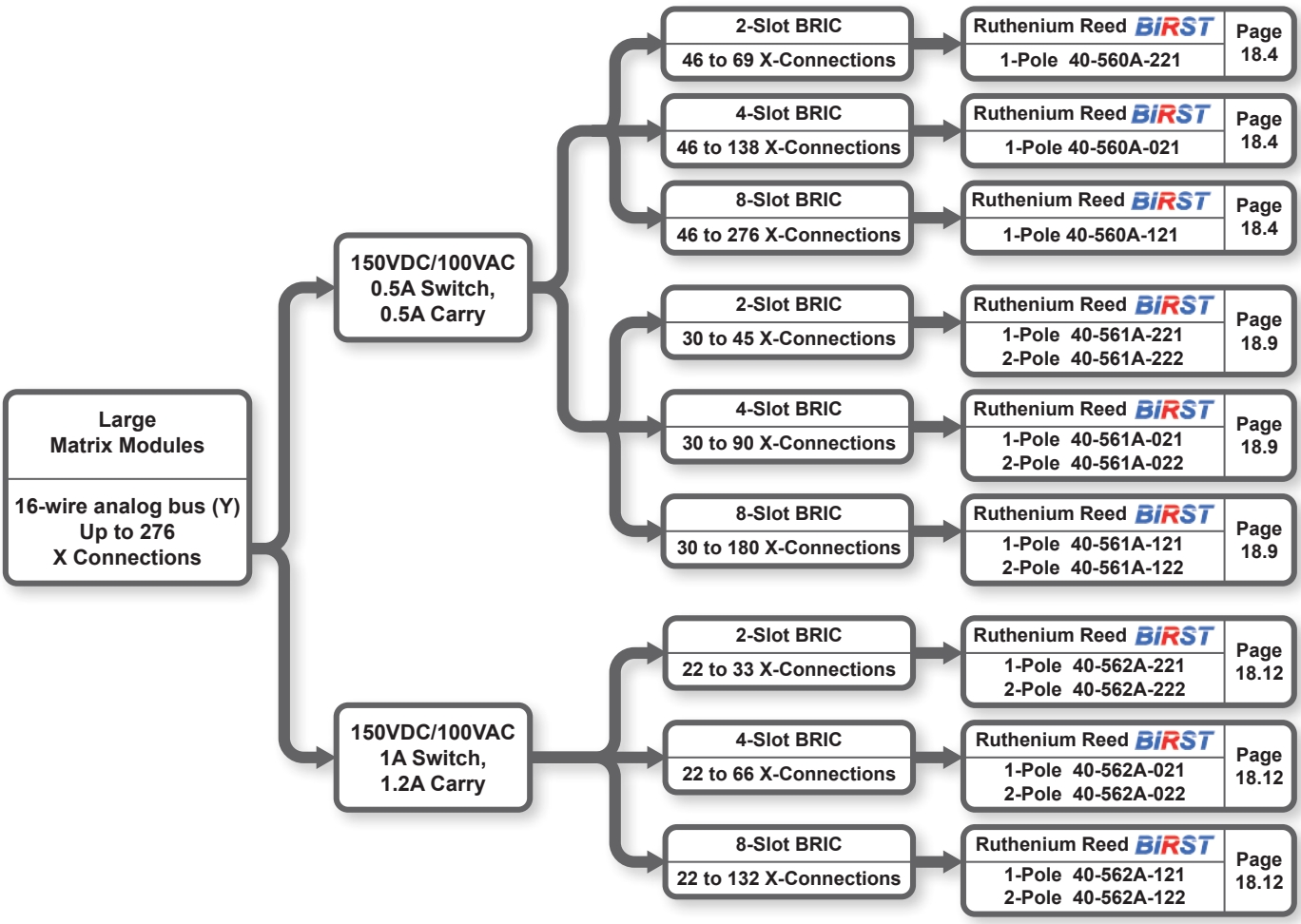
Large Matrix Modules
Up to 4416 Crosspoints

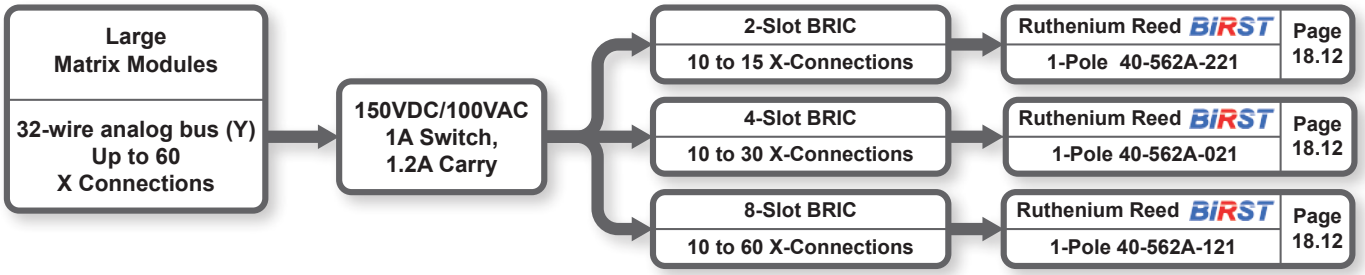
Ruthenium Reed Relay	4-wire analog bus (Y), Up to 1104 X Connections	Page 18.2
Ruthenium Reed Relay	8-wire analog bus (Y), Up to 552 X Connections	Page 18.2
Ruthenium Reed Relay	16-wire analog bus (Y), Up to 276 X Connections	Page 18.3
Ruthenium Reed Relay	32-wire analog bus (Y), Up to 60 X Connections	Page 18.3
Solid State Relay	8-wire analog bus (Y), Up to 384 X Connections	Page 18.3

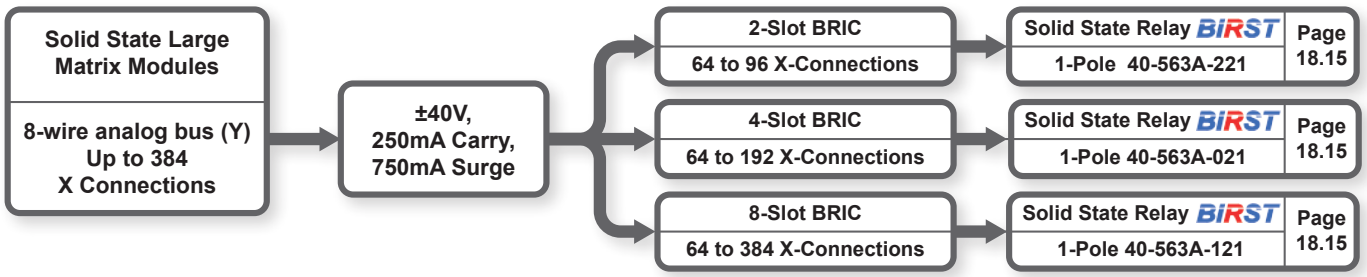


Schematic diagram showing a 552x8 BRIC Matrix being used to parallel test multiple DUTs. The BRIC Matrix allows tremendous test system flexibility.


Large Matrix Modules
4-wire analog bus (Y) Up to 1104 X Connections
150VDC/100VAC 0.5A Switch, 0.5A Carry
2-Slot BRIC
184 to 276 X-Connections
Ruthenium Reed BiRST
1-Pole 40-560A-221
Page 18.4
4-Slot BRIC
184 to 552 X-Connections
Ruthenium Reed BiRST
1-Pole 40-560A-021
Page 18.4
8-Slot BRIC
184 to 1104 X-Connections
Ruthenium Reed BiRST
1-Pole 40-560A-121
Page 18.4
150VDC/100VAC 1A Switch, 1.2A Carry
2-Slot BRIC
88 to 132 X-Connections
Ruthenium Reed BiRST
1-Pole 40-562A-221
2-Pole 40-562A-222
Page 18.12
4-Slot BRIC
88 to 264 X-Connections
Ruthenium Reed BiRST
1-Pole 40-562A-021
2-Pole 40-562A-022
Page 18.12
8-Slot BRIC
88 to 528 X-Connections
Ruthenium Reed BiRST
1-Pole 40-562A-121
2-Pole 40-562A-122
Page 18.12
Large Matrix Modules
8-wire analog bus (Y) Up to 552 X Connections
150VDC/100VAC 0.5A Switch, 0.5A Carry
2-Slot BRIC
92 to 138 X-Connections
Ruthenium Reed BiRST
1-Pole 40-560A-221
Page 18.4
4-Slot BRIC
92 to 276 X-Connections
Ruthenium Reed BiRST
1-Pole 40-560A-021
1-Pole, Dual Analog Bus 40-560A-021-M
Page 18.4
8-Slot BRIC
92 to 552 X-Connections
Ruthenium Reed BiRST
1-Pole 40-560A-121
1-Pole, Dual Analog Bus 40-560A-121-M
Page 18.4
2-Slot BRIC
60 to 90 X-Connections
Ruthenium Reed BiRST
1-Pole 40-561A-221
2-Pole 40-561A-222
Page 18.9
4-Slot BRIC
60 to 180 X-Connections
Ruthenium Reed BiRST
1-Pole 40-561A-021
2-Pole 40-561A-022
Page 18.9
8-Slot BRIC
60 to 360 X-Connections
Ruthenium Reed BiRST
1-Pole 40-561A-121
2-Pole 40-561A-122
Page 18.9
150VDC/100VAC 1A Switch, 1.2A Carry
2-Slot BRIC
44 to 66 X-Connections
Ruthenium Reed BiRST
1-Pole 40-562A-221
2-Pole 40-562A-222
Page 18.12
4-Slot BRIC
44 to 132 X-Connections
Ruthenium Reed BiRST
1-Pole 40-562A-021
2-Pole 40-562A-022
Page 18.12
8-Slot BRIC
44 to 264 X-Connections
Ruthenium Reed BiRST
1-Pole 40-562A-121
2-Pole 40-562A-122
Page 18.12


Large Matrix Modules
16-wire analog bus (Y) Up to 276 X Connections
150VDC/100VAC 0.5A Switch, 0.5A Carry
150VDC/100VAC 1A Switch, 1.2A Carry
2-Slot BRIC
46 to 69 X-Connections
4-Slot BRIC
46 to 138 X-Connections
8-Slot BRIC
46 to 276 X-Connections
2-Slot BRIC
30 to 45 X-Connections
4-Slot BRIC
30 to 90 X-Connections
8-Slot BRIC
30 to 180 X-Connections
2-Slot BRIC
22 to 33 X-Connections
4-Slot BRIC
22 to 66 X-Connections
8-Slot BRIC
22 to 132 X-Connections
Ruthenium Reed BiRST
1-Pole 40-560A-221
Page 18.4
Ruthenium Reed BiRST
1-Pole 40-560A-021
Page 18.4
Ruthenium Reed BiRST
1-Pole 40-560A-121
Page 18.4
Ruthenium Reed BiRST
1-Pole 40-561A-221
2-Pole 40-561A-222
Page 18.9
Ruthenium Reed BiRST
1-Pole 40-561A-021
2-Pole 40-561A-022
Page 18.9
Ruthenium Reed BiRST
1-Pole 40-561A-121
2-Pole 40-561A-122
Page 18.9
Ruthenium Reed BiRST
1-Pole 40-562A-221
2-Pole 40-562A-222
Page 18.12
Ruthenium Reed BiRST
1-Pole 40-562A-021
2-Pole 40-562A-022
Page 18.12
Ruthenium Reed BiRST
1-Pole 40-562A-121
2-Pole 40-562A-122
Page 18.12


Large Matrix Modules
32-wire analog bus (Y) Up to 60 X Connections
150VDC/100VAC 1A Switch, 1.2A Carry
2-Slot BRIC
10 to 15 X-Connections
4-Slot BRIC
10 to 30 X-Connections
8-Slot BRIC
10 to 60 X-Connections
Ruthenium Reed BiRST
1-Pole 40-562A-221
Page 18.12
Ruthenium Reed BiRST
1-Pole 40-562A-021
Page 18.12
Ruthenium Reed BiRST
1-Pole 40-562A-121
Page 18.12


Solid State Large Matrix Modules
8-wire analog bus (Y) Up to 384 X Connections
±40V, 250mA Carry, 750mA Surge
2-Slot BRIC
64 to 96 X-Connections
4-Slot BRIC
64 to 192 X-Connections
8-Slot BRIC
64 to 384 X-Connections
Solid State Relay BiRST
1-Pole 40-563A-221
Page 18.15
Solid State Relay BiRST
1-Pole 40-563A-021
Page 18.15
Solid State Relay BiRST
1-Pole 40-563A-121
Page 18.15

40-560A Matrix BRIC™
3U PXI Multi Slot Matrix Module

- Integrated PXI Matrix Module With Built In High Performance Screened Analog Bus
- Available as 2, 4 and 8-Slot 3U PXI Modules
- 1-Pole Switching
- Switch up to 150Volts, 0.5A, 10W
- Automatic Isolation Relay Switches Maximizes Bandwidth and Matrix Reliability
- Simplified Maintenance Through The Use of Leaded Reed Relays
- Support in Any PXI Compliant Chassis or Control Through Ethernet in Our LXI Modular Chassis
- VISA, IVI & Kernel Drivers Supplied for Windows
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

BRIC™ PXI Reed Relay Matrices

The 40-560A PXI BRIC is an ultra high density matrix module. The module is available in 2, 4 or 8-slot PXI sizes to suit all high performance PXI Matrix requirements and is constructed using instrumentation quality reed relays.

With this high level of switching density, the 40-560A PXI matrix module allows a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of much lower cost 8 or 14 slot PXI chassis.

- **BRIC2** is a 2-slot PXI Module, this can hold up to 3 matrix daughtercards, >1100 crosspoints.
- **BRIC4** is a 4-slot PXI Module, this can hold up to 6 matrix daughtercards, >2200 crosspoints.
- **BRIC8** is an 8-slot PXI Module, which can hold up to 12 matrix daughtercards, >4400 crosspoints.

High Reliability and Easy of Use

All models are constructed using the world's smallest and highest reliability Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and very stable contact resistance.

The 40-560A PXI BRICs are designed to minimize the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the BRIC module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the BRIC user connectors, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, replace the relay and identify the cause of the failure. More information on the use of the BIRST tool is contained within the BRIC operating manual. For general information see the **BIRST** page on our website.

Supported by eBIRST

As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay For more information on eBIRST see **93-000D.pdf**

Pickering Reed Relay BRIC Advantages

- Only uses the highest quality instrument grade reed relays – be wary of inferior copies.
- Simplified cabling and interconnection for large matrix solutions.
- Extensive accessory support.
- Built in self-test to find defective and degrading relays with full path resistance characterisation.
- Simplified operation through automated isolation relay operation and single matrix presentation.
- Highest density reed relay solution in PXI.
- Designed for simple relay replacement and ease of field service.
- Extensive range of configurations and solutions.
- Fast operation through VISA driver with multiple relay operation in one command or have the convenience and simplicity of IVI drivers.

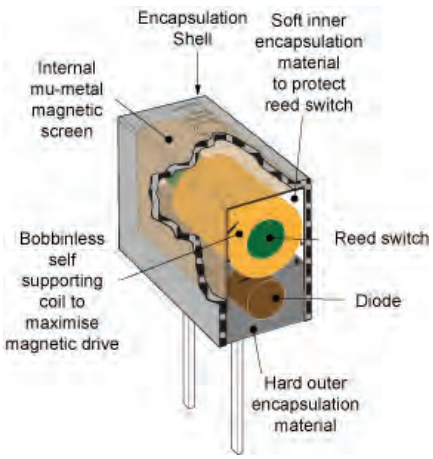
Pickering *SoftCenter*® Instrumentation Quality Reed Relays

Reed relay switching solutions can only be as good as the reeds they use, and Pickering Interfaces uses only the best instrumentation quality reed relays manufactured by Pickering Electronics.

These are the reed relays of choice for ATE manufacturers, consistently providing the most reliable and well controlled reed relays available in the industry.

Pickering have over 40 years of experience of designing relays to the highest quality levels demanded of the ATE industry. We know what makes a good relay and how to construct a reliable relay.

All our reed relays use the ***SoftCenter***® construction, a construction that allows for the constant expansion and contraction of the reed relay coils and the glass body without fear of damage to wires or glass seals. The high performance of reed relays is due to their hermetic structure, and only the ***SoftCenter***® structure provides the means to reliably avoid seal or wire damage that ensures a long relay contact life.

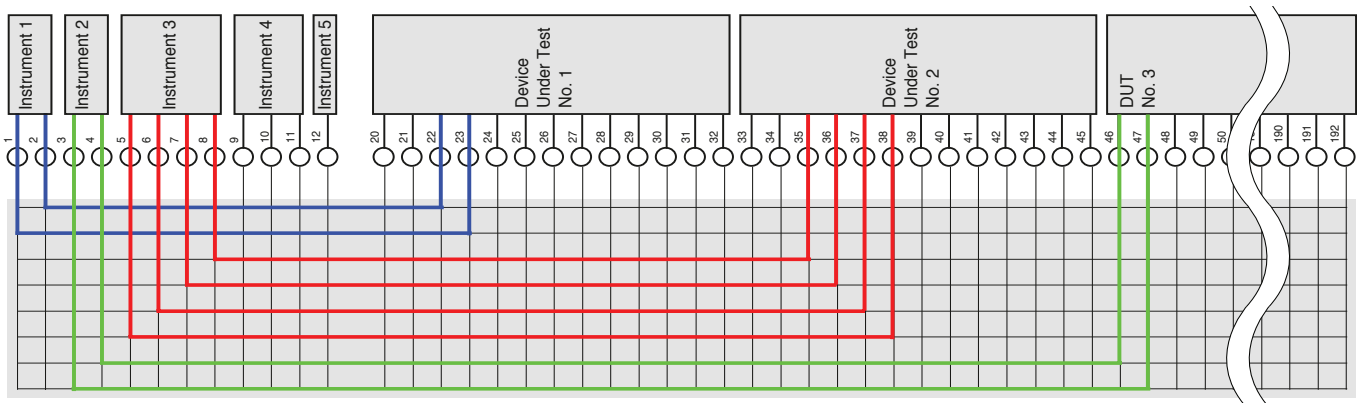


So choose the right matrix solution, and use the best quality reed relays by choosing the Pickering Interfaces' reed relay BRICs.

Pickering's Range of High Density BRIC Matrix Modules	
40-560A - 1-Pole Matrix - Reed Relay	
BRIC2	Up to 276x4, 138x8 or 69x16
BRIC4	Up to 552x4, 276x8 or 138x16
BRIC8	Up to 1104x4, 552x8 or 276x16
40-561A - 1-Pole or 2-Pole Matrix - Reed Relay	
BRIC2	Up to 90x8 or 45x16
BRIC4	Up to 180x8 or 90x16
BRIC8	Up to 360x8 or 180x16
40-562A - 1-Pole or 2-Pole Matrix - Reed Relay	
BRIC2	Up to 132x4, 66x8, 33x16 or 15x32
BRIC4	Up to 264x4, 132x8, 66x16 or 30x32
BRIC8	Up to 528x4, 264x8, 132x16 or 60x32
40-563A - 1-Pole Matrix - Solid State	
BRIC2	Up to 96x8
BRIC4	Up to 192x8
BRIC8	Up to 384x8

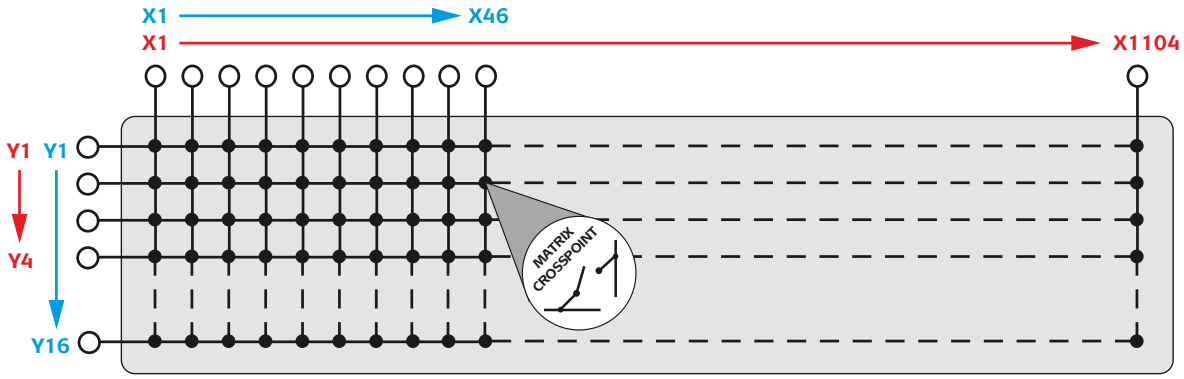
2 Amp BRIC Matrix Modules From Pickering
40-565B - 2-Pole Matrix - Electro-mechanical Relay
From 29x8 to 232x8
40-566A - 2-Pole Matrix - Electro-mechanical Relay
From 55x4 to 385x4
40-568 - 1-Pole Matrix - Electro-mechanical Relay
From 75x4 to 600x4
40-596 - 1-Pole Matrix - Electro-mechanical Relay
From 58x6 to 464x6
40-567 - 1-Pole Matrix - Electro-mechanical Relay
From 44x8 to 352x8
40-597 - 1-Pole Matrix - Electro-mechanical Relay
From 32x12 to 256x12
40-598 - 1-Pole Matrix - Electro-mechanical Relay
From 24x16 to 192x16

How to use the BRIC matrix to connect instrumentation to the UUT

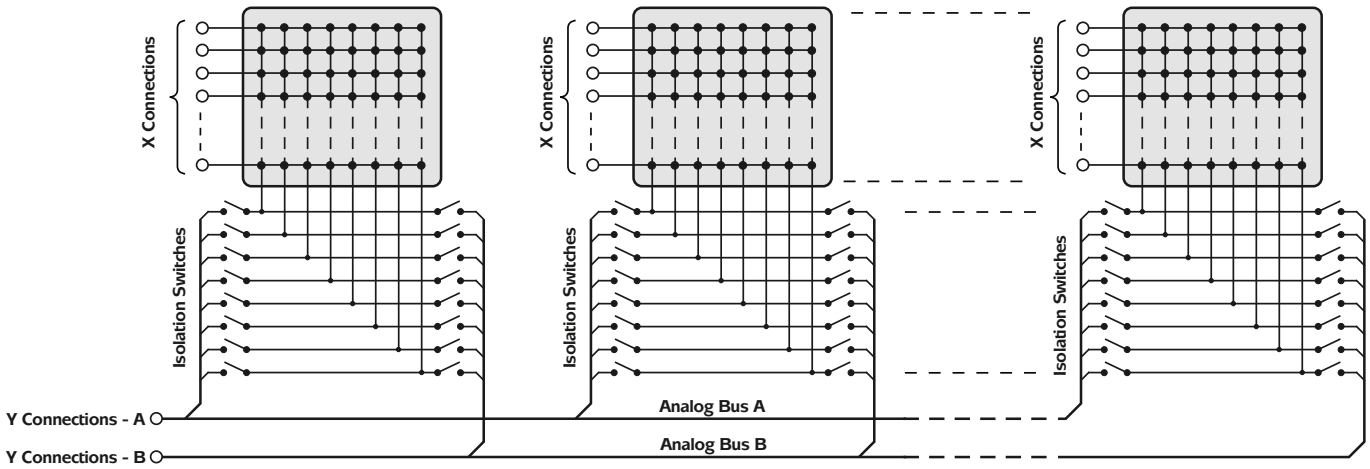


Single Pole Matrices

Single pole 40-560A matrices extend from 46x16 configurations to 1104x4 configurations



Dual Bus Matrices



General Switching Specifications

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Relay Resistance:	100mΩ typical
Path Resistance X to X - on:	1Ω typical (within same daughter card) 2Ω typical (across different daughter cards)
Path Resistance - off:	10^9Ω
Typical Operate Time:	1ms
Typical Operate Time (-R version):	0.5ms
Expected Life (Operations) Low Power Load: Full Power Load	 $>10^9$ $>1x10^6$
Bandwidth For Fully Loaded 276x8 Matrix (40-560A-021-276x8) (for X to Y connection):	20MHz min, 35MHz max †
Crosstalk for 40-560A-021-276x8 @1MHz:	-55dB
Typical Bandwidth For -R Version Fully Loaded 276 x 8 Matrix 40-560A-021-276x8-R:	5MHz †

† Bandwidth is dependent upon configuration, please contact factory for advise concerning alternative configurations.

Comparison Between 40-560A, 40-561A & 40-562A BRICs

40-560A: Offers the highest density solution for single pole applications only. It offers a wide bandwidth since all versions are fitted with isolation relays as standard that automatically disconnect unused daughter cards from the backplane (matrices can be supplied as -R versions with the isolation relays removed).

40-561A: Offers the same electrical specification as the 40-560A but with lower density and more options. It can be supplied with 2-pole switching, providing a very dense solution for 2-pole matrices. Isolation switches are provided on 8-wire Y configurations, but not on 16-wire configurations.

40-562A: For applications requiring a higher electrical rating at the expense of density then choose the 40-562A. The 40-562A is available in 1-pole and 2-pole versions.

Maximum Crosspoint Count

The 40-560A series has a suggested maximum number of simultaneously operated crosspoints of 50 per BRIC2, 50 per BRIC4 or 100 per BRIC8 (please contact factory for applications requiring higher closure counts).

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A (typical 1A)	0	0

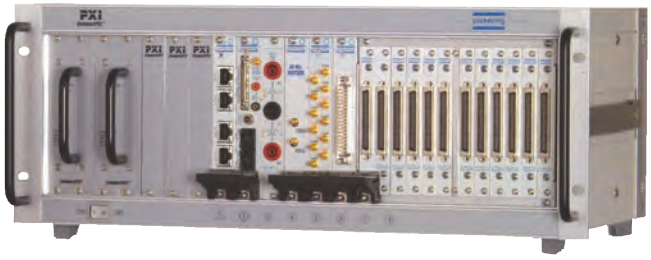
Width and Dimensions

Two, four or eight slot 3U PXI module (CompactPCI).

3D models for these modules in a variety of popular file formats are available on request.

Weight

	Empty BRIC	Fully Loaded BRIC
BRIC2	0.6Kg	1.2Kg
BRIC4	0.9Kg	2.1Kg
BRIC8	1.6Kg	4.0Kg
BRIC daughter card	0.2Kg	



A BRIC Matrix allows the use of the much lower cost 8-slot 19 Inch PXI chassis, such as the Pickering 40-908 shown (leaving 5 PXI Instrument slots)

40-560A BRIC Matrix Product Order Codes

BRIC2 - 2-Slot Ultra High Density 1-Pole Matrix	**40-560A-221-(config)**
BRIC4 - 4-Slot Ultra High Density 1-Pole Matrix	**40-560A-021-(config)**
BRIC8 - 8-Slot Ultra High Density 1-Pole Matrix	**40-560A-121-(config)**

When ordering 40-560A modules the matrix configuration **must** be specified, this includes the prefix code together with the configuration code, see the table below for specific details.

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

x4 Configuration Options			
	BRIC2 40-560A-221	**BRIC4 40-560A-021**	**BRIC8 40-560A-121**
184x4 Matrix	**-184x4**	**-184x4**	**-184x4**
276x4 Matrix	**-276x4**	**-276x4**	**-276x4**
368x4 Matrix		**-368x4**	**-368x4**
460x4 Matrix		**-460x4**	**-460x4**
552x4 Matrix		**-552x4**	**-552x4**
644x4 Matrix			**-644x4**
736x4 Matrix			**-736x4**
828x4 Matrix			**-828x4**
920x4 Matrix			**-920x4**
1012x4 Matrix			**-1012x4**
1104x4 Matrix			**-1104x4**
x8 Configuration Options			
	BRIC2 40-560A-221	**BRIC4 40-560A-021**	**BRIC8 40-560A-121**
92x8 Matrix	**-92x8**	**-92x8**	**-92x8**
138x8 Matrix	**-138x8**	**-138x8**	**-138x8**
184x8 Matrix		**-184x8**	**-184x8**
230x8 Matrix		**-230x8**	**-230x8**
276x8 Matrix		**-276x8**	**-276x8**
322x8 Matrix			**-322x8**
368x8 Matrix			**-368x8**
414x8 Matrix			**-414x8**
460x8 Matrix			**-460x8**
506x8 Matrix			**-506x8**
552x8 Matrix			**-552x8**
x16 Configuration Options			
	BRIC2 40-560A-221	**BRIC4 40-560A-021**	**BRIC8 40-560A-121**
46x16 Matrix	**-46x16**	**-46x16**	**-46x16**
69x16 Matrix	**-69x16**	**-69x16**	**-69x16**
92x16 Matrix		**-92x16**	**-92x16**
115x16 Matrix		**-115x16**	**-115x16**
138x16 Matrix		**-138x16**	**-138x16**
161x16 Matrix			**-161x16**
184x16 Matrix			**-184x16**
207x16 Matrix			**-207x16**
230x16 Matrix			**-230x16**
253x16 Matrix			**-253x16**
276x16 Matrix			**-276x16**
Further Options - Isolation Relays Removed			
This will improve path resistance by 150mΩ but will degrade isolation and bandwith.			**-R**

40-560A Dual Bus BRIC Matrix Product Order Codes

BRIC4 - 4 Slot Ultra High Density Dual Analog Bus 1-Pole Matrix	**40-560A-021-(config)**
BRIC8 - 8 Slot Ultra High Density Dual Analog Bus 1-Pole Matrix	**40-560A-121-(config)**

When ordering 40-560A modules the matrix configuration **must** be specified, this includes the prefix code together with the configuration code, see the table below for specific details.

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Dual Analog Bus Version (Dual 8 Wire) x8 Configuration Options		
	BRIC4 40-560A-021	**BRIC8 40-560A-121**
92x8 Matrix Dual Analog Bus	**-92x8-M**	**-92x8-M**
138x8 Matrix Dual Analog Bus	**-138x8-M**	**-138x8-M**
184x8 Matrix Dual Analog Bus	**-184x8-M**	**-184x8-M**
230x8 Matrix Dual Analog Bus	**-230x8-M**	**-230x8-M**
276x8 Matrix Dual Analog Bus	**-276x8-M**	**-276x8-M**
322x8 Matrix Dual Analog Bus		**-322x8-M**
368x8 Matrix Dual Analog Bus		**-368x8-M**
414x8 Matrix Dual Analog Bus		**-414x8-M**
460x8 Matrix Dual Analog Bus		**-460x8-M**
506x8 Matrix Dual Analog Bus		**-506x8-M**
552x8 Matrix Dual Analog Bus		**-552x8-M**

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

x4 configurations use 96-way male micro-D connectors.

x8 and x16 configurations use 68-way male micro-D connectors.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST.**

Configuration	Test Tool	Adapter	Termination
x4	**93-002-001**	**93-002-226**	**93-016-103**
x8 and x16	**93-006-001**	**93-006-222**	**93-015-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-010**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-560A series BRIC modules please refer to the **90-016D** 96-way micro-D and **90-015D** 68-way micro-D Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-561A Matrix BRIC™
3U PXI Multi Slot Matrix Module

- Integrated PXI Matrix Module With Built In High Performance Screened Analog Bus
- Available as 2, 4 and 8-Slot 3U PXI Modules
- 1-Pole or 2-Pole Switching
- Switch up to 150Volts, 0.5A, 10W
- Automatic Isolation Relay Switches Maximizes Bandwidth and Matrix Reliability
- Simplified Maintenance Through The Use of Leaded Reed Relays
- Support in Any PXI Compliant Chassis or Control Through Ethernet in Our LXI Modular Chassis
- VISA, IVI & Kernel Drivers Supplied for Windows
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

BRIC™ PXI Reed Relay Matrices

The 40-561A PXI BRIC is an ultra high density matrix module. The module is available in 2, 4 or 8-slot PXI sizes to suit all high performance PXI Matrix requirements and is constructed using instrumentation quality reed relays.

With this high level of switching density, the 40-561A PXI matrix module allows a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of much lower cost 8 or 14 slot PXI chassis.

- **BRIC2** is a 2-slot PXI Module, this can hold up to 3 matrix daughtercards, 720 crosspoints.
- **BRIC4** is a 4-slot PXI Module, this can hold up to 6 matrix daughtercards, 1440 crosspoints.
- **BRIC8** is an 8-slot PXI Module, which can hold up to 12 matrix daughtercards, 2880 crosspoints.

High Reliability and Easy of Use

All models are constructed using the world's smallest and highest reliability Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and very stable contact resistance.

The 40-561A PXI BRICs are designed to minimize the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the BRIC module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the BRIC user connectors, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, replace the relay and identify the cause of the failure. More information on the use of the BIRST tool is contained within the BRIC operating manual. For general information see the **BIRST** page on our website.

Supported by eBIRST

As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

General Switching Specifications

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Relay Resistance:	100mΩ typical
Path Resistance X to X - on:	1Ω typical (within same daughter card) 2Ω typical (across different daughter cards)
Path Resistance - off:	10^9Ω
Typical Operate Time:	1ms
Typical Operate Time (-R version):	0.5ms
Expected Life (Operations) Low Power Load: Full Power Load:	 $>10^9$ $>1x10^6$

Comparison Between 40-560A, 40-561A & 40-562A BRICs

40-560A: Offers the highest density solution for single pole applications only. It offers a wide bandwidth since all versions are fitted with isolation relays as standard that automatically disconnect unused daughter cards from the backplane (matrices can be supplied as -R versions with the isolation relays removed).

40-561A: Offers the same electrical specification as the 40-560A but with lower density and more options. It can be supplied with 2-pole switching, providing a very dense solution for 2-pole matrices. Isolation switches are provided on 8-wire Y configurations, but not on 16-wire configurations.

40-562A: For applications requiring a higher electrical rating at the expense of density then choose the 40-562A. The 40-562A is available in 1-pole and 2-pole versions.

Maximum Crosspoint Count

The 40-561A series has a suggested maximum number of simultaneously operated crosspoints of 50 per BRIC2, 50 per BRIC4 or 100 per BRIC8 (please contact factory for applications requiring higher closure counts).

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A (typical 1A)	0	0

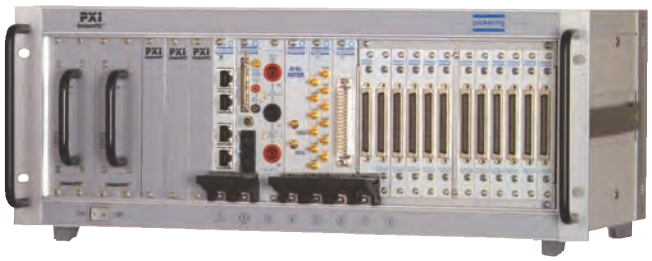
Width and Dimensions

Two, four or eight slot 3U PXI module (CompactPCI).

3D models for these modules in a variety of popular file formats are available on request.

Weight

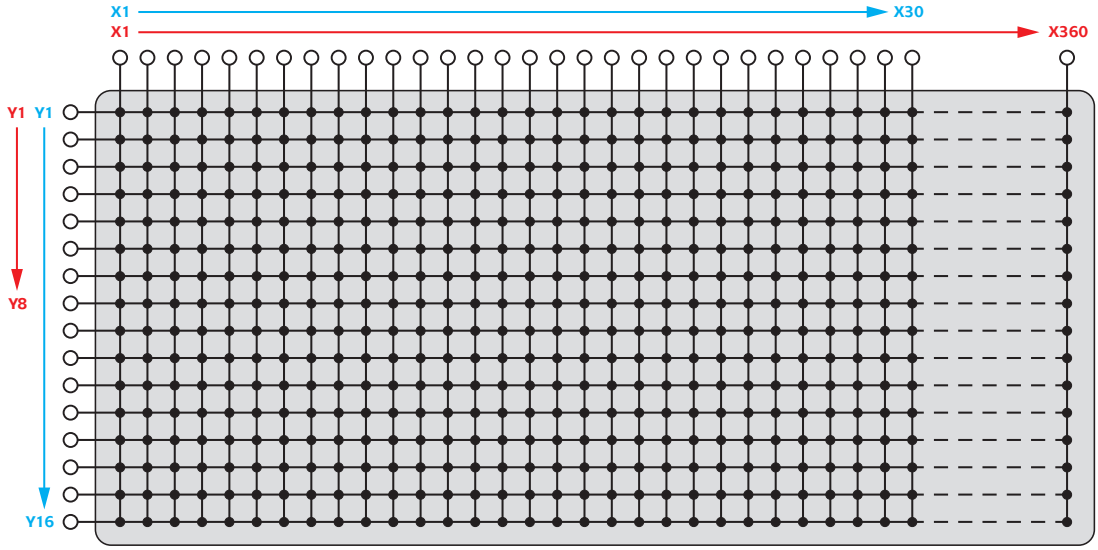
	Empty BRIC	Fully Loaded BRIC
BRIC2	0.6Kg	1.2Kg
BRIC4	0.9Kg	2.1Kg
BRIC8	1.6Kg	4.0Kg
BRIC daughter card	0.2Kg	



A BRIC Matrix allows the use of the much lower cost 8-slot 19 Inch PXI chassis, such as the Pickering 40-908 shown (leaving 5 PXI Instrument slots)

Single or Double Pole Matrices

Single or double pole 40-561A matrices extend from 30x16 configurations to 360x8 configurations



40-561A BRIC Matrix Product Order Codes

BRIC2 - 2-Slot Ultra High Density 1-Pole Matrix	**40-561A-221-(config)**
BRIC2 - 2-Slot Ultra High Density 2-Pole Matrix	**40-561A-222-(config)**
BRIC4 - 4-Slot Ultra High Density 1-Pole Matrix	**40-561A-021-(config)**
BRIC4 - 4-Slot Ultra High Density 2-Pole Matrix	**40-561A-022-(config)**
BRIC8 - 8-Slot Ultra High Density 1-Pole Matrix	**40-561A-121-(config)**
BRIC8 - 8-Slot Ultra High Density 2-Pole Matrix	**40-561A-122-(config)**

When ordering 40-561A modules the matrix configuration **must** be specified, this includes the prefix code together with the configuration code, see the tables below for specific details.

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

x8 Configuration Options			
	BRIC2 40-561A-221/222	**BRIC4 40-561A-021/022**	**BRIC8 40-561A-121/122**
60x8 Matrix	**-60x8**	**-60x8**	**-60x8**
90x8 Matrix	**-90x8**	**-90x8**	**-90x8**
120x8 Matrix		**-120x8**	**-120x8**
150x8 Matrix		**-150x8**	**-150x8**
180x8 Matrix		**-180x8**	**-180x8**
210x8 Matrix			**-210x8**
240x8 Matrix			**-240x8**
270x8 Matrix			**-270x8**
300x8 Matrix			**-300x8**
330x8 Matrix			**-330x8**
360x8 Matrix			**-360x8**
Further Options - Isolation Relays Removed			
This will improve path resistance by 150mΩ but will degrade isolation and bandwith.			**-R**
x16 Configuration Options			
	BRIC2 40-561A-221/222	**BRIC4 40-561A-021/022**	**BRIC8 40-561A-121/122**
30x16 Matrix	**-30x16**	**-30x16**	**-30x16**
45x16 Matrix	**-45x16**	**-45x16**	**-45x16**
60x16 Matrix		**-60x16**	**-60x16**
75x16 Matrix		**-75x16**	**-75x16**
90x16 Matrix		**-90x16**	**-90x16**
105x16 Matrix			**-105x16**
120x16 Matrix			**-120x16**
135x16 Matrix			**-135x16**
150x16 Matrix			**-150x16**
165x16 Matrix			**-165x16**
180x16 Matrix			**-180x16**

40-561A Isolation Switching

Isolation switches are only available on the x8 configurations, x16 configurations do not have isolation switching.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

x8 configurations. First daughter card (on left) uses a 96-way male micro D connector, other connectors are 68-way male micro-D connectors.

x16 configurations use 68-way male micro-D connectors.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two tools are required with their adapters together with a termination for each adapter type, a master slave cable **93-970-301** is also required. For more information see **eBIRST**.

Configuration	Test Tool	Adapter	Termination
x8 (one of each tool)			
	93-002-001	**93-002-226**	**93-016-103**
	93-006-001	**93-006-222**	**93-015-103**
x16 (two tools)			
	93-006-001	**93-006-222**	**93-015-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
1-Pole Versions	**91-100-010**
2-Pole Versions	**91-100-022**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-561A series BRIC modules please refer to the **90-016D** 96-way micro-D and **90-015D** 68-way micro-D Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-562A Matrix BRIC™
3U PXI Multi Slot Matrix Module

- Integrated PXI Matrix Module With Built In High Performance Screened Analog Bus
- Available as 2, 4 and 8-Slot 3U PXI Modules
- 1-Pole or 2-Pole Switching
- Switch up to 150Volts, 1A, 20W
- Automatic Isolation Relay Switches Maximizes Bandwidth and Matrix Reliability
- Simplified Maintenance Through The Use of Leaded Reed Relays
- Support in Any PXI Compliant Chassis or Control Through Ethernet in Our LXI Modular Chassis
- VISA, IVI & Kernel Drivers Supplied for Windows
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

BRIC™ PXI Reed Relay Matrices

The 40-562A PXI BRIC is an ultra high density matrix module. The module is available in 2, 4 or 8-slot PXI sizes to suit all high performance PXI Matrix requirements and is constructed using instrumentation quality reed relays.

With this high level of switching density, the 40-562A PXI matrix module allows a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of much lower cost 8 or 14 slot PXI chassis.

- **BRIC2** is a 2-slot PXI Module, this can hold up to 3 matrix daughtercards, up to 528 crosspoints.
- **BRIC4** is a 4-slot PXI Module, this can hold up to 6 matrix daughtercards, up to 1056 crosspoints.
- **BRIC8** is an 8-slot PXI Module, which can hold up to 12 matrix daughtercards, up to 2112 crosspoints.

High Reliability and Easy of Use

All models are constructed using the world's smallest and highest reliability Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and very stable contact resistance.

The 40-562A PXI BRICs are designed to minimize the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the BRIC module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the BRIC user connectors, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, the user needs to look for a cabling or programming errors.

If a relay failure is detected by BIRST the user can quickly identify the failed relay, replace the relay and identify the cause of the failure. More information on the use of the BIRST tool is contained within the BRIC operating manual. For general information see the **BIRST** page on our website.

Supported by eBIRST

As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Switching Specifications

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.2A
Relay Resistance:	100mΩ typical
Path Resistance X to X - on:	1Ω typical (within same daughter card) 2Ω typical (across different daughter cards)
Path Resistance - off:	10^9Ω
Typical Operate Time:	1ms
Typical Operate Time (-R version):	0.5ms
Expected Life (Operations) Low Power Load: Full Power Load:	 $>10^9$ $>5x10^6$
Bandwidth for x8 configurations (-3dB)	10MHz
Crosstalk for x8 configurations (typical)	-80dB at 10kHz -60dB at 100kHz -40dB at 1MHz -20dB at 10MHz
Isolation for x8 configurations (typical)	100dB at 10kHz 75dB at 100kHz 50dB at 1MHz 20dB at 10MHz

Maximum Crosspoint Count

The 40-562A series have a suggested maximum number of simultaneously operated crosspoints of 50 per BRIC2, 50 per BRIC4 or 100 per BRIC8 (please contact factory for applications requiring higher closure counts).

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A (typical 1A)	0	0

Width and Dimensions

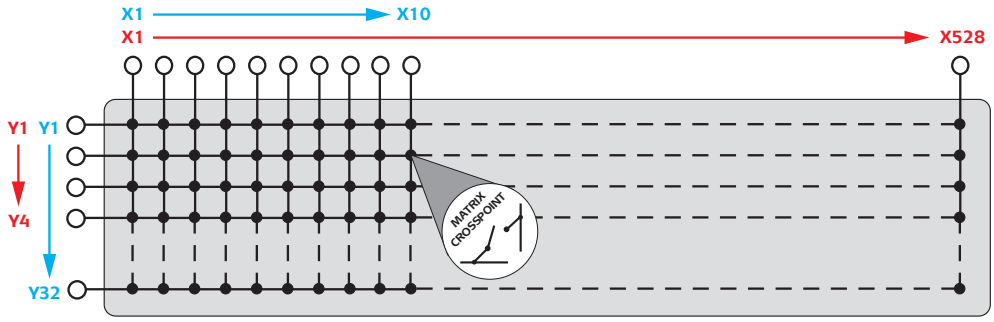
Two, four or eight slot 3U PXI module (CompactPCI).
3D models for these modules in a variety of popular file formats are available on request.

Weight

	Empty BRIC	Fully Loaded BRIC
BRIC2	0.6Kg	1.2Kg
BRIC4	0.9Kg	2.1Kg
BRIC8	1.6Kg	4.0Kg
BRIC daughter card	0.2Kg	

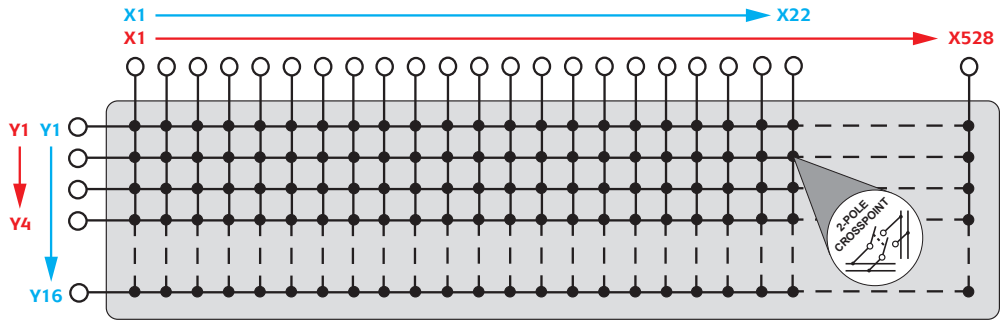
Single Pole Matrices

Single pole 40-562A matrices extend from 10x32 configurations to 528x4 configurations



Double Pole Matrices

Double pole 40-562A matrices extend form 22x16 configurations to 528x4 configurations



40-562A BRIC Matrix Product Order Codes

BRIC2 - 2-Slot 1-Pole Matrix	**40-562A-221-(config)**
BRIC2 - 2-Slot 2-Pole Matrix	**40-562A-222-(config)**
BRIC4 - 4-Slot 1-Pole Matrix	**40-562A-021-(config)**
BRIC4 - 4-Slot 2-Pole Matrix	**40-562A-022-(config)**
BRIC8 - 8-Slot 1-Pole Matrix	**40-562A-121-(config)**
BRIC8 - 8-Slot 2-Pole Matrix	**40-562A-122-(config)**

When ordering 40-562A modules the matrix configuration **must** be specified, this includes the prefix code together with the configuration code, see the tables below for specific details. x4, x8 and x16 versions are available as 1 pole (-021) and 2 pole versions (-022), x32 is only available as 1pole.

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

x4 Configuration Options			
	BRIC2 40-562A-221/222	**BRIC4 40-562A-021/022**	**BRIC8 40-562A-121/122**
88x4 Matrix	**-88x4**	**-88x4**	**-88x4**
132x4 Matrix	**-132x4**	**-132x4**	**-132x4**
176x4 Matrix		**-176x4**	**-176x4**
220x4 Matrix		**-220x4**	**-220x4**
264x4 Matrix		**-264x4**	**-264x4**
308x4 Matrix			**-308x4**
352x4 Matrix			**-352x4**
396x4 Matrix			**-396x4**
440x4 Matrix			**-440x4**
484x4 Matrix			**-484x4**
528x4 Matrix			**-528x4**
Further Options - Isolation Relays Removed			
This will improve path resistance by 150mΩ but will degrade isolation and bandwith.			**-R**

x8 Configuration Options			
	BRIC2 40-562A-221/222	**BRIC4 40-562A-021/022**	**BRIC8 40-562A-121/122**
44x8 Matrix	**-44x8**	**-44x8**	**-44x8**
66x8 Matrix	**-66x8**	**-66x8**	**-66x8**
88x8 Matrix		**-88x8**	**-88x8**
110x8 Matrix		**-110x8**	**-110x8**
132x8 Matrix		**-132x8**	**-132x8**
154x8 Matrix			**-154x8**
176x8 Matrix			**-176x8**
198x8 Matrix			**-198x8**
220x8 Matrix			**-220x8**
242x8 Matrix			**-242x8**
264x8 Matrix			**-264x8**
Further Options - Isolation Relays Removed			
This will improve path resistance by 150mΩ but will degrade isolation and bandwith.			**-R**

x16 Configuration Options			
	BRIC2 40-562A-221/222	**BRIC4 40-562A-021/022**	**BRIC8 40-562A-121/122**
22x16 Matrix	**-22x16**	**-22x16**	**-22x16**
33x16 Matrix	**-33x16**	**-33x16**	**-33x16**
44x16 Matrix		**-44x16**	**-44x16**
55x16 Matrix		**-55x16**	**-55x16**
66x16 Matrix		**-66x16**	**-66x16**
77x16 Matrix			**-77x16**
88x16 Matrix			**-88x16**
99x16 Matrix			**-99x16**
110x16 Matrix			**-110x16**
121x16 Matrix			**-121x16**
132x16 Matrix			**-132x16**
x32 Configuration Options (1 pole only)			
	BRIC2 40-562A-221	**BRIC4 40-562A-021**	**BRIC8 40-562A-121**
10x32 Matrix	**-10x32**	**-10x32**	**-10x32**
15x32 Matrix	**-15x32**	**-15x32**	**-15x32**
20x32 Matrix		**-20x32**	**-20x32**
25x32 Matrix		**-25x32**	**-25x32**
30x32 Matrix		**-30x32**	**-30x32**
35x32 Matrix			**-35x32**
40x32 Matrix			**-40x32**
45x32 Matrix			**-45x32**
50x32 Matrix			**-50x32**
55x32 Matrix			**-55x32**
60x32 Matrix			**-60x32**

40-562A Isolation Switching

Isolation switches are only available on the x4 and x8 configurations, x16 and x32 configurations do not have isolation switching

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
x4 configurations use 96-way male micro-D connectors, x8, x16 and x32 configurations use 68-way male micro-D connectors.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Configuration	Test Tool	Adapter	Termination
x4	**93-002-001**	**93-002-226**	**93-016-103**
x8, x16, x32	**93-006-001**	**93-006-222**	**93-015-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
1-Pole Versions	**91-100-003**
2-Pole Versions	**91-100-005**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-562A series BRIC modules please refer to the **90-016D** 96-way micro-D and **90-015D** 68-way micro-D Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-563A Solid State Matrix BRIC™
3U PXI Multi Slot Matrix Module

- Integrated PXI Matrix Module With Built In High Performance Screened Analog Bus
- Available as 2, 4 and 8-Slot 3U PXI Modules
- Solid State 1-Pole Matrix With Sizes Between 64x8 and 384x8
- Low Thermal EMF
- Fast Switch Operation and Long Service Life
- Switch up to 40 Volts, 0.25A Continuous Current
- Automatic Analog Bus Isolation Switching Gives Maximum Bandwidth
- Supported by PXI or LXI Chassis
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Reduced Service and Maintenance Costs Through the Use of BIRST™ Diagnostics
- Supported by eBIRST
- 3 Year Warranty

BRIC™ PXI Solid State Matrices

The 40-563A PXI BRICs are a range of ultra high density matrix modules. These modules are available in 2, 4 or 8-slot PXI sizes to suit all high performance PXI Matrix requirements and are constructed using solid state switches.

With this high level of switching density, the 40-563A PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of much lower cost 8 or 14-slot PXI chassis.

- **BRIC2** is a 2-slot PXI Module, this can hold up to 3 matrix daughtercards with a maximum size of 96x8.
- **BRIC4** is a 4-slot PXI Module, this can hold up to 6 matrix daughtercards with a maximum size of 192x8.
- **BRIC8** is an 8-slot PXI Module, which can hold up to 12 matrix daughtercards with a maximum size of 384x8.

High Reliability and Easy of Use

All models in the 40-563A range are constructed using solid state relays making them ideal for applications requiring fast operation and a long service life with frequent switch operations. Since the design is based on solid state switching, the matrix has no wear out mechanism.

The 40-563A PXI BRICs are designed to minimize the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the BRIC module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the BRIC user connectors, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all short circuit relays or relays with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

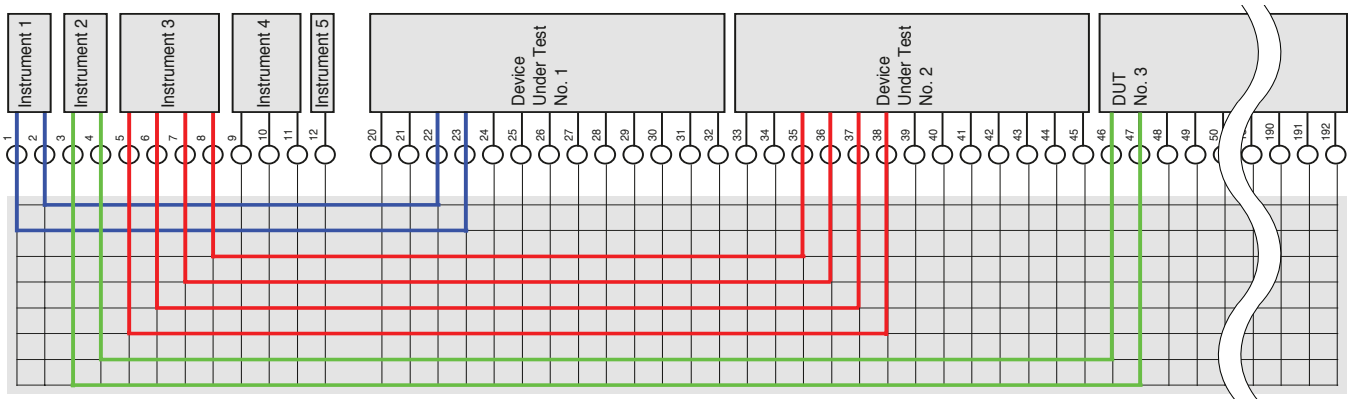
The BIRST tool compliments any self test diagnostic test tools build into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, the user needs to look for a cabling or programming errors.

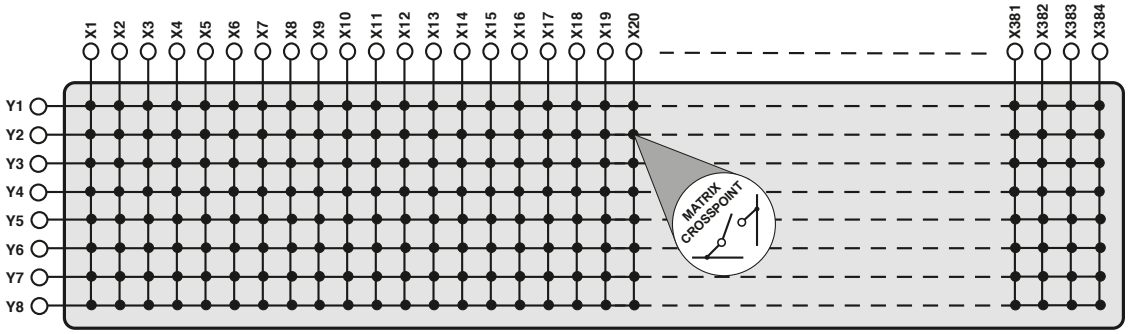
If a relay failure is detected by BIRST the user can quickly identify the failed relay, replace the relay and identify the cause of the failure. More information on the use of the BIRST tool is contained within the BRIC operating manual. For general information see BIRST.

Supported by eBIRST

As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf

How to use the BRIC matrix to connect instrumentation to the UUT





Switching Diagram for the 40-563A Solid State Matrix
Avilable With a Minimum Size of 64x8 and a Maximum Size of 384x8

Pickering Solid State BRIC Advantages

- Uses high speed, high reliability solid state relays.
- Long service life – solid state relays have no wear out mechanism.
- Low thermal EMF errors for accurate low voltage switching.
- Simplified cabling and interconnection for large matrix solutions.
- Extensive accessory support.
- Built in self-test to find defective and degrading relays with full path resistance characterisation.
- Simplified operation through automated isolation relay operation and single matrix presentation.
- Highest density solid state switching solution in PXI.
- Extensive range of configurations and solutions.
- Fast operation through VISA driver with multiple relay operation in one command or have the convenience and simplicity of IVI drivers.

OTHER PXI BRIC MODULES FROM PICKERING	
40-560A - 1-Pole Matrix with BIRST	
BRIC2	Up to 276x4, 138x8 or 69x16
BRIC4	Up to 552x4, 276x8 or 138x16
BRIC8	Up to 1104x4, 552x8 or 276x16
40-561A - 1-Pole, 1-Pole Screened or 2-Pole Matrix with BIRST	
BRIC2	Up to 90x8 or 45x16
BRIC4	Up to 180x8 or 90x16
BRIC8	Up to 360x8 or 180x16
40-562A - 1-Pole, 1-Pole Screened or 2-Pole Matrix with BIRST	
BRIC2	Up to 132x4, 66x8, 33x16 or 15x32
BRIC4	Up to 264x4, 132x8, 66x16 or 30x32
BRIC8	Up to 528x4, 264x8, 132x16 or 60x32
40-565A - 2-Pole, 2 Amp Matrix with BIRST	
BRIC4	Up to 96x8
BRIC8	Up to 192x8
40-566A - 2-Pole, 2 Amp Matrix with BIRST	
BRIC4	Up to 165x4
BRIC8	Up to 385x4
40-592 - Fault Insertion Breakout Matrix	
BRIC4	Up to 124x8 with 2 or 3-pin breakout
BRIC8	Up to 248x8 with 2 or 3-pin breakout
40-595 - Power Fault Insertion Breakout Matrix	
BRIC8	Up to 30x8 with 3-pin breakout
40-569 - ARINC 608 Resource Distributor/Bus Matrix	
BRIC4	1 or 2 Resource Distributor, 1 to 4 Bus Matrix Cards
BRIC8	1 or 2 Resource Distributor, 1 to 6 Bus Matrix Cards

40-563A Specification

Switch Type:	Solid State Relay
Max Switch Voltage:	±40V
Max Continuous Switch Current: Surge Current:	0.25A 0.75A for 100ms
Relay Resistance: Path Resistance X to X - on: Leakage Current (off state): Thermal Offset:	800mΩ typical 2.4Ω typical (within same daughter card) 4.8Ω typical (across different daughter cards) Typically <1nA at 40V, X to X. Typically <3µV (X to Y) Typically <5µV (X to X)
Programming Time: Switching Time:	<0.5ms <20µs, no bounce
Expected Life:	Unlimited at full load
Typical Bandwidth for 192x8 Matrix (40-563A-021-192x8):	8MHz †
Isolation: Crosstalk:	-48dB typ at 8MHz 50Ω -27dB at 1MHz 50Ω

Relay Type

The 40-563A uses solid state relays base on fully isolated MOSFET switches that exhibit a long service life under all conditions within its capacity ratings. The switches can withstand short term surges without damage.

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A (typical 1A)	0	0

Width and Dimensions

Two, four or eight slot 3U PXI module (CompactPCI).

3D models for these modules in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals are carried via multiple front panel 68-way male micro-D connectors (3 per 2-slot module, 6 per 4-slot module or 12 per 8-slot module).

Weight

	Empty BRIC	Fully Loaded BRIC
BRIC2	0.6Kg	1.2Kg
BRIC4	0.9Kg	2.1Kg
BRIC8	1.6Kg	4.0Kg
BRIC daughter card	0.2Kg	

40-563A BRIC Solid State Matrix Product Order Codes

BRIC2 - 2-Slot Ultra High Density Solid State
1-Pole Matrix 0.25A/40V **40-563A-221-(config)**

BRIC4 - 4-Slot Ultra High Density Solid State
1-Pole Matrix 0.25A/40V **40-563A-021-(config)**

BRIC8 - 8-Slot Ultra High Density Solid State
1-Pole Matrix 0.25A/40V **40-563A-121-(config)**

When ordering 40-563A modules the matrix configuration **must** be specified, this includes the prefix code together with the configuration code, see the configuration table below for specific details. All versions are 1 pole with 8-way Y-bus.

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

x8 Configuration Options	BRIC2 40-563A-221	BRIC4 40-563A-021	BRIC8 40-563A-121
64x8 Matrix	**-64x8**	**-64x8**	**-64x8**
96x8 Matrix	**-96x8**	**-96x8**	**-96x8**
128x8 Matrix		**-128x8**	**-128x8**
160x8 Matrix		**-160x8**	**-160x8**
192x8 Matrix		**-192x8**	**-192x8**
224x8 Matrix			**-224x8**
256x8 Matrix			**-256x8**
288x8 Matrix			**-288x8**
320x8 Matrix			**-320x8**
352x8 Matrix			**-352x8**
384x8 Matrix			**-384x8**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-006-001**	**93-006-222**	**93-015-103**

Mating Connectors & Cabling

For connection accessories for the 40-563A series BRIC modules please refer to the **90-015D** 68-way micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Matrix: 2 Amp Large Modules

- Integrated Large Size Matrices With Crosspoint Count Up To 3072
- Require No User Configuration
- Pickering BRIC™ Modules Offer a Scalable Solution With Upgrade Paths
- Electro-mechanical Relays With Current Handling of 2 Amps
- Wide Range of Matrix Sizes with 4, 6, 8, 12, or 16 Y Connections
- Partially Populated Configurations Available
- Fast Operating Speed of <3ms
- Occupy 2, 4 or 8 3U PXI Slots
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments
- Built-In Diagnostics - BiRST™ For 2-Pole Versions

Pickering Interfaces range of Large Matrix Modules offers integrated solutions for large matrix assemblies. The use of high density packaging and integrated backplanes enables a large matrix to be implemented with no user configuration or special matrix expansion kits. The high density approach used ensures the matrix has a large bandwidth and low through path resistance. These matrices use thru-hole relays (not surface mount), therefore they can be serviced using standard de-soldering tools simplifying repair and reducing down time.

This range of large matrices feature 1 or 2-pole switching and current handling up to 2A using electromechanical relays.

Any large matrix is available in partially populated configurations giving a cost effective solution for specific applications. Please consult the sales office for details.

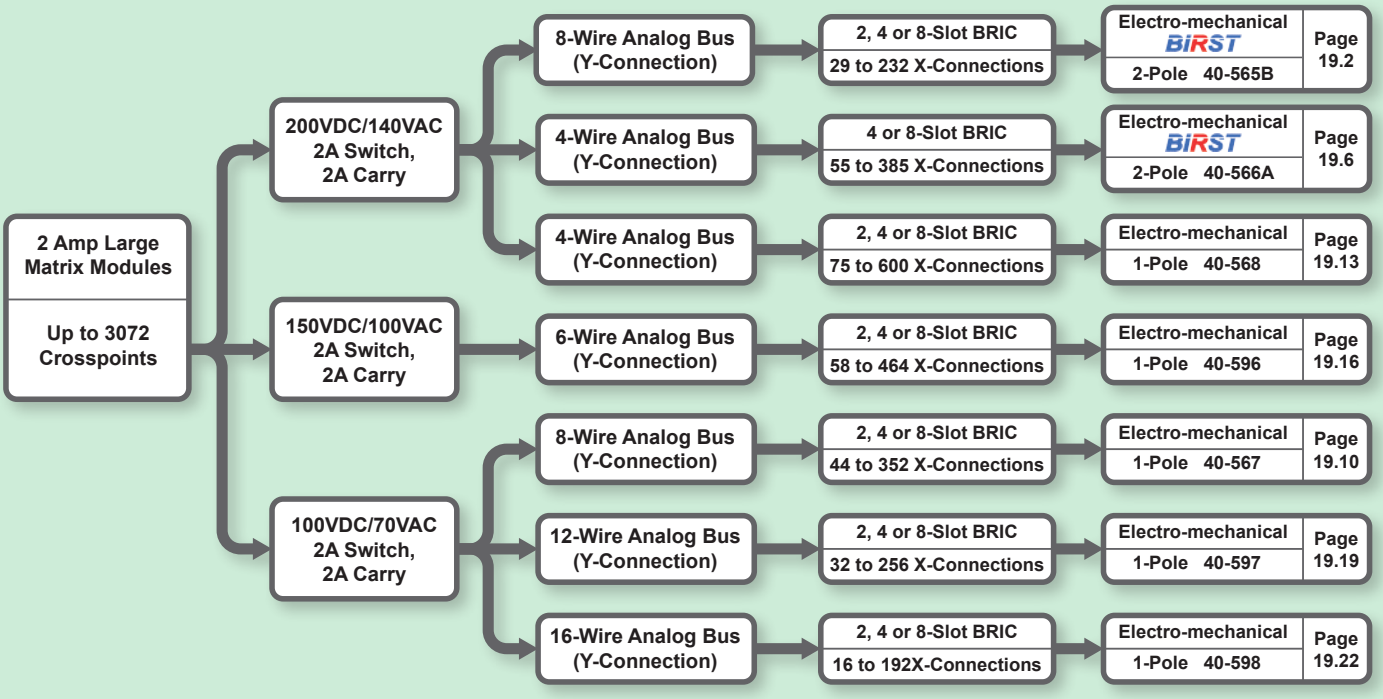
All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

The 2-pole versions of these BRIC modules are now supplied with Built In Relay Self Test. This provides a quick way of finding switch path failures down to a specific relay without the use of any external test equipment.

40-565B BRIC8 2 Amp 2-Pole Matrix Module

40-566A BRIC8 2 Amp 2-Pole Matrix Module

40-567 BRIC8 2 Amp 1-Pole Matrix Module



40-565B 2Amp BRIC™
3U PXI Multi Slot Matrix Module

- Integrated PXI 2Amp Matrix Module With Built In High Performance Screened Analog Bus
- 2-Slot Configurations to 58x8 (2-Pole), 4-Slot Configurations to 116x8 (2-Pole) & 8-Slot Configurations to 232x8 (2-Pole)
- Load Just The Number Of Daughter Switch Cards You Need For Your Application
- Maximum Current 2A Hot or Cold Switching
- 2-Pole Switching up to 150VDC/100VAC and up to 60W Max Power
- 3ms Operate Time
- Automatic Analog Bus Isolation Switching Gives >10MHz Bandwidth
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

The 2 Amp Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling capability than the existing ultra high density reed relay based BRICs. But it is not as suited to switching low level signals - specifically signals <100µV - here Ruthenium Reed Relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560A/561A/562A range.

Pickering's Range of 2A BRIC Matrix Modules				
Model No.	**Poles**	**Y-Bus Size**	**Min. Matrix Size**	**Max. Matrix Size**
40-568	1	4	75x4	600x4
40-596	1	6	58x6	464x6
40-567	1	8	44x8	352x8
40-597	1	12	32x12	256x12
40-598	1	16	24x16	192x16
40-566A	2	4	55x4	385x4
40-565B	2	8	29x8	232x8

BRIC™ 2nd Generation PXI 2Amp Switch Matrix

The 40-565B PXI Matrix BRIC provides a range of high density matrix modules able to switch up to 2 Amps at 150VDC/100VAC The 40-565B BRIC modules are available in 2, 4 or 8-slot PXI sizes to suit most high performance PXI Matrix requirements, constructed using quality electro-mechanical relays for high switching confidence.

Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-565B PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of much lower cost 8 or 14-slot PXI chassis.

- **BRIC2** is a 2-slot PXI Module, this can hold 1 or 2 matrix daughtercards, 464 crosspoints (up to 58x8 2-pole).
- **BRIC4** is a 4-slot PXI Module, this can hold up to 4 matrix daughtercards, 928 crosspoints (up to 116x8 2-pole).
- **BRIC8** is an 8-slot PXI Module, which can hold up to 8 matrix daughtercards, 1856 crosspoints (up to 232x8 2-pole).

High Reliability and Easy of Use

The 40-565B PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

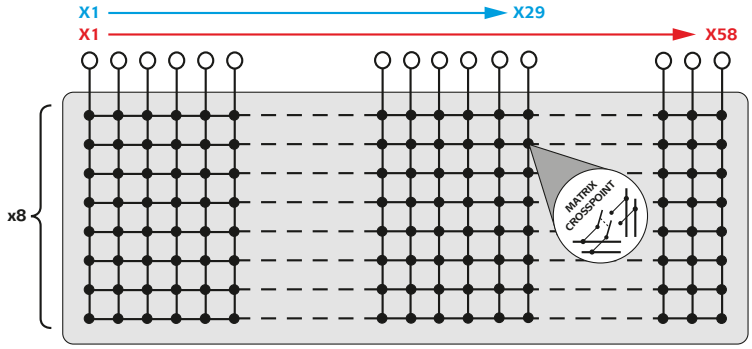
Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the BRIC module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the BRIC user connectors, launch the supplied BIRST application and the tool will run a diagnostic test that will find all crosspoint and backplane isolation relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system.

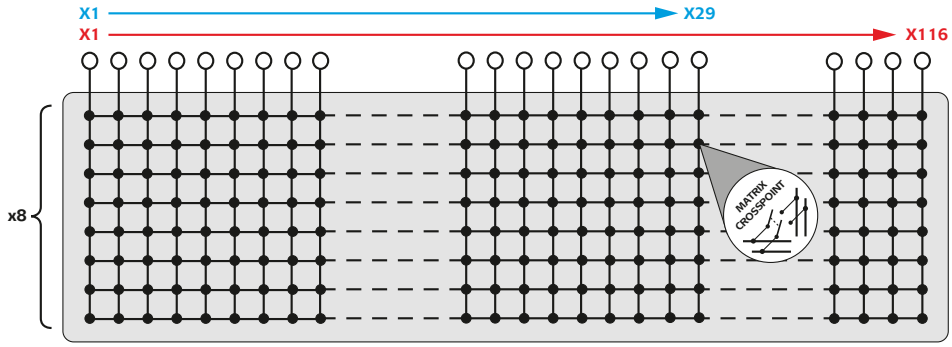
If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. More information on the use of the BIRST tool is contained in the BRIC user manual. For general information see **BIRST**.

Supported by eBIRST

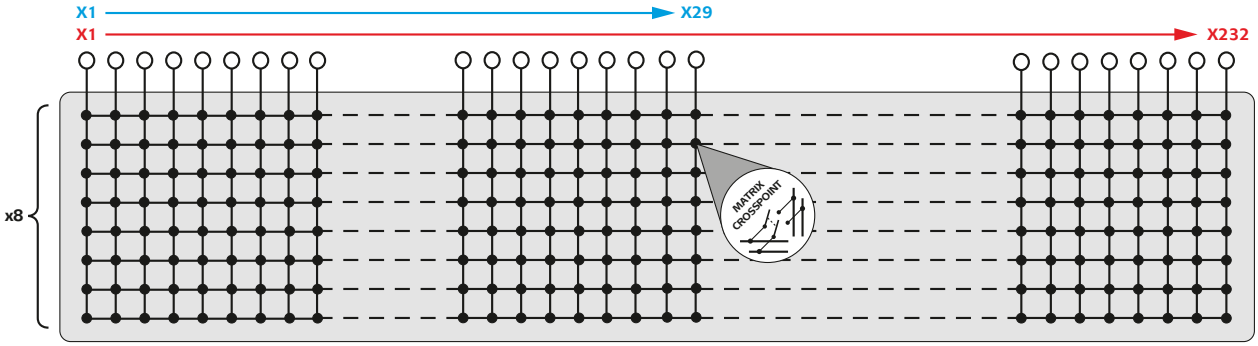
As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



The 40-565B in BRIC2 Format is Available With Matrix Configurations of 29x8 or 58x8 (2-Pole)

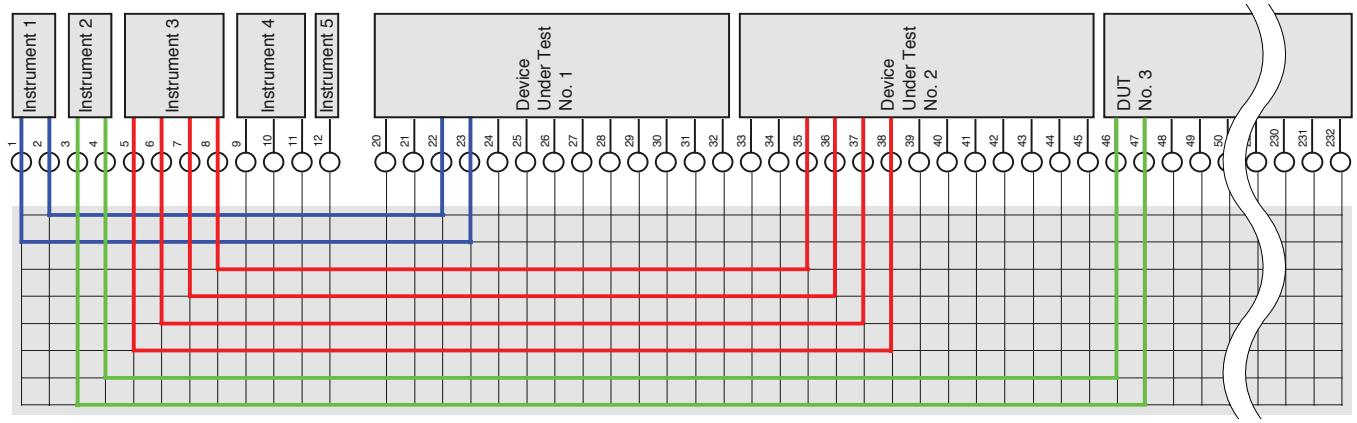


The 40-565B in BRIC4 Format is Available With Matrix Configurations Between 29x8 and 116x8 (2-Pole)



The 40-565B in BRIC8 Format is Available With Matrix Configurations Between 29x8 and 232x8 (2-Pole)

Example Configurations of the 40-565B 2 Amp BRIC Matrix



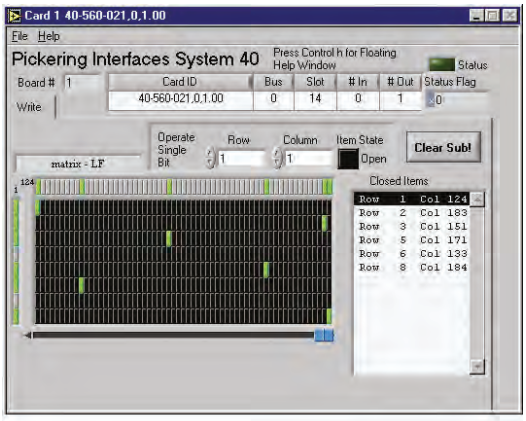
Schematic diagram showing a 232x8 BRIC Matrix being used to parallel test multiple DUTs.
The BRIC Matrix allows tremendous test system flexibility.

40-565B BRIC Key Advantages

- ✔ Pickering Introduced the original BRIC back in 2003, the 40-565B is an update to the original, well proven 40-565 intoduced in 2004.
- ✔ Complete PXI Switching Solution in one PXI Module.
- ✔ Simplified cabling, easy to connect to the DUT thus minimizing costs.
- ✔ Internal Shielded Analog Bus giving maximum signal integrity with easy expansion at minimal cost with maximum bandwidth and isolation.
- ✔ Program as one whole matrix, so very easy to achieve fast operate time.
- ✔ Targeted at high performance matrix switching with minimized cost.
- ✔ Build just the matrix configuration you need. Modular architecture allows users to buy just as much matrix capacity as they require, expansion cards can be added later.
- ✔ BRICs allow use of much lower cost 8 or 14 slot PXI chassis (such as 40-908 or 40-914).
- ✔ Simpler and faster programming with Direct I/O, VISA and IVI Drivers + LabView Soft Front Panels. Fully compatible with NI Switch Executive.
- ✔ Built-in BIRST™ self-test.
- ✔ Custom versions built to order.

Connectors and Cabling Options for PXI BRIC Modules

Pickering Interfaces offer a complete range PXI Connectors and Prototyping Cable for the 78 Way D-Type connector used on the 40-565B, providing a means of connecting your U.U.T. to a Pickering Interfaces BRIC module. Wire as large as 28 gauge can be used and with the ample cable exit at the back of the connector backshell, rapid accurate custom cabling is assured.



Pickering Interfaces PXI Matrix Soft Front Panel

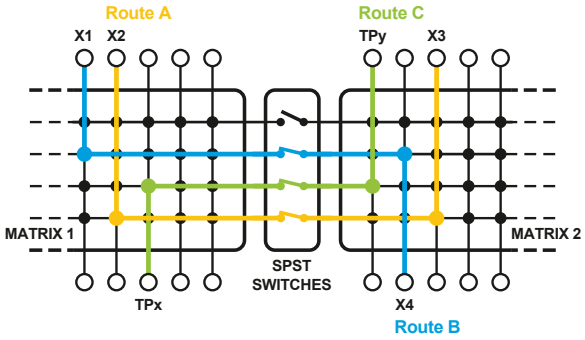
PXI BRIC Software Drivers

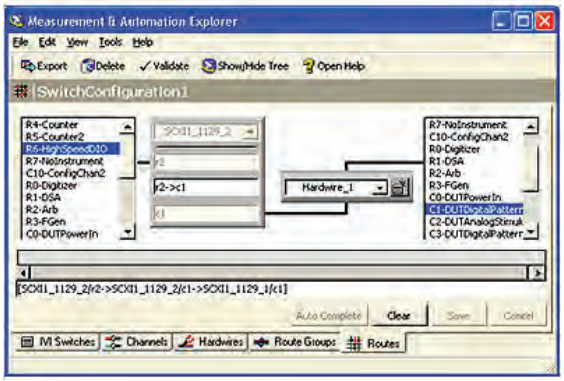
The PXI BRIC uses the standard software drivers used by all Pickering Interfaces PXI switch modules, these are supplied with Windows XP/Vista/7/8 drivers - freely available from our web site www.pickeringtest.com, also available are code examples in LabWindows/CVI, Visual Basic, Visual C++ and Borland C++.

All modules also have comprehensive IVI, VISA and DLL (Direct I/O) support together with Soft Front Panels, source code for LabView VI's, Diagnostic utillities and HTML Help, all of which which may also be downloaded directly from our web site. Pickering PXI modules are compatible with NI's Measurement & Automation Explorer.

Tecap Switching - Signal Routing Made Simple

Tecap Switching simplifies the routing of signals through switching systems and speeds up the development of switching system software. Tecap Switching supports Pickering Interfaces switching products and the interconnection between these products. Third party products can be supported on request.





NI Switch Executive Support

National Instrument's Switch Executive (NISE) is a switch management software package designed to simplify the control of switching systems. Pickering Interfaces provides an IVI-C compliant switch driver for all BRIC's, allowing the product to be integrated into a test system using NISE.

Switching Specification (40-565B)

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	150VDC/100VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance	
On (Single Module):	<1Ω (X-Y connection)
Off (Single Module):	$>10^9\Omega$
Minimum Voltage:	100µV
Differential Thermal Offset:	<10µV
Operate Times	
Crosspoint Relay:	<3ms
Crosspoint & Isolation Relay:	<6ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

Typical Bandwidth and Crosstalk

Anticipated Bandwidth For 40-565B-002-116x8:	10MHz
Anticipated Crosstalk For 40-565B-002-116x8 @1MHz:	-50dB

Maximum Crosspoint Count

Maximum Number of Simultaneously Closed Crosspoints:

BRIC2 = 65
BRIC4 = 123
BRIC8 = 239

Power Requirements

+3.3V	+5V	+12V	-12V
60mA (typical)	1.1A max (BRIC2) 2.1A max (BRIC4) 4.1A max (BRIC8)	30mA (typical)	0

Mechanical Characteristics

Two, four or eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Weight

BRIC2 empty module	0.6Kg
BRIC2 fully loaded	1.3Kg
BRIC4 empty module	0.9Kg
BRIC4 fully loaded	2.2Kg
BRIC8 empty module	1.6Kg
BRIC8 fully loaded	4.2Kg
BRIC daughter card	0.3Kg

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals are carried via multiple front panel 78-Way male D-Type connectors (1 or 2 per 2-slot module, up to 4 per 4-slot module or up to 8 per 8-slot module).

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to a larger matrix size using daughtercards, please consult your local sales office for further information.

40-565B BRIC Matrix Product Order Codes

BRIC2 - 2-Slot High Density Matrix	
2 Amp 2-Pole 29x8 Matrix	**40-565B-202-29x8**
2 Amp 2-Pole 58x8 Matrix	**40-565B-202-58x8**
BRIC4 - 4-Slot High Density Matrix	
2 Amp 2-Pole 29x8 Matrix	**40-565B-002-29x8**
2 Amp 2-Pole 58x8 Matrix	**40-565B-002-58x8**
2 Amp 2-Pole 87x8 Matrix	**40-565B-002-87x8**
2 Amp 2-Pole 116x8 Matrix	**40-565B-002-116x8**
BRIC8 - 8-Slot High Density Matrix	
2 Amp 2-Pole 29x8 Matrix	**40-565B-102-29x8**
2 Amp 2-Pole 58x8 Matrix	**40-565B-102-58x8**
2 Amp 2-Pole 87x8 Matrix	**40-565B-102-87x8**
2 Amp 2-Pole 116x8 Matrix	**40-565B-102-116x8**
2 Amp 2-Pole 145x8 Matrix	**40-565B-102-145x8**
2 Amp 2-Pole 174x8 Matrix	**40-565B-102-174x8**
2 Amp 2-Pole 203x8 Matrix	**40-565B-102-203x8**
2 Amp 2-Pole 232x8 Matrix	**40-565B-102-232x8**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST.**

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-565B module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-566A 2 Amp BRIC™
3U PXI Multi Slot Matrix Module

- Integrated PXI 2A Matrix Module With Built In High Performance Screened Analog Bus
- Fully Scalable Matrix Solution
- High Density Configurations With 4-Slot to 165x4 (2-Pole) & 8-Slot to 385x4 (2-Pole)
- Flexible Matrix Architecture Through Isolation Switching Enabling Multiple Independent Matrices (Up To 7 Per BRIC8)
- Partially Populated Versions Available
- Maximum Current 2A Hot or Cold Switching
- 2-Pole Switching up to 150VDC/100VAC and up to 60W Max Power
- VISA, Kernel & IVI Drivers Supplied
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

Pickering 2A BRIC matrices are higher signal power versions of our established range of PXI BRIC modules. Comprising high quality electro-mechanical relays they feature higher voltage, current and power handling capabilities than existing ultra high density reed relay based BRICs.

The 40-566A is an ideal choice for simultaneously busing up to four higher power signal pairs, where improved robustness is required (please refer to our 40-565 for busing up to eight higher power signal pairs simultaneously).

For lower level switching requirements, please also consider our 40-560A/561A/562A range of sputtered ruthenium reed relay solutions that exhibit superior operating speed & life performance.

BRIC™ 2nd Generation PXI 2A Switch Matrix

The 40-566A PXI Matrix BRIC provides a range of high density matrix configurations able to switch up to 2A or 150VDC/100VAC. The 40-566A BRIC modules are available in 4 or 8-slot PXI sizes and are constructed using high quality electro-mechanical relays.

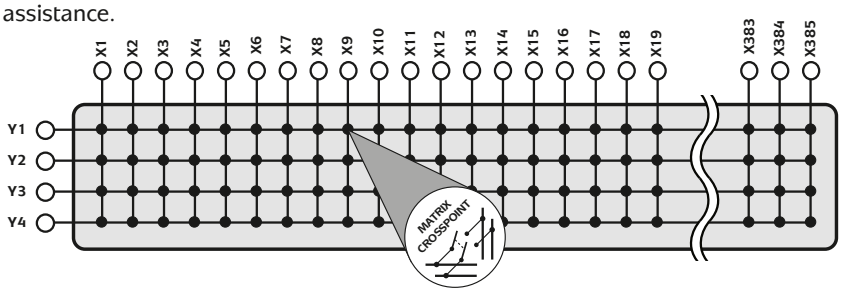
Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-566A PXI matrix modules allow a complete Functional ATE switching system to be housed in a single 3U PXI chassis. BRIC Modules allow the use of a much lower cost 8 slot PXI chassis.

40-566A BRIC4 is a 4-slot PXI Module which can hold up to 3 matrix daughtercards with 660 crosspoints (maximum matrix size of 165x4, 2-pole).

40-566A BRIC8 is an 8-slot PXI Module which can hold up to 7 matrix daughtercards with 1540 crosspoints (maximum matrix size of 385x4, 2-pole).

High Reliability and Ease of Use

The 40-566A PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.



Schematic diagram for 385x4 2-Pole BRIC Matrix (40-566A-107)

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the BRIC module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the BRIC user connectors, launch the supplied BIRST application and the tool will run a diagnostic test that will find all crosspoint and backplane isolation relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system. Please contact sales office if the isolation relays for independent sub-matrix Y connection (illustrated overleaf) require testing.

The BIRST tool compliments any self test diagnostic test tools built into the system since a switch path failure can be caused by switch or by cabling failures. If a system self test identifies a system failure and the BIRST indicates there are no relay failures, chances are the user needs to look for a cabling or programming errors.

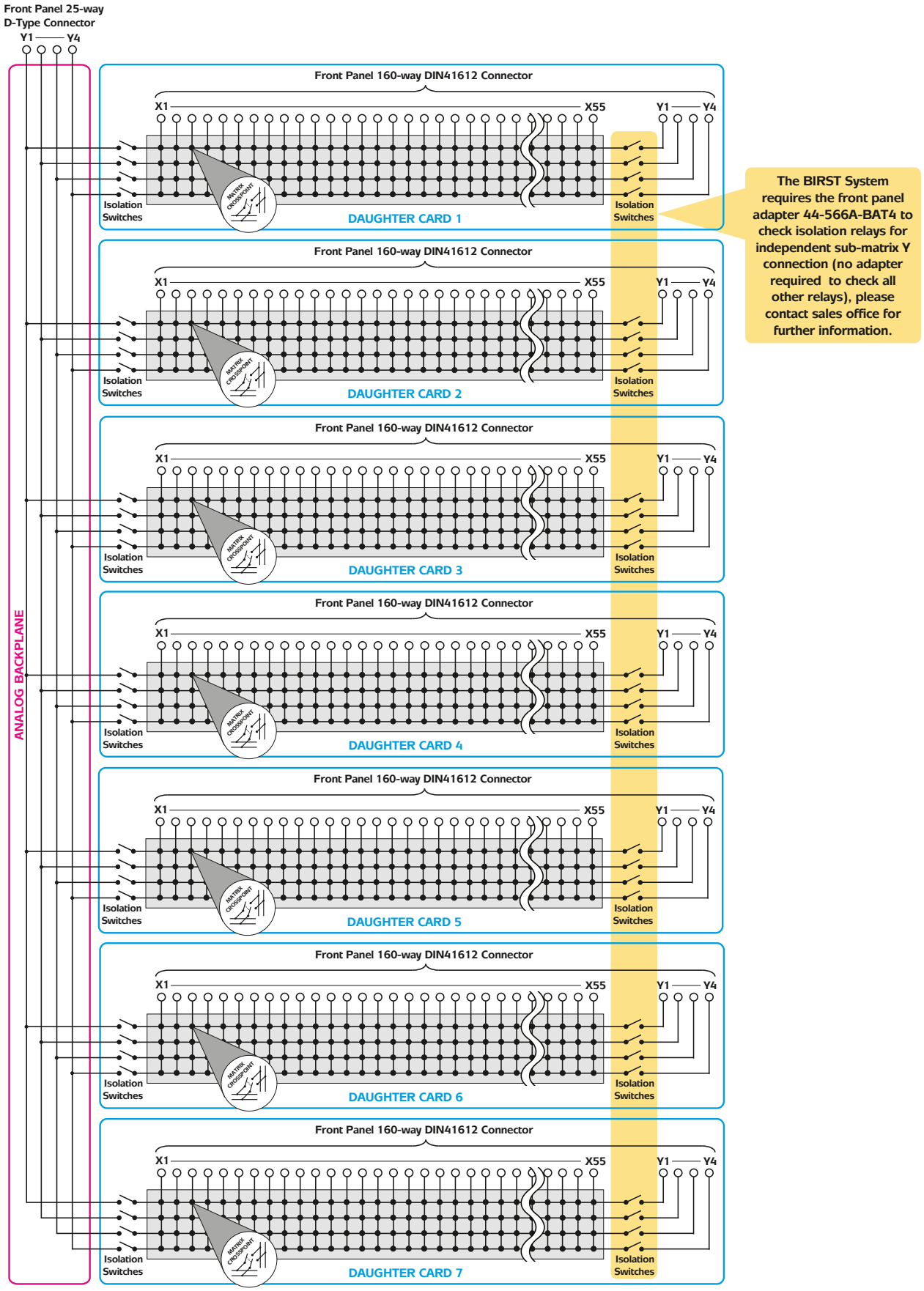
If a relay failure is detected by BIRST the user can quickly identify the failed relay, locate the cause of the failure and replace the failed device. For general information see **BIRST**.

Supported by eBIRST

As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Flexible Matrix Architecture

Isolation Switching within the 40-566A enables the configuration of multiple independent matrices (up to 7 per BRIC8). These switches allow the removal of redundant rows/columns within a system, maintaining signal integrity through maximized bandwidth (along with keeping interconnection capacitance, leakage and crosstalk to an absolute minimum.)

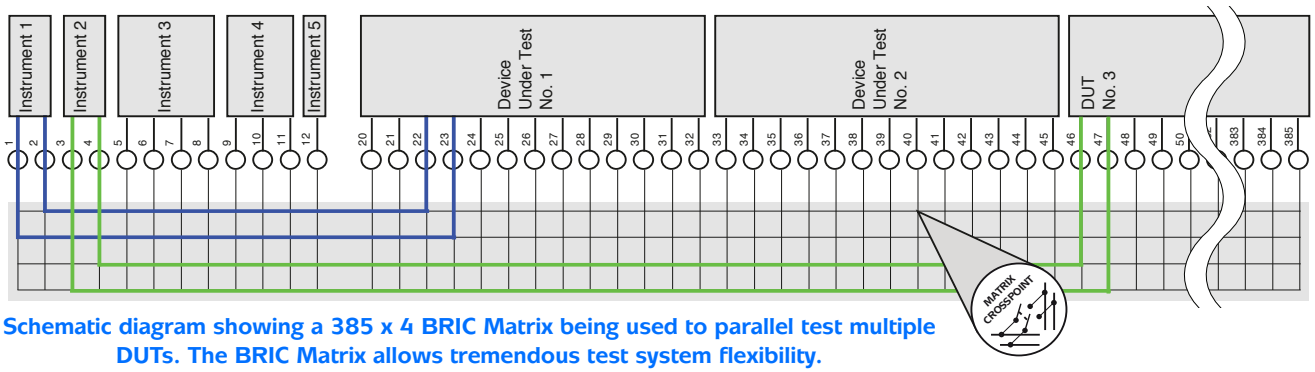


The BIRST System requires the front panel adapter 44-566A-BAT4 to check isolation relays for independent sub-matrix Y connection (no adapter required to check all other relays), please contact sales office for further information.

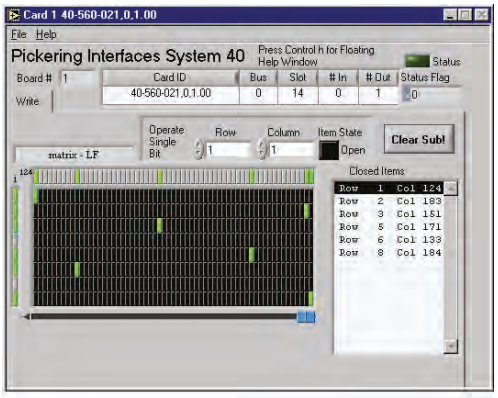
40-566A BRIC Key Advantages

- ✔ Complete PXI Switching Solution in one PXI Module.
- ✔ Simplified cabling, easy to connect to the DUT thus minimizing costs.
- ✔ Internal Shielded Analog Bus giving maximum signal integrity with easy expansion at minimal cost with maximum bandwidth and isolation.
- ✔ Program as one whole matrix, so very easy to achieve fast operate time.
- ✔ Targeted at high performance matrix switching with minimized cost.
- ✔ Build just the matrix configuration you need. Modular architecture allows users to buy just as much matrix capacity as they require, expansion cards can be added later.
- ✔ BRICs allow use of much lower cost 8 slot PXI chassis (40-908).
- ✔ Simpler and faster programming with Direct I/O, VISA and IVI Drivers + LabView Soft Front Panels. Fully compatible with NI Switch Executive.
- ✔ Custom versions built to order.

Example Application of the 40-566A 2A BRIC Matrix (All connections via X-axis for maximum efficiency)



Schematic diagram showing a 385 x 4 BRIC Matrix being used to parallel test multiple DUTs. The BRIC Matrix allows tremendous test system flexibility.

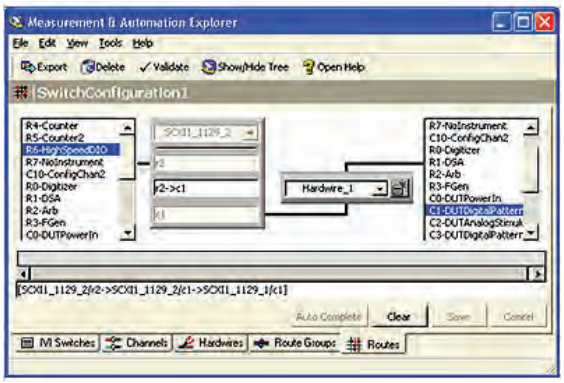


Pickering Interfaces PXI Matrix Soft Front Panel

PXI BRIC Software Drivers

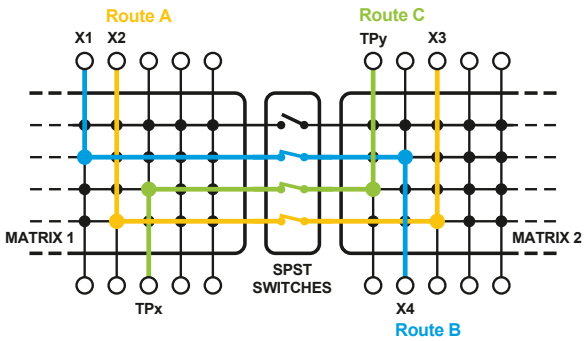
The PXI BRIC uses the standard software drivers used by all Pickering Interfaces PXI switch modules, these are supplied with Windows XP/Vista/7/8 drivers - freely available from our web site www.pickeringtest.com, also available are code examples in LabWindows/CVI, Visual Basic, Visual C++ and Borland C++.

All modules also have comprehensive IVI, VISA and DLL (Direct I/O) support together with Soft Front Panels, source code for LabView VI's, Diagnostic utillities and HTML Help, all of which which may also be downloaded directly from our web site. Pickering PXI modules are compatible with NI's Measurement & Automation Explorer.



Tecap Switching - Signal Routing Made Simple

Tecap Switching simplifies the routing of signals through switching systems and speeds up the development of switching system software. Tecap Switching supports Pickering Interfaces switching products and the interconnection between these products. Third party products can be supported on request.



NI Switch Executive Support

National Instrument's Switch Executive (NISE) is a switch management software package designed to simplify the control of switching systems. Pickering Interfaces provides an IVI-C compliant switch driver for all BRIC's, allowing the product to be integrated into a test system using NISE.

Maximum Crosspoint Count

The 40-566A has a suggested maximum number of simultaneously operated crosspoints of 50 per BRIC4 or 100 per BRIC8, please contact factory for higher closure requirements.

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A max (fully loaded 40-566A-107, 100 crosspoints energised), typically <2A	0	0

Mechanical Characteristics

Four or eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Weight

BRIC4 empty module	0.9Kg
BRIC4 fully loaded	2.1Kg
BRIC8 empty module	1.6Kg
BRIC8 fully loaded	4.0Kg
BRIC daughter card	0.2Kg

Switching Specification (40-566A)

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	150VDC/100VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance	
On (Single Module):	<850mΩ (X to X) <750mΩ (X to Y)
Off (Single Module):	$>10^9\Omega$
Differential Thermal Offset:	<10µV per relay
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

Typical Bandwidth

Typical Bandwidth For Fully Loaded 385x4 Matrix (40-566A-107)	10MHz

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
X connections are made via multiple front panel 160-way male DIN 41612 connectors (Up to 3 per 4-slot module or up to 7 per 8 slot module).
Y connections are made via a single front panel 25-way male D-Type connector.
Note: We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to a larger matrix size using daughtercards, please consult your local sales office for further information.

40-566A BRIC Matrix Product Order Codes

BRIC4 - 4-Slot High Density Matrix	
2A 2-Pole 55x4 Matrix	**40-566A-001**
2A 2-Pole 110x4 Matrix	**40-566A-002**
2A 2-Pole 165x4 Matrix	**40-566A-003**
BRIC8 - 8-Slot High Density Matrix	
2A 2-Pole 55x4 Matrix	**40-566A-101**
2A 2-Pole 110x4 Matrix	**40-566A-102**
2A 2-Pole 165x4 Matrix	**40-566A-103**
2A 2-Pole 220x4 Matrix	**40-566A-104**
2A 2-Pole 275x4 Matrix	**40-566A-105**
2A 2-Pole 330x4 Matrix	**40-566A-106**
2A 2-Pole 385x4 Matrix	**40-566A-107**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Support Products

BIRST Adapter

For the BIRST tool to achieve full relay coverage the supplied **44-566A-BAT4** adapter is required to allow the front panel Y isolation switches to be tested. The adapter consists of a pre-wired 160-way DIN41612 socket with back-shell, and is fitted to the front panel connector during testing.

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and one set of each tool is required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Connector	Test Tool	Adapter
160-way DIN41612	**93-002-001**	**93-002-410**
25-way D-Type	**93-005-001**	**93-005-414**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-566A module please refer to the **90-001D** 160-way DIN 41612 and **90-008D** 25-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-567 1-Pole 2 Amp BRIC™ 3U PXI Multi Slot Matrix Module

- **Very High Density 2A Matrix With Up To 704 Crosspoints Per 2-Slot BRIC, 1408 Crosspoints Per 4-Slot BRIC & 2816 Crosspoints Per 8-Slot BRIC (352 Crosspoints Per PXI Slot)**
- **Integrated PXI Module With Built In High Performance Screened Analog Bus**
- **2-Slot Configurations to 88x8 (1-Pole), 4-Slot Configurations to 176x8 (1-Pole) & 8-Slot Configurations to 352x8 (1-Pole)**
- **Switch up to 100VDC/70VAC, 2A, 60W**
- **Automatic Analog Bus Isolation Switching Maximizes Bandwidth and Matrix Reliability**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **Supported by eBIRST**
- **3 Year Warranty**

The 2 Amp Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling capability than the existing ultra high density reed relay based BRICs. But it is not as suited to switching low level signals, where Ruthenium Reed Relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560/561/562 range.

BRIC™ 2nd Generation PXI 2Amp Switch Matrix

The 40-567 PXI Matrix BRIC provides a range of high density matrix modules able to switch up to 2 Amps or 100VDC/70VAC. The 40-567 BRIC modules are available in 2, 4 or 8-slot PXI sizes to suit most high performance PXI Matrix requirements, constructed using high quality electro-mechanical relays for high switching confidence.

Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-567 PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of a much lower cost 8-slot PXI chassis.

High Reliability and Easy of Use

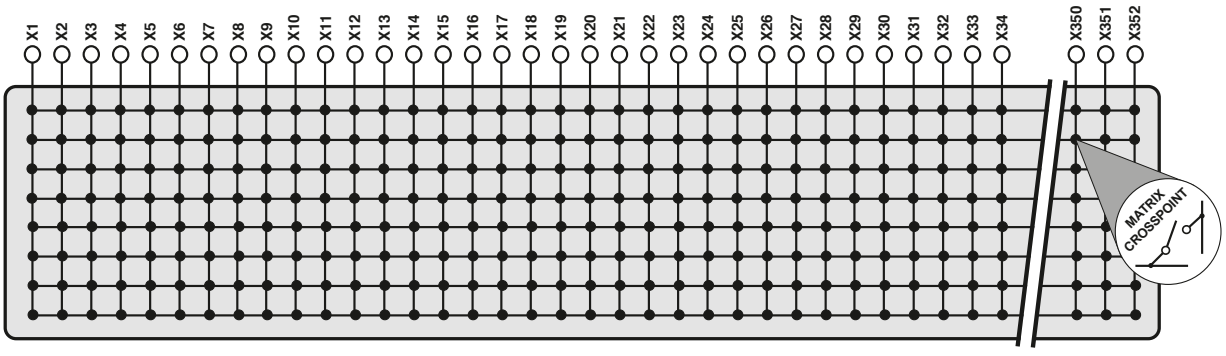
The 40-567 PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Pickering's Range of 2A BRIC Matrix Modules

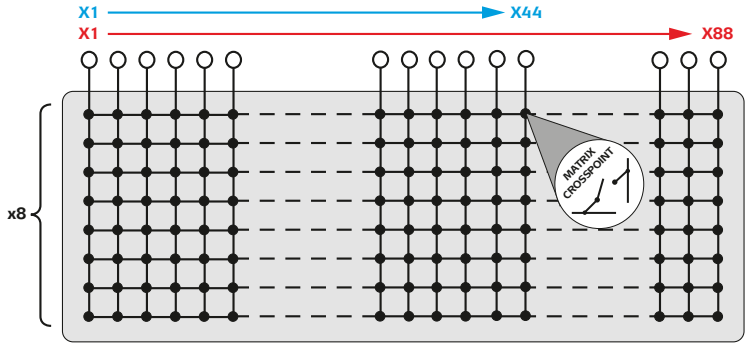
Model No.	Poles	Y-Bus Size	Min. Matrix Size	Max. Matrix Size
40-568	1	4	75x4	600x4
40-596	1	6	58x6	464x6
40-567	1	8	44x8	352x8
40-597	1	12	32x12	256x12
40-598	1	16	24x16	192x16
40-566A	2	4	55x4	385x4
40-565A	2	8	24x8	192x8

Supported by eBIRST

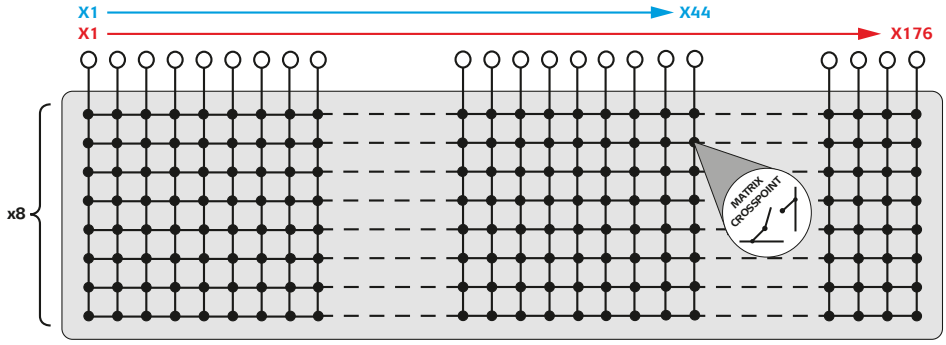
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



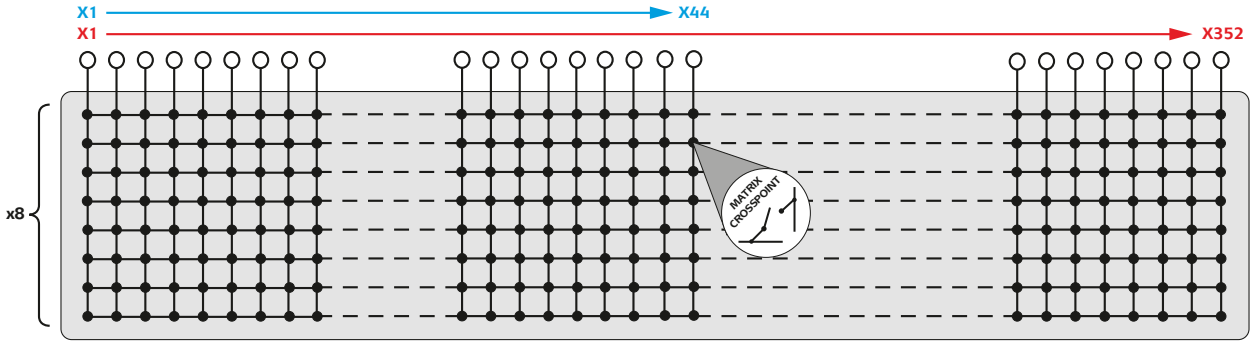
40-567-108 352x8 Matrix Switching Diagram (Fully Populated BRIC8)
The 40-567 supports 8 concurrent switch paths for X to X (see application diagram overleaf)



The 40-567 in BRIC2 Format is Available With Matrix Configurations of 44x8 and 88x8

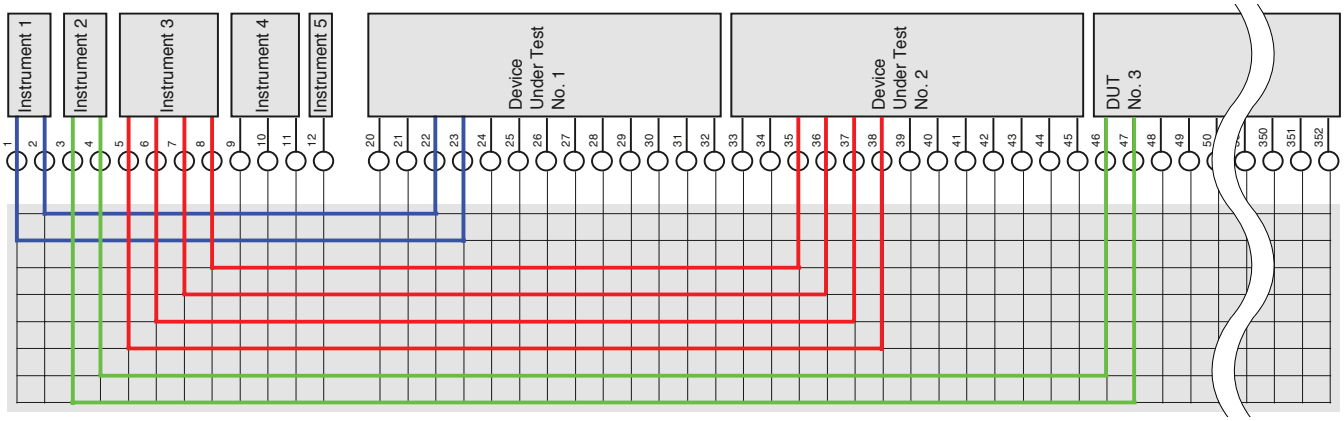


The 40-567 in BRIC4 Format is Available With Matrix Configurations Between 44x8 and 176x8



The 40-567 in BRIC8 Format is Available With Matrix Configurations Between 44x8 and 352x8

Example Application of the 40-567 1-Pole 2A BRIC Matrix



Schematic diagram showing a 352x8 BRIC Matrix being used to parallel test multiple DUTs.
The BRIC Matrix allows tremendous test system flexibility.

Switching Specification

Relay Type:	2 Amp Electro-mechanical Relay
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	100VDC/70VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	<1Ω
Off Path Resistance:	>10^9Ω
Thermal Offset:	10μV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	BRIC-2 & -4 = 65 BRIC-8 = 130
Switch Operate Time:	6.5ms
Expected Life (operations)	
Very low power signal load:	>$1x10^8$
Low power load (2W):	>$1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	>$5x10^6$ (1A 30VDC)
Full power load (60W):	>$1x10^5$ (2A 30VDC)

Typical Bandwidth and Crosstalk

Bandwidth (-3dB):	>5MHz	
Crosstalk (typical):	10kHz:	-65dB
	100kHz:	-45dB
	1MHz:	-30dB
	10MHz:	-15dB
Isolation (typical):	10kHz:	65dB
	100kHz:	50dB
	1MHz:	30dB
	10MHz:	10dB

Matrix Functionality

Permits any X to X with multiple connections and 8 concurrent Y paths. Direct Y connections are not provided at the user connector but can be accessed by reassignment of 8off X connections to provide Y connections. The driver prevents the connection of Y axis connections together (e.g. Y1 to Y4).

Power Requirements - BRIC2 & BRIC4

+3.3V	+5V	+12V	-12V
50mA	1.5A	35mA	0

Power Requirements - BRIC8

+3.3V	+5V	+12V	-12V
115mA	2.2A	35mA	0

Weight	Empty module	Fully loaded
BRIC2	0.6kg	1.3kg
BRIC4	0.9kg	2.2kg
BRIC8	1.6kg	4.2kg
BRIC daughter card		325g

Mechanical Characteristics

Two, four or eight slot 3U PXI (CompactPCI module).3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals are carried via multiple front panel 50-Way male D- Type connectors (Up to 2 per 2-slot module, up to 4 per 4-slot module or up to 8 per 8-slot module).

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to larger matrix sizes using daughter-cards, please consult your local sales office for further information.

40-567 BRIC Matrix Product Order Codes

BRIC2 - 2-Slot High Density Matrix	
2 Amp 1-Pole 44x8 Matrix	**40-567-201**
2 Amp 1-Pole 88x8 Matrix	**40-567-202**
BRIC4 - 4-Slot High Density Matrix	
2 Amp 1-Pole 44x8 Matrix	**40-567-001**
2 Amp 1-Pole 88x8 Matrix	**40-567-002**
2 Amp 1-Pole 132x8 Matrix	**40-567-003**
2 Amp 1-Pole 176x8 Matrix	**40-567-004**
BRIC8 - 8-Slot High Density Matrix	
2 Amp 1-Pole 44x8 Matrix	**40-567-101**
2 Amp 1-Pole 88x8 Matrix	**40-567-102**
2 Amp 1-Pole 132x8 Matrix	**40-567-103**
2 Amp 1-Pole 176x8 Matrix	**40-567-104**
2 Amp 1-Pole 220x8 Matrix	**40-567-105**
2 Amp 1-Pole 264x8 Matrix	**40-567-106**
2 Amp 1-Pole 308x8 Matrix	**40-567-107**
2 Amp 1-Pole 352x8 Matrix	**40-567-108**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-005-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-567 module please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

All Pickering's 1-Pole 2A BRICs are Available in 2, 4 or 8-Slot Formats

40-568 1-Pole 2 Amp BRIC™ 3U PXI Multi Slot Matrix Module

- Very High Density 2A Matrix With Up To 600 Crosspoints Per 2-Slot BRIC, 1200 Crosspoints Per 4-Slot BRIC & 2400 Crosspoints Per 8-Slot BRIC (300 Crosspoints Per PXI Slot)
- Integrated PXI Module With Built In High Performance Screened Analog Bus
- 2-Slot Configurations to 150x4 (1-Pole), 4-Slot Configurations to 300x4 (1-Pole), 8-Slot Configurations to 600x4 (1-Pole)
- Switch up to 200VDC/140VAC, 2A, 60W
- Automatic Analog Bus Isolation Switching Maximizes Bandwidth and Matrix Reliability
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 2 Amp Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling capability than the existing ultra high density reed relay based BRICs. But it is not as suited to switching low level signals, where Ruthenium Reed Relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560/561/562 range.

BRIC™ 2nd Generation PXI 2Amp Switch Matrix

The 40-568 PXI Matrix BRIC provides a range of high density matrix modules able to switch up to 2 Amps or 200VDC/140VAC. The 40-568 BRIC modules are available in 2, 4 or 8-slot PXI sizes to suit most high performance PXI Matrix requirements, constructed using high quality electro-mechanical relays for high switching confidence.

Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-568 PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of a much lower cost 8-slot PXI chassis.

High Reliability and Easy of Use

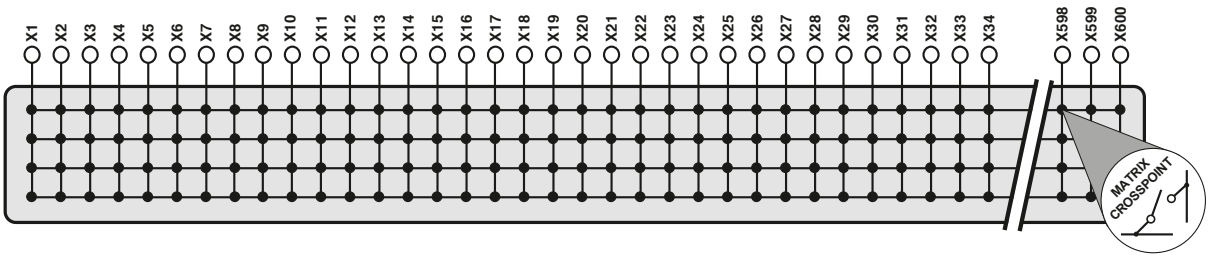
The 40-568 PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Pickering's Range of 2A BRIC Matrix Modules

Model No.	Poles	Y-Bus Size	Min. Matrix Size	Max. Matrix Size
40-568	1	4	75x4	600x4
40-596	1	6	58x6	464x6
40-567	1	8	44x8	352x8
40-597	1	12	32x12	256x12
40-598	1	16	24x16	192x16
40-566A	2	4	55x4	385x4
40-565A	2	8	24x8	192x8

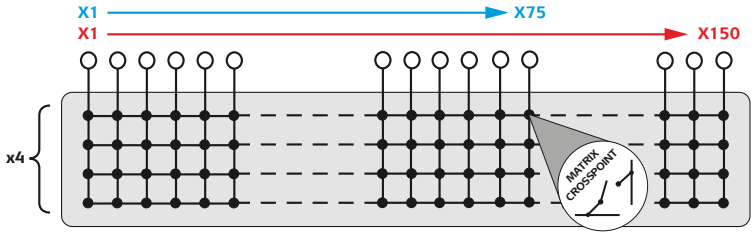
Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

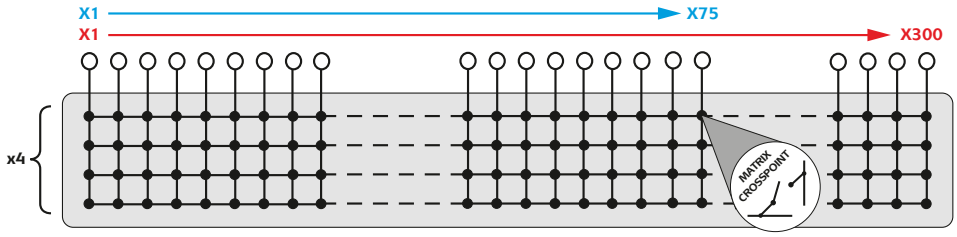


40-568-108 600x4 Matrix Switching Diagram (Fully Populated BRIC8)

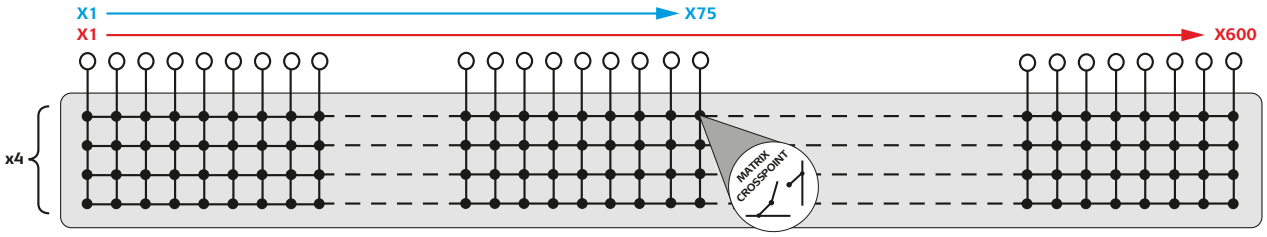
The 40-568 supports 4 concurrent switch paths for X to X (see application diagram overleaf)



The 40-568 in BRIC2 Format is Available With Matrix Configurations of 75x4 and 150x4

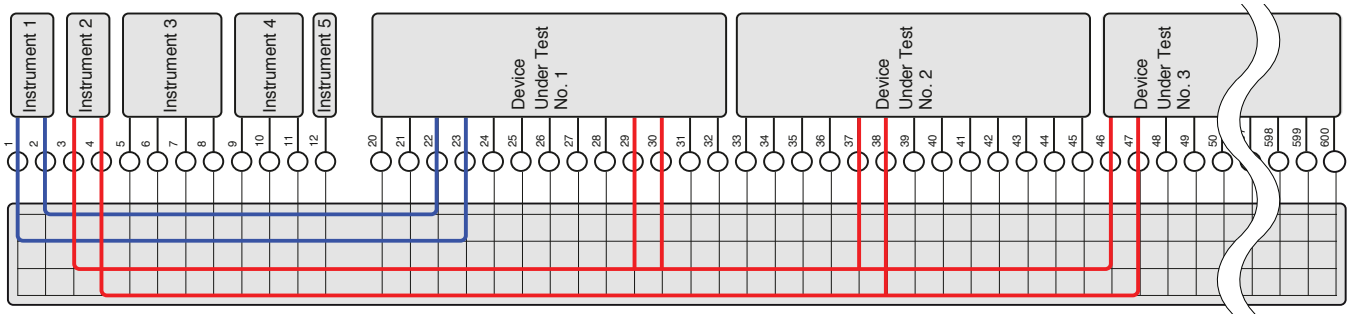


The 40-568 in BRIC4 Format is Available With Matrix Configurations Between 75x4 and 300x4



The 40-568 in BRIC8 Format is Available With Matrix Configurations Between 75x4 and 600x4

Example Application of the 40-568 1-Pole 2A BRIC Matrix



Schematic diagram showing a 600x4 BRIC Matrix being used to parallel test multiple DUTs.
The BRIC Matrix allows tremendous test system flexibility.

Switching Specification

Relay Type:	2 Amp Electro-Mechanical Relay
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	200VDC/140VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	<1Ω
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	15µV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	65 per BRIC4, 130 per BRIC8
Switch Operate Time:	6.5ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

Typical Bandwidth and Crosstalk

Bandwidth (-3dB):	>5MHz	
Crosstalk (typical):	10kHz:	-70dB
	100kHz:	-55dB
	1MHz:	-35dB
	10MHz:	-20dB
Isolation (typical):	10kHz:	90dB
	100kHz:	70dB
	1MHz:	50dB
	10MHz:	30dB

Matrix Functionality

Permits any X to X with multiple connections and 4 concurrent Y paths. Direct Y connections are not provided at the user connector but can be accessed by reassignment of 4 off X connections to provide Y connections. The driver prevents the connection of Y axis connections together (e.g. Y1 to Y4).

Power Requirements - BRIC2 & BRIC4

+3.3V	+5V	+12V	-12V
50mA	1.5A	35mA	0

Power Requirements - BRIC8

+3.3V	+5V	+12V	-12V
115mA	2.2A	35mA	0

Weight	Empty module	Fully loaded
BRIC2	0.5kg	1.3kg
BRIC4	0.9kg	2.2kg
BRIC8	1.6kg	4.2kg
BRIC daughter card		325g

Mechanical Characteristics

Two, four or eight slot 3U PXI (CompactPCI module).3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals are carried via multiple front panel 78-Way male D- Type connectors (1 or 2 per 2-slot module, up to 4 per 4-slot module or up to 8 per 8-slot module).

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to larger matrix sizes using daughter-cards, please consult your local sales office for further information.

40-568 BRIC Matrix Product Order Codes

BRIC2 - 2-Slot High Density Matrix	
2 Amp 1-Pole 75x4 Matrix	**40-568-201**
2 Amp 1-Pole 150x4 Matrix	**40-568-202**
BRIC4 - 4-Slot High Density Matrix	
2 Amp 1-Pole 75x4 Matrix	**40-568-001**
2 Amp 1-Pole 150x4 Matrix	**40-568-002**
2 Amp 1-Pole 225x4 Matrix	**40-568-003**
2 Amp 1-Pole 300x4 Matrix	**40-568-004**
BRIC8 - 8-Slot High Density Matrix	
2 Amp 1-Pole 75x4 Matrix	**40-568-101**
2 Amp 1-Pole 150x4 Matrix	**40-568-102**
2 Amp 1-Pole 225x4 Matrix	**40-568-103**
2 Amp 1-Pole 300x4 Matrix	**40-568-104**
2 Amp 1-Pole 375x4 Matrix	**40-568-105**
2 Amp 1-Pole 450x4 Matrix	**40-568-106**
2 Amp 1-Pole 525x4 Matrix	**40-568-107**
2 Amp 1-Pole 600x4 Matrix	**40-568-108**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-568 module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

All Pickering's 1-Pole 2A BRICs are Available in 2, 4 or 8-Slot Formats

40-596 1-Pole 2 Amp BRIC™ 3U PXI Multi Slot Matrix Module

- **Very High Density 2A Matrix With Up To 696 Crosspoints Per 2-Slot BRIC, 1392 Crosspoints Per 4-Slot BRIC & 2784 Crosspoints Per 8-Slot BRIC (348 Crosspoints Per PXI Slot)**
- **Integrated PXI Module With Built In High Performance Screened Analog Bus**
- **2-Slot Configurations to 116x6 (1-Pole), 4-Slot Configurations to 232x6 (1-Pole) & 8-Slot Configurations to 464x6 (1-Pole)**
- **Switch up to 150VDC/100VAC, 2A, 60W**
- **Automatic Analog Bus Isolation Switching Maximizes Bandwidth and Matrix Reliability**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **Supported by eBIRST**
- **3 Year Warranty**

The 2 Amp Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling capability than the existing ultra high density reed relay based BRICs. But it is not as suited to switching low level signals, where Ruthenium Reed Relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560/561/562 range.

BRIC™ 2nd Generation PXI 2Amp Switch Matrix

The 40-596 PXI Matrix BRIC provides a range of high density matrix modules able to switch up to 2 Amps or 150VDC/100VAC. The 40-596 BRIC modules are available in 2, 4 or 8-slot PXI sizes to suit most high performance PXI Matrix requirements, constructed using high quality electro-mechanical relays for high switching confidence.

Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-596 PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of a much lower cost 8-slot PXI chassis.

High Reliability and Easy of Use

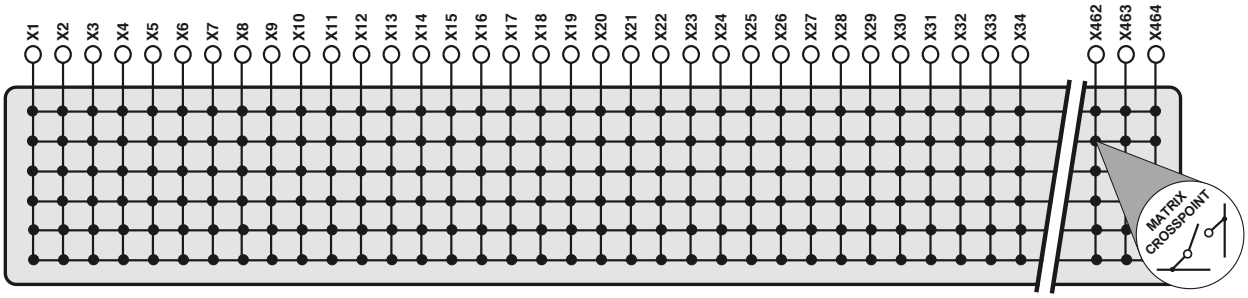
The 40-596 PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Pickering's Range of 2A BRIC Matrix Modules

Model No.	Poles	Y-Bus Size	Min. Matrix Size	Max. Matrix Size
40-568	1	4	75x4	600x4
40-596	1	6	58x6	464x6
40-567	1	8	44x8	352x8
40-597	1	12	32x12	256x12
40-598	1	16	24x16	192x16
40-566A	2	4	55x4	385x4
40-565A	2	8	24x8	192x8

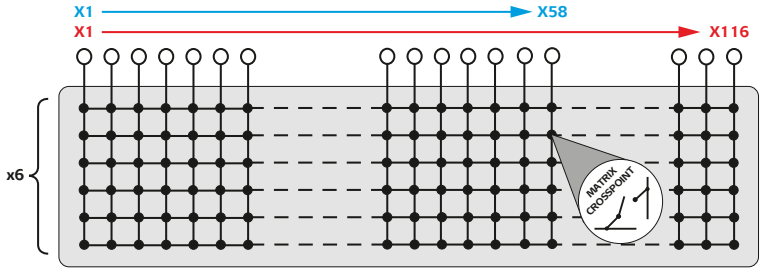
Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

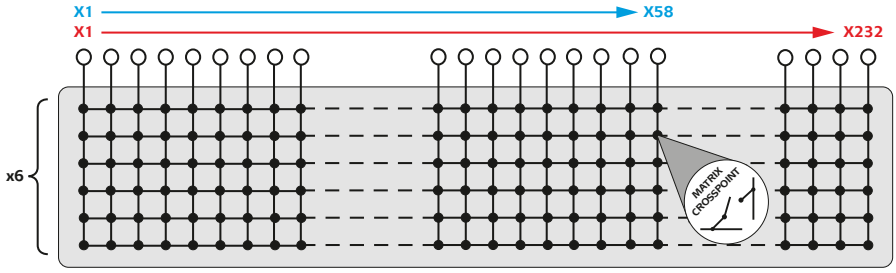


40-596-208 464x6 Matrix Switching Diagram (Fully Populated BRIC8)

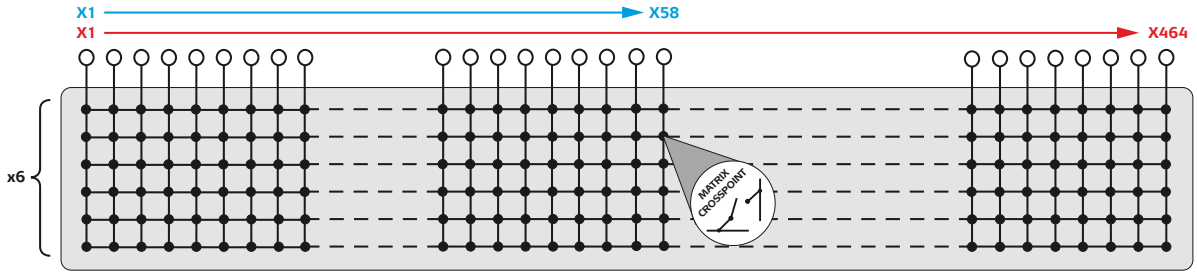
The 40-596 supports 6 concurrent switch paths for X to X (see application diagram overleaf)



The 40-596 in BRIC2 Format is Available With Matrix Configurations of 58x6 and 116x6

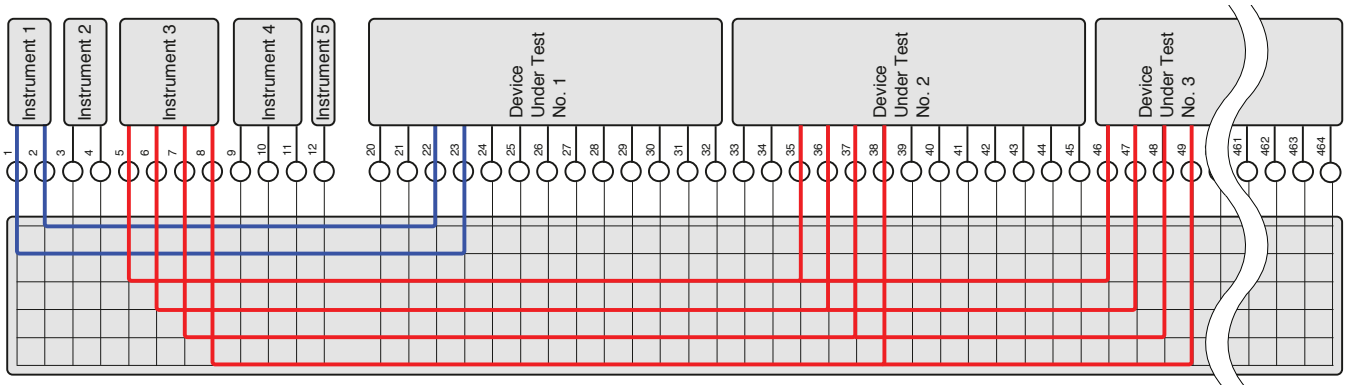


The 40-596 in BRIC4 Format is Available With Matrix Configurations Between 58x6 and 232x6



The 40-596 in BRIC8 Format is Available With Matrix Configurations Between 58x6 and 464x6

Example Application of the 40-596 1-Pole 2A BRIC Matrix



Schematic diagram showing a 464x6 BRIC Matrix being used to parallel test multiple DUTs.
The BRIC Matrix allows tremendous test system flexibility.

Switching Specification

Relay Type:	2 Amp Electro-Mechanical Relay
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	150VDC/100VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	<1Ω
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	15µV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	65 per BRIC2 or BRIC4, 130 per BRIC8
Switch Operate Time:	6.5ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

Typical Bandwidth and Crosstalk

Bandwidth (-3dB):	>5MHz	
Crosstalk (typical):	10kHz:	-75dB
	100kHz:	-55dB
	1MHz:	-35dB
	10MHz:	-20dB
Isolation (typical):	10kHz:	100dB
	100kHz:	80dB
	1MHz:	60dB
	10MHz:	40dB

Matrix Functionality

Permits any X to X with multiple connections and 6 concurrent Y paths. Direct Y connections are not provided at the user connector but can be accessed by reassignment of 6off X connections to provide Y connections. The driver prevents the connection of Y axis connections together (e.g. Y1 to Y4).

Power Requirements - BRIC2 & BRIC4

+3.3V	+5V	+12V	-12V
50mA	1.5A	35mA	0

Power Requirements - BRIC8

+3.3V	+5V	+12V	-12V
115mA	2.2A	35mA	0

Weight	Empty module	Fully loaded
BRIC2	0.6kg	1.3kg
BRIC4	0.9kg	2.2kg
BRIC8	1.6kg	4.2kg
BRIC daughter card		325g

Mechanical Characteristics

Two, four or eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals are carried via multiple front panel 78-Way male D-Type connectors (1 or 2 per 2-slot module, up to 4 per 4-slot module or up to 8 per 8-slot module).

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to larger matrix sizes using daughter-cards, please consult your local sales office for further information.

X40-596 BRIC Matrix Product Order Codes

BRIC2 - 2-Slot High Density Matrix	
2 Amp 1-Pole 58x6 Matrix	**40-596-201**
2 Amp 1-Pole 116x6 Matrix	**40-596-202**
BRIC4 - 4-Slot High Density Matrix	
2 Amp 1-Pole 58x6 Matrix	**40-596-001**
2 Amp 1-Pole 116x6 Matrix	**40-596-002**
2 Amp 1-Pole 174x6 Matrix	**40-596-003**
2 Amp 1-Pole 232x6 Matrix	**40-596-004**
BRIC8 - 8-Slot High Density Matrix	
2 Amp 1-Pole 58x6 Matrix	**40-596-101**
2 Amp 1-Pole 116x6 Matrix	**40-596-102**
2 Amp 1-Pole 174x6 Matrix	**40-596-103**
2 Amp 1-Pole 232x6 Matrix	**40-596-104**
2 Amp 1-Pole 290x6 Matrix	**40-596-105**
2 Amp 1-Pole 348x6 Matrix	**40-596-106**
2 Amp 1-Pole 406x6 Matrix	**40-596-107**
2 Amp 1-Pole 464x6 Matrix	**40-596-108**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-596 module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

All Pickering's 1-Pole 2A BRICs are Available in 2, 4 or 8-Slot Formats

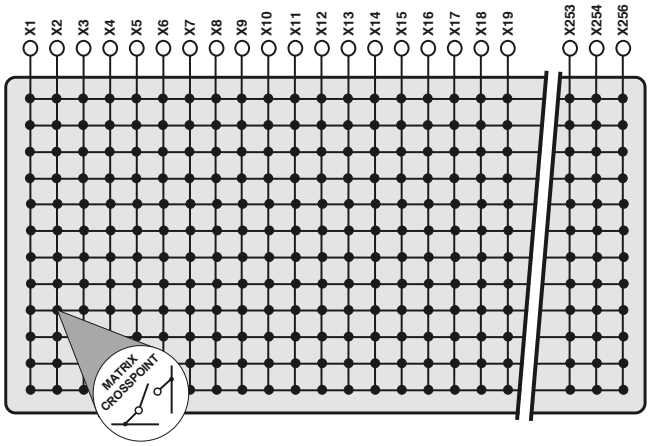
40-597 1-Pole 2 Amp BRIC™ 3U PXI Multi Slot Matrix Module

- **Very High Density 2A Matrix With Up To 768 Crosspoints Per 2-Slot BRIC, 1536 Crosspoints Per 4-Slot BRIC & 3072 Crosspoints Per 8-Slot BRIC (384 Crosspoints Per PXI Slot)**
- **Integrated PXI Module With Built In High Performance Screened Analog Bus**
- **2-Slot Configurations to 64x12 (1-Pole), 4-Slot Configurations to 128x12 (1-Pole) & 8-Slot Configurations to 256x12 (1-Pole)**
- **Switch up to 100VDC/70VAC, 2A, 60W**
- **Automatic Analog Bus Isolation Switching Maximizes Bandwidth and Matrix Reliability**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **Supported by eBIRST**
- **3 Year Warranty**

The 2 Amp Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling capability than the existing ultra high density reed relay based BRICs. But it is not as suited to switching low level signals, where Ruthenium Reed Relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560/561/562 range.

BRIC™ 2nd Generation PXI 2Amp Switch Matrix

The 40-597 PXI Matrix BRIC provides a range of high density matrix modules able to switch up to 2 Amps or 100VDC/70VAC. The 40-597 BRIC modules are available in 2, 4 or 8-slot PXI sizes to suit most high performance PXI Matrix requirements, constructed using high quality electro-mechanical relays for high switching confidence.



40-597-108 256x12 Matrix Switching Diagram (Fully Populated BRIC8)

The 40-597 supports 12 concurrent switch paths for X to X (see application diagram overleaf)

Pickering's Range of 2A BRIC Matrix Modules				
Model No.	**Poles**	**Y-Bus Size**	**Min. Matrix Size**	**Max. Matrix Size**
40-568	1	4	75x4	600x4
40-596	1	6	58x6	464x6
40-567	1	8	44x8	352x8
40-597	1	12	32x12	256x12
40-598	1	16	24x16	192x16
40-566A	2	4	55x4	385x4
40-565A	2	8	24x8	192x8

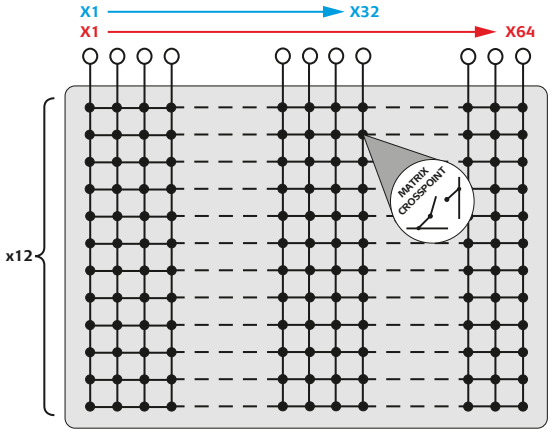
Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-597 PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of a much lower cost 8-slot PXI chassis.

High Reliability and Easy of Use

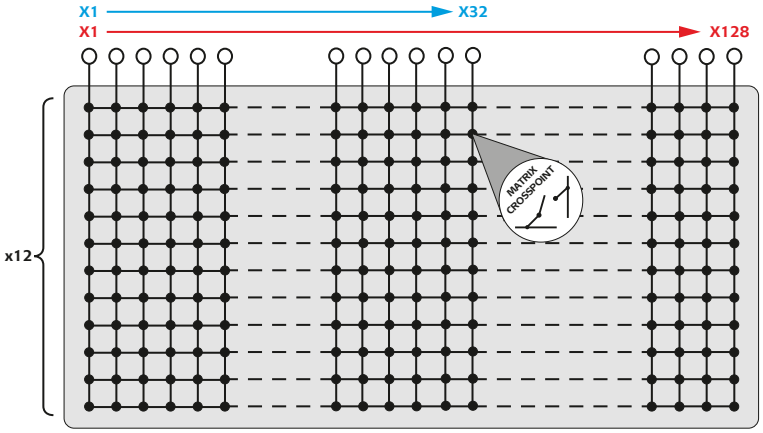
The 40-597 PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Supported by eBIRST

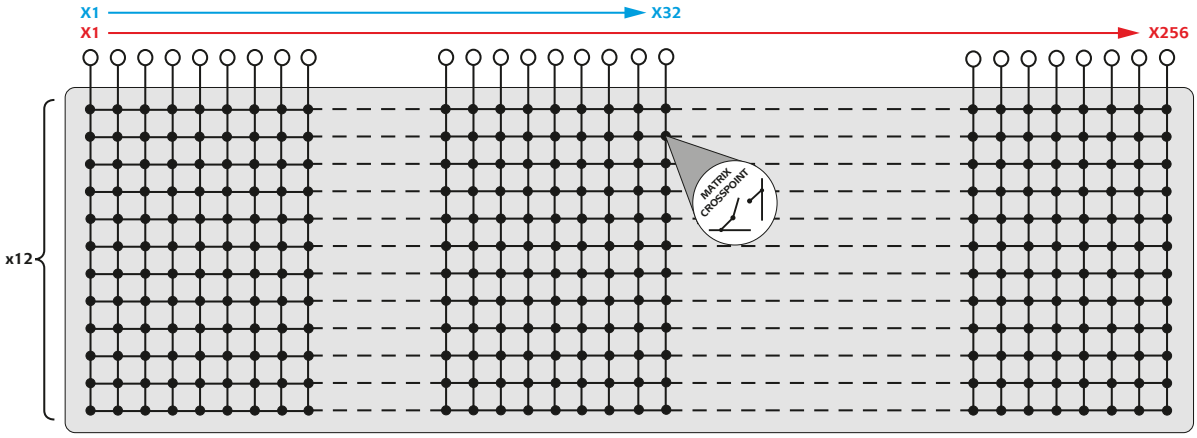
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



The 40-597 in BRIC2 Format is Available With Matrix Configurations of 32x12 and 64x12

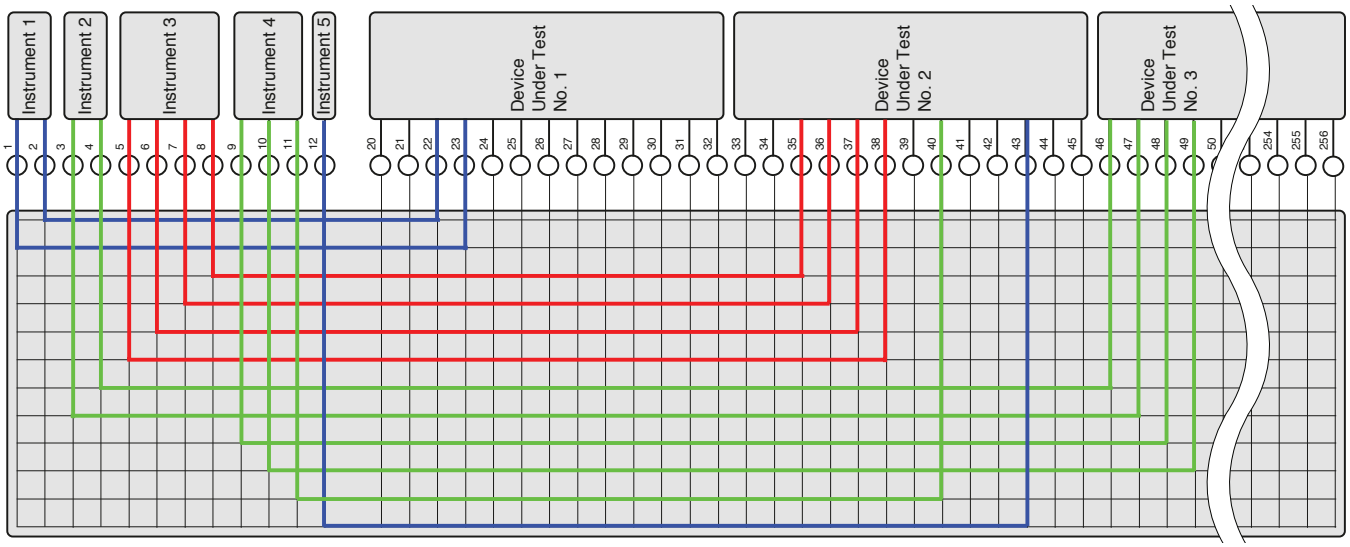


The 40-597 in BRIC4 Format is Available With Matrix Configurations Between 32x12 and 128x12



The 40-597 in BRIC8 Format is Available With Matrix Configurations Between 32x12 and 256x12

Example Application of the 40-597 1-Pole 2A BRIC Matrix



Schematic diagram showing a 256x12 BRIC Matrix being used to parallel test multiple DUTs. The BRIC Matrix allows tremendous test system flexibility.

Switching Specification

Relay Type:	2 Amp Electro-mechanical Relay
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	100VDC/70VAC
Max Power: Max Switch Current: Max Continuous Carry Current: Max Pulsed Carry Current Example (for a single switch path):	62.5VA, 60W 2A 2A 6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance: Off Path Resistance: Thermal Offset:	<1Ω $>10^9$Ω 10µV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	65 per BRIC2 or BRIC4, 130 per BRIC8
Switch Operate Time:	6.5ms
Expected Life (operations) Very low power signal load: Low power load (2W): Medium power load (30W): Full power load (60W):	 $>1x10^8$ $>1.5x10^7$ (0.1A 20VDC) $>5x10^6$ (1A 30VDC) $>1x10^5$ (2A 30VDC)

Typical Bandwidth and Crosstalk

Bandwidth (-3dB):	>5MHz	
Crosstalk (typical):	10kHz: 100kHz: 1MHz: 10MHz:	-70dB -55dB -35dB -20dB
Isolation (typical):	10kHz: 100kHz: 1MHz: 10MHz:	75dB 60dB 40dB 20dB

Matrix Functionality

Permits any X to X with multiple connections and 12 concurrent Y paths. Direct Y connections are not provided at the user connector but can be accessed by reassignment of 12off X connections to provide Y connections. The driver prevents the connection of Y axis connections together (e.g. Y1 to Y4).

Power Requirements - BRIC2 & BRIC4

+3.3V	+5V	+12V	-12V
50mA	1.5A	35mA	0

Power Requirements - BRIC8

+3.3V	+5V	+12V	-12V
115mA	2.2A	35mA	0

Weight	Empty module	Fully loaded
BRIC2	0.6kg	1.3kg
BRIC4	0.9kg	2.2kg
BRIC8	1.6kg	4.2kg
BRIC daughter card		325g

Mechanical Characteristics

Two, four or eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals are carried via multiple front panel 37-Way male D-Type connectors (Up to 4 per 4-slot module or up to 8 per 8-slot module).

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to larger matrix sizes using daughter-cards, please consult your local sales office for further information.

X40-597 BRIC Matrix Product Order Codes

BRIC2 - 2-Slot High Density Matrix	
2 Amp 1-Pole 32x12 Matrix	**40-597-201**
2 Amp 1-Pole 64x12 Matrix	**40-597-202**
BRIC4 - 4-Slot High Density Matrix	
2 Amp 1-Pole 32x12 Matrix	**40-597-001**
2 Amp 1-Pole 64x12 Matrix	**40-597-002**
2 Amp 1-Pole 96x12 Matrix	**40-597-003**
2 Amp 1-Pole 128x12 Matrix	**40-597-004**
BRIC8 - 8-Slot High Density Matrix	
2 Amp 1-Pole 32x12 Matrix	**40-597-101**
2 Amp 1-Pole 64x12 Matrix	**40-597-102**
2 Amp 1-Pole 96x12 Matrix	**40-597-103**
2 Amp 1-Pole 128x12 Matrix	**40-597-104**
2 Amp 1-Pole 160x12 Matrix	**40-597-105**
2 Amp 1-Pole 192x12 Matrix	**40-597-106**
2 Amp 1-Pole 224x12 Matrix	**40-597-107**
2 Amp 1-Pole 256x12 Matrix	**40-597-108**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-005-001**	**93-005-418**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-597 module please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

All Pickering's 1-Pole 2A BRICs are Available in 2, 4 or 8-Slot Formats

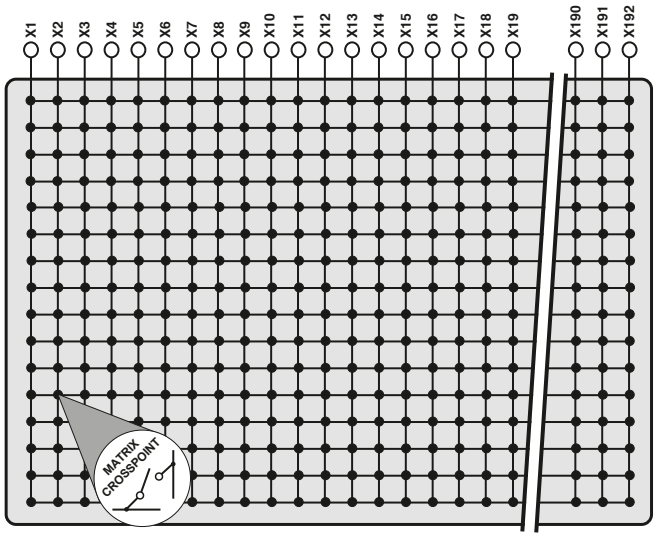
40-598 1-Pole 2 Amp BRIC™ 3U PXI Multi Slot Matrix Module

- **Very High Density 2A Matrix With Up To 768 Crosspoints Per 2-Slot BRIC, 1536 Crosspoints Per 4-Slot BRIC & 3072 Crosspoints Per 8-Slot BRIC (384 Crosspoints Per PXI Slot)**
- **Integrated PXI Module With Built In High Performance Screened Analog Bus**
- **2-Slot Configurations to 48x16 (1-Pole), 4-Slot Configurations to 96x16 (1-Pole) & 8-Slot Configurations to 192x16 (1-Pole)**
- **Switch up to 100VDC/70VAC, 2A, 60W**
- **Automatic Analog Bus Isolation Switching Maximizes Bandwidth and Matrix Reliability**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **Supported by eBIRST**
- **3 Year Warranty**

The 2 Amp Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling capability than the existing ultra high density reed relay based BRICs. But it is not as suited to switching low level signals, where Ruthenium Reed Relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560/561/562 range.

BRIC™ 2nd Generation PXI 2Amp Switch Matrix

The 40-598 PXI Matrix BRIC provides a range of high density matrix modules able to switch up to 2 Amps or 100VDC/70VAC. The 40-598 BRIC modules are available in 2, 4 or 8-slot PXI sizes to suit most high performance PXI Matrix requirements, constructed using high quality electro-mechanical relays for high switching confidence.



40-598-208 192x16 Matrix Switching Diagram (Fully Populated BRIC8)

The 40-598 supports 16 concurrent switch paths for X to X (see application diagram overleaf)

Pickering's Range of 2A BRIC Matrix Modules				
Model No.	**Poles**	**Y-Bus Size**	**Min. Matrix Size**	**Max. Matrix Size**
40-568	1	4	75x4	600x4
40-596	1	6	58x6	464x6
40-567	1	8	44x8	352x8
40-597	1	12	32x12	256x12
40-598	1	16	24x16	192x16
40-566A	2	4	55x4	385x4
40-565A	2	8	24x8	192x8

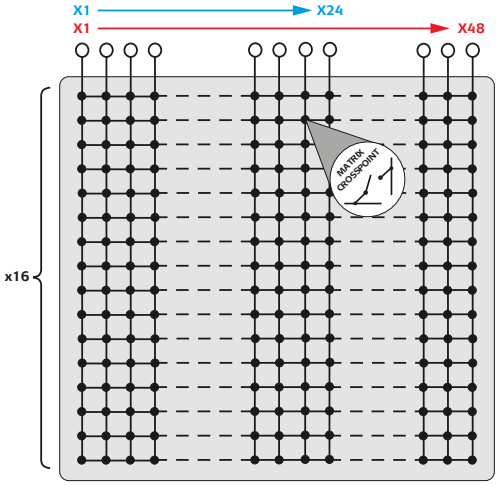
Typical applications include signal routing for Functional ATE systems. With this high level of switching density, 40-596 PXI matrix modules allow a complete Functional ATE system to be housed in a single 3U PXI chassis, BRIC Modules allow the use of a much lower cost 8-slot PXI chassis.

High Reliability and Easy of Use

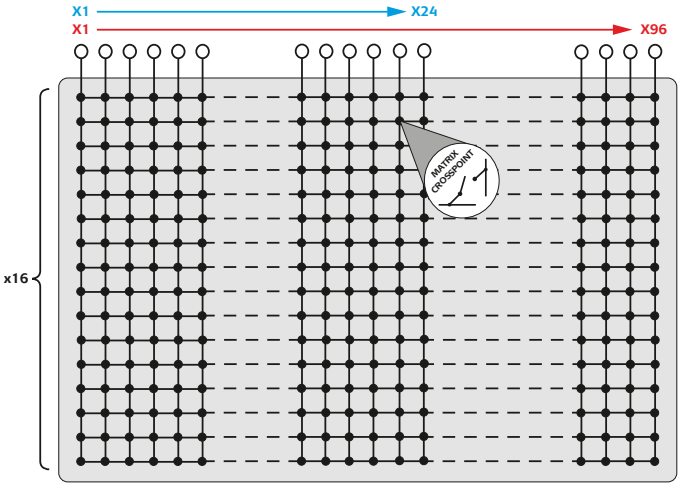
The 40-598 PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Supported by eBIRST

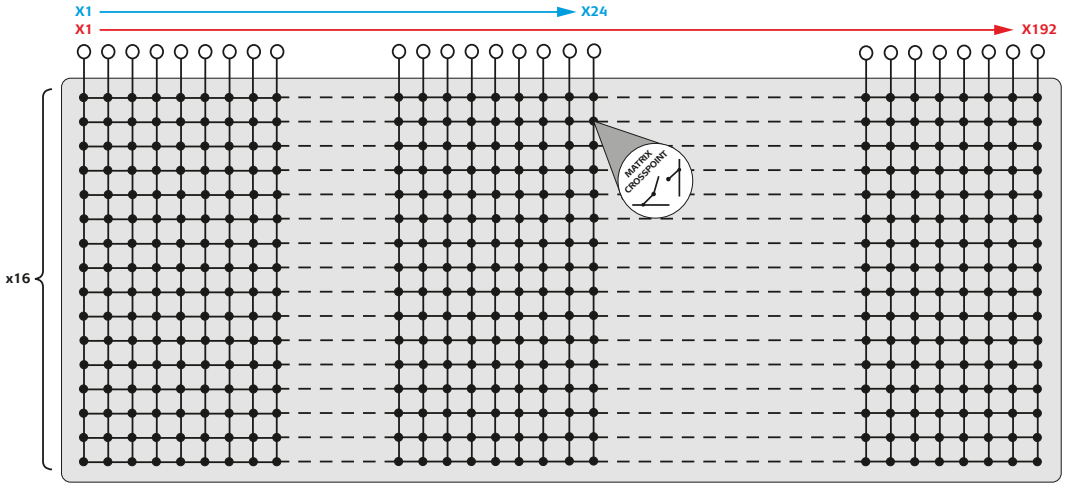
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



The 40-598 in BRIC2 Format is Available With Matrix Configurations of 24x16 and 48x16

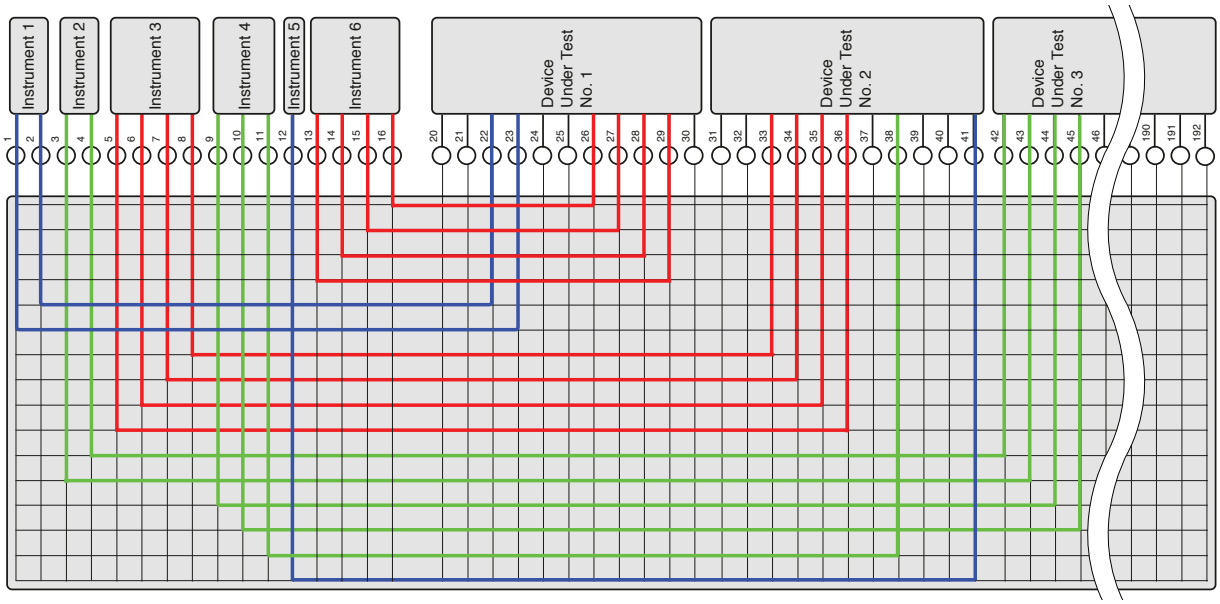


The 40-598 in BRIC4 Format is Available With Matrix Configurations Between 24x16 and 96x16



The 40-598 in BRIC8 Format is Available With Matrix Configurations Between 24x16 and 192x16

Example Application of the 40-598 1-Pole 2A BRIC Matrix



Schematic diagram showing a 192x16 BRIC Matrix being used to parallel test multiple DUTs. The BRIC Matrix allows tremendous test system flexibility.

Switching Specification

Relay Type:	2 Amp Electro-Mechanical Relay
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	100VDC/70VAC
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial On Path Resistance:	<1Ω
Off Path Resistance:	>10^9Ω
Thermal Offset:	10µV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	65 per BRIC2 or BRIC4, 130 per BRIC8
Switch Operate Time:	6.5ms
Expected Life (operations)	
Very low power signal load:	>1x10^8
Low power load (2W):	>1.5x10^7 (0.1A 20VDC)
Medium power load (30W):	>5x10^6 (1A 30VDC)
Full power load (60W):	>1x10^5 (2A 30VDC)

Typical Bandwidth and Crosstalk

Bandwidth (-3dB):	>5MHz	
Crosstalk (typical):	10kHz:	-65dB
	100kHz:	-50dB
	1MHz:	-35dB
	10MHz:	-20dB
Isolation (typical):	10kHz:	100dB
	100kHz:	85dB
	1MHz:	65dB
	10MHz:	40dB

Matrix Functionality

Permits any X to X with multiple connections and 16 concurrent Y paths. Direct Y connections are not provided at the user connector but can be accessed by reassignment of 16off X connections to provide Y connections. The driver prevents the connection of Y axis connections together (e.g. Y1 to Y4).

Power Requirements - BRIC2 & BRIC4

+3.3V	+5V	+12V	-12V
50mA	1.5A	35mA	0

Power Requirements - BRIC8

+3.3V	+5V	+12V	-12V
115mA	2.2A	35mA	0

Weight	Empty module	Fully loaded
BRIC2	0.6kg	1.3kg
BRIC4	0.9kg	2.2kg
BRIC8	1.6kg	4.2kg
BRIC daughter card		325g

Mechanical Characteristics

Two, four or eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals are carried via multiple front panel 25-Way male D-Type connectors (1 or 2 per 2-slot module, up to 4 per 4-slot module or up to 8 per 8-slot module).

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to larger matrix sizes using daughter-cards, please consult your local sales office for further information.

X40-598 BRIC Matrix Product Order Codes

BRIC2 - 2-Slot High Density Matrix	
2 Amp 1-Pole 24x16 Matrix	**40-598-201**
2 Amp 1-Pole 48x16 Matrix	**40-598-202**
BRIC4 - 4-Slot High Density Matrix	
2 Amp 1-Pole 24x16 Matrix	**40-598-001**
2 Amp 1-Pole 48x16 Matrix	**40-598-002**
2 Amp 1-Pole 72x16 Matrix	**40-598-003**
2 Amp 1-Pole 96x16 Matrix	**40-598-004**
BRIC8 - 8-Slot High Density Matrix	
2 Amp 1-Pole 24x16 Matrix	**40-598-101**
2 Amp 1-Pole 48x16 Matrix	**40-598-102**
2 Amp 1-Pole 72x16 Matrix	**40-598-103**
2 Amp 1-Pole 96x16 Matrix	**40-598-104**
2 Amp 1-Pole 120x16 Matrix	**40-598-105**
2 Amp 1-Pole 144x16 Matrix	**40-598-106**
2 Amp 1-Pole 168x16 Matrix	**40-598-107**
2 Amp 1-Pole 192x16 Matrix	**40-598-108**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-005-001**	**93-005-414**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-598 module please refer to the **90-008D** 25-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

All Pickering's 1-Pole 2A BRICs are Available in 2, 4 or 8-Slot Formats

Fault/Signal Insertion Matrix Modules

- Designed For Fault Insertion Applications
- Breakout Connections For Wiring to Sensors
- Pickering BRIC™ Architecture Provides Scalable Matrix Size
- Wide Range of Matrix Sizes
- Partially Populated Configurations Available
- Ruthenium Reed Relay Versions For Maximum Signal Performance
- Electro-mechanical Relay Versions For Current Handling up to 10 Amps
- Occupy 4 or 8 3U PXI Slots
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-592A BRIC8 FIBO Matrix Module

The Fault Insertion matrices are designed specifically for safety critical applications where the response of a control system is required to be evaluated when sensor connections behave in unexpected ways. This is particularly important in safety critical applications, such as automotive and aeronautical systems, where unexpected controller behavior could result in loss of life or substantial asset loss.

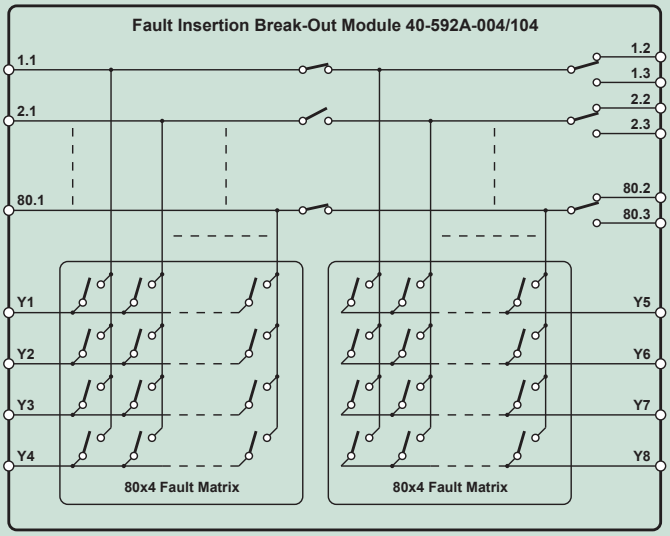
All these matrices feature a breakout arrangement that allows faults to be attached to the sensor lines via the Y axis. This includes the breaking of a connection or the adding of a series defect – all of which can simulate connectivity problems in the system. The three pin breakout versions allow the connection to be swapped for a "bad" sensor simulation.

The use of a programmable matrix for fault insertion ensures testing is fast to perform and can be reproduced on subsequent test cycles in the event of corrective action or a system upgrade.

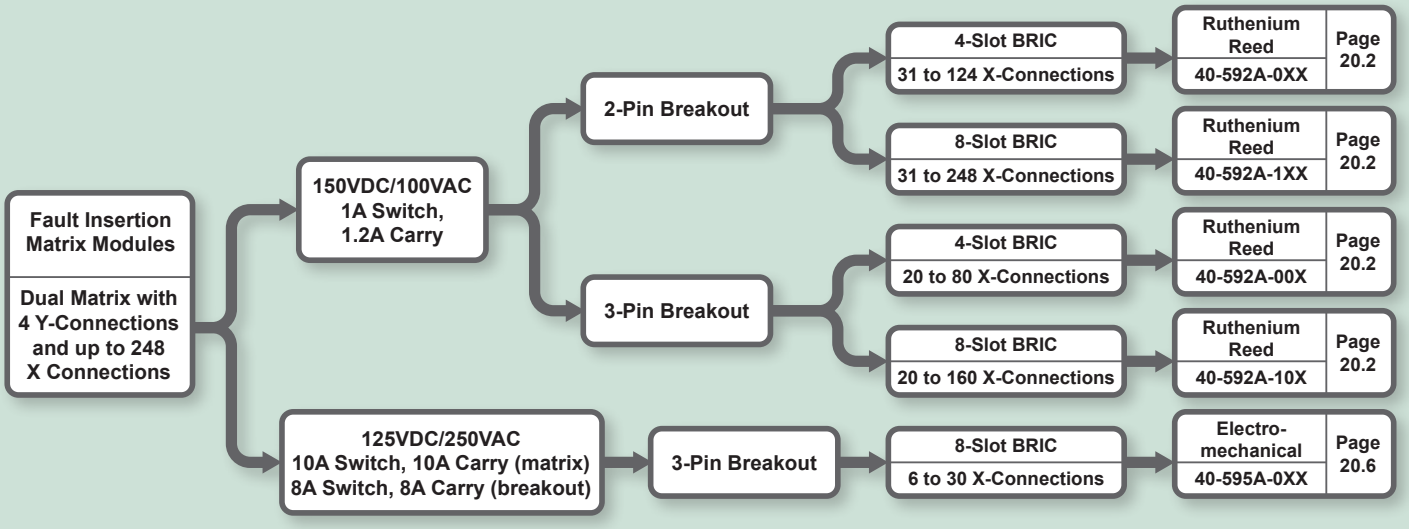
All reed relay matrices use high quality sputtered ruthenium relays that exhibit excellent contact performance under low and medium level switching conditions. For applications that require fault insertion in power circuits and current handling up to 10A, Pickering's matrices based on electromechanical relays provide an ideal solution.

The matrix design is based on Pickering's proven BRIC architecture that allows the matrix size required for an application to be selected from the many versions available. Also, any FIBO matrix is available in partially populated configurations giving a cost effective solution for specific applications. Please consult the sales office for details.

Connectors used are fully supported by Pickering's accessory range of cables.



Example Configuration: 40-592A BRIC8 Dual 80x4 FIBO Matrix Module With 3-Pin Breakout



40-592A
BRIC™ High-Density FIBO Matrix Module

- Integrated PXI Matrix Module With Built In High Performance Screened 8-Channel Analog Bus
- 2 or 3-Pin Breakout Configurations For Fault Simulation and Specialist Test Applications
- Very high Density With a Dual 248x4 Matrix in an 8-slot Module (Including 2-Pin Breakout)
- Load Just The Number of Daughter Switch Cards You Need For Your Application
- Uses High Reliability Ruthenium Reed Relays for Maximum Performance
- Switches up to 150Volts, 1A, 20W
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-592A FIBO (Fault Insertion Break-Out) Matrix Module is a large-scale high density switching matrix based on the Pickering BRIC™ format.

The fault insertion BRICs are designed for applications requiring the simulation of a variety of faults in complex, high pin count, applications involving sensors and control units. Typical faults that can be simulated are open-circuits, short-circuits to ground or battery, or short-circuits between input/output lines. Typical applications are in automotive and aerospace industries which involve safety or mission critical systems that have to behave predictably when cabling or sensor faults occur.

The FIBO Matrix Module is available as either a BRIC4 containing up to 4 daughter cards or a BRIC8 containing up to 8 daughter cards. This allows the X-bus of the matrix to be expanded in multiples of 31 for the 2-pin breakout version or multiples of 20 for the 3-pin breakout version.

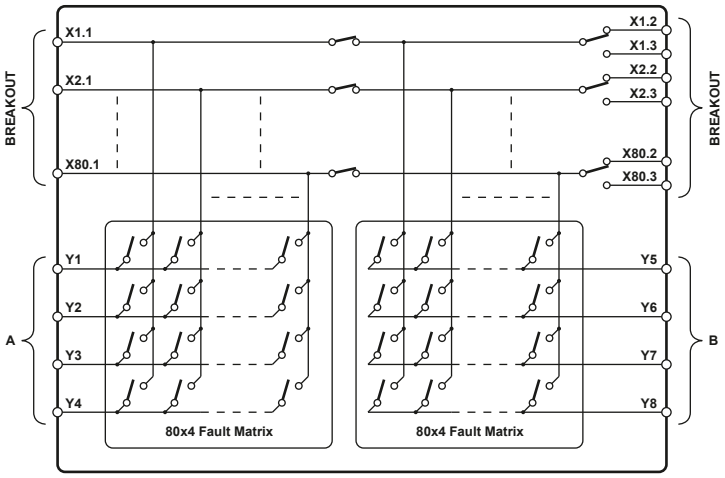
The use of a programmable matrix designed to aid the simulation of faults allows measurement controllers and management systems to be automated, ensuring that the test can be performed quickly and reliably.

The fault insertion BRIC uses ruthenium reed relays to ensure a long and trouble free service life.

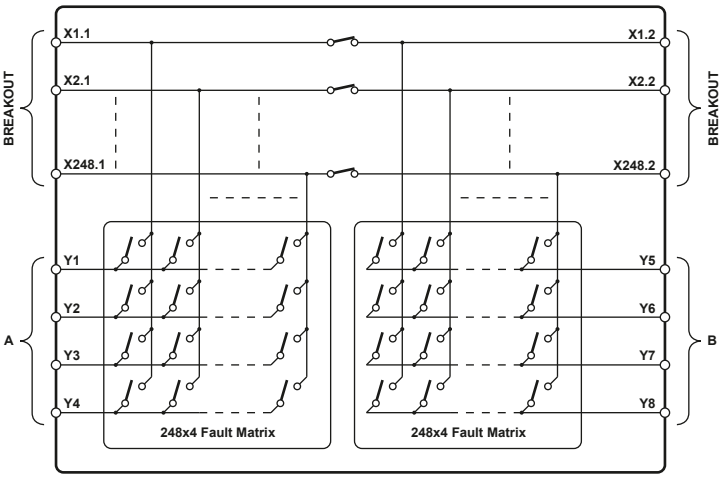
The backplane interface of the fault insertion BRIC uses a high speed buffered interface that ensure low latency on the the bus, ideal for operation with real time operating systems

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



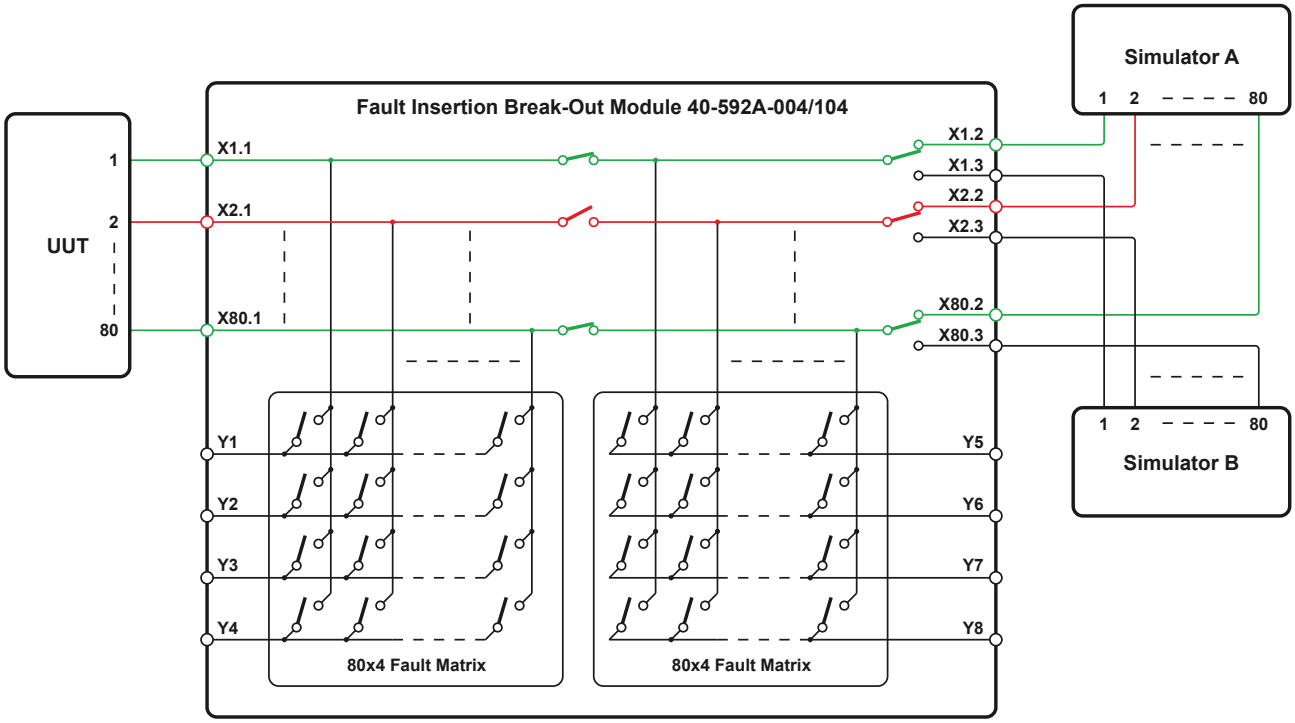
Schematic of the 40-592A-104 Dual 80x4 FIBO High Density Matrix Module with 3-pin breakout (switches are shown in their default state



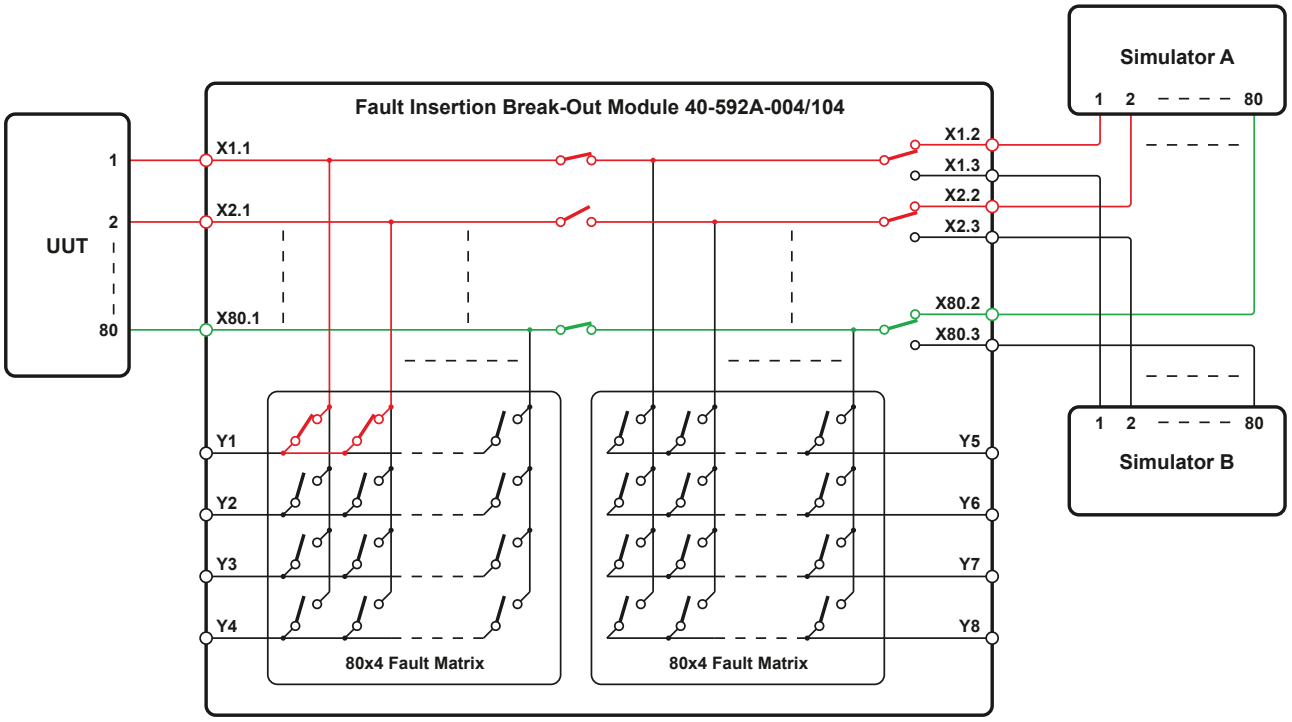
Schematic of the 40-592A-118 Dual 248x4 High Density FIBO Matrix Module with 2-pin breakout (switches are shown in their default state)

Fault Insertion Examples Using The FIBO Matrix

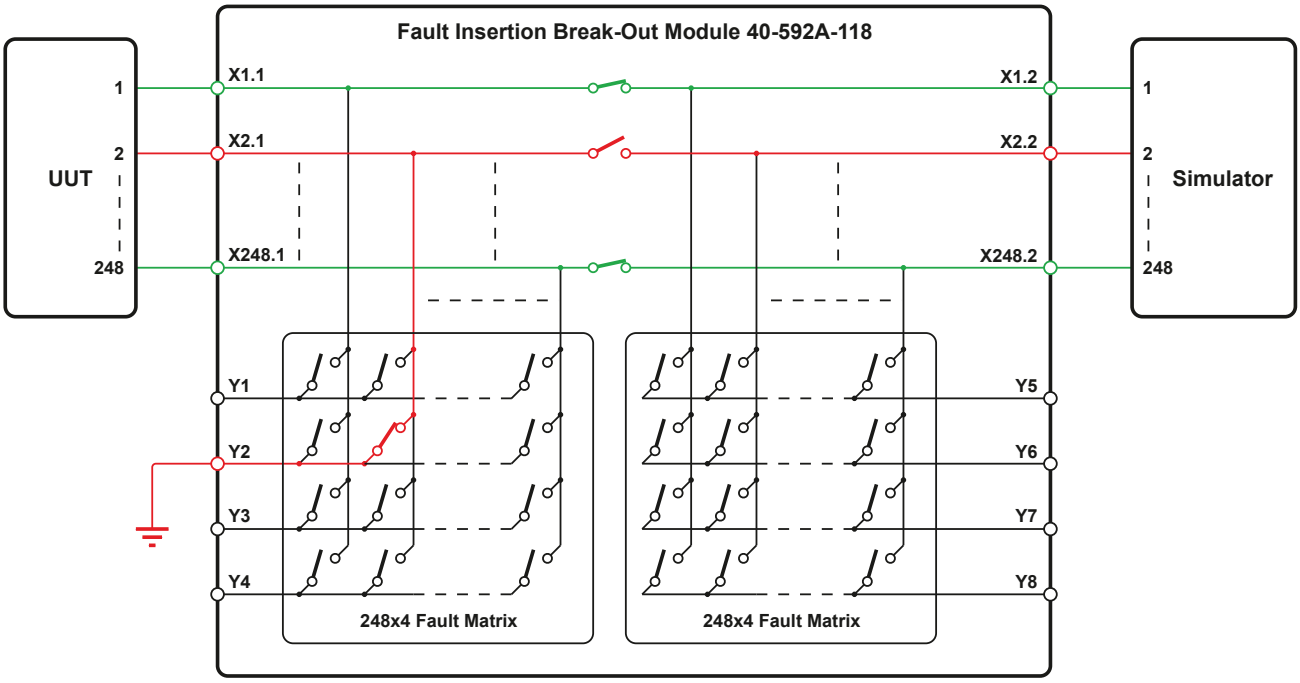
In a typical fault insertion example the X breakout connections are used to connect either a simulated sensor or a real sensor output to the device under test. The isolation switch can be used to disconnect the sensor source and faults can be inserted on either the sensor side or the device side of the isolation switch. Fault networks are connected to the Y axis connections to simulate shorts to ground or to power, or to simulate the effect of leakage paths. High resistance paths can also be simulated either in series with the signal or as a leakage between signal paths.



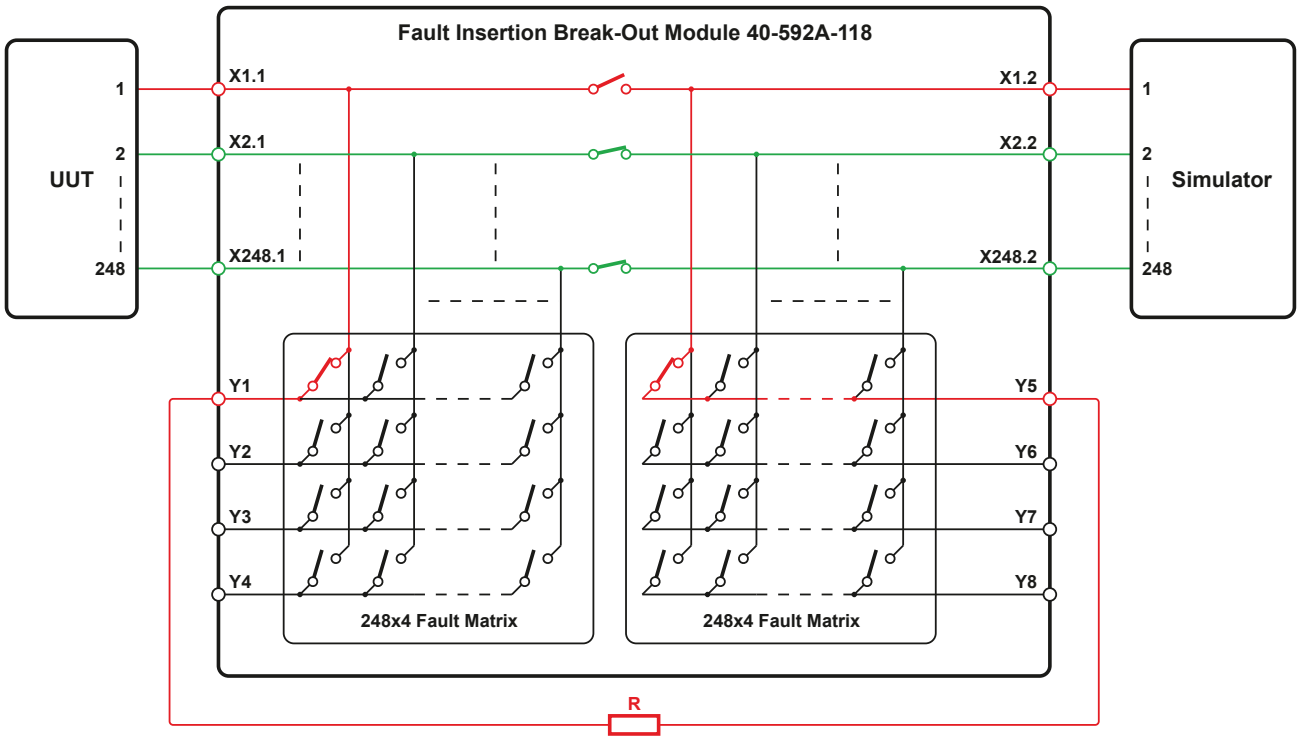
Fault Insertion Example 1: Open Circuit on Breakout 2 of a Dual 80x4 FIBO High Density Matrix Module With 3-pin Breakout



Fault Insertion Example 2: Short Circuit Between Breakout 1 & 2 With Breakout 2 Connection Open Using a Dual 80x4 FIBO High Density Matrix Module With 3-pin Breakout



Fault Insertion Example 3: Signal Short to Ground Using Y2 With Breakout 2 Connection Open Using a Dual 248x4 FIBO High Density Matrix Module With 2-pin Breakout



Fault Insertion Example 4: Adding a Series Resistance Into Breakout 1 Using Y1 and Y5 On a Dual 248x4 FIBO High Density Matrix Module With 2-pin Breakout

For Further Examples of Using The FIBO Matrix Module, Please Refer to The 40-592A User Manual

Relay Type

The 40-592A is fitted with high performance instrumentation grade Reed Relays (Ruthenium sputtered type). These offer very long life with good low level switching performance and excellent contact resistance stability.

Switching Specification

Switch Type	Ruthenium Reed
Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.2A
Initial Path Resistance (2-pin breakout) On path through matrix: On path through breakout: Off path resistance:	 <750mΩ <200mΩ $>10^9$Ω
Initial Path Resistance (3-pin breakout) On path through matrix: On path through breakout: Off path resistance:	 <750mΩ <300mΩ $>10^9$Ω
Thermal Offset:	<30µV
Operate Times Ganged BREAKOUT 1.2 / BREAKOUT 1.3 operation: BREAKOUT 1.1 to BREAKOUT 1.2 / BREAKOUT 1.3 isolation/thru connection: Matrix crosspoints:	 1ms 0.5ms 0.5ms
Expected Life Low power load: Full power load:	 $>1x10^9$ operations $>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A (typ. 1A)	0	0

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front Panel Connectors: **40-592A-1XX** up to 8 x 78-way male D-type connector plugs (one per daughter card)

40-592A-0XX up to 4 x 78-way male D-type connector plugs (one per daughter card)

For pin-outs please refer to the operating manual.

Mechanical Characteristics

8-slot 3U PXI/CompactPCI module (40-592A-1XX)
4-slot 3U PXI/CompactPCI module (40-592A-0XX)

3D models for all versions in a variety of popular file formats are available on request.

Weight	Empty module	Fully loaded
BRIC4	0.9kg	2.1kg
BRIC8	1.6kg	4.0kg
BRIC daughter card		0.3kg

Upgrading With Daughter Cards

BRIC modules can be upgraded to a larger matrix size using daughter cards, please consult your local sales office for further information.

Product Order Codes

3-Pin Breakout FIBO Matrix Order Codes		
	BRIC4	BRIC8
Dual 20x4 matrix	40-592A-001	40-592A-101
Dual 40x4 matrix	40-592A-002	40-592A-102
Dual 60x4 matrix	40-592A-003	40-592A-103
Dual 80x4 matrix	40-592A-004	40-592A-104
Dual 100x4 matrix		40-592A-105
Dual 120x4 matrix		40-592A-106
Dual 140x4 matrix		40-592A-107
Dual 160x4 matrix		40-592A-108

2-Pin Breakout FIBO Matrix Order Codes		
	BRIC4	BRIC8
Dual 31x4 matrix	40-592A-011	40-592A-111
Dual 62x4 matrix	40-592A-012	40-592A-112
Dual 93x4 matrix	40-592A-013	40-592A-113
Dual 124x4 matrix	40-592A-014	40-592A-114
Dual 155x4 matrix		40-592A-115
Dual 186x4 matrix		40-592A-116
Dual 217x4 matrix		40-592A-117
Dual 248x4 matrix		40-592A-118

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST.**

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PCI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-030**

For further assistance, please contact your local Pickering sales office.

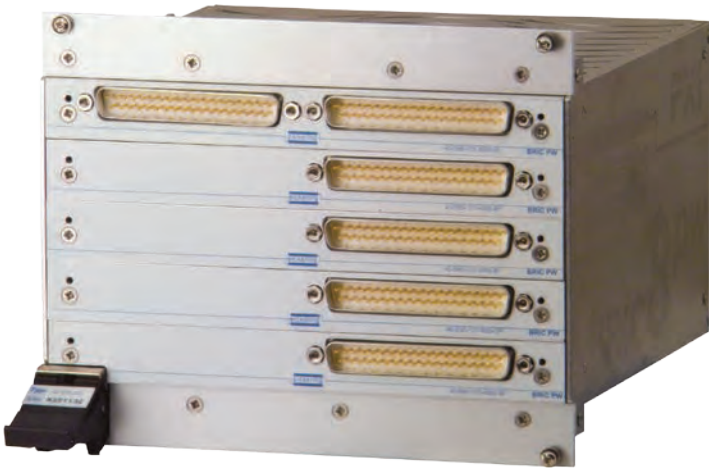
Mating Connectors & Cabling

For connection accessories for the 40-592A range please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

High Density FIBO Matrix Module in BRIC8 Format

40-595A
BRIC™ Power FIBO Matrix Module

- Integrated High Power PXI Matrix Module
- Built In High Performance Screened 8-Channel Analog Bus
- 3-Pin Breakout Configuration For Fault Simulation and Specialist Test Applications
- Sizes Up To Dual 30x4 Power Matrix on 5 Daughter Cards
- Load Just The Number of Daughter Switch Cards You Need For Your Application
- Uses Gold Flash Over Silver Alloy Contact Electro-mechanical Relays
- Cross-point Switches 125VDC/250VAC, 10A
- Breakout Switches 125VDC/250VAC, 8A
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



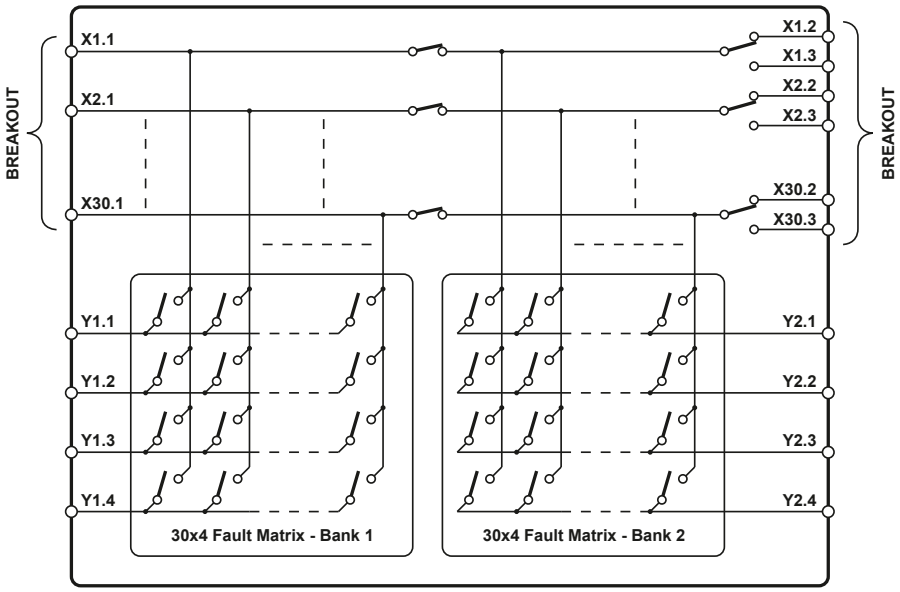
The 40-595A is a matrix module based on the BRIC format that is designed for fault insertion applications in safety critical testing. As with other BRIC modules the matrix size can be scaled to suit the user application. The 40-595 has a very high current rating of 10 Amps, ideal for higher power systems, and can be used as a conventional matrix.

Fault insertion techniques are used in applications where the response of a controller needs to be assessed when one or more sensors are providing poor quality information. The controller needs to be tested to ensure that is does not produce an inappropriate response, such as turning an engine or braking system off, and consequently risking a serious system failure. Testing in aeronautic, aerospace and automotive environments has to be particularly rigorously performed and documented to ensure that expensive failures or loss of life do not occur.

The 40-595A allows such testing to be automated, replacing manual test systems that are hard to repeat and document. Referring to the functional diagram, the 40-595A is typically used with a sensor emulation connected to breakout 1.2 or 1.3 and connected to the controller under test through 1.1. The connection can be broken and a fault can be placed by connecting the line to a fault condition, such as a short circuit, on the Y axis. The third breakout connection can be used to connect to a “poor” sensor emulation, allowing the controller to be tested with more complex sensor faults present. The dual bus arrangement allows an external series element to be added across the breakout connections with shunt defects provided by the Y axis.

The 40-595A allows up 8 types of fault to be connected to the Y axis and up to 30 connections to sensors. Modules can be supplied not fully loaded for applications that do not require the full complement of daughter cards.

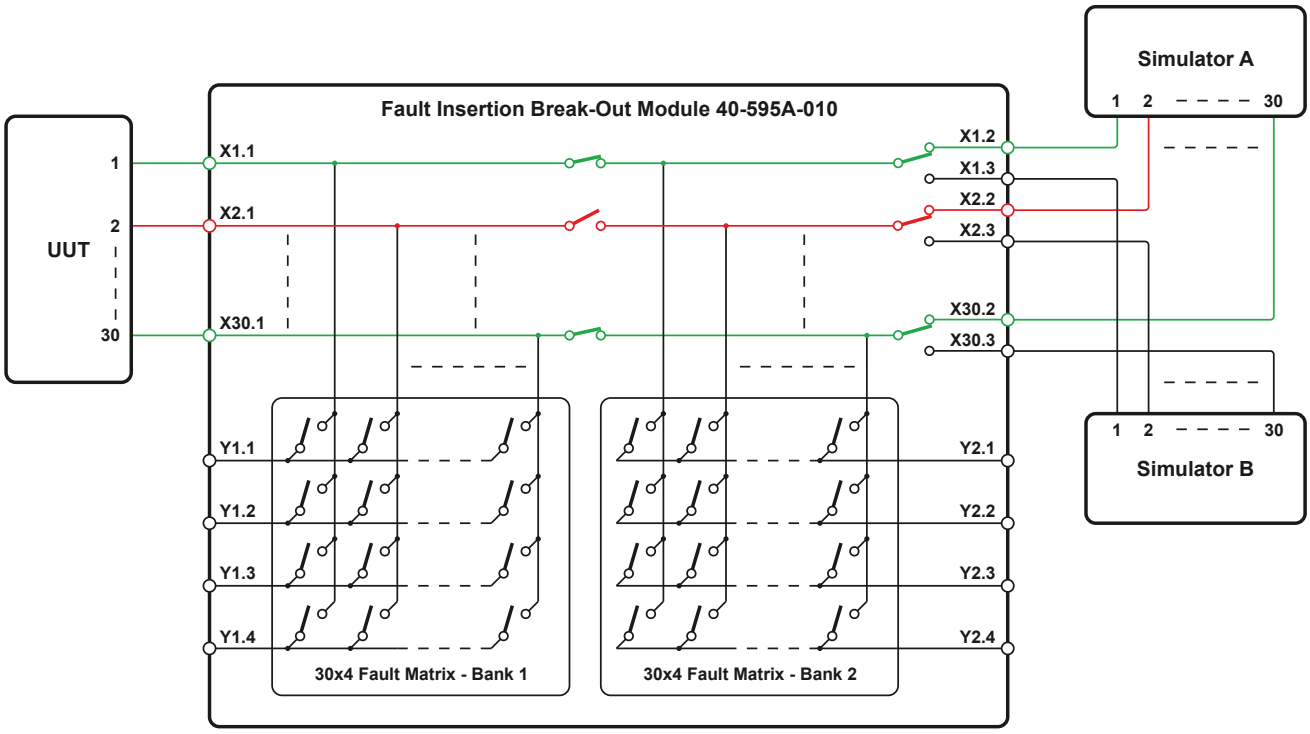
The connector used is fully supported by a range of mating parts and cable accessories.



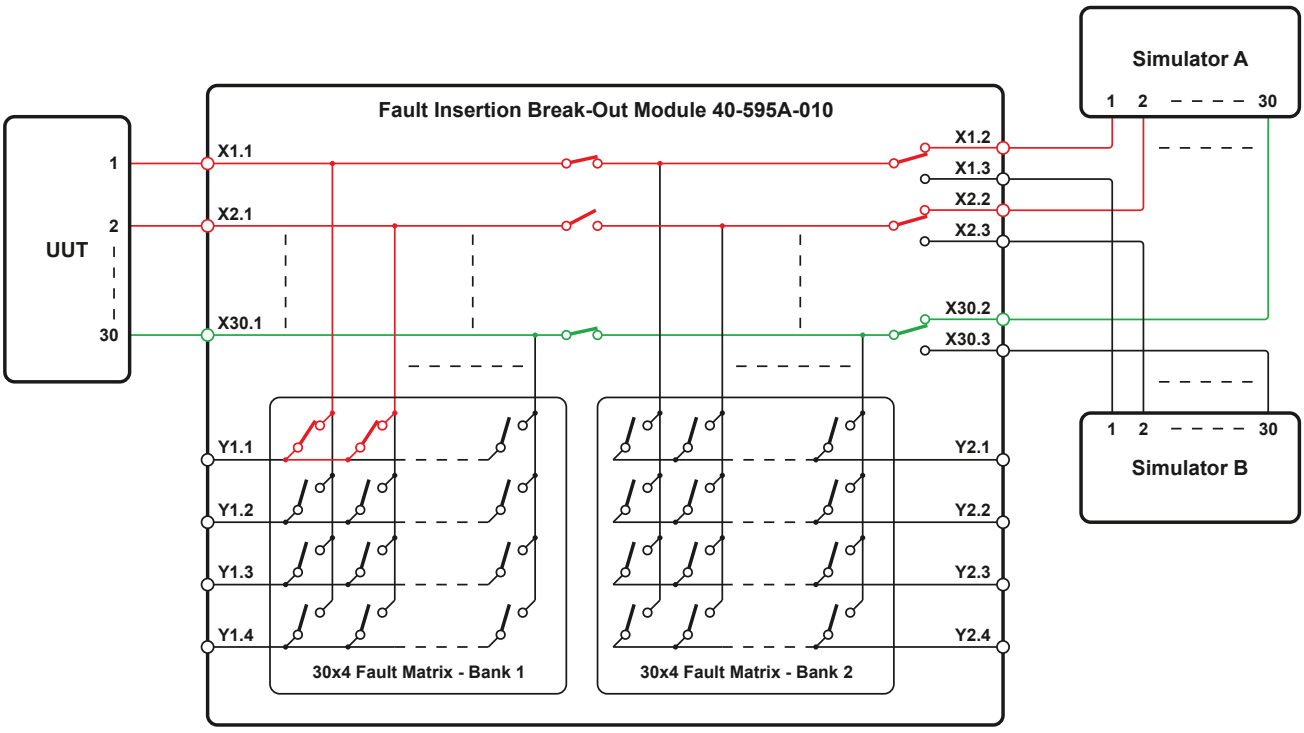
Schematic of the 40-595A-010 Dual 30x4 Power FIBO Matrix Module With 3-Pin Breakout (switches are shown in their default state)

Fault Insertion Examples Using The FIBO Matrix

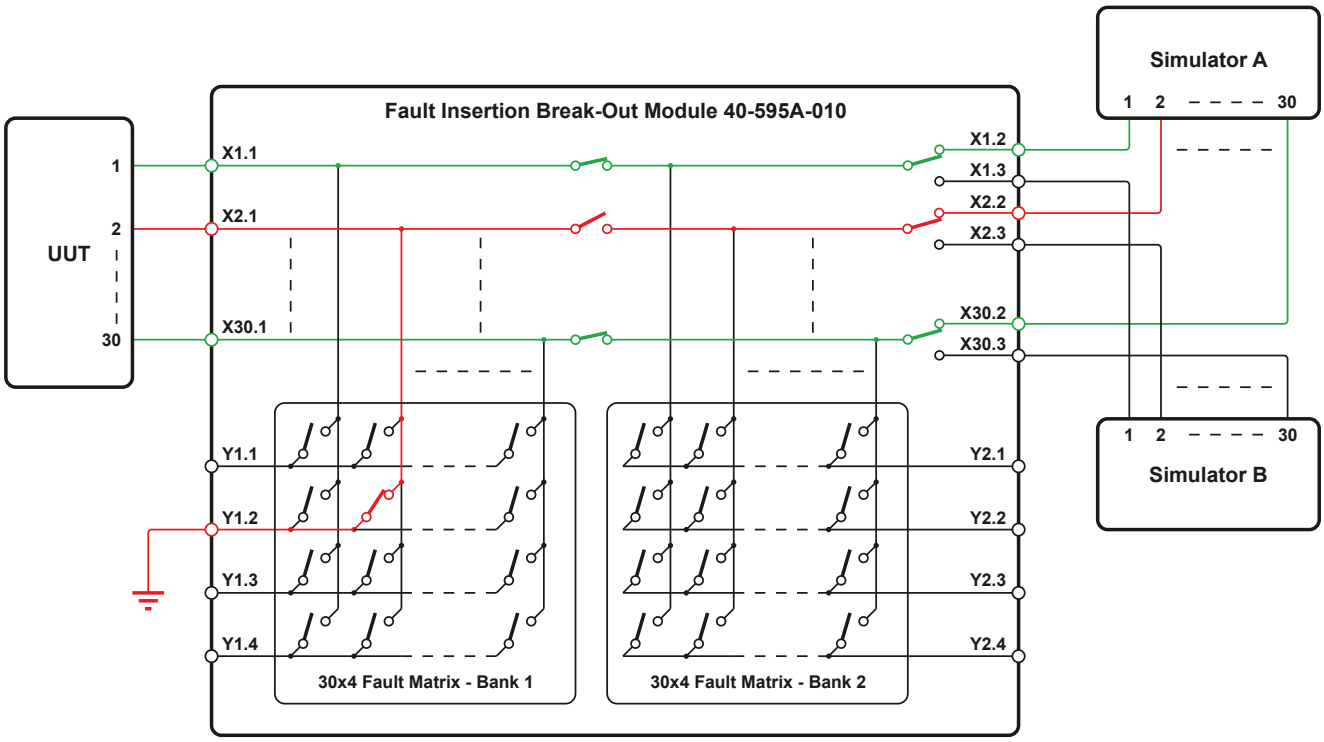
In a typical fault insertion example the X breakout connections are used to connect either a simulated sensor or a real sensor output to the device under test. The isolation switch can be used to disconnect the sensor source and faults can be inserted on either the sensor side or the device side of the isolation switch. Fault networks are connected to the Y axis connections to simulate shorts to ground or to power, or to simulate the effect of leakage paths. High resistance paths can also be simulated either in series with the signal or as a leakage between signal paths.



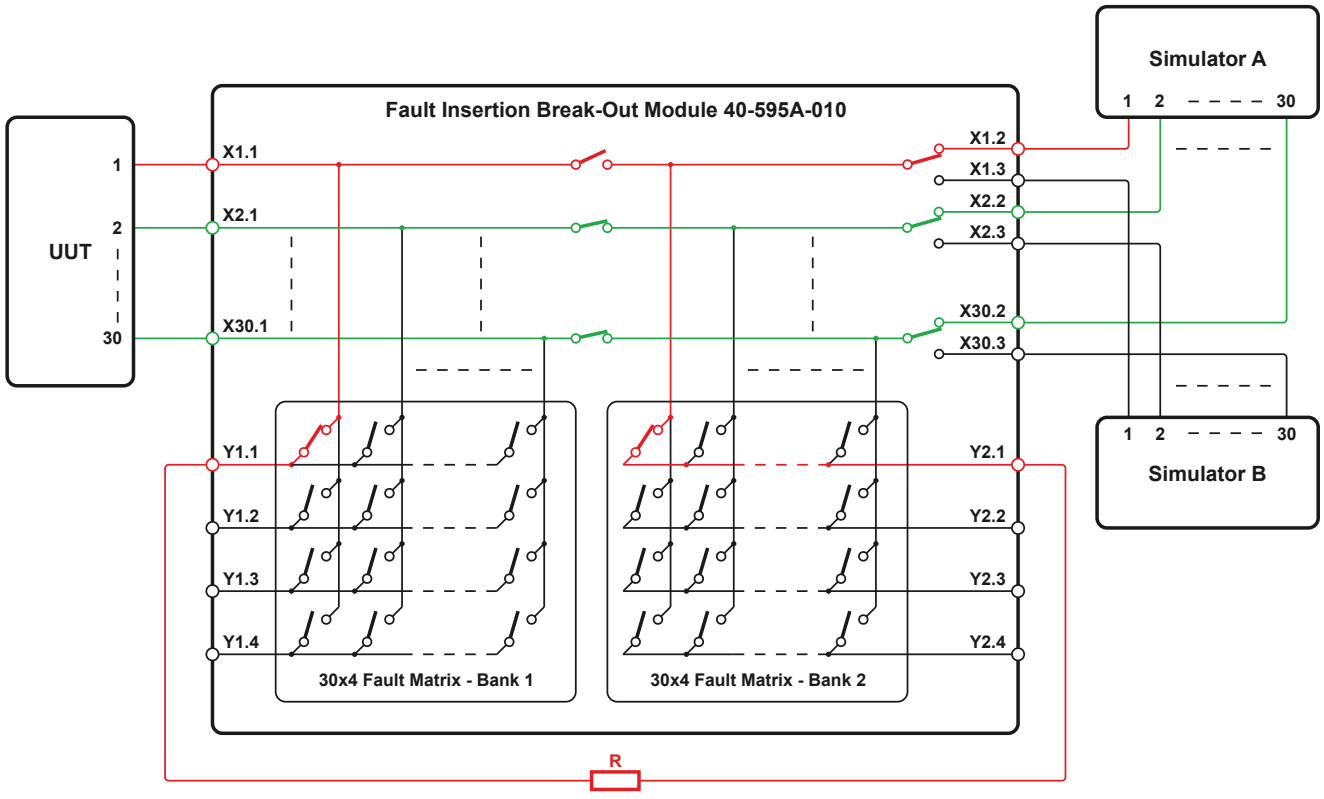
Fault Insertion Example 1: Open Circuit on Breakout 2 of a Dual 30x4 FIBO High Density Matrix Module With 3-pin Breakout



Fault Insertion Example 2: Short Circuit Between Breakout 1 & 2 With Breakout 2 Connection Open Using a Dual 30x4 FIBO High Density Matrix Module With 3-pin Breakout



Fault Insertion Example 3: Signal Short to Ground Using Y1.2 With Breakout 2 Connection Open Using a Dual 30x4 FIBO High Density Matrix Module With 3-pin Breakout



Fault Insertion Example 4: Adding a Series Resistance Into Breakout 1 Using Y1.1 and Y1.2 On a Dual 30x4 FIBO High Density Matrix Module With 3-pin Breakout

For Further Examples of Using The FIBO Matrix Module, Please Refer to The 40-595A User Manual

Switching Specification - Crosspoint Relays

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 10A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 10A 125VDC/250VAC 300W/2500VA 10mA, 5VDC
Initial Path Resistance, On: Path Resistance, Off:	<250mΩ >1x10^{9}Ω
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 >5x10^7 >1x10^5

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Switching Specification - Breakout Relays

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 8A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 8A 125VDC/250VAC 240W/2000VA 10mA, 5VDC
Initial Path Resistance, On: Path Resistance, Off:	<250mΩ >1x10^{9}Ω
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 >5x10^7 >1x10^5

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

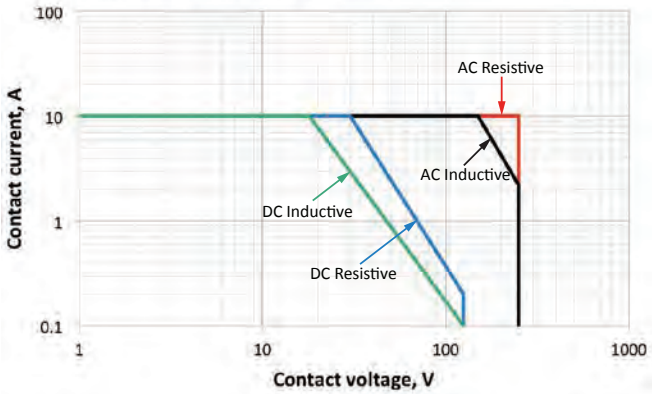
+3.3V	+5V	+12V	-12V
0	2A	0	0

Mechanical Characteristics

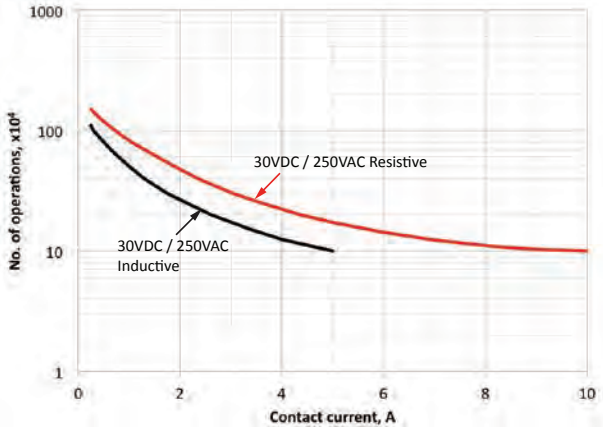
8-slot 3U PXI/CompactPCI module
3D models for all versions in a variety of popular file formats are available on request.

Connectors

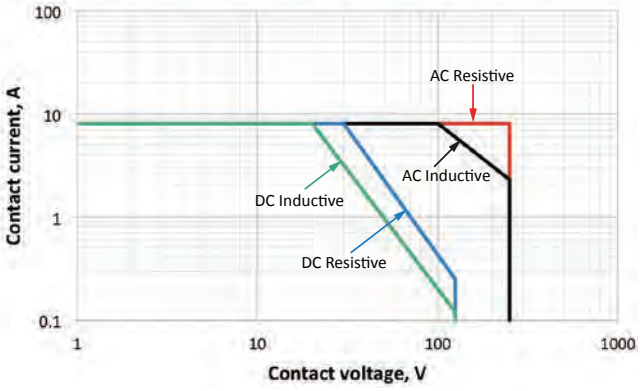
PXI bus: 32-bit P1/J1 backplane connector
Front Panel Connectors: 5 x 37-Way male D-type plugs (one per daughter card)



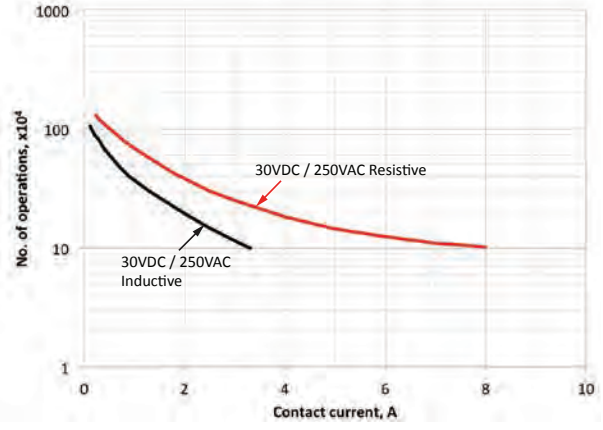
40-595A Current/Voltage Plot - Crosspoint Relays



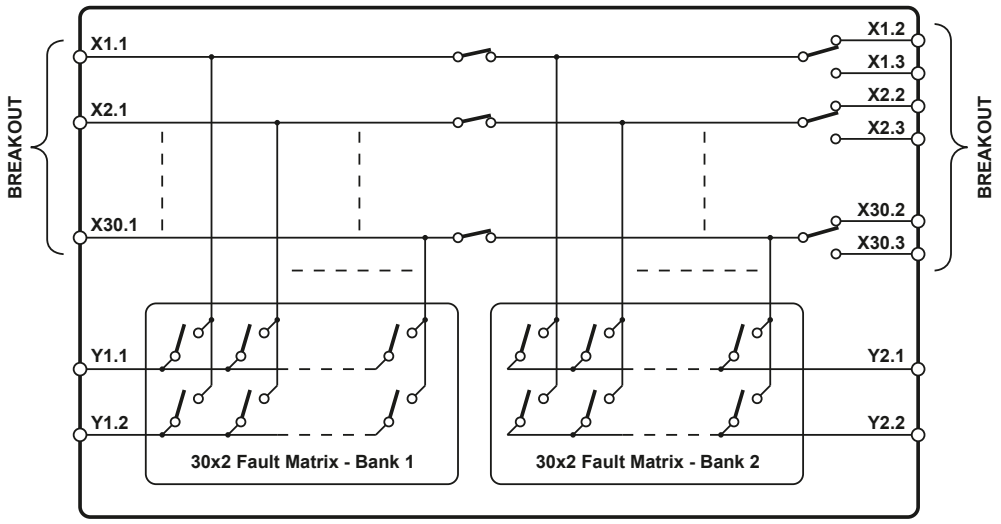
40-595A Current/Operating Life Plot - Crosspoint Relays



40-595A Current/Voltage Plot - Breakout Relays



40-595A Current/Operating Life Plot - Breakout Relays



Schematic of the 40-595A-005 Dual 30x2 Power FIBO Matrix Module With 3-Pin Breakout

Relay Type

The 40-595A is fitted with single-pole electro-mechanical power relays with gold-flash over silver alloy contacts.

Upgrading With Daughter Cards

BRIC modules can be upgraded to a larger matrix size using daughter cards, please consult your local sales office for further information.

Mating Connectors & Cabling

For connection accessories for the 40-595A range please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Product Order Codes

BRIC8 Power FIBO Matrix with 3-pin breakout	
Dual 6x2 matrix	**40-595A-001**
Dual 12x2 matrix	**40-595A-002**
Dual 18x2 matrix	**40-595A-003**
Dual 24x2 matrix	**40-595A-004**
Dual 30x2 matrix	**40-595A-005**
Dual 6x4 matrix	**40-595A-006**
Dual 12x4 matrix	**40-595A-007**
Dual 18x4 matrix	**40-595A-008**
Dual 24x4 matrix	**40-595A-009**
Dual 30x4 matrix	**40-595A-010**

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office

Support Products

Spare Relay Kits

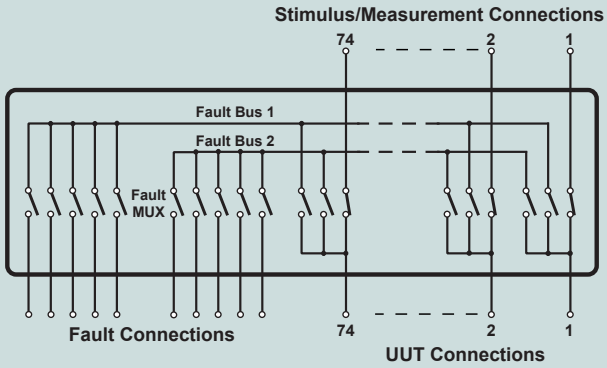
Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the 40-595A range is as follows:

91-100-085 kit for 40-595A-0XX

For further assistance, please contact your local Pickering sales office.

Fault/Signal Insertion Switch Modules

- Designed For Fault Insertion Applications
- Breakout Connections For Wiring to Sensors
- Choice of Channel Counts and Switch Configurations
- Solid State Relay Versions For Current Handling up to 30 Amps
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments



40-190B Fault Insertion Switch with two fault buses

40-196 Avionics/ Automotive 5A Fault Switch

40-191 30A Fault Insertion Switch

Fault Insertion switches are designed for safety critical applications where the response of a control system is required to be evaluated when sensor connections behave in unexpected ways.

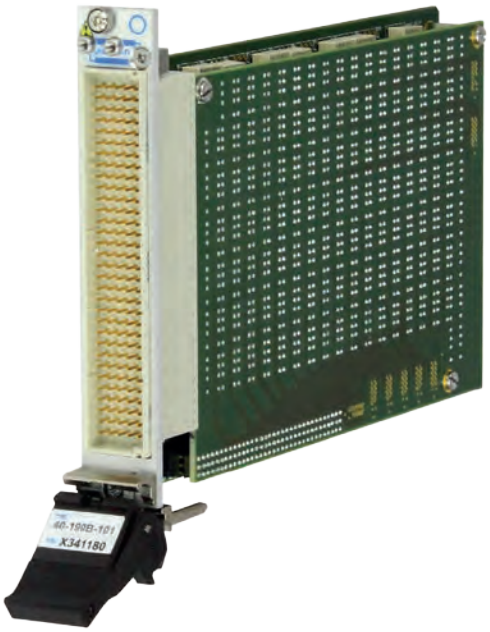
These switch modules feature a breakout arrangement that allows faults to be attached to sensor lines. This includes the breaking of a connection or adding a defect.

Fault insertion switches based on electro-mechanical relays are available with current handling up to 20A. Versions with solid state relays can handle up to 30A. For applications that require fault insertion switching on a larger scale, Pickering's BRIC based fault insertion matrices provide an ideal solution.

Fault Insertion Switch Modules — Up to 74 Channels				
	150VDC/100VAC 2A Switch, 2A Carry	74 Channels (also available with 32 or 64 channels)	Electro-mechanical Relay 4 Fault Inputs, 1 Bus 40-190B-001 8 Fault Inputs, 2 Buses 40-190B-002	Page 21.2
	±40V (DC or AC peak) 30A Carry, 120A Surge	6 Channels	Solid State Relay 2 Fault Inputs, 2 Buses 40-191-012	Page 21.5
	±200V (DC or AC peak) 10A Carry, 50A Surge	6 Channels	Solid State Relay 2 Fault Inputs, 2 Buses 40-192-012	Page 21.7
	16VDC, 20A Max Switch, 1A Min Switch	7 Channels	Electro-mechanical Relay 1 Fault Inputs, 1 Bus 40-193-001 2 Fault Inputs, 2 Buses 40-193-002	Page 21.9
	16VDC, 20A Max Switch, No Min Switch	7 Channels	Electro-mechanical Relay 1 Fault Inputs, 1 Bus 40-194-001 2 Fault Inputs, 2 Buses 40-194-002	Page 21.11
	150VDC/100VAC 1A Switch, 1A Carry	11 or 22 Channel pairs	Electro-mechanical Relay 22 Channel, 8 Fault Inputs 40-195-001 11 Channel, 4 Fault Inputs 40-195-101	Page 21.13
	110VDC/100VAC 5A Switch, 5A Carry	5 or 10 Channel pairs	Electro-mechanical Relay 10 Channel, 10 Fault Inputs 40-196-001 5 Channel, 5 Fault Inputs 40-196-101	Page 21.15
	300VDC/250VAC 2A Switch, 2A Carry	34 or 16 Channels	Electro-mechanical Relay 34 Chan, 8 Input, 4 Buses 40-197A-001 16 Chan, 8 Input, 4 Buses 40-197A-002	Page 21.17
	110VDC/250VAC 5A Switch, 5A Carry	20 Channels	Electro-mechanical Relay 3 Fault Inputs, 1 Bus 40-198-001 6 Fault Inputs, 2 Buses 40-198-002	Page 21.19
	125VDC/250VAC 10A Switch, 10A Carry	10 Channels	Electro-mechanical Relay 1 Fault Input, 1 Bus 40-199-001 2 Fault Inputs, 2 Buses 40-199-002	Page 21.21
	100V, 0.3A 2A Fault Bus	4 or 8 Differential Channels Designed for CAN/FlexRay	Electro-mechanical Relay 4 Chan, 8 Inputs, 4 Buses 40-200-004 8 Chan, 8 Inputs, 4 Buses 40-200-008	Page 21.23
		4 or 8 Differential Channels Designed for Ethernet/AFDX	Electro-mechanical Relay 4 Chan, 4 Inputs, 2 Buses 40-201-004 8 Chan, 4 Inputs, 2 Buses 40-201-008	Page 21.25

40-190B
2A Fault Insertion Switch

- 74, 64 or 32 Fault Insertion Channels
- Suitable for Automotive/Avionics ECU Burn-in/ Endurance Test Applications
- High Density Low Cost Solution
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- High Simultaneous Relay Drive
- Choice of 1 or 2 Fault Insertion Buses
- Fault Bus MUX For Selecting External Fault Conditions
- 2A Hot or Cold Switching
- Switch up to 165VDC/115VAC with 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



The 40-190B is a Fault Insertion switch available with 74, 64 or 32 channels. It is primarily designed for the simulation of fault conditions in automotive & avionics applications involving the reliability testing of safety critical controllers.

It is designed to be able to insert 3 different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to other signals such as Power, Ignition and Ground via Fault Insertion Bus

Through relays on each channel enable signals to the UUT to be held open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external fault condition. Each version of the module is available with either 1 fault bus or 2 fault buses. A 4 channel multiplexer on each bus allows an external signal level such as Power, Ignition or Ground to be selected as the fault condition. Additionally, switched signal lines (Monitor1 & Monitor2 in the schematic diagram) allow direct monitoring of the fault Buses with a DMM.

The default state of the unit is with all through relays closed and all fault insertion relays open, giving an un-interrupted path between the test fixture and the equipment under test.

High Simultaneous Drive

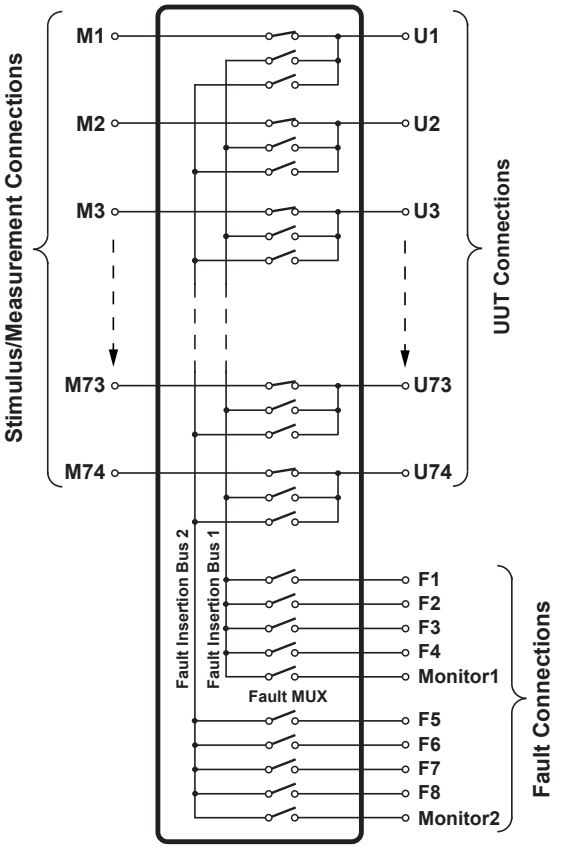
Any combination of relays may be operated (providing the maximum total card switch current is not exceeded), enabling maximum flexibility for fault selection.

Supported by eBIRST

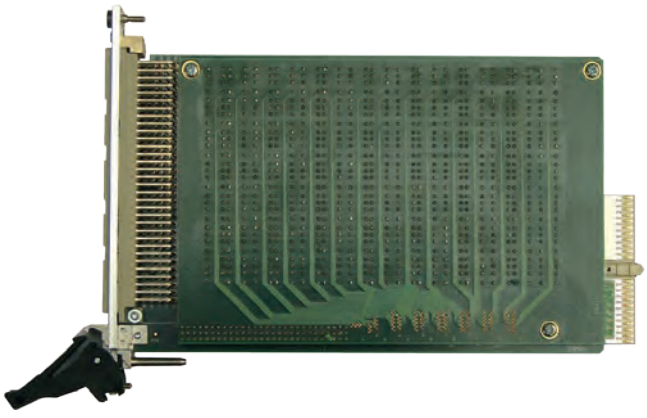
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf

Pickering's Range of PXI Fault Insertion Switches

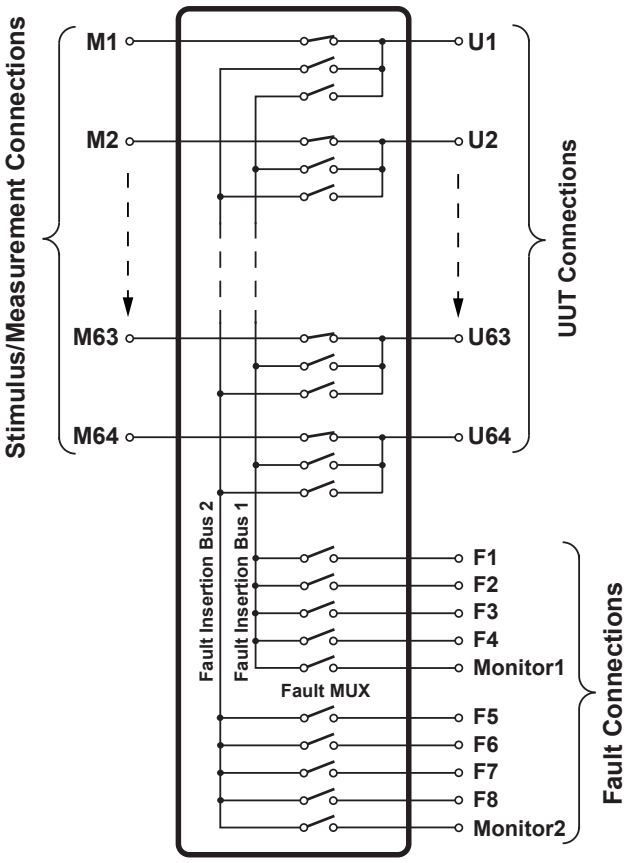
Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A



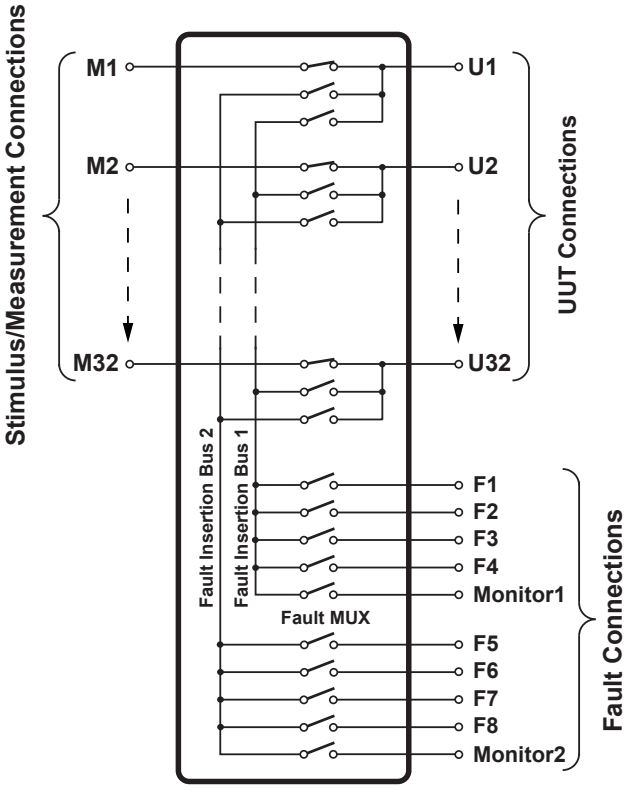
40-190B-002 Dual Bus, 74-Channel FaultInsertion Switch Schematic (40-190B-001 Has 1 Fault Bus)



Side View of 40-190B Fault Insertion Switch



40-190B-102 Dual Bus, 64-Channel Fault Insertion Switch Schematic (40-190B-101 Has 1 Fault Bus)



40-190B-202 Dual Bus, 32-Channel Fault Insertion Switch Schematic (40-190B-201 Has 1 Fault Bus)

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	165VDC/115VAC
Max Power:	60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Max Total Card Switch Current:	64A †
Max number of simultaneously operated relays:	No Limit
Initial Path Resistance - On:	150mΩ typical
Path Resistance - Off:	>10^9Ω
Thermal Offset:	<5µV per relay
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	>$1x10^8$
Low power load (2W):	>$1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	>$5x10^6$ (1A 30VDC)
Full power load (60W):	>$1x10^5$ (2A 30VDC)

† Applies to PXI chassis installation (please contact sales office for use in alternative platforms).

Bandwidth Specification

M to U path:	>35MHz typical at 50Ω impedance
Fault path:	>7MHz typical at 50Ω impedance

Note: The 40-190B is suitable for carrying signals such as CAN to 1Mbps & FlexRay to 20Mbps (10Mbps per channel path)

Power Requirements

+3.3V	+5V	+12V	-12V
0	<2A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 380g (40-190B-002)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
Signals via front panel 160 way DIN41612 male connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

NOTE: The pinout of the 40-190B is not compatible with the pinout of the earlier 40-190 Fault Insertion Switch.

Relay Type

The 40-190B is fitted with high quality electro-mechanical relays, Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Product Order Codes

Single Bus 74-Chan 2A Fault Insertion Switch:	**40-190B-001**
Dual Bus 74-Chan 2A Fault Insertion Switch:	**40-190B-002**
Single Bus 64-Chan 2A Fault Insertion Switch:	**40-190B-101**
Dual Bus 64-Chan 2A Fault Insertion Switch:	**40-190B-102**
Single Bus 32-Chan 2A Fault Insertion Switch:	**40-190B-201**
Dual Bus 32-Chan 2A Fault Insertion Switch:	**40-190B-202**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-410**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-190B please refer to the **90-001D** 160 way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-191
30A Fault Insertion Switch

- 6 Fault Insertion Channels
- 40 Amp Single Channel
- 30 Amp Continuous, All Channels
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- 2 Fault Insertion Buses
- High Inrush Current Rating
- Switch ±40V Signals (AC or DC)
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-191 is a 6 Channel Fault Insertion switch designed for the simulation of fault conditions in automotive systems.

The 40-191 is capable of carrying 40A on single channel or 30A on all channels at the same time and provides a robust solution to high current fault insertion.

It is designed to be able to insert 3 different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to external signals

Through relays on each channel enable signals to the UUT to be set open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external signal such as Power, Ignition or Ground to simulate fault conditions. The module is supplied with 2 fault buses.

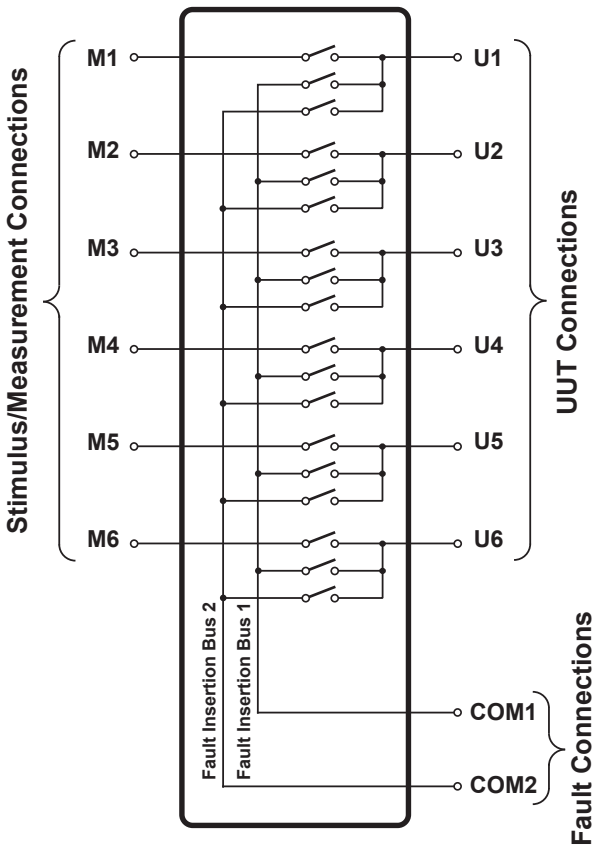
The 40-191 uses solid state switching capable of withstanding inrush current of greater than 120 Amps and peak voltages of 40V. With an indefinite number of switching operations the 40-191 can hot switch AC or DC with no life degradation.

Pickering's Range of PXI Fault Insertion Switches

Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	–	8 or 4	150V	1A
40-196	10 or 5 pairs	–	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-191 6-Channel Fault Insertion Switch Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±40V (DC or AC peak)
Continuous Switch Current:	30A continuous, all channels. 40A continuous for single relay (other relays carrying <10A).
Peak Current:	120A for 200µs
Max Total Module Current:	6 channels each carrying 30A on thru path †
Max Fault Bus Current:	40A, each bus
Initial Path Resistance - On:	6mΩ at 25˚C typical
Leakage Current (at ±40V):	<1µA at 25˚C and switch cold, <250µA at max temperature immediately after switch has carried maximum current for >10 minutes.
Rise/Fall Time:	40µs/140µs (typical)
Operate Time:	250µs
Max Operating Speed at nominal load:	60 operations/sec
Expected Life (operations):	Indefinite when used within ratings

† The capacity of the module to carry 30A on all channels is chassis dependent and dependent on the number of high power modules fitted to the chassis. Specification reflects test conditions in a Pickering PXI chassis. Refer to supplier for chassis cooling capacity, restrict average RMS current over 5 minute period to 25A per channel for chassis meeting the minimum PXI recommendations.

Relay Type

The 40-191 is fitted with solid state MOSFET switches

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	1A	0	0

Mechanical Characteristics

Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
Signals via 2 front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

6-Channel 30A Fault Insertion Switch: Two Fault Buses	**40-191-012**

Note: The 40-191-012 supersedes the 40-191-002 which is functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two tools are required with their adapters and one termination, a master slave cable 93-970-301 is also required. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-005-001**	**93-005-236**	**93-012-103**

Mating Connectors & Cabling

For connection accessories for the 40-191 please refer to the **90-012D** 8 way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-192
10A Fault Insertion Switch

- 6 Fault Insertion Channels
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- 2 Fault Insertion Buses
- High Inrush Current Rating
- Switch ±200V Signals (AC or DC)
- 10 Amp Continuous Current
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-192 is a 6 Channel Fault Insertion switch designed for the simulation of fault conditions in automotive systems.

It is designed to be able to insert 3 different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to external signals

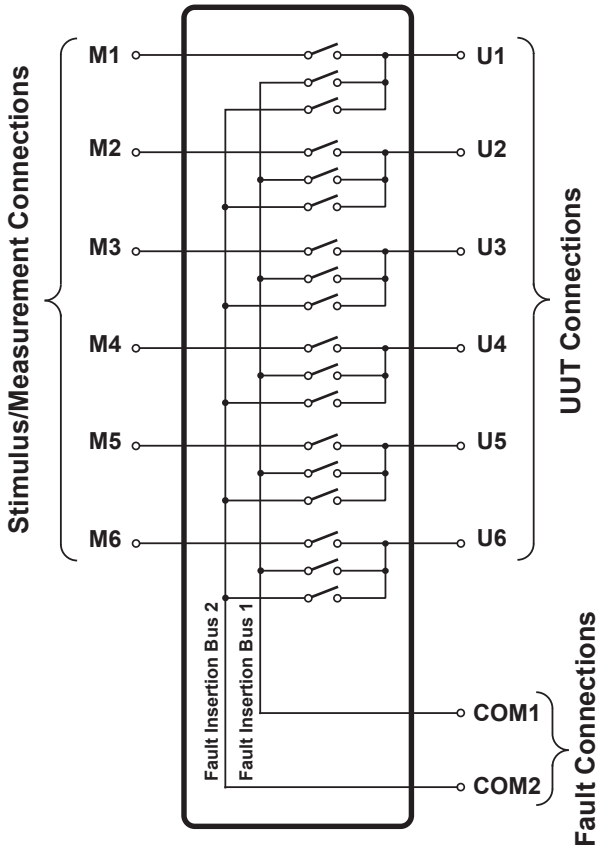
Through relays on each channel enable signals to the UUT to be set open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external signal such as Power, Ignition or Ground to simulate fault conditions. The module is supplied with 2 fault buses.

The 40-192 uses solid state switching capable of withstanding inrush current of greater than 50 Amps and peak voltages of 200V. With an indefinite number of switching operations the 40-192 can hot switch AC or DC with no life degradation.

Pickering's Range of PXI Fault Insertion Switches					
Model No.	**Signal Channels**	**Fault Buses**	**Fault Inputs**	**Max Voltage**	**Max Current**
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-192 6-Channel Fault Insertion Switch Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±200V (DC or AC peak)
Continuous Switch Current:	10A
Peak Current:	50A for 200µs
Max Total Module Current:	6 channels each carrying 10A on thru path †
Max Fault Bus Current:	40A, each bus
Initial Path Resistance - On:	60mΩ at 25˚C typical
Rise/Fall Time:	20µs typical
Operate Time:	70µs on, 120µs off
Recommended Maximum Cycle Rate (on, then off):	150 operations/sec
Expected Life (operations):	Indefinite when used within ratings

† The capacity of the module to carry 10A on all channels is chassis dependent and dependent on the number of high power modules fitted to the chassis. Specification reflects test conditions in a Pickering PXI chassis. Refer to supplier for chassis cooling capacity, restrict average RMS current over 5 minute period to 7A per channel for chassis meeting the minimum PXI recommendations.

Relay Type

The 40-192 is fitted with solid state MOSFET switches

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	1A	0	0

Mechanical Characteristics

Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
Signals via 2 front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.

Product Order Codes

6-Channel 10A Fault Insertion Switch: Two Fault Buses	**40-192-012**

Note: The 40-192-012 supersedes the 40-192-002 which is functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two tools are required with their adapters and one termination, a master slave cable 93-970-301 is also required. For more information see **eBIRST**.

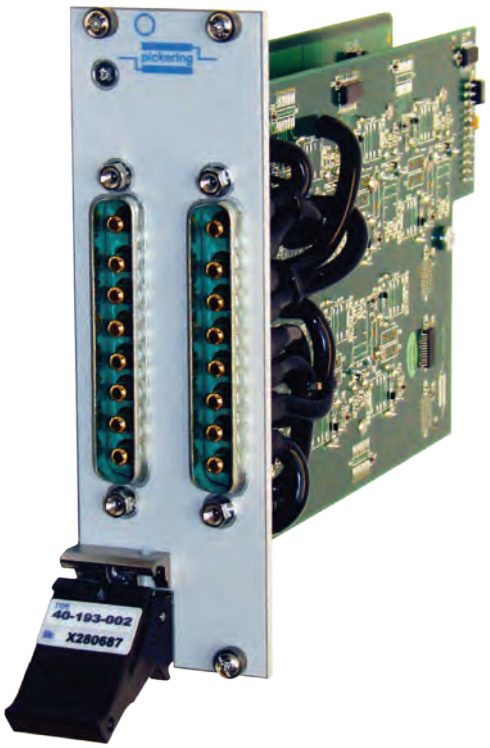
Product	Test Tool	Adapter	Termination
All Types	**93-005-001**	**93-005-236**	**93-012-103**

Mating Connectors & Cabling

For connection accessories for the 40-191 please refer to the **90-012D** 8 way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-193
20A Fault Insertion Switch

- 7 Fault Insertion Channels
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- Choice of 1 or 2 Fault Insertion Buses
- 20A Hot or Cold Switching
- Switch up to 16 Volts DC
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-193 is a 7 Channel Fault Insertion switch designed for the simulation of fault conditions in automotive systems.

It is designed to be able to insert 3 different fault conditions between the test fixture and the equipment under test:

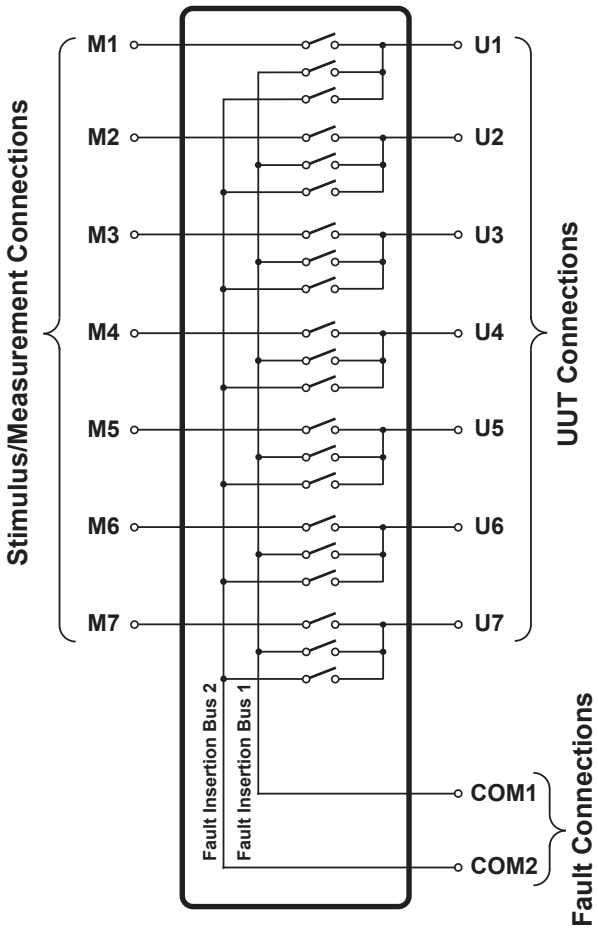
- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to other signals such as Power, Ignition & Ground via Fault Insertion Bus

Through relays on each channel enable signals to the UUT to be held open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external signal such as Power, Ignition or Ground to simulate fault conditions. The module is available with either 1 fault bus (40-193-001) or 2 fault buses (40-193-002).

The 40-193 uses miniature automotive relays with 20A hot or cold switching current. All relays are normally open types.

Pickering's Range of PXI Fault Insertion Switches

Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	–	8 or 4	150V	1A
40-196	10 or 5 pairs	–	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A



40-193-002 Fault Insertion Switch Schematic Diagram. This version has 2 fault buses, the 40-193-001 has 1 fault bus

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 20A 16VDC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 20A 16VDC 280W 1A, 12VDC
Max Total Fault Bus Current: Overall Module Current:	20A 20A simultaneously on each stimulus connection
Initial Path Resistance - On: Path Resistance - Off:	<15mΩ $>10^8$Ω
Operate Time: Max Operating Speed at nominal load:	10ms typical 6cpm
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 $>1x10^7$ $>1x10^5$

Relay Type

The 40-193 is fitted with miniature automotive relays with silver alloy contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

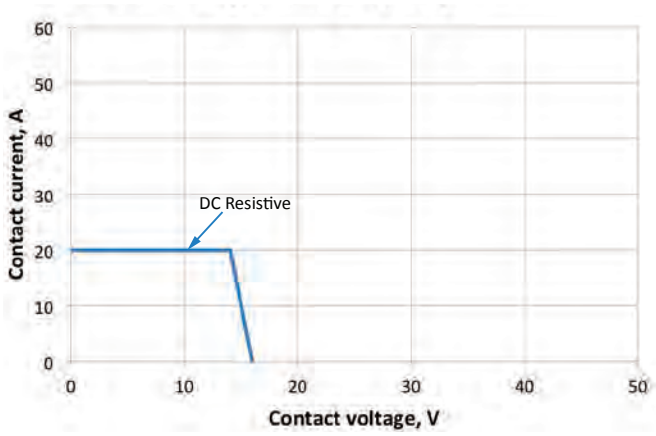
+3.3V	+5V	+12V	-12V
0	160mA	450mA (9 relays energised)	0

Mechanical Characteristics

Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
Signals via 2 front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.



40-193 Current/Voltage Curve

Product Order Codes

7-Channel 20A Fault Insertion Switch:	
One Fault Bus	**40-193-001**
Two Fault Buses	**40-193-002**

Mating Connectors & Cabling

For connection accessories for the 40-193 please refer to the **90-012D** 8 way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

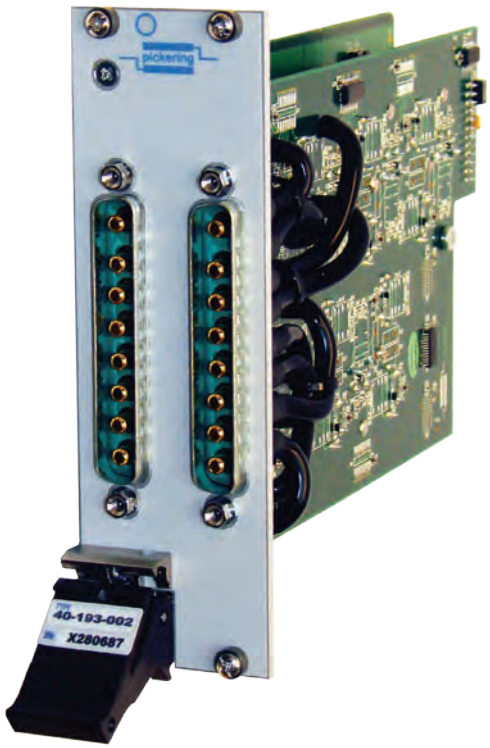
Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-193 range are as follows:

91-100-070 Relay Kit 70 for 40-193-001
91-100-070 Relay Kit 70 for 40-193-002

For further assistance, please contact your local Pickering sales office.

40-194
20A Fault Insertion Switch

- 7 Fault Insertion Channels
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- Choice of 1 or 2 Fault Insertion Buses
- Hot or Cold Switch Currents from less than 1nA to 20A
- Switch up to 16 Volts DC
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-194 is a 7 Channel Fault Insertion switch designed for the simulation of fault conditions in automotive systems.

It is designed to be able to insert 3 different fault conditions between the test fixture and the equipment under test:

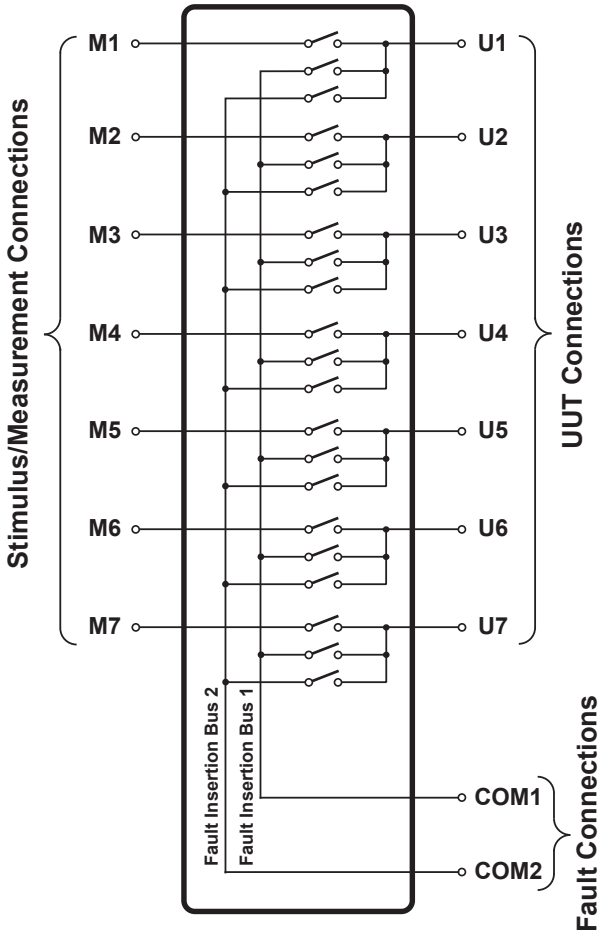
- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to other signals such as Power, Ignition & Ground via Fault Insertion Bus

Through relays on each channel enable signals to the UUT to be held open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external signal such as Power, Ignition or Ground to simulate fault conditions. The module is available with either 1 fault bus (40-194-001) or 2 fault buses (40-194-002).

The 40-194 uses composite relays that support both high current and low current hot switching. Hot switching operations can be performed on currents from less than 1nA to 20A.

Pickering's Range of PXI Fault Insertion Switches

Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A



40-194-002 Fault Insertion Switch Schematic Diagram. This version has 2 fault buses, the 40-194-001 has 1 fault bus

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Silver Alloy & Palladium-Ruthenium Gold Covered Bifurcated
Cold Switching Capacity	
Maximum Current:	20A
Maximum Voltage:	16VDC
Hot Switching Capacity	
Maximum Current:	20A
Maximum Voltage:	16VDC
Maximum Power:*	280W
Min. Switching Capacity:	<1nA, 12VDC
Max Total Fault Bus Current:	20A
Overall Module Current:	20A simultaneously on each stimulus connection
Initial Path Resistance - On:	<15mΩ at 1A <80mΩ at 1mA
Path Resistance - Off:	$>10^8\Omega$
Operate Time:	25ms typical
Max Operating Speed at nominal load:	6cpm
Expected Life (operations) - resistive load	
Mechanical Life:	$>1x10^7$
At Max. Switch Capacity:	$>1x10^5$

Relay Type

The 40-194 is fitted with miniature automotive relays with silver alloy contacts and uses additional switching technology to enable low current switching to below 1mA.
A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	430mA	450mA (9 relays energised)	0

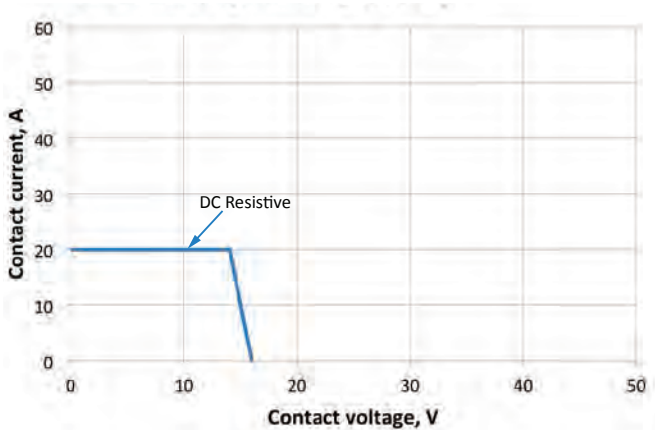
Mechanical Characteristics

Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.

Signals via 2 front panel mounted 8-way male power D-type connectors, for pin outs please refer to the operating manual.



40-194 Current/Voltage Curve

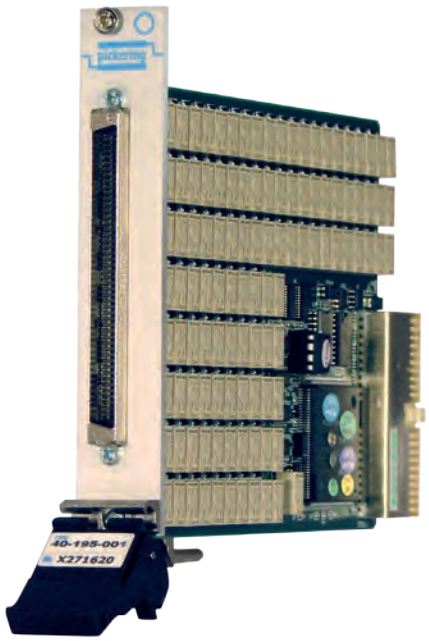
Product Order Codes

7-Channel 20A Fault Insertion Switch:	
One Fault Bus	**40-194-001**
Two Fault Buses	**40-194-002**

Mating Connectors & Cabling

For connection accessories for the 40-183 please refer to the **90-012D** 8 way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-195
Avionics/Automotive 1A Fault Insertion Switch



- 22 Fault Insertion Channels
- Suitable for Automotive or Avionics Test Applications
- Multiple Channels Can Be Combined To Form More Complex Networks
- High Density Low Cost Solution
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing & Simulation
- 1A Hot or Cold Switching
- Switch up to 150 Volts DC with 60W Max Power
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-195 is a 22 Channel Fault Insertion Switch, primarily designed for the simulation of fault conditions in automotive & avionics applications involving the reliability testing of safety critical controllers.

It is designed to be able to insert different fault conditions on pairs of signals between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between signal pairs
- Short-Circuit between signal pairs and user applied signals such as Power or Ground.

Relays in-line with the signal paths allow open circuit conditions to be simulated on either side or both sides of a signal pair. Relays between each channel pair enable adjacent signals to be shorted, and relays between signal paths and the "Fault" connection allow the application of external user applied fault conditions.

The switching topology of the 40-195 allows switching channels to be interconnected so that complex fault insertion systems can be constructed.

The 40-195 uses miniature electro-mechanical relays with 1A hot or cold switching current.

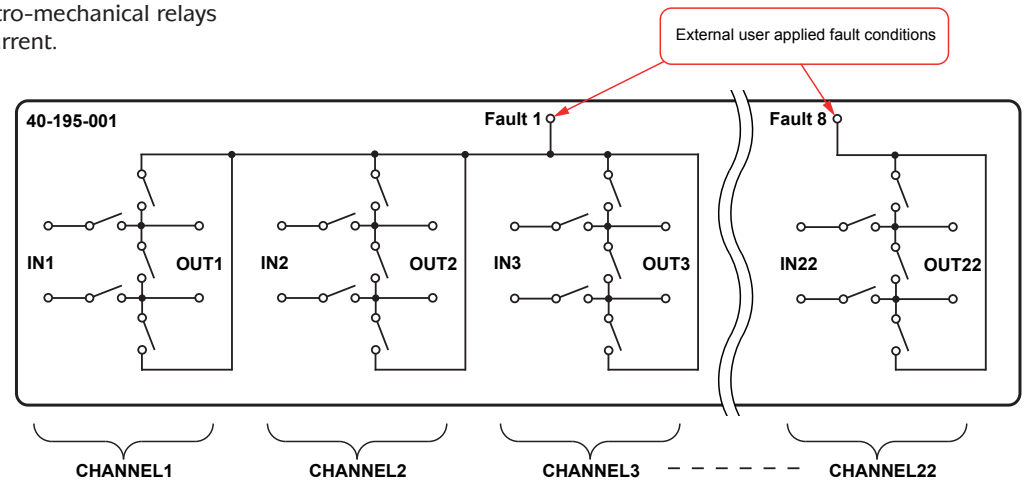
Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Pickering's Range of PXI Fault Insertion Switches					
Model No.	**Signal Channels**	**Fault Buses**	**Fault Inputs**	**Max Voltage**	**Max Current**
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A

40-195 22-Channel Fault Insertion Switch Schematic Diagram

Note: There are 8 inputs that can be used to inject external fault conditions (one Fault input for every 3 switch channels, with channel 22 having its own Fault input) .



Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	60W 1A 1A
Initial Path Resistance - On: Path Resistance - Off: Thermal Offset:	< 500mΩ $>10^9\Omega$ <5µV per relay
Operate Time:	<3ms
Expected Life (operations) Very low power signal load: Low power load (2W): Medium power load (30W): Full power load (60W):	 $>1x10^8$ $>1.5x10^7$ (0.1A 20VDC) $>5x10^6$ (1A 30VDC) $>1x10^5$ (1A 60VDC)

Relay Type

The 40-195 is fitted with high quality electro-mechanical relays, Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	typically 1.4A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
Signals via front panel male 96-way SCSI style micro-D connector, for pin outs please refer to the operating manual.

Product Order Codes

22-Channel 1A Fault Insertion Switch:	**40-195-001**
11-Channel 1A Fault Insertion Switch:	**40-195-101**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

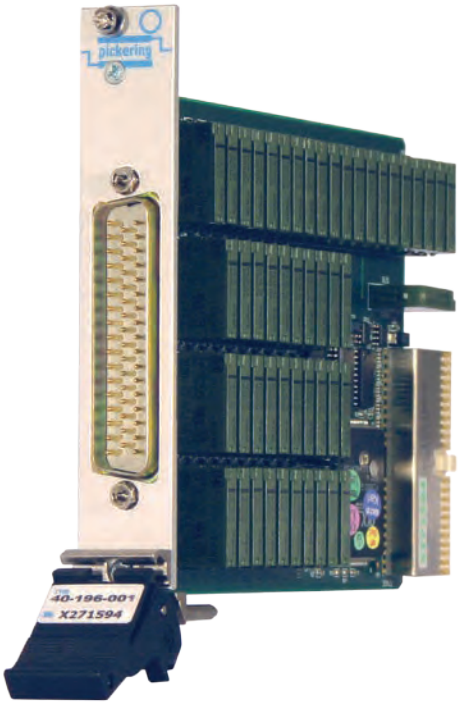
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-183 please refer to the **90-016D** 96 way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-196
Avionics/Automotive 5A Fault Insertion Switch

- 10 Fault Insertion Channels
- Suitable for Automotive or Avionics Test Applications
- Multiple Channels Can Be Combined To Form More Complex Networks
- High Density Low Cost Solution
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing & Simulation
- 5A Hot or Cold Switching
- Switch up to 110VDC/100VAC with 150W Max Power
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-196 is a 10 Channel 5A Fault Insertion Switch, primarily designed for the simulation of fault conditions in automotive & avionics applications involving the reliability testing of safety critical controllers.

It is designed to be able to insert different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between signal pairs
- Short-Circuit between signal pairs and user applied signals such as Power or Ground.

Shorting relays on each channel enable UUT signals to be subjected to external user applied fault conditions

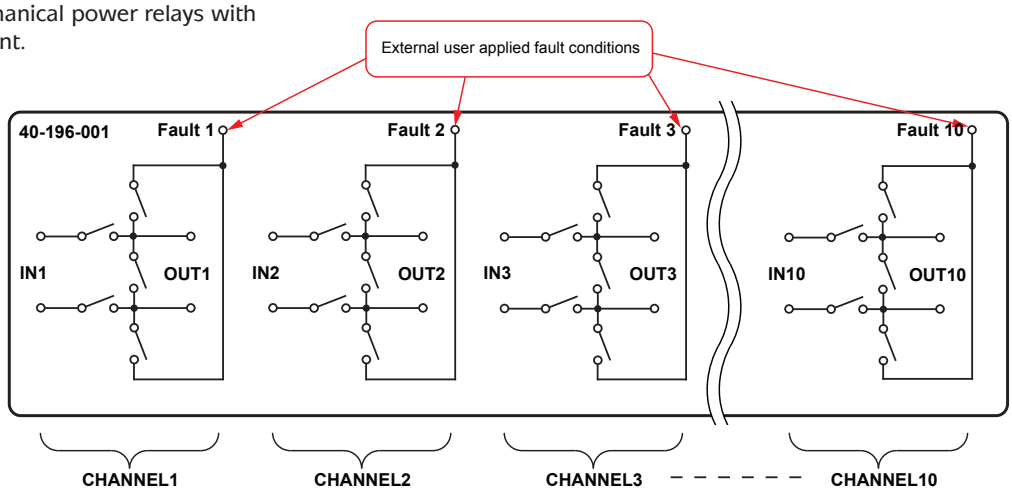
or to be shorted to the adjacent signal in the same channel. Relays in line with the signal allow open circuit conditions to be simulated on either side or both sides of a channel signal pair. The switching topology of the 40-196 allows channels to be interconnected so that complex fault insertion systems can be constructed.

The 40-196 uses electro-mechanical power relays with 5A hot or cold switching current.

Pickering's Range of PXI Fault Insertion Switches

Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A

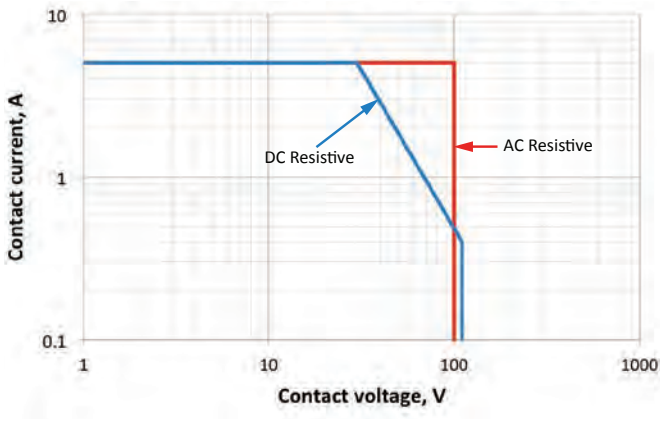
40-196 10-Channel Fault Insertion Switch Schematic Diagram



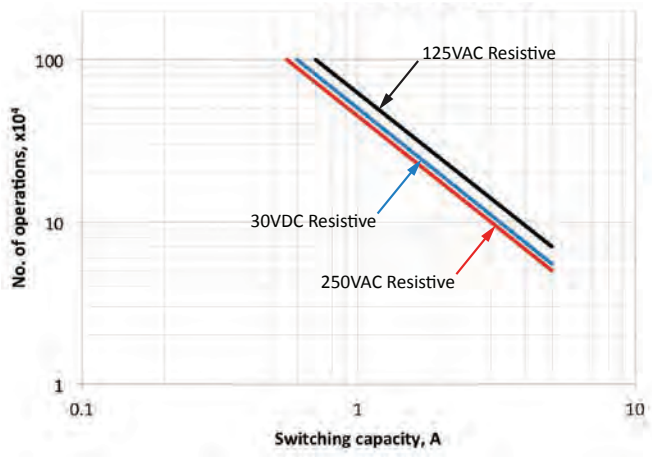
Switching Specification

Contact Type:	Gold clad silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 5A 110VDC/100VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 5A 110VDC/100VAC 150W/500VA 10mA, 5VDC
Initial Path Resistance, On: Path Resistance, Off:	<100mΩ $>10^9$Ω
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 $>2x10^7$ $>5x10^4$ (5A 250VAC, 5A 30VDC) $>1x10^5$ (3A 250VAC, 3A 30VDC)

* For variation of maximum hot switching capacity of voltage with current refer to plot.



Current/Voltage Curve



Current/Operating Life Curve

Relay Type

The 40-196 is fitted with high quality electro-mechanical power relays. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	typically 650mA	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 50-way male D-type connector.

Product Order Codes

10-Channel 5A Fault Insertion Switch:	**40-196-001**
5-Channel 5A Fault Insertion Switch:	**40-196-101**

Mating Connectors & Cabling

For connection accessories for the 40-196 please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kits for the 40-196 range are as follows:

91-100-020 Relay Kit 20 for 40-196-001
91-100-020 Relay Kit 20 for 40-196-101

For further assistance, please contact your local Pickering sales office.

40-197A
34-Channel, 4-Bus, 2A Fault Insertion Switch

- 34 or 16 Fault Insertion Channels
- 4 Buses For Inserting Fault Conditions, Each With a Changeover Switch For Further Flexibility
- Suitable for Automotive ECU Burn-in/Endurance Test Applications
- High Density Low Cost Solution, Bridging the Gap Between Pickering's Simpler Fault Insertion Offerings & More Complex FIBO BRIC Solutions
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- VISA/IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-197A is a 34 Channel Fault Insertion switch, primarily designed for routing simulated fault conditions in automotive and aerospace applications involving the reliability testing of safety critical controllers. A low cost 16 Channel option is also available.

It is designed to be able to route different fault conditions between the test fixture and the equipment under test, including:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to other signals such as Power, Ignition & Ground via fault buses

Through relays on each channel enable signals to the UUT to be held open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external fault condition. The module has 4 fault buses which allow an external signal level such as Power, Ignition or Ground to be inserted as a fault condition.

Pickering's Range of PXI Fault Insertion Switches

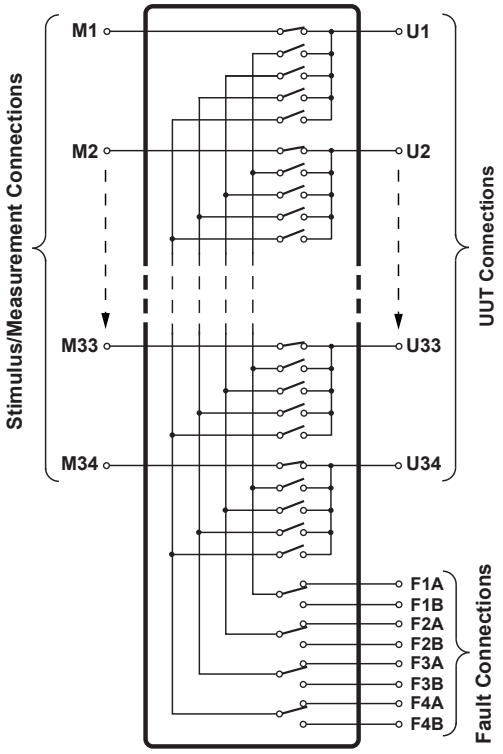
Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	–	8 or 4	150V	1A
40-196	10 or 5 pairs	–	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A

For further flexibility, each fault bus includes a changeover switch to select one of two fault conditions.

The default state of the unit is with all through relays closed and all fault insertion relays open, giving an un-interrupted path between the test fixture and the equipment under test.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf

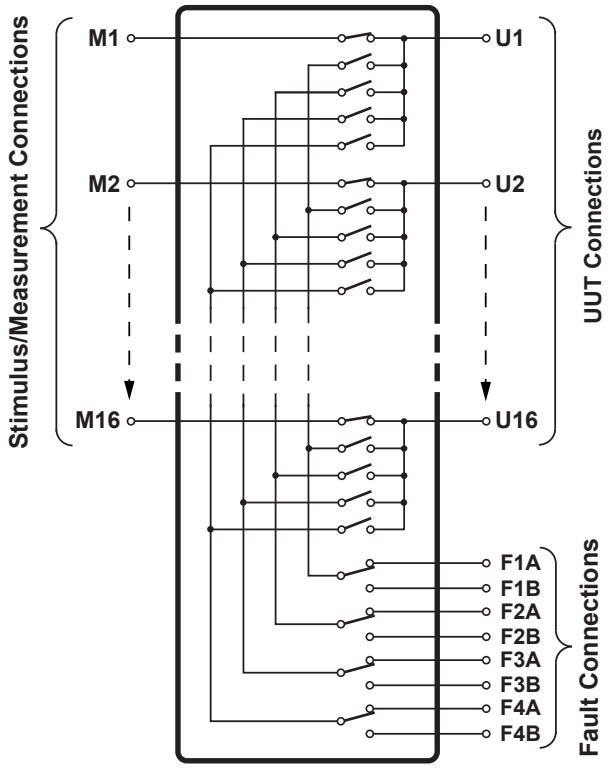


40-197A-001 Fault Insertion Switch Schematic with 34 channels and 4 fault buses.

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA/60W
Max Switch Current:	2A
Max Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Max Total Card Switch Current:	64A †
Max Number of Simultaneously Operated Relays:	No Limit
Initial Path Resistance - On:	<500mΩ
Path Resistance - Off:	$>10^9\Omega$
Minimum Voltage:	100µV
Thermal Offset:	<5µV per relay
Typical Operate Time:	3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

† Applies to PXI chassis installation (please contact sales office for use in alternative platforms).



40-197A-002 Fault Insertion Switch Schematic with 16 channels and 4 fault buses.

Relay Type

The 40-197A is fitted with high quality electro-mechanical relays, Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	<1.9A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel connector: 78-way male D-type

Product Order Codes

34-Channel, 4-Bus, 2A Fault Insertion Switch:	**40-197A-001**
16-Channel, 4-Bus, 2A Fault Insertion Switch:	**40-197A-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

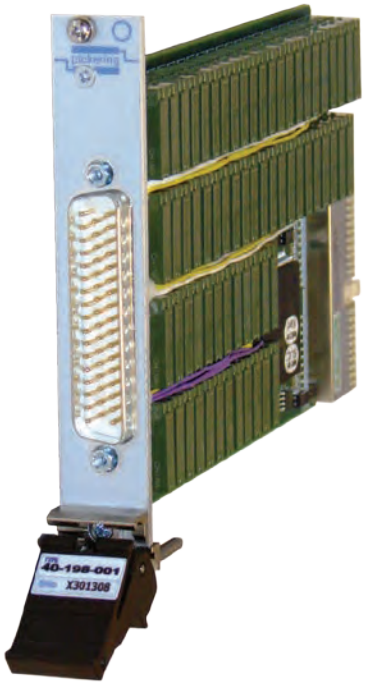
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-197A please refer to the **90-006D** 78 way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-198
5A Fault Insertion Switch

- 20 Fault Insertion Channels
- Suitable for Automotive/Avionics ECU Burn-in/Endurance Test Applications
- High Density Low Cost Solution, Bridging the Gap Between Pickering's 2A & 10A Standard Topology Fault Insertion Solutions
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- Choice of 1 or 2 Fault Insertion Buses
- Fault Bus MUX For Selecting External Fault Conditions
- 5A Hot or Cold Switching
- Hot Switch up to 110VDC/250VAC & up to 150W/1250VA
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-198 is a 20 Channel Fault Insertion switch, primarily designed for the simulation of fault conditions in automotive/avionics applications involving the reliability testing of safety critical controllers.

It is designed to be able to insert 3 different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to other signals such as Power, Ignition and Ground via Fault Insertion Bus

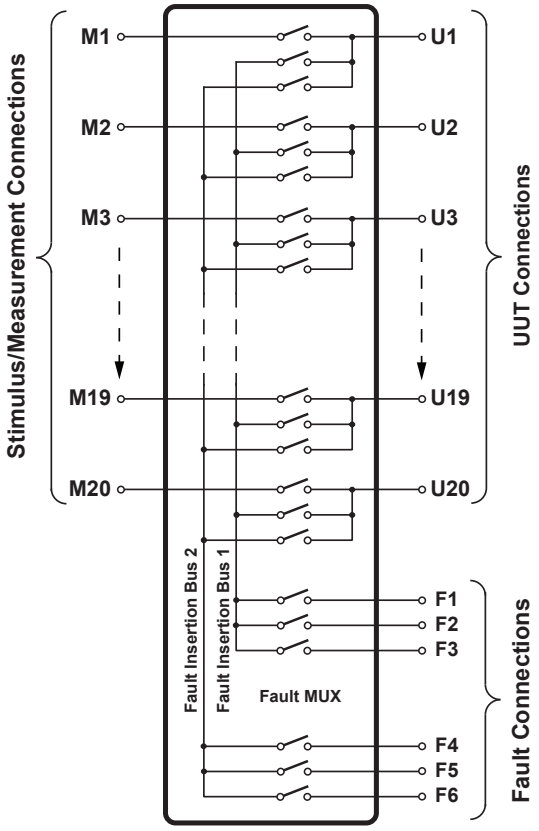
Through relays on each channel enable signals to the UUT to be held open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external fault condition. The module is available with either 1 fault bus (40-198-001) or 2 fault buses (40-198-002). A 3 channel multiplexer on each bus allows an external signal level such as Power, Ignition or Ground to be selected as the fault condition.

Pickering's Range of PXI Fault Insertion Switches

Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	–	8 or 4	150V	1A
40-196	10 or 5 pairs	–	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A

Relay Type

The 40-198 is fitted with high quality electro-mechanical relays. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.



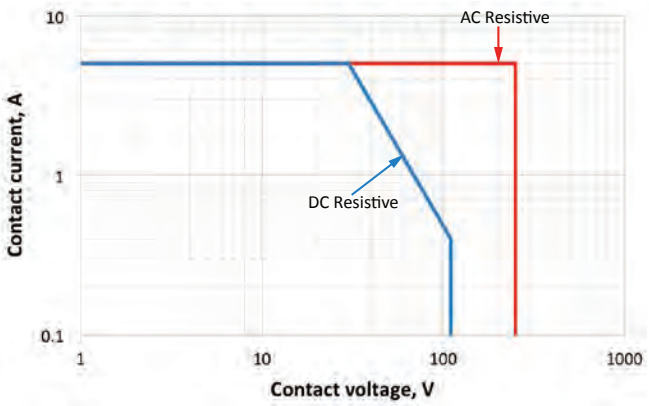
40-198-002 Fault Insertion Switch Schematic: This version has 2 fault buses, the 40-198-001 has 1 fault bus

Switching Specification

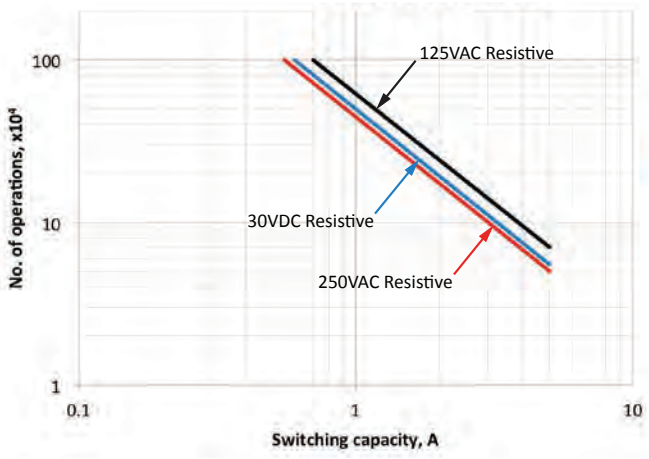
Contact Type:	Gold clad silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 5A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 5A 110VDC/250VAC 150W/1250VA 10mA, 5VDC
Typical Pulse Capability: Max Combined Switch Path Total Current:	Cold Switch 10A for 100ms under low duty cycle conditions (please contact sales office for further advice). 60A †
Initial Path Resistance, On: Path Resistance, Off:	150mΩ max, 70mΩ typical $>10^9\Omega$
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 $>2x10^7$ $>5x10^4$ (5A 250VAC, 5A 30VDC) $>1x10^5$ (3A 250VAC, 3A 30VDC)

* For variation of maximum hot switching capacity of voltage with current refer to plot.

† Applies to PXI chassis installation (please contact sales office for use in alternative platforms).



Current/Voltage Curve



Current/Operating Life Curve

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.34A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signal connections via front panel 50-way male D-type connector.

Product Order Codes

Single Bus 20-Chan 5A Fault Insertion Switch	**40-198-001**
Dual Bus 20-Chan 5A Fault Insertion Switch	**40-198-002**

Mating Connectors & Cabling

For connection accessories for the 40-198 please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kit for the 40-198 is as follows:

91-100-020 Relay Kit 20 for 40-198-001/002

For further assistance, please contact your local Pickering sales office.

40-199
10A Fault Insertion Switch

- 10 Fault Insertion Channels
- Suitable for Automotive/Avionics ECU Burn-in/ Endurance Test Applications
- High Quality Electro-Mechanical Relays
- Simulation of Various Types of Electrical Fault, Enabling Rigorous Fault Testing
- Choice of 1 or 2 Fault Insertion Buses
- 10A Hot or Cold Switching and up to 300W/2500VA Power
- Hot Switch up to 125VDC or 250VAC
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-199 is a 10 Channel Fault Insertion switch designed for the simulation of fault conditions in automotive/avionics applications, involving the reliability testing of safety critical controllers.

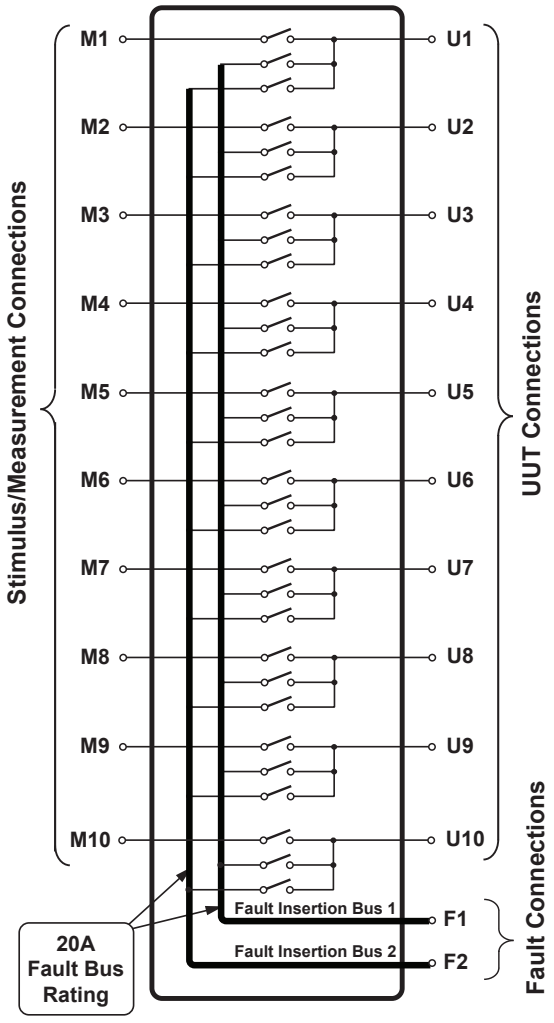
It is designed to be able to insert 3 different fault conditions between the test fixture and the equipment under test:

- Open-Circuit
- Short-Circuit between UUT connections
- Short-Circuit to other signals such as Power, Ignition & Ground via Fault Insertion Bus

Through relays on each channel enable signals to the UUT to be held open-circuit. Fault Insertion Buses allow any channel to be shorted to any other channel and also enable any channel to be connected to an external signal such as Power, Ignition or Ground to simulate fault conditions. The module is available with either 1 fault bus (40-199-001) or 2 fault buses (40-199-002).

The 40-199 uses high quality electro-mechanical power relays with 10A hot or cold switching capability. All relays are normally open types. The fault buses are rated at 20A in order to allow 2 off 10A fault connections to each bus.

Pickering's Range of PXI Fault Insertion Switches					
Model No.	**Signal Channels**	**Fault Buses**	**Fault Inputs**	**Max Voltage**	**Max Current**
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A



40-199-002 Fault Insertion Switch Schematic Diagram. This version has 2 fault buses, the 40-199-001 has 1 fault bus

Switching Specification

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 10A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 10A 125VDC/250VAC 300W/2500VA 10mA, 5VDC
Max Continuous Total Switch Path Loading: †	 16W (Example allowed conditions - 6 channels at 10A or 10 channels at 8A, please contact sales office for any further advice).
Max Fault Bus Current:	20A, each bus
Max Standoff Voltage: Initial Path Resistance, On: Path Resistance, Off:	400VDC 25mΩ typical $>10^9\Omega$
Operate Time:	10ms typical
Expected Life (operations) - resistive load ‡ Mechanical Life: At Max. Switch Capacity:	 $>5x10^7$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

† Significantly higher total switch path loading is possible when using Pickering 40-922/923 PXI & 60-102/103 LXI chassis', please contact sales office for details.

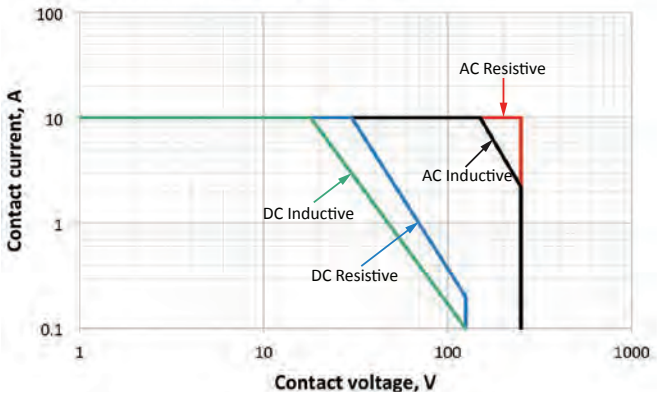
‡ Note: As switch life deteriorates rapidly when hot switching signals above 30VDC, it is advisable to only cold switch above this level.

Relay Type

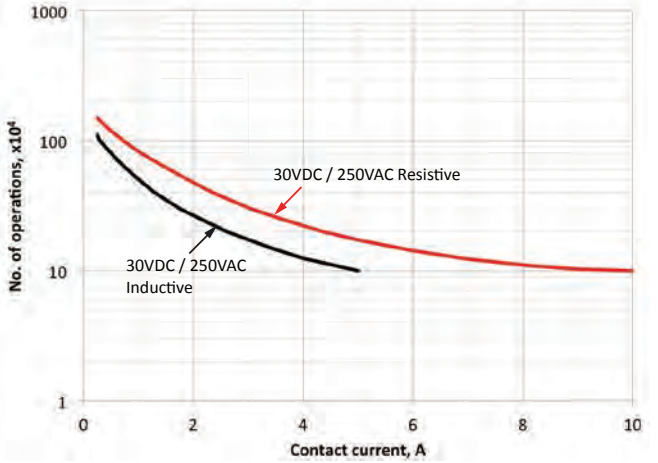
The 40-199 is fitted with high quality electro-mechanical power relays, gold-flash over silver alloy.

Power Requirements

+3.3V	+5V	+12V	-12V
0	95mA	<0.5A	0



40-199 Current/Voltage Curve



40-199 Current/Operating Life Curve

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). 3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signal connections via front panel mounted 20-way male GMCT connector, Fault Bus via 3-way male power D-type.

Product Order Codes

Single Bus 10-Channel 10A Fault Insertion Switch:	**40-199-001**
Dual Bus 10-Channel 10A Fault Insertion Switch:	**40-199-002**

Mating Connectors & Cabling

For connection accessories for the 40-199 please refer to the **90-014D** 20-way GMCT and **90-018D** 3-way Power D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kits for the 40-199 range are as follows:

91-100-071 Relay Kit 71 for 40-199-001 & 40-199-002

For further assistance, please contact your local Pickering sales office.

40-200
CAN/FlexRay/Differential Bus PXI Fault Insertion Module

- Fault Insertion on 4 or 8 Channels of 2 Wire Connections
- Suited for CAN Bus and FlexRay Fault Insertion
- Controlled Transmission Line Impedance
- Simple Insertion of Shorted Pair, Open and Battery/ Ground Connection
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-200 is designed to simulate common faults on two wire communication interfaces such as CAN Bus.

The 40-200 supports 4 or 8 channels of two wire serial interfaces. Each channel can simulate an open fault in either or both wires, a short between both wires or a short to one of eight externally applied fault connections – such as a battery connection or ground - via four fault buses.

Each channel can support up to 0.3A and is rated to handle up to 100V between the wire pairs. The wire pairs have controlled transmission line impedance suited to most differential pair signalling systems, including fast CAN Bus interfaces and RS232.

Each fault bus is capable of carrying 2A allowing multiple channels to be connected to the same fault condition. Additionally, each fault bus features a changeover relay to allow the user to connect alternative fault conditions to the fault buses.

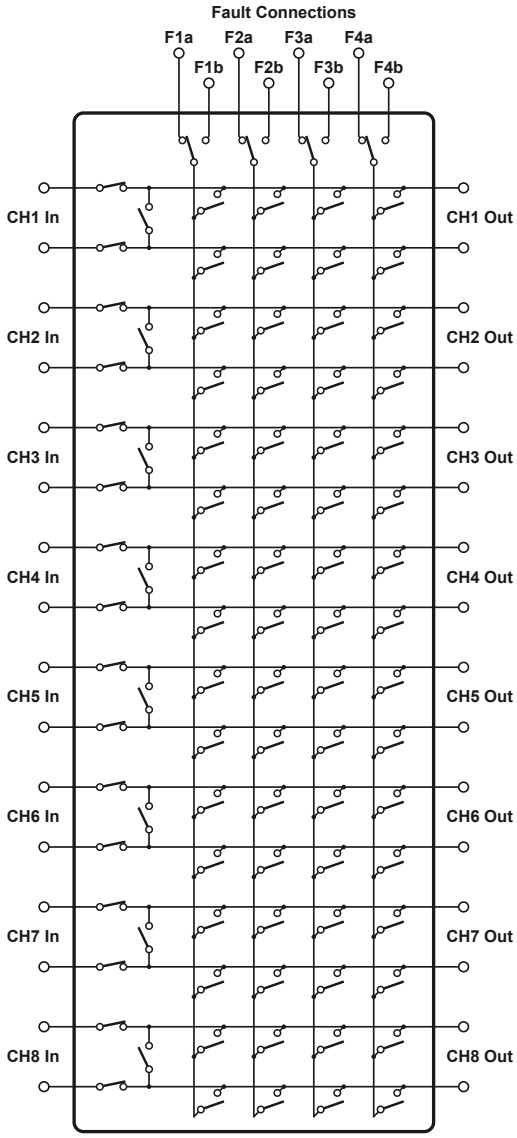
The front panel signal connector is an easy to use 78-way D-type which is fully supported by Pickering Interfaces range of connector accessories. Relays used are high quality EMR relays designed for telecommunications use with a long service life.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf

Pickering's Range of PXI Fault Insertion Switches

Model No.	Signal Channels	Fault Buses	Fault Inputs	Max Voltage	Max Current or Bus Type
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A
40-200	4 or 8 differential	4	8	100V	CAN, FlexRay
40-201	4 or 8 differential	2	4	100V	Ethernet/AFDX



40-200-008 2-Wire, 8-Channel Fault Insertion Switch Schematic Diagram

Data Path Specification

Configuration:	4 or 8 pairs of two wire connections designed for use on differential serial interfaces.
Faults Simulated:	Open on either wire or both, short between wires, short to one of eight fault connections via four fault buses.
Differential Line Impedance:	120Ω
Voltage Rating: Current Rating: Max Hot Switch Power:	100V 0.3A 30W
Path Resistance:	<2Ω
Typical Bandwidth:	50MHz Differential
Operate Time:	3ms typical

Fault Bus Specification

Configuration:	Four fault buses each with a changeover relay for selecting one of two fault conditions.
Voltage Rating: Current Rating: Max Hot Switch Power:	100V 2A 60W

Power Requirements

+3.3V	+5V	+12V	-12V
150mA	1A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). 3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signal connections via front panel mounted 78-way male D-type connector.

Product Order Codes

4-Channel CAN/FlexRay/Differential Bus Fault Insertion Switch:	**40-200-004**
8-Channel CAN/FlexRay/Differential Bus Fault Insertion Switch:	**40-200-008**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

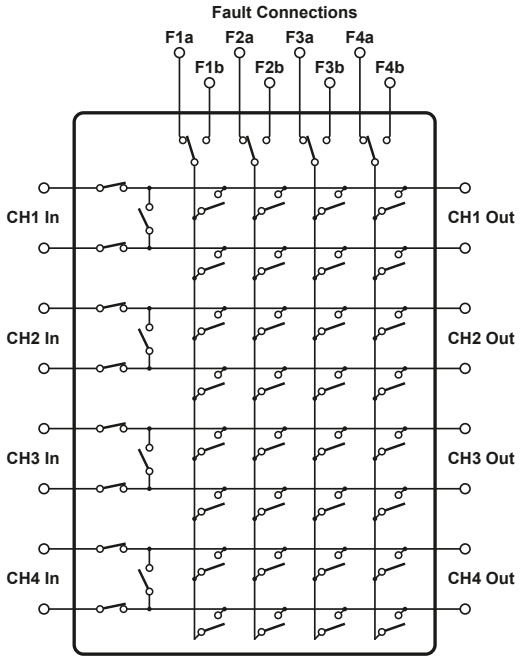
Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For general purpose (non-differential) connection accessories for the 40-200 module please refer to the **90-006D** 78-way D-type connector data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Note: To use the 40-200 up to its full operating frequency, cables with twisted pairs must be used.



40-200-004 2-Wire, 4-Channel Fault Insertion Switch Schematic Diagram

40-201
Ethernet/AFDX
PXI Fault Insertion Module

- Fault Insertion on 4 or 8 Channels of 2 Wire Connections
- Suited for Ethernet Fault Insertion
- Compatible With 1Gb Ethernet & AFDX
- Controlled Transmission Line Impedance
- Simple Insertion of Shorted Pair, Open and Battery/Ground Connection
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-201 is designed to simulate common faults on high speed two wire communication interfaces such as Ethernet.

The 40-201 supports 4 or 8 channels of two wire serial connections and can be used for simulating faults on Ethernet AFDX, 100BaseT and 1000BaseT interfaces. Any wire can be set to an open circuit, shorts can be applied across the wire pair, or to the adjacent pair. Fault connections can be made to one of four external signals via two fault buses, typically simulating connections to a supply voltage or ground.

Each channel can support up to 0.3A and is rated to handle up to 100V between the wire pairs. The wire pairs have controlled transmission line impedance suited to most differential pair signalling systems, including 100BaseT, 1000BaseT, AFDX and automotive Ethernet systems.

Each fault bus is capable of carrying 2A allowing multiple channels to be connected to the same fault condition. Additionally, each fault bus features a changeover relay to allow the user to connect alternative fault conditions to the fault buses.

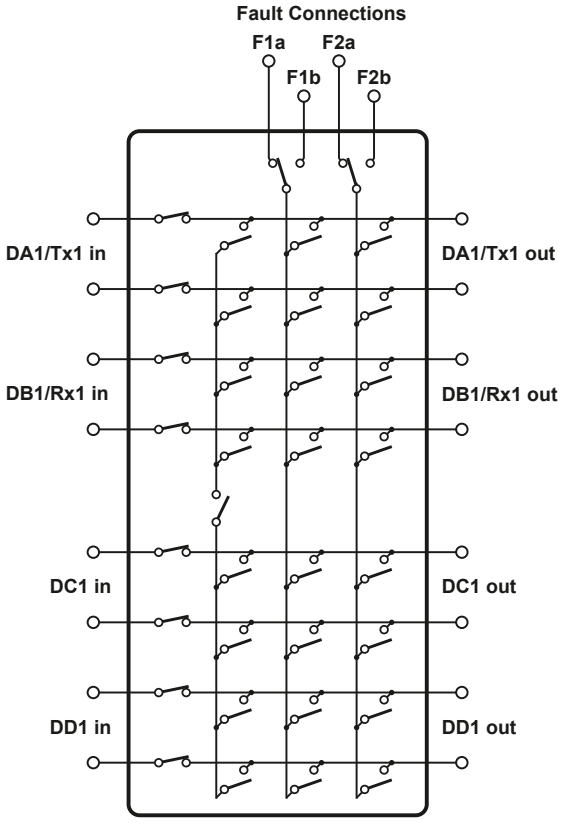
The front panel signal connector is an easy to use 78-way D-type which is fully supported by Pickering Interfaces range of connector accessories. Relays used are high quality EMR relays designed for telecommunications use with a long service life.

Differential Bus Switching

Pickering Interfaces also offer 40-736 and 40-737 multiplexers which are suitable for switching Ethernet, USB and other serial communications interfaces.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-201-004 2-Wire, 4-Channel Fault Insertion Switch Schematic Diagram

Pickering's Range of PXI Fault Insertion Switches					
Model No.	**Signal Channels**	**Fault Buses**	**Fault Inputs**	**Max Voltage**	**Max Current or Bus Type**
40-190B	74, 64 or 32	1 or 2	4 or 8	165V	2A
40-191	6	2	2	40V	30A
40-192	6	2	2	200V	10A
40-193	7	1 or 2	1 or 2	16V	20A, 1A min
40-194	7	1 or 2	1 or 2	16V	20A, no min
40-195	22 or 11 pairs	—	8 or 4	150V	1A
40-196	10 or 5 pairs	—	10 or 5	110V	5A
40-197A	34 or 16	4	8	300V	2A
40-198	20	1 or 2	3 or 6	250V	5A
40-199	10	1 or 2	2	250V	10A
40-200	4 or 8 differential	4	8	100V	CAN, FlexRay
40-201	4 or 8 differential	2	4	100V	Ethernet/AFDX

Data Path Specification

Configuration:	4 or 8 pairs of two wire connections designed for use on high speed differential serial interfaces including Ethernet 1000BaseT.
Faults Simulated:	Open on either wire or both, short between wires or to adjacent wire pair, short to one of four fault connections via two fault buses.
Differential Line Impedance:	100Ω
Voltage Rating: Current Rating: Max Hot Switch Power:	100V 0.3A 30W
Path Resistance:	<2Ω data input to output
Typical Bandwidth:	>400MHz differential
Typical Operate Time:	3.5ms

Fault Bus Specification

Configuration:	Two fault buses each with a changeover relay for selecting one of two fault conditions.
Voltage Rating: Current Rating: Max Hot Switch Power:	100V 2A 60W

Power Requirements

+3.3V	+5V	+12V	-12V
150mA	700mA	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). 3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signal connections via front panel mounted 78-way male D-type connector.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Product Order Codes

4-Channel Ethernet/AFDX Fault Insertion Switch:	**40-201-004**
8-Channel Ethernet/AFDX Fault Insertion Switch:	**40-201-008**
Accessories:	
Interface Board for Gigabit Ethernet, 78-way D-type to 4xRJ45 & 9-way D-type fault connector	**40-965-910**
Interface Board for 100-BaseT, 78-way D-type to 8xRJ45 & 9-way D-type fault connector	**40-965-911**

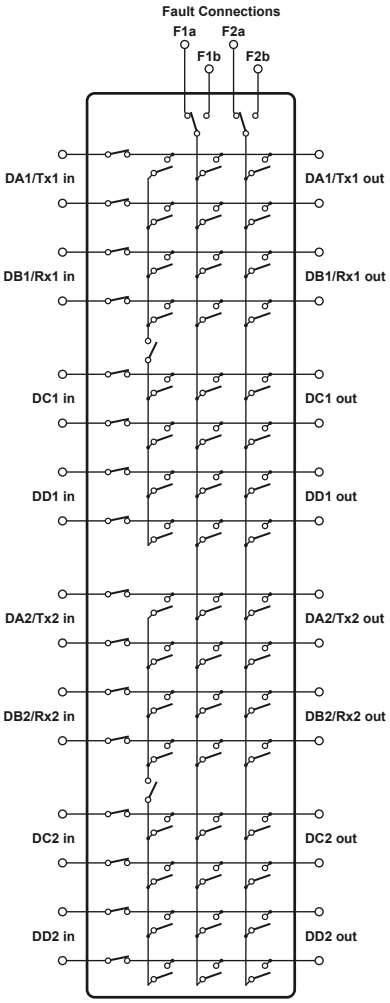
Interface Boards

Pickering Interfaces is able to design and supply interface boards, such as the 40-965-910 and 40-965-911, that adapt the 78-way D-type connector to other connector types, including RJ45. For further information contact your local Pickering Interfaces sales representative with your requirements.

Mating Connectors & Cabling

For general purpose (non-differential) connection accessories for the 40-201 module please refer to the **90-006D** 78-way D-type connector data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

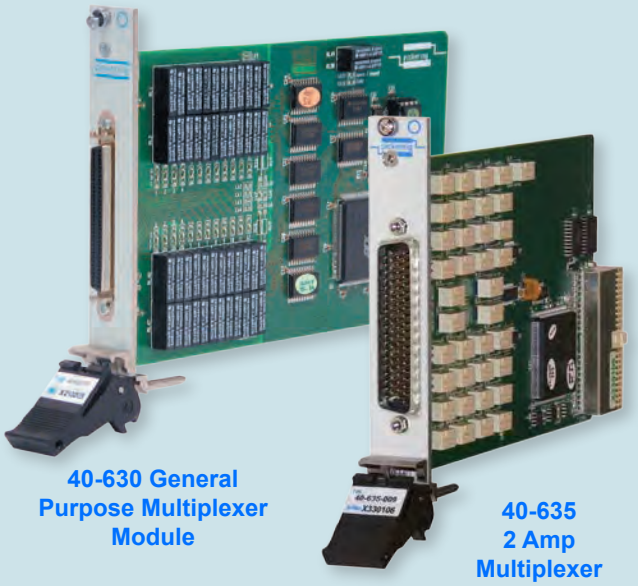
Note: To use the 40-201 up to its full operating frequency, cables with twisted pairs must be used.



40-201-008 2-Wire, 8-Channel Fault Insertion Switch

Multiplexer: Low Density

- Versatile Multiplexer Range With Single, Dual & Quad Operation
- Configurable Versions Can be Set With Different Bank Sizes and Pole Count
- Low Thermal EMF Version
- Reed Versions Use High Reliability Pickering Ruthenium Reed Relays
- Electro-mechanical Relay Versions With Current Handling to 2 Amps
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments



40-630 General Purpose Multiplexer Module

40-635 2 Amp Multiplexer Module

The range of low density multiplexer solutions are ideal for applications requiring a lower number of channels and poles. All reed based modules use high quality ruthenium reed relays that provide a very long service life and consistent contact operations at all rated switching levels. Electro-mechanical relay based modules have a voltage rating of 300VDC/250VAC and are capable of switching up to 2 Amps.

The range includes a low thermal offset multiplexer that is suitable for connecting to thermocouples and other sensors that requires the use of contacts with low offset errors and consistent contact performance.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

Low Density Multiplexer Modules

Between 4 & 64 Channels, 1, 2 & 4 Banks, 1, 2 & 4 Poles

150VDC/100VAC 0.5A Switch, 1.2A Carry

Ruthenium Reed			Page
Dual 16:1, 2-Pole Dual 32:1, 1-Pole Single 16:1, 4-Pole Single 32:1, 2-Pole Single 64:1, 1-Pole		40-630-022	22.2

Ruthenium Reed			Page
Dual 24:1, 1-Pole Single 24:1, 2-Pole Single 48:1, 1-Pole		40-632-021	22.2

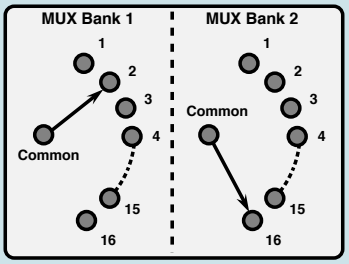
150VDC/100VAC 0.5A Switch, 1A Carry

Low Thermal Ruthenium Reed			Page
Single 23:1, 2-Pole		40-620-022	22.5

300VDC/250VAC 2A Switch, 2A Carry

Electro-mechanical			Page
Single 64:1, 1-Pole		40-635-001	22.7
Single 32:1, 2-Pole		40-635-002	
Single 16:1, 4-Pole		40-635-003	
Single 8:1, 8-Pole		40-635-004	
Dual 32:1, 1-Pole		40-635-005	
Dual 16:1, 2-Pole		40-635-006	
Dual 8:1, 4-Pole		40-635-007	
Quad 16:1, 1-Pole		40-635-008	
Quad 8:1, 2-Pole		40-635-009	

Electro-mechanical			Page
Single 32:1, 1-Pole		40-635-101	22.7
Single 16:1, 2-Pole		40-635-102	
Single 8:1, 4-Pole		40-635-103	
Single 4:1, 8-Pole		40-635-104	
Dual 16:1, 1-Pole		40-635-105	
Dual 8:1, 2-Pole		40-635-106	
Dual 4:1, 4-Pole		40-635-107	
Quad 8:1, 1-Pole		40-635-108	
Quad 4:1, 2-Pole		40-635-109	



Example Multiplexer Configuration: Dual 1 to 16 (40-630)

40-630/632
Dual 16/24 Channel Multiplexer Module

- Versatile Multiplexer With Single & Dual Operation
- 40-630 Dual 16-Channel 2-Pole Multiplexer, Configurable In 4 Other Modes
- 40-632 Dual 24-Channel 1-Pole Multiplexer, Configurable In 2 Other Modes
- 1, 2 & 4-Pole Switching Formats
- All Versions Use High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 150V, 1.2A with 20W Max Power
- Automatic Isolation Switches Reduce Capacitive Loading in Large Systems
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-630 series of general purpose multiplexer modules feature a wide range of switching configurations. Typical applications include signal routing in ATE and data acquisition systems.

Each module is factory configured into one of the configuration modes *(refer to schematics overleaf)*. Connections are made via a front panel 68 pin connector. Available reed relay formats are 1-pole and 2-pole.

The 40-630/632 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected *(not available on the Single 64-channel 1 pole or Dual 32-channel 1-pole configurations)*.

Built in Automatic Isolation Switching *(see diagrams overleaf)* connects only the currently active multiplexer bank on to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

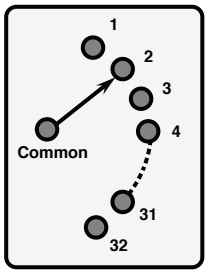
Relay Type

The 40-630 is fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

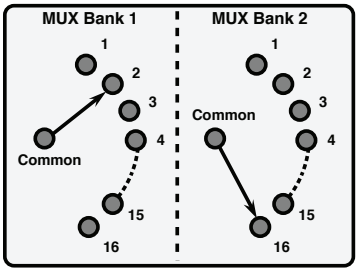
Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime. All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

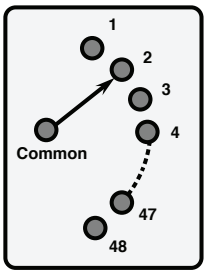


Single: 16, 32 or 64-Channel

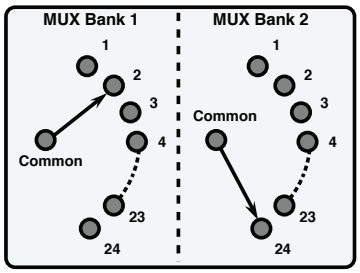


Dual: 16 or 32-Channel

40-630 Multiplexer Modes

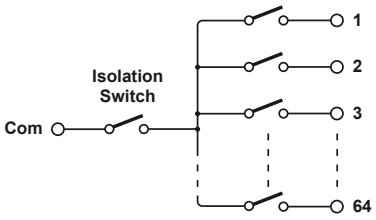


Single: 24 or 48-Channel

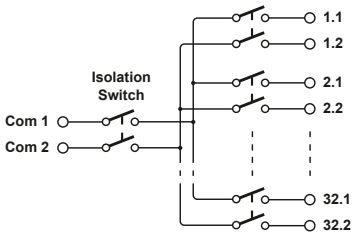


Dual: 24-Channel

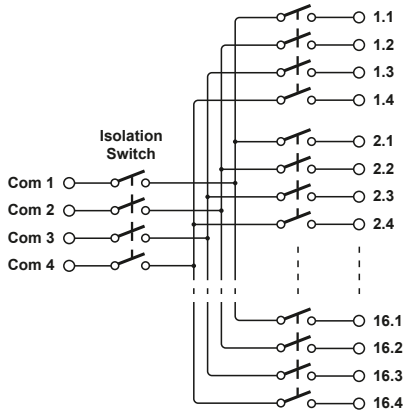
40-632 Multiplexer Modes



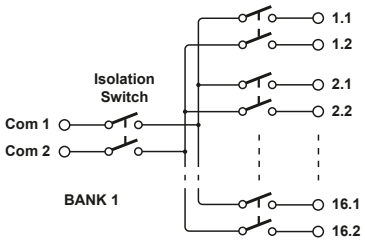
40-630-022-64/1
Single 64-Channel 1-Pole MUX Mode

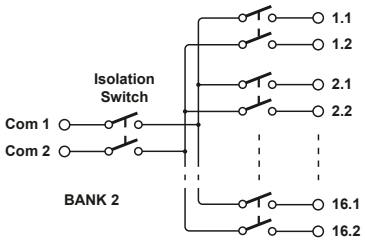


40-630-022-32/2
Single 32-Channel 2-Pole MUX Mode

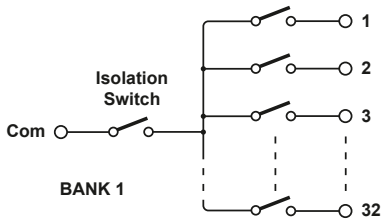


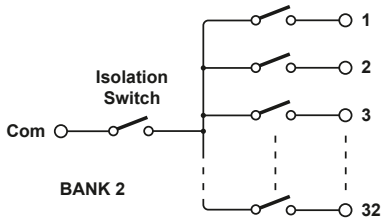
40-630-022-16/4
Single 16-Channel 4-Pole MUX Mode





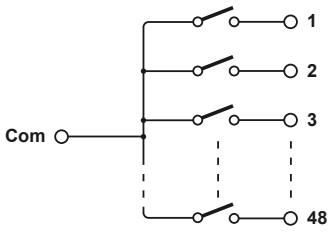
40-630-022-D/16/2
Dual 16-Channel 2-Pole MUX Mode



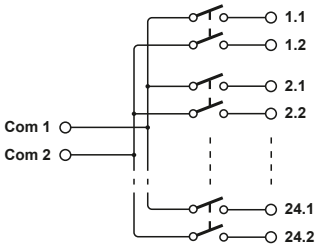


40-630-022-D/32/1
Dual 32-Channel 1-Pole MUX Mode

40-630-022 Multiplexer Configuration Schematics

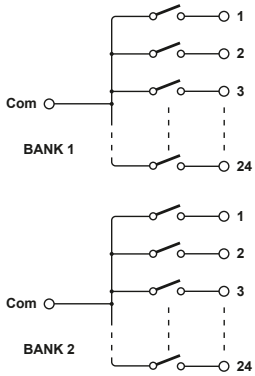


40-632-021-48/1
Single 48-Channel 1-Pole MUX Mode



40-632-021-24/2
Single 24-Channel 2-Pole MUX Mode

40-632-021 Multiplexer Configuration Schematics

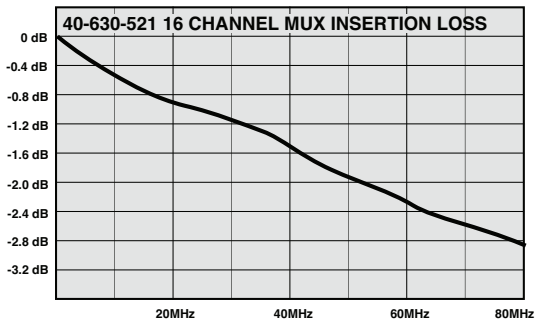


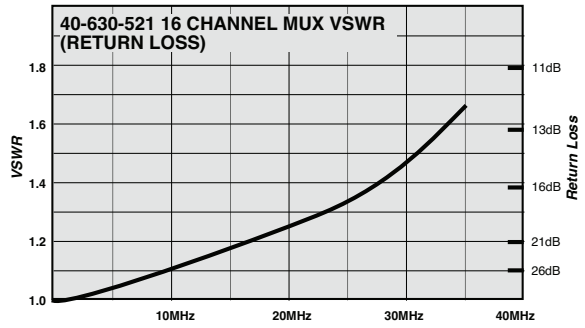
40-632-021-D/24/1
Dual 24-Channel 1-Pole MUX Mode

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage: †	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.2A
Initial On Path Resistance: Initial Off Path Resistance: Thermal Offset:	<750mΩ (single module) $>10^9$Ω (single module) <10µV
Bandwidth (3dB, 1 module)	>10MHz
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life, low power load: Expected Life, full power load:	$1x10^9$ operations $>1x10^6$ operations

† Higher switching voltages may be available.





Power Requirements

+3.3V	+5V	+12V	-12V
0	280mA (220mA typ)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-630-022-32/2)
180g (40-630-022-D/32/1)
180g (40-632-021-D/24/1)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel 68-way female SCSI style micro-D.

Optional Limiting Resistors

Modules may be fitted with limiting resistors, these are fitted in series with the analogue common. These are very useful if over-current signals may be encountered, thus extending the life and reliability of the reed relays.

40-630-022 Multiplexer Shipping Configurations

Multiplexer Mode	Dual		Single		
Number of Channels	16	†32	16	32	†64
Number of Poles	2	1	4	2	1

† Dual 32 channel 1 pole and Single 64 channel 1 pole configurations are NOT capable of switching multiple channels simultaneously.

Note: When ordering you may specify that the multiplexer is configured into any of the Shipping Configuration modes shown, this saves having to alter internal jumpers yourself upon receipt of the unit. For example, to ship a 40-630-022 multiplexer set up as Single 64 Channel 1 Pole then order: "**40-630-022** Configuration S/64/1"

40-630-021-S Screened Multiplexer Shipping Configurations

Multiplexer Mode	Dual	Single
Number of Channels	16	32

40-632-021 Multiplexer Shipping Configurations

Multiplexer Mode	Dual	Single	
Number of Channels	24	24	48
Number of Poles	1	2	1

Product Order Codes

Single 64-Channel 1-Pole MUX	**40-630-022-64/1**
Single 32-Channel 2-Pole MUX	**40-630-022-32/2**
Single 16-Channel 4-Pole MUX	**40-630-022-16/4**
Dual 32-Channel 1-Pole MUX	**40-630-022-D/32/1**
Dual 16-Channel 2-Pole MUX	**40-630-022-D/16/2**
Single 48-Channel 1-Pole MUX	**40-632-021-48/1**
Single 24-Channel 2-Pole MUX	**40-632-021-24/2**
Dual 24-Channel 1-Pole MUX	**40-632-021-D/24/1**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**93-006-401**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-630-022	**91-100-003 and 91-100-005**
40-630-021	**91-100-003**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-630 series please refer to the **90-015D** 68-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-620
Low Thermal EMF Multiplexer Module

- Single 23-Channel Multiplexer
- Maximum Thermal Offset <1.5µV
- Excellent Low Level Switching Characteristics
- Uses High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 100Volts with 20W Max Power
- Maximum Carry Current of 1A
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

Pickering 40-620 Multiplexer modules are similar to other Pickering Multiplexer modules except thermal E.M.F. is substantially reduced to <1.5µV with 250nV thermal stability.

Typical applications include signal routing in ATE, selecting thermocouple inputs, switching amplifier gain circuits and high accuracy DC microvolt measurements.

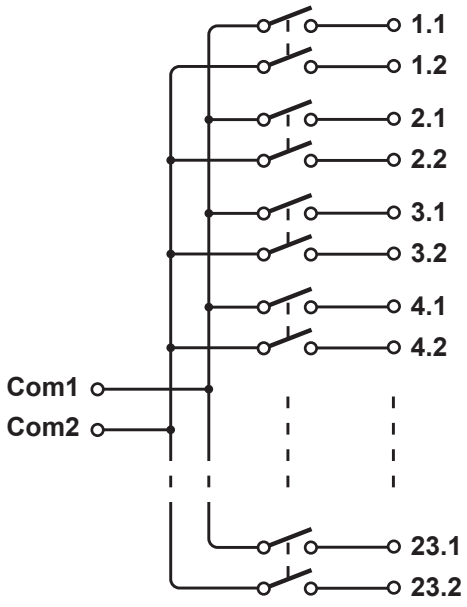
Ruthenium reed switches are used because of their good low level switching capability and very long life with good contact resistance stability, minimal wetting current and low thermal offset.

The 40-620 multiplexer may be operated as a conventional multiplexer with break-before-make action enforced when a new channel is selected. In addition multiple channels may be simultaneously selected (i.e. no break-before-make).

Note: For the best thermal performance of the 40-620 module its position in the parent PXI rack is critical. It should be placed in a slot with the highest possible airflow and with no other modules adjacent to it.

Supported by eBIRST

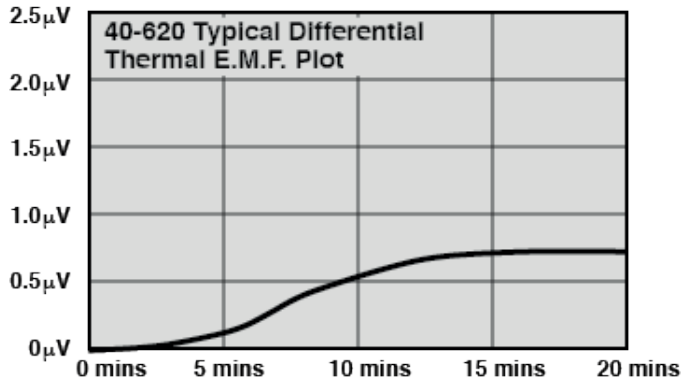
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-620-022 Single 23-Channel 2-Pole Multiplexer

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	100V
Max Power: Max Switch Current: Max Carry Current:	20W 0.5A 1A
Initial Path Resistance On: Off: Differential Thermal Offset:	 <1000mΩ >10^9Ω <1.5µV
Capacitance Open Channel: Channel to Channel:	 <6pF <15pF
Bandwidth (3dB, 1 Module): Noise Level (0 to1MHz in 50Ω system):	>40Mhz <-80dBm
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 >1x10^9 operations >1x10^6 operations



Thermal E.M.F. Plot (2 Pole Switching)

Relay Type

The 40-620 is fitted with Low Thermal Pickering Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

A Spare Reed Relay is built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Power Requirements

+3.3V	+5V	+12V	-12V
0	400mA (200mA typ)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel male 96-way SCSI style micro-D connector.

Product Order Codes

23-Channel Low Thermal MUX	**40-620-022**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-043**

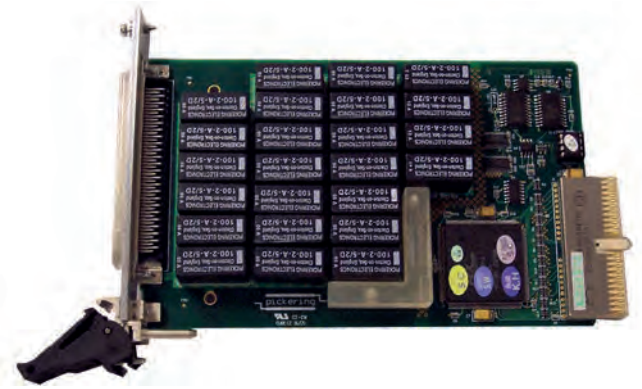
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-620 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Further Information

For further applications information on using the 40-620 Low Thermal Multiplexer please consult 40-620 Operating Manual or contact sales office.



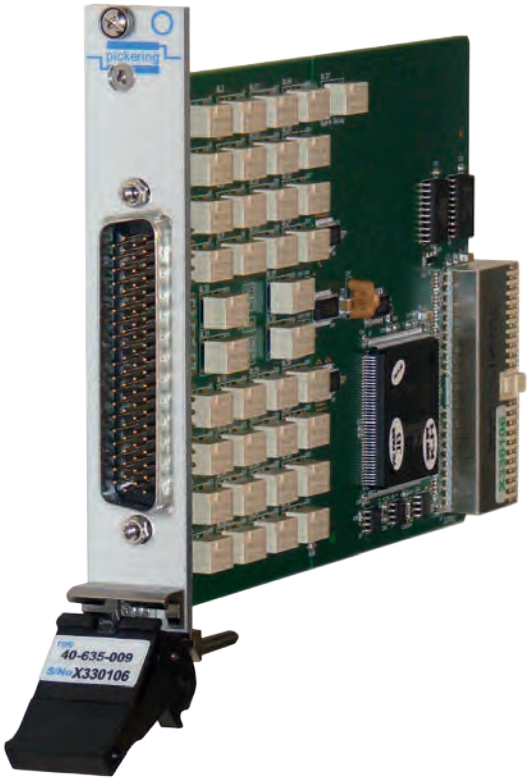
PCB View of the 40-620 Low Thermal MUX Card

40-635
2 Amp Multiplexer Module

- Single: 64-Channel 1-Pole, 32-Channel 2-Pole, 16-Channel 4-Pole, 8-Channel 8-Pole

  Dual: 32-Channel 1-Pole, 16-Channel 2-Pole, 8-Channel 4-Pole

  Quad: 16-Channel 1-Pole, 8-Channel 2-Pole
- 9 Half Density Configurations
- Low Cost
- 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Simple 78-Way D-Type Connection
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



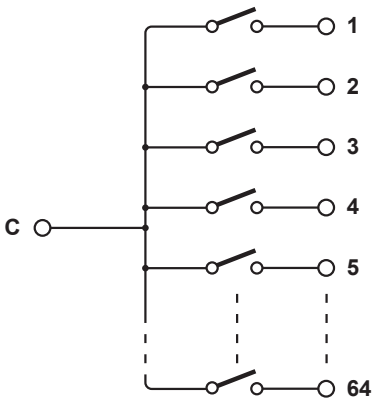
The 40-635 2 Amp Multiplexer module is available in 9 standard configurations as well as 9 half density configurations, all using high quality electro-mechanical signal relays allowing each channel to switch current up to 2A and voltage up to 300VDC/250VAC.

The module is suitable for signal routing in ATE and data acquisition systems. Connections are made via a front panel 78-way D-type connector.

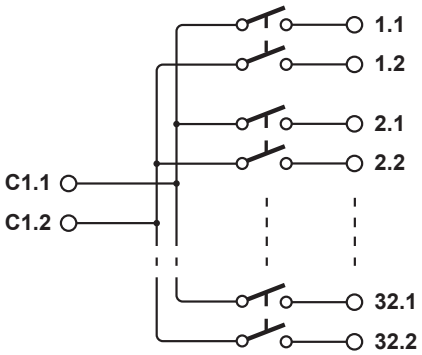
The 40-635 may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition, for 2-pole, 4-pole and 8-pole versions, multiple channels may be simultaneously selected (not available for 1-pole versions). Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Supported by eBIRST

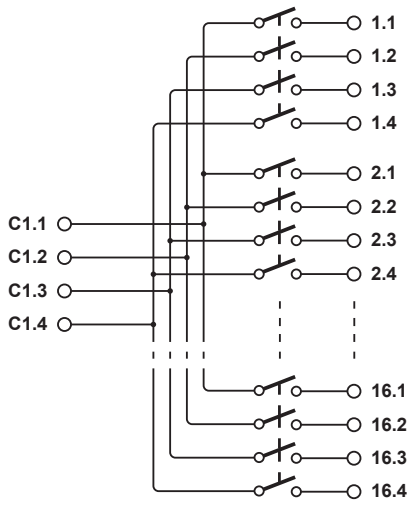
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



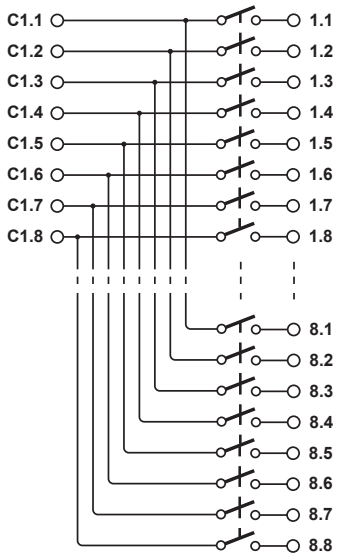
40-635-001 Multiplexer Module - Single 64-Channel 1-Pole (Standard Configuration)



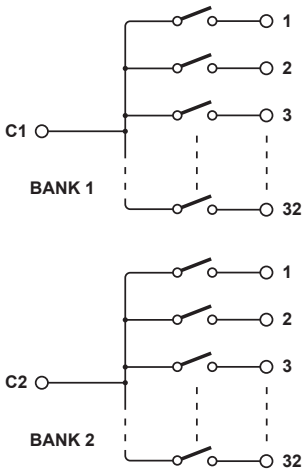
40-635-002 Multiplexer Module - Single 32-Channel 2-Pole (Standard Configuration)



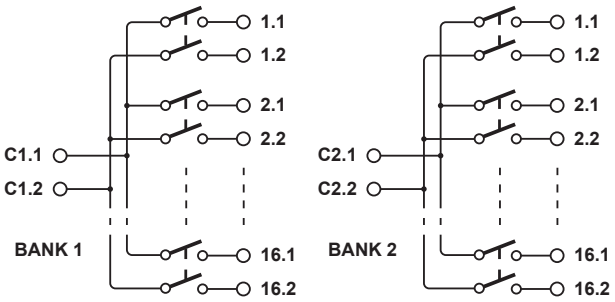
40-635-003
Single 16-Channel 4-Pole MUX



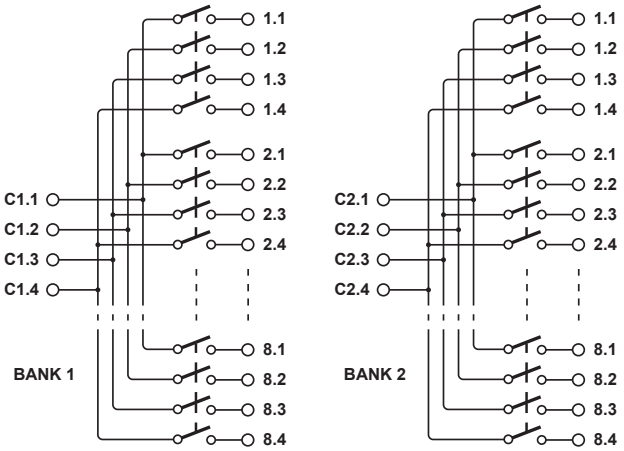
40-635-004
Single 8-Channel 8-Pole MUX



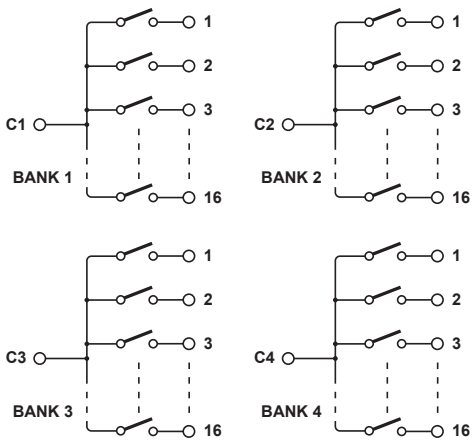
40-635-005
Dual 32-Channel 1-Pole MUX



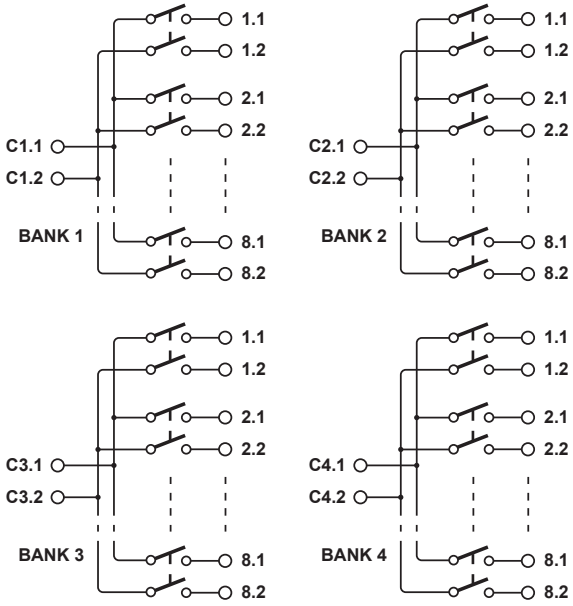
40-635-006
Dual 16-Channel 2-Pole MUX



40-635-007 Dual 8-Channel 4-Pole MUX

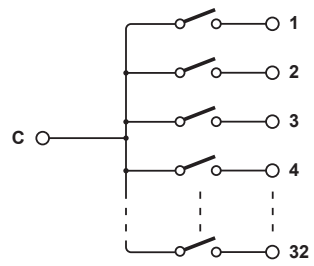


40-635-008
Quad 16-Channel 1-Pole MUX

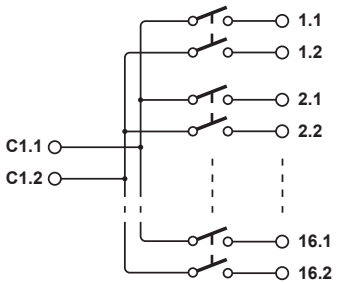


40-635-009 Quad 8-Channel 2-Pole MUX

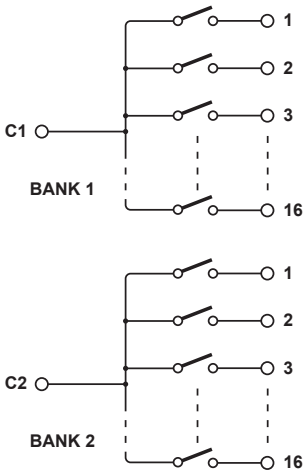
40-635 Multiplexer Standard Configuration Schematics



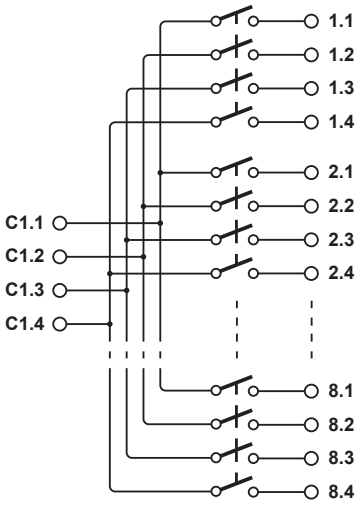
40-635-101
32-Channel 1-Pole MUX



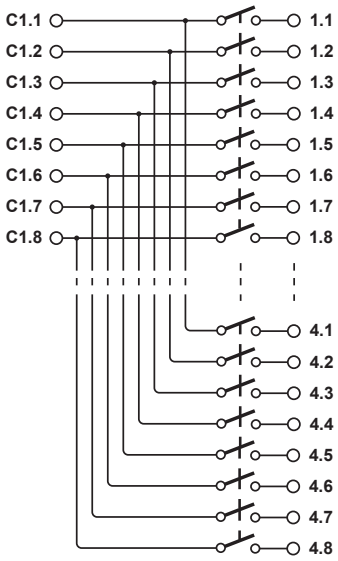
40-635-102
16-Channel 2-Pole MUX



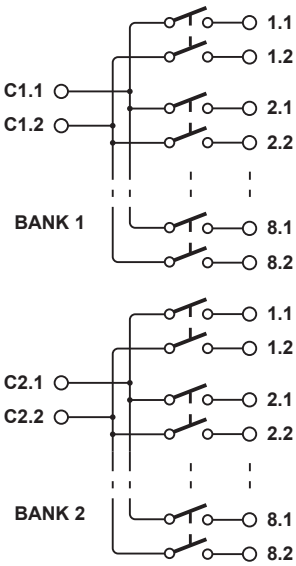
40-635-105
Dual 16-Channel 1-Pole MUX



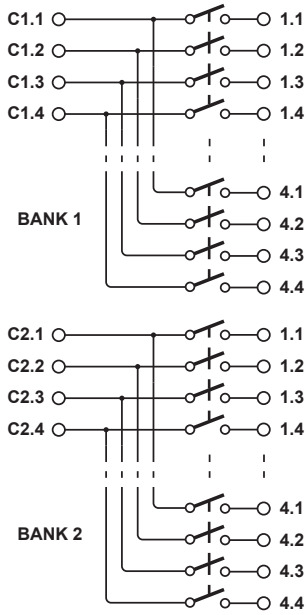
40-635-103
Single 8-Channel 4-Pole MUX



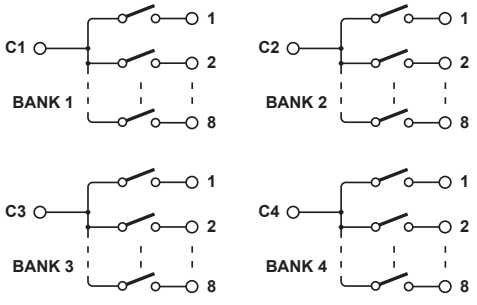
40-635-104
Single 4-Channel 8-Pole MUX



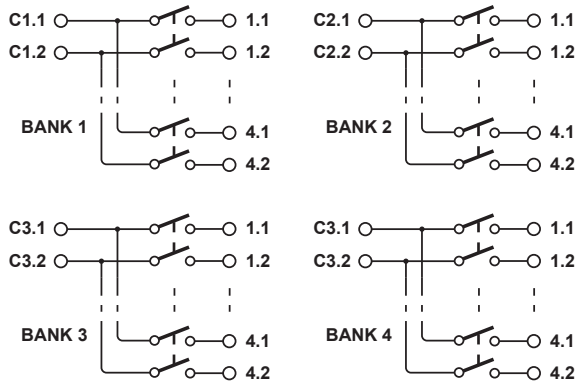
40-635-106
Dual 8-Channel 2-Pole MUX



40-635-107
Dual 4-Channel 4-Pole MUX



40-635-108 Quad 8-Channel 1-Pole MUX



40-635-109 Quad 4-Channel 2-Pole MUX

40-635 Multiplexer Half Density Configuration Schematics

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance - On:	<300mΩ
Path Resistance - Off:	$>10^9\Omega$
Single-Ended Thermal Offset:	<10µV
Differential Thermal Offset:	<5µV
Operate Time:	3ms typical
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
	$>1x10^5$ (0.1A 300VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

Power Requirements

+3.3V	+5V	+12V	-12V
0	350mA (max)	30mA	0

RF Specification - In a 50Ω System

Bandwidth (-3dB):	15MHz	(40-635-001)
	15MHz	(40-635-002)
	20MHz	(40-635-003)
	30MHz	(40-635-004)
	20MHz	(40-635-005)
	25MHz	(40-635-006)
	30MHz	(40-635-007)
	35MHz	(40-635-008)
	35MHz	(40-635-009)
	15MHz	(40-635-101)
	15MHz	(40-635-102)
	25MHz	(40-635-103)
	30MHz	(40-635-104)
	25MHz	(40-635-105)
	25MHz	(40-635-106)
	35MHz	(40-635-107)
	35MHz	(40-635-108)
	35MHz	(40-635-109)
Crosstalk (typical):	10kHz:	-90dB
	100kHz:	-70dB
	1MHz	-50dB
	10MHz	-30dB
Isolation (typical):	10kHz:	90dB
	100kHz:	70dB
	1MHz	50dB
	10MHz	30dB

Relay Type

The 40-635 is fitted with electro-mechanical relays with Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

Signals via front panel 78-way male D-type connector, for pin outs please refer to the operating manual.

Product Order Codes - Standard Configurations

2 Amp Multiplexer, Single 64-Ch/1-Pole	**40-635-001**
2 Amp Multiplexer, Single 32-Ch/2-Pole	**40-635-002**
2 Amp Multiplexer, Single 16-Ch/4-Pole	**40-635-003**
2 Amp Multiplexer, Single 8-Ch/8-Pole	**40-635-004**
2 Amp Multiplexer, Dual 32-Ch/1-Pole	**40-635-005**
2 Amp Multiplexer, Dual 16-Ch/2-Pole	**40-635-006**
2 Amp Multiplexer, Dual 8-Ch/4-Pole	**40-635-007**
2 Amp Multiplexer, Quad 16-Ch/1-Pole	**40-635-008**
2 Amp Multiplexer, Quad 8-Ch/2-Pole	**40-635-009**

Product Order Codes - Half Density Configurations

2 Amp Multiplexer, Single 32-Ch/1-Pole	**40-635-101**
2 Amp Multiplexer, Single 16-Ch/2-Pole	**40-635-102**
2 Amp Multiplexer, Single 8-Ch/4-Pole	**40-635-103**
2 Amp Multiplexer, Single 4-Ch/8-Pole	**40-635-104**
2 Amp Multiplexer, Dual 16-Ch/1-Pole	**40-635-105**
2 Amp Multiplexer, Dual 8-Ch/2-Pole	**40-635-106**
2 Amp Multiplexer, Dual 4-Ch/4-Pole	**40-635-107**
2 Amp Multiplexer, Quad 8-Ch/1-Pole	**40-635-108**
2 Amp Multiplexer, Quad 4-Ch/2-Pole	**40-635-109**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-635 module range please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

NOTE: Low-cost partially populated cabling solutions are available for the half density versions of this module, significantly reducing the cost of integration.

Multiplexer: High Density

- Versatile Multiplexer Range With Channel Counts From 4 to 1, Up To 198 to 1
- Versions Available With Between 1 and 20 Separate Banks
- Pole Count From 1 Up To 32
- Reed Versions Use High Quality Sputtered Ruthenium Reed Relays
- Screened 50Ω Option with 50MHz Bandwidth
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments
- Software Configured Versatile Multiplexers

40-670A Very High Density Reed Relay Multiplexer

High Density Multiplexer Modules

Between 4 & 198 Channels, Between 1 & 20 Banks, Between 1 & 32 Poles

Large BRIC Multiplexers: Between 2 & 96 Channels, Between 6 & 160 Poles

- 150VDC Max Voltage 1A Switch, 1.2A Carry
  - Ruthenium Reed — Configurations between Single 128:1, 1-Pole & 8-Bank 8:1, 2-Pole: 40-610-021/022; Shielded Configurations between Single 64:1, 1-Pole & 8-Bank 8:1, 1-Pole: 40-610-021-S — Page 23.2
  - Ruthenium Reed — Configurations between Single 160:1, 1-Pole & 20-Bank 4:1, 2-Pole: 40-615-021/022 — Page 23.5
- 100VDC Max Voltage 1A Switch, 1A Carry
  - Ruthenium Reed — 16-Bank 5:1, 1-Pole: 40-616-021 — Page 23.8
  - Ruthenium Reed — 18-Bank 3:1, 1-Pole: 40-617-021 — Page 23.10
- 150VDC Max Voltage 0.5A Switch, 1.2A Carry
  - Ruthenium Reed — Single 94:1, 1-Pole or Single 47:1, 2-Pole: 40-640-022 — Page 23.12
- 150VDC Max Voltage 0.5A Switch, 0.5A Carry
  - Ruthenium Reed — Configurations between Single 198:1, 1-Pole & Single 5:1, 32-Pole: 40-670A-021/022; Shielded Configurations between Single 99:1, 1-Pole & Single 5:1, 16-Pole: 40-670A-021-S — Page 23.14
- 150VDC Max Voltage 1A Switch, 1A Carry
  - Electro-mechanical — Configurations between Single 198:1, 1-Pole & Single 5:1, 32-Pole: 40-675-002 — Page 23.17
- 300VDC/250VAC 2A Switch, 2A Carry
  - Electro-mechanical — Single 158:1, 1-Pole: 40-611-001; Single 79:1, 2-Pole: 40-611-002 — Page 23.20
  - Electro-mechanical — Software Configurable between Single 128:1, 1-Pole & 8-Bank 16:1, 1-Pole: 40-612-002 — Page 23.22
  - Electro-mechanical — Software Configurable between Single 64:1, 2-Pole & 16-Bank 4:1, 2-Pole: 40-613-002 — Page 23.25
  - Electro-mechanical — Page 23.28
    - 16-Bank, 8:1, 1-Pole: 40-614-001
    - 16-Bank, 4:1, 2-Pole: 40-614-002
    - 8-Bank, 16:1, 1-Pole: 40-614-003
    - 8-Bank, 8:1, 2-Pole: 40-614-004
    - 8-Bank, 4:1, 4-Pole: 40-614-005
    - 4-Bank, 32:1, 1-Pole: 40-614-006
    - 4-Bank, 16:1, 2-Pole: 40-614-007
    - 4-Bank, 8:1, 4-Pole: 40-614-008
    - 4-Bank, 4:1, 8-Pole: 40-614-009
    - 2-Bank, 64:1, 1-Pole: 40-614-010
    - 2-Bank, 32:1, 2-Pole: 40-614-011
    - 2-Bank, 16:1, 4-Pole: 40-614-012
    - 2-Bank, 8:1, 8-Pole: 40-614-013
    - 2-Bank, 4:1, 16-Pole: 40-614-014
    - 1-Bank, 128:1, 1-Pole: 40-614-015
    - 1-Bank, 64:1, 2-Pole: 40-614-016
    - 1-Bank, 32:1, 4-Pole: 40-614-017
    - 1-Bank, 16:1, 8-Pole: 40-614-018
    - 1-Bank, 8:1, 16-Pole: 40-614-019
    - 1-Bank, 4:1, 32-Pole: 40-614-020
- 100V 1A Switch, 1A Carry
  - Electro-mechanical — Max. Configurations between 6:1, 160-Pole & 96:1, 10-Pole, with switched loop-thru: 40-570 — Page 23.33
- 100V (DC or AC peak) 3A Switch, 3A Carry
  - Electro-mechanical — Max. Configurations between 6:1, 48-Pole & 48:1, 6-Pole, with loop-thru: 40-571 — Page 23.36

The range of High Density Multiplexers provide a compact array of MUX solutions with differing combinations of channel counts and poles. Most high density solutions include isolation relays that allows the MUX to be disconnected from the single input/output port, enabling the convenient interconnection of other channels.

The modules use high density connectors that are fully supported by the Pickering Interfaces range of connector and cable accessories.

40-610
Very High Density Multiplexer Module

- Very High Density Multi-Banked Multiplexer
- Choice of 8, 4, 2 or 1 Multiplexers Per Module
- Up to 144 Switch Points Available with 1 or 2-Pole Switching Formats
- Screened Option For Improved Noise Performance
- All Versions Use High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 150VDC/100VAC, 1.2A with 20W Max Power
- Automatic Isolation Switches Reduce Capacitive Loading in Large Systems
- Factory Reconfigurable To Different Configurations As Needs Change
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-610 series of high density multiplexer modules feature a wide range of switching configurations, especially useful where a large number of small multiplexers are required. Typical applications include signal routing in ATE and data acquisition systems.

Each module is factory configured into one of the configuration modes (refer to schematics overleaf). Connections are made via a front panel 200-pin connector.

Available multiplexer formats are:-
8 Banks, 16 Channels, 1-Pole 8 Banks, 8 Channels, 2-Pole
4 Banks, 32 Channels, 1-Pole 4 Banks, 16 Channels, 2-Pole
2 Banks, 64 Channels, 1-Pole 2 Banks, 32 Channels, 2-Pole
1 Bank, 128 Channels, 1-Pole 1 Bank, 64 Channels, 2-Pole
4 Lower Density Versions 4 Screened Lower Density Versions Custom Sizes (100s of combinations)

The 40-610 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected (not available for 40-610-022 single pole mode).

Built in Automatic Isolation Switching connects only the currently active multiplexer bank to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

The screened version (40-610-021-S) is suitable where improved noise performance is required.

The 40-610 is part of a family of high density PXI Multiplexer modules all sharing similar architecture and the same 200-way connector, other members include the 40-615 and 40-670A High Density Multiplexer series.

Higher Pole Counts

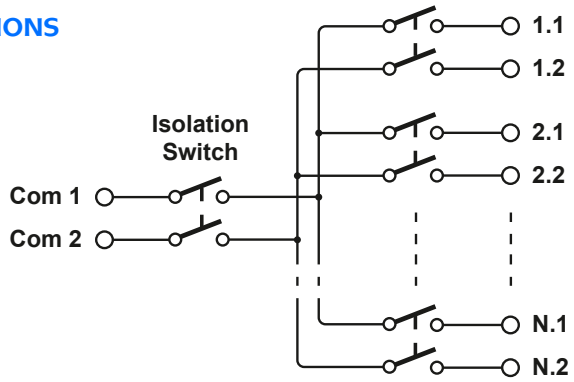
Any multiplexer module with more that one bank can be used as a multipole multiplexer. For example, a 2-bank, 32-channel, 2-pole multiplexer can be used as a single bank, 32-channel, 4-pole multiplexer. The software driver simply switches both banks simultaneously.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

2-POLE MUX MODE – AVAILABLE CONFIGURATIONS

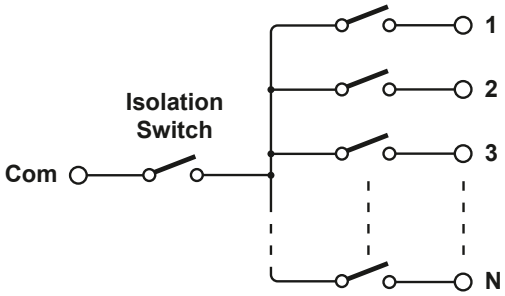
- 8 Banks of 8 Channels
- 4 Banks of 16 Channels
- 2 Banks of 32 Channels
- 1 Bank of 64 Channels
- Custom Configurations



1-POLE MUX MODE – AVAILABLE CONFIGURATIONS

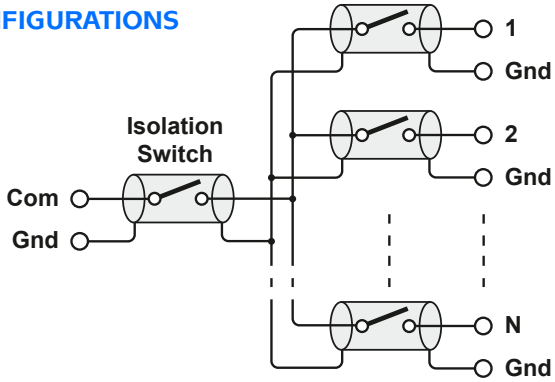
- 8 Banks of 16 Channels †
- 8 Banks of 8 Channels
- 4 Banks of 32 Channels †
- 4 Banks of 16 Channels
- 2 Banks of 64 Channels †
- 2 Banks of 32 Channels
- 1 Bank of 128 Channels †
- 1 Bank of 64 Channels
- Custom Configurations

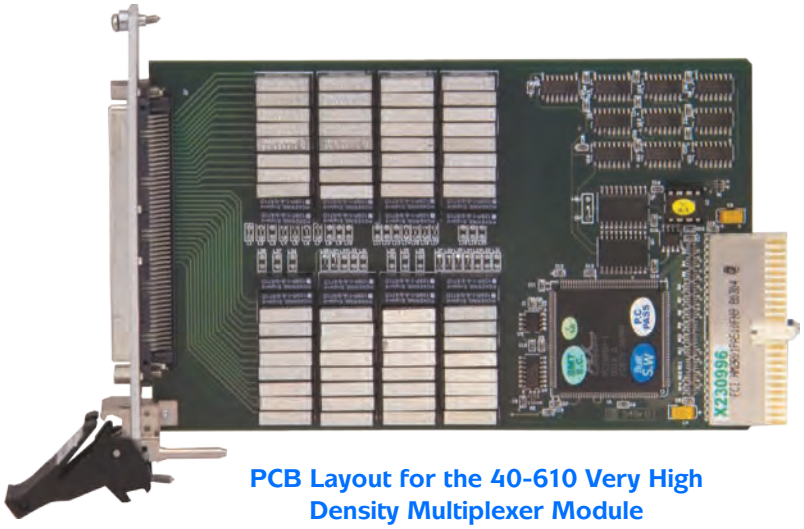
† Multi-channel selection not available.



1-POLE SCREENED MUX MODE – AVAILABLE CONFIGURATIONS

- 8 Banks of 8 Channels
- 4 Banks of 16 Channels
- 2 Banks of 32 Channels
- 1 Bank of 64 Channels
- Custom Configurations





PCB Layout for the 40-610 Very High Density Multiplexer Module

Relay Type

The 40-610 is fitted with High Quality Reed Relays, these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.2A
Initial On Path Resistance: Initial Off Path Resistance: Thermal Offset:	<1Ω (single module) $>10^9$Ω (single module) <10µV
Bandwidth (3dB, 1 module)	>5MHz †
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life, low power load: Expected Life, full power load:	$1x10^9$ operations $>1x10^6$ operations

† Bandwidth is configuration dependent (please consult sales office for further information).

Extra Specification - Long Life Version

Max Switch Current: Max Carry Current:	0.5A 1.2A
Expected Life:	$>3x10^9$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.34A (280mA typ)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 220g (40-610-022)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.

Signals via a front panel 200-way female LFH connector.

Product Order Codes

High Density Configurations:

8 Bank, 16 Channel, 1-Pole MUX	**40-610-022-8/16/1**
8 Bank, 8 Channel, 2-Pole MUX	**40-610-022-8/8/2**
4 Bank, 32 Channel, 1-Pole MUX	**40-610-022-4/32/1**
4 Bank, 16 Channel, 2-Pole MUX	**40-610-022-4/16/2**
2 Bank, 64 Channel, 1-Pole MUX	**40-610-022-2/64/1**
2 Bank, 32 Channel, 2-Pole MUX	**40-610-022-2/32/2**
1 Bank, 128 Channel, 1-Pole MUX	**40-610-022-1/128/1**
1 Bank, 64 Channel, 2-Pole MUX	**40-610-022-1/64/2**

40-610-022 modules can be factory reconfigured into any of the above configurations.

Low Density Configurations:

8 Bank, 8 Channel, 1-Pole MUX	**40-610-021-8/8/1**
4 Bank, 16 Channel, 1-Pole MUX	**40-610-021-4/16/1**
2 Bank, 32 Channel, 1-Pole MUX	**40-610-021-2/32/1**
1 Bank, 64 Channel, 1-Pole MUX	**40-610-021-1/64/1**

40-610-021 modules can be factory reconfigured into any of the above configurations.

Screened Low Density Configurations:

8 Bank, 8 Chan Screened 1-Pole MUX	**40-610-021-S-8/8/1**
4 Bank, 16 Chan Screened 1-Pole MUX	**40-610-021-S-4/16/1**
2 Bank, 32 Chan Screened 1-Pole MUX	**40-610-021-S-2/32/1**
1 Bank, 64 Chan Screened 1-Pole MUX	**40-610-021-S-1/64/1**

40-610-021-S modules can be factory reconfigured into any of the above configurations.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-610-022	**91-100-003 and 91-100-008**
40-610-021	**91-100-003**
40-610-021-S	**91-100-011 and 91-100-003**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-610 series please refer to the **90-002D** 200-way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

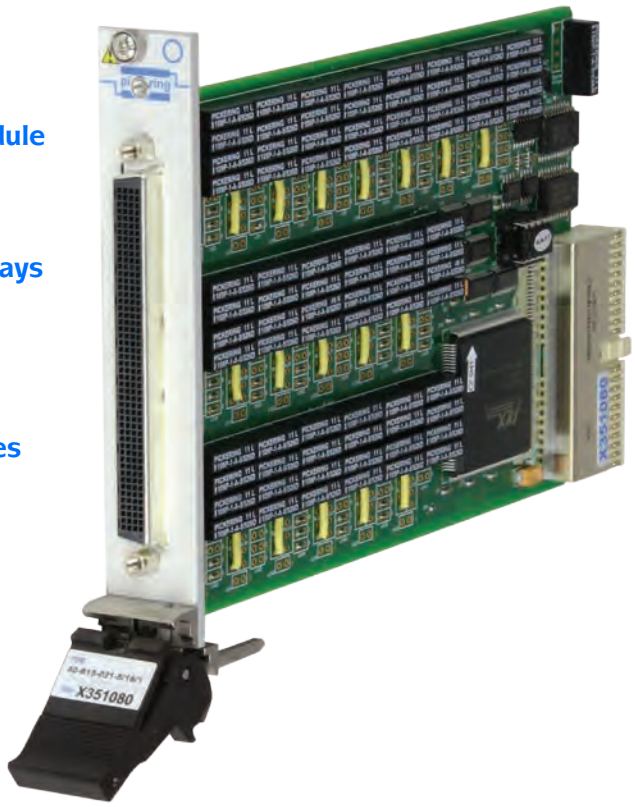
40-961A-200 200-Way Mating Connector

40-971A-200 200-Way to 4x50-Way Cable Assembly

Pickering have a wide range of connector and cabling options please consult PXI connector & cabling datasheets or visit our web site

40-615
Very High Density Multiplexer Module

- Very High Density Multi-Banked Multiplexer
- Choice of 20, 10, 5, 4, 2 or 1 Multiplexers Per Module
- Up to 168 Switch Points Available with 1 or 2-Pole Switching Formats
- All Versions Use High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 150VDC/100VAC, 1.0A with 20W Max Power
- Versions Available With Automatic Isolation Switches To Reduce Capacitive Loading in Large Systems
- Factory or User Reconfigurable To Different Configurations As Needs Change
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



The 40-615 series of high density multiplexer modules feature a wide range of switching configurations, especially useful where a large number of small multiplexers are required. Typical applications include signal routing in ATE and data acquisition systems.

Each module is factory configured into one of the configuration modes (refer to schematics overleaf). Connections are made via a front panel 200-pin connector.

Available multiplexer formats are:-
20 Banks, 8 Channels, 1-Pole 20 Banks, 4 Channels, 2-Pole
10 Banks, 16 Channels, 1-Pole 10 Banks, 8 Channels, 2-Pole
5 Banks, 32 Channels, 1-Pole 5 Banks, 16 Channels, 2-Pole
4 Banks, 40 Channels, 1-Pole 4 Banks, 20 Channels, 2-Pole
2 Banks, 80 Channels, 1-Pole 2 Banks, 40 Channels, 2-Pole
1 Bank, 160 Channels, 1-Pole 1 Bank, 80 Channels, 2-Pole
6 Lower Density Versions Custom Sizes (100s of combinations)

The 40-615 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected (not available for 40-615-022 single pole high density mode).

The 40-615-022 single pole high density versions have built in Automatic Isolation Switching. This connects only the currently active multiplexer bank to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

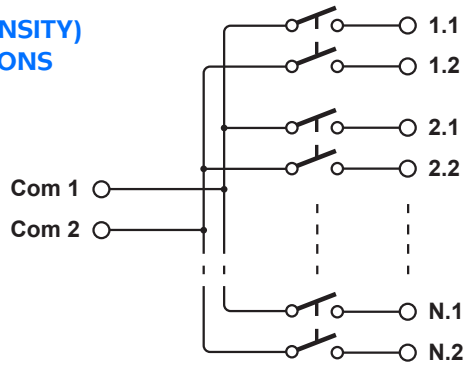
The 40-615 is part of a family of high density PXI Multiplexer modules all sharing similar architecture and the same 200 way connector, other members include the 40-610 and 40-670A High Density Multiplexer series.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

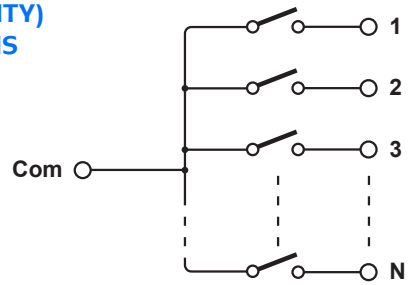
2-POLE MUX MODE (HIGH DENSITY) – AVAILABLE CONFIGURATIONS

- 20 Banks of 4 Channels
- 10 Banks of 8 Channels
- 5 Banks of 16 Channels
- 4 Bank of 20 Channels
- 2 Banks of 40 Channels
- 1 Bank of 80 Channels
- Custom Configurations



1-POLE MUX MODE (LOW DENSITY) – AVAILABLE CONFIGURATIONS

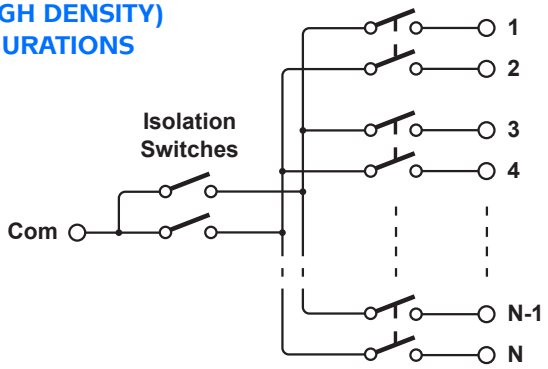
- 20 Banks of 4 Channels
- 10 Banks of 8 Channels
- 5 Banks of 16 Channels
- 4 Banks of 20 Channels
- 2 Banks of 40 Channels
- 1 Bank of 80 Channels
- Custom Configurations



1-POLE MUX MODE (HIGH DENSITY) – AVAILABLE CONFIGURATIONS

- 20 Banks of 8 Channels
- 10 Banks of 16 Channels
- 5 Banks of 32 Channels
- 4 Banks of 40 Channels
- 2 Banks of 80 Channels
- 1 Bank of 160 Channels
- Custom Configurations

Note: Multi-channel selection not available in this mode



40-961A-200 200-Way Mating Connector

40-971A-200 200 Way to 4x50-Way Cable Assembly

Pickering have a wide range of connector and cabling options please consult PXI connector & cabling datasheets or visit our web site

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 1.0A 1.2A
Initial Path Resistance On (Single Module): Off (Single Module):	 <1Ω $>10^9$Ω
Bandwidth (3dB, 1 module)	>5MHz †
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>1x10^6$ operations

† Bandwidth is configuration dependent (please consult sales office for further information).

Relay Type

The 40-615 is fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1350mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 240g (40-615-022)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via a front panel 200-way female LFH connector.

Product Order Codes

High Density Configurations:	
20 Bank, 8 Channel, 1-Pole MUX	**40-615-022-20/8/1**
20 Bank, 4 Channel, 2-Pole MUX	**40-615-022-20/4/2**
10 Bank, 16 Channel, 1-Pole MUX	**40-615-022-10/16/1**
10 Bank, 8 Channel, 2-Pole MUX	**40-615-022-10/8/2**
5 Bank, 32 Channel, 1-Pole MUX	**40-615-022-5/32/1**
5 Bank, 16 Channel, 2-Pole MUX	**40-615-022-5/16/2**
4 Bank, 40 Channel, 1-Pole MUX	**40-615-022-4/40/1**
4 Bank, 20 Channel, 2-Pole MUX	**40-615-022-4/20/2**
2 Bank, 80 Channel, 1-Pole MUX	**40-615-022-2/80/1**
2 Bank, 40 Channel, 2-Pole MUX	**40-615-022-2/40/2**
1 Bank, 160 Channel, 1-Pole MUX	**40-615-022-1/160/1**
1 Bank, 80 Channel, 2-Pole MUX	**40-615-022-1/80/2**

40-615-022 modules can be factory reconfigured into any of the above configurations.

1-Pole configuration does not allow multi-channel selections (refer to manual for details). Only applies to 40-615-022.

Product Order Codes (continued)

Low Density Configurations:	
20 Bank, 4 Channel, 1-Pole MUX	**40-615-021-20/4/1**
10 Bank, 8 Channel, 1-Pole MUX	**40-615-021-10/8/1**
5 Bank, 16 Channel, 1-Pole MUX	**40-615-021-5/16/1**
4 Bank, 20 Channel, 1-Pole MUX	**40-615-021-4/20/1**
2 Bank, 40 Channel, 1-Pole MUX	**40-615-021-2/40/1**
1 Bank, 80 Channel, 1-Pole MUX	**40-615-021-1/80/1**

40-615-021 modules can be reconfigured into any of the above configurations.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

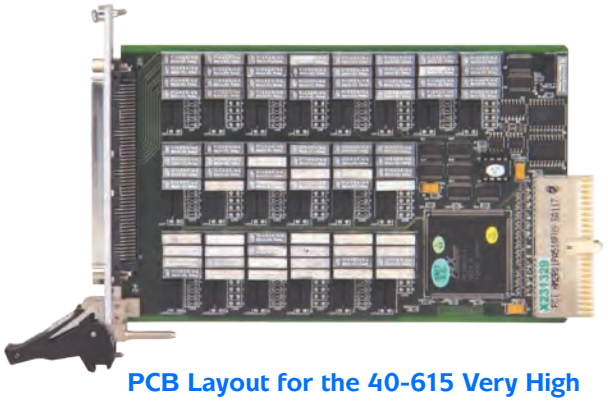
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-615-022	**91-100-008 and 91-100-015**
40-615-021	**91-100-003 and 91-100-015**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-615 series please refer to the **90-002D** 200-way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB Layout for the 40-615 Very High Density Multiplexer Module

40-616
16-Bank, 5-Channel, 1-Pole Multiplexer Module

- 16 Separate Multiplexers in One Module
- Each Multiplexer is Single Pole, 5-Way
- Features Isolation Switches to Reduce Signal Loading
- Inter-Bank Linking Relays Allow Multiplexer Size to be Increased in Multiples of 5
- Multiplexer Channels Can be Set Individually
- Any Number of Multiplexer Channels Can be Set Simultaneously
- Switches Up To 100 Volts, 1 Amp, 20 Watt.
- Uses High Reliability Ruthenium Reed Relays for Maximum Performance
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-616 16-Bank, 5-Channel, 1-Pole Multiplexer Module forms part of the System 40 PXI Programmable Switching system. The Module consists of 16 electrically isolated banks of multiplexers controlled by a PXI/PCI interface. Each bank is a 1 to 5 multiplexer and operates with break-before-make action when a new channel is selected. Any Individual multiplexer bank can have a channel set by itself, alternatively, multiple banks can have channels selected simultaneously.

Inter-bank linking relays allow multiplexer size to be increased in multiples of 5 by joining the common terminals of adjacent banks. Closing one linking switch produces a 10 channel multiplexer, closing all linking switches produces an 80 channel multiplexer

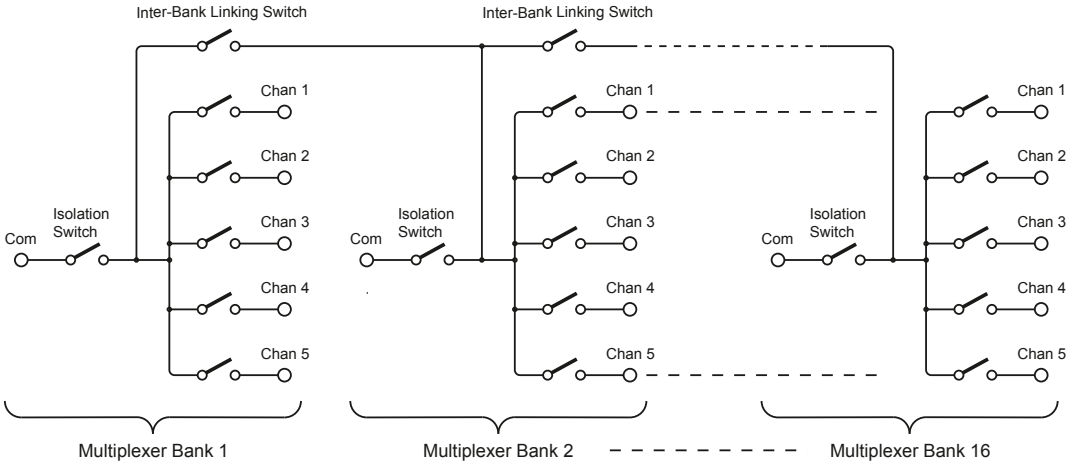
Built-in Isolation Switches are used to connect only currently active multiplexer banks to their respective analogue commons. This keeps capacitive loading and leakage currents in large multiplexer systems to a minimum.

The 40-616 is fitted with high performance instrumentation grade Reed Relays (Ruthenium sputtered type). These offer very long life with good low level switching performance and excellent contact resistance stability.

The module is suitable for cascading in applications that require large multiplexer systems, it is also suitable for test systems that require the switching of a large number of signals in parallel.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Switching Diagram for the 40-616 16-Bank, 5-Channel, 1-Pole Multiplexer

Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	100V
Max Power: Max Switch Current: Max Carry Current:	20W 1A 1A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <700mΩ $>10^9$Ω <10µV
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 $>1x10^9$ operations $>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.3A typ. 1.4A max.	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector
Front panel Connector:	96-way male SCSI style micro-D connector.

Product Order Codes

16-Bank, 5-Channel, 1-Pole Multiplexer Module	**40-616-021-16/5/1**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

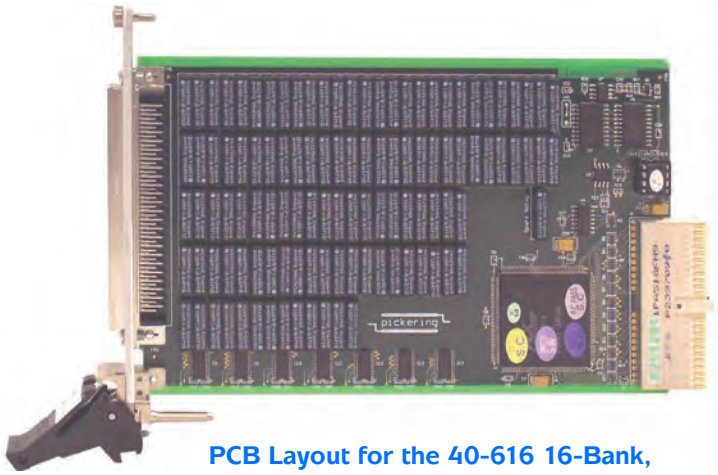
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-003**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-616 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB Layout for the 40-616 16-Bank, 5-Channel, 1-Pole Multiplexer Module

40-617
18-Bank, 3-Channel, 1-Pole Multiplexer Module

- 18 Separate Multiplexers in One Module
- Each Multiplexer is Single Pole, 3-Way
- Isolation Switches to Reduce Signal Loading
- Inter-Bank Linking Relays Allow Multiplexer Size to be Increased in Multiples of 3
- Includes 12 SPST Uncommitted Relays
- Multiplexer Channels Can be Set Individually
- Any Number of Multiplexer Channels Can be Set Simultaneously
- Switches Up To 100 Volts, 1 Amp, 20 Watt.
- Uses High Reliability Ruthenium Reed Relays for Maximum Performance
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-617 18-Bank, 3-Channel, 1-Pole Multiplexer Module forms part of the System 40 PXI Programmable Switching system. The Module consists of 18 electrically isolated banks of multiplexers controlled by a PXI/PCI interface. Each bank is a 1 to 3 multiplexer and operates with break-before-make action when a new channel is selected. Any Individual multiplexer bank can have a channel set by itself, alternatively, multiple banks can have channels selected simultaneously.

Inter-bank linking relays allow multiplexer size to be increased in multiples of 3 by joining the common terminals of adjacent banks. Closing one linking switch produces a 6 channel multiplexer, closing all linking switches produces an 54 channel multiplexer

Built-in Isolation Switches are used to connect only currently active multiplexer banks to their respective analogue commons. This keeps capacitive loading and leakage currents in large multiplexer systems to a minimum.

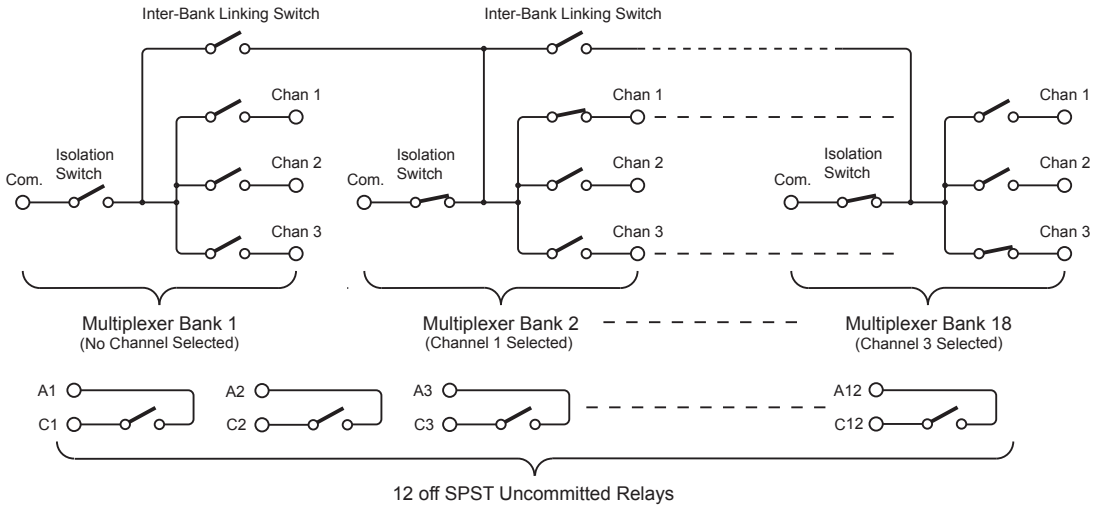
Included in the module are 12 SPST uncommitted relays which are separate from the multiplexers and are connected to via pins on the front panel plug.

The 40-617 is fitted with high performance instrumentation grade Reed Relays (Ruthenium sputtered type). These offer very long life with good low level switching performance and excellent contact resistance stability.

The module is suitable for cascading in applications that require large multiplexer systems, it is also suitable for test systems that require the switching of a large number of signals in parallel.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Switching Diagram for the 40-617 18-Bank, 3-Channel, 1-Pole Multiplexer Including 12 SPST Relays

Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	100V
Max Power: Max Switch Current: Max Carry Current:	20W 1A 1A
Initial Path Resistance On (Single Module): Off (Single Module): Differential Thermal Offset:	 <700mΩ $>10^9$Ω <10µV
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 $>1x10^9$ operations $>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	0.3A typ. 1.4A max.	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel Connector: 96-way male SCSI style micro-D connector.

Product Order Codes

18-Bank, 3-Channel, 1-Pole Multiplexer Module	**40-617-021**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

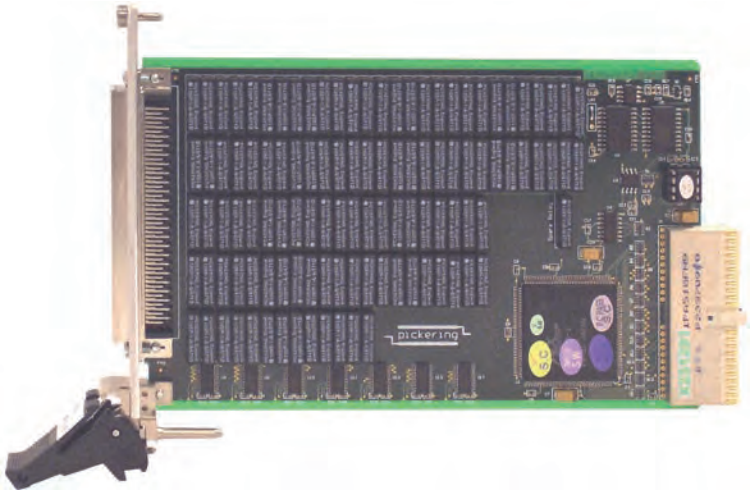
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-003**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-617 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB Layout for the 40-616 16-Bank, 5-Channel, 1-Pole Multiplexer Module

40-640
47/94 Channel Multiplexer Module

- High Density Multiplexer
- 47-Channel 2-Pole or 94-Channel 1-Pole Configurations
- All Versions Use High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 150V, 1.2A with 20W Max Power
- Automatic Isolation Switches Reduce Capacitive Loading in Large Systems
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-640 series of high density multiplexer modules feature a choice of switching configurations. Typical applications include signal routing in ATE and data acquisition systems.

The multiplexer module is available as 47-channel 2-pole or 94-channel 1-pole. Connections are made via a front panel 96-pin connector.

The 40-640 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected *(not available for 1-pole version)*.

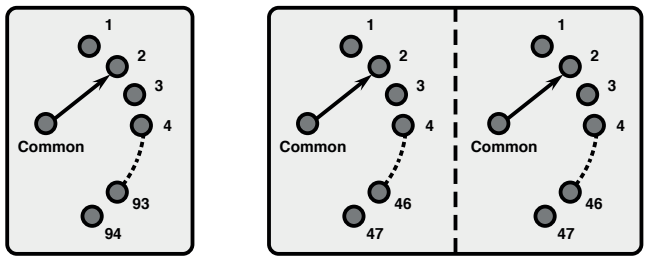
Built in Automatic Isolation Switching *(see diagrams overleaf)* connects only the currently active multiplexer bank on to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Relay Type

The 40-640 is fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

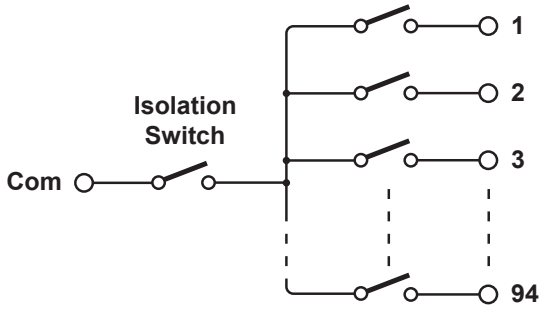


94-Channel 1-Pole 47-Channel 2-Pole

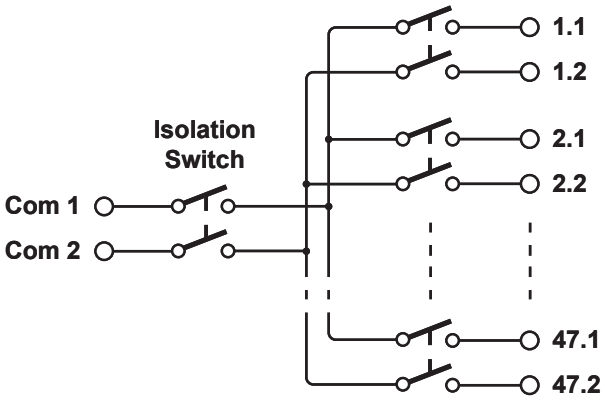
Two Configurations Available For The 60-640 High Density Multiplexer Module

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Switching Diagram For 40-640-022-94/1
Single 94-Channel 1-Pole Multiplexer



Switching Diagram For 40-640-022-47/2
Single 47-Channel 2-Pole Multiplexer

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	20W 0.5A 1.2A
Initial Path Resistance On (Single Module): Off (Single Module): Thermal Offset:	 <750mΩ $>10^9$Ω <10µV
Bandwidth (3dB, 1 module)	>10MHz
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>1x10^6$ operations

Power Requirements

+3.3V	+5V	+12V	-12V
0	280mA (220mA typ)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 96-way male SCSI style micro-D connector.

Product Order Codes

Single 47-Channel 2-Pole Multiplexer	**40-640-022-47/2**
Single 94-Channel 1-Pole Multiplexer	**40-640-022-94/1**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-002-001**	**93-002-226**	**93-016-103**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-005**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-640 module please refer to the **90-016D** 96-way SCSI style micro-D Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-670A
Very High Density Multiplexer Module

- Very High Density Multiplexer
- Up to 198 Switch Pins Available with 1, 2, 4, 8, 16 or 32-Pole Switching Formats
- All Versions Use High Reliability Pickering Reed Relays
- Fast Operating Speed <500µs
- Switch up to 150VDC/100VAC, 0.5A with 10W Max Power
- Automatic Isolation Switches Reduce Capacitive Loading in Large Systems
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-670A series of very high density multiplexer modules feature a wide range of switching configurations. Typical applications include signal routing in ATE and data acquisition systems.

Each module is factory configured into one of the configuration modes *(refer to schematics overleaf)*. Connections are made via a front panel 200-pin connector. Available reed relay formats are:

198-Channel, 1-Pole (with isolation switching)
99-Channel, 2-Pole (with isolation switching)
49-Channel, 4-Pole (with isolation switching)
24-Channel, 8-Pole (with isolation switching)
10-Channel, 16-Pole (no isolation switching)
5-Channel, 32-Pole (no isolation switching)

99-Channel, 1-Pole (with isolation switching)
49-Channel, 2-Pole (with isolation switching)
24-Channel, 4-Pole (with isolation switching)
10-Channel, 8-Pole (no isolation switching)
5-Channel, 16-Pole (no isolation switching)

The 40-670A multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected *(not available for 40-670A-022-198/1 version)*.

Built in Automatic Isolation Switching *(available in 1, 2 and 4-pole modes, and 24-channel 8-pole mode see diagrams overleaf)* connects only the currently active multiplexer bank on to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Relay Type

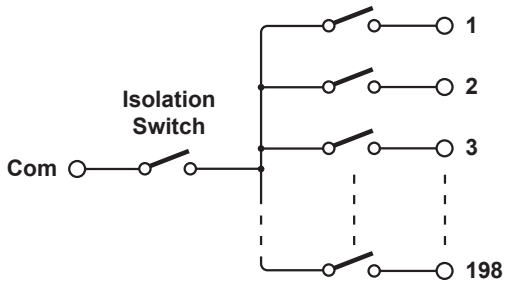
The 40-670A is fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability.

Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

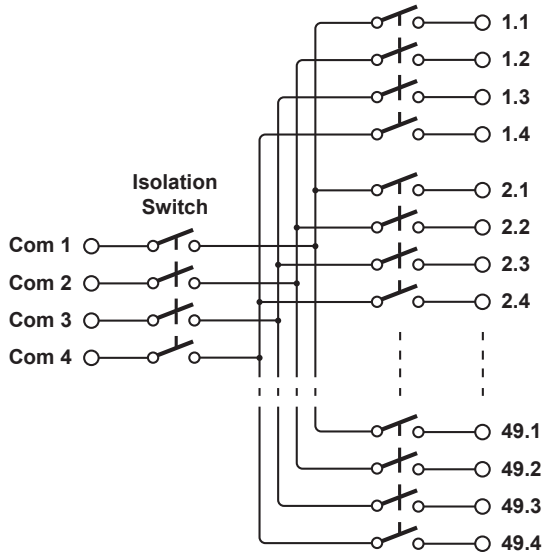
All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Supported by eBIRST

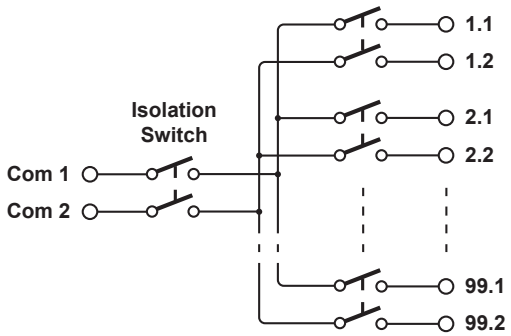
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



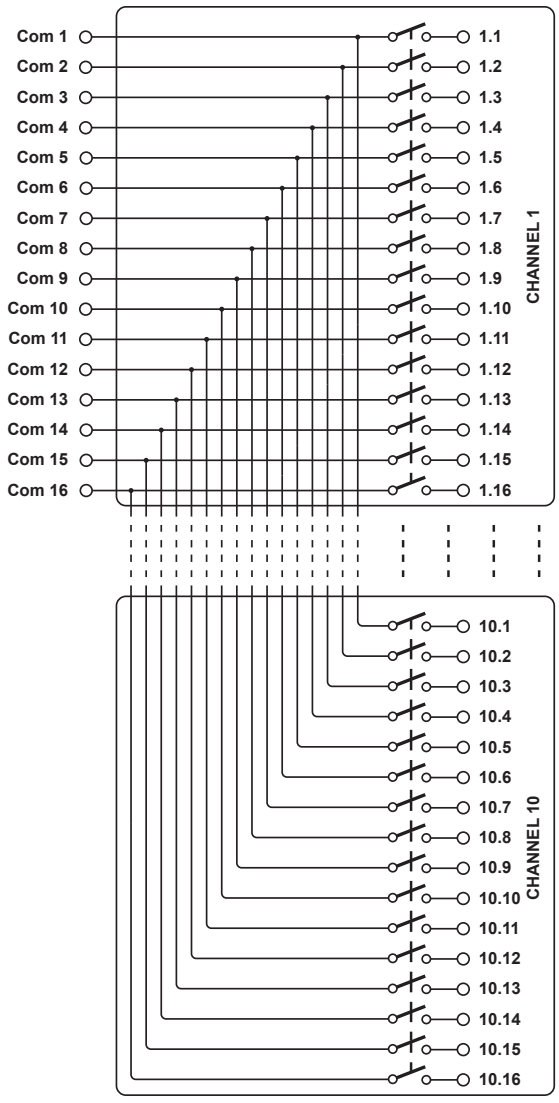
40-670A-022 198-Channel 1-Pole Multiplexer Mode
(40-670A-022-198/1 multiple channel selection not available)



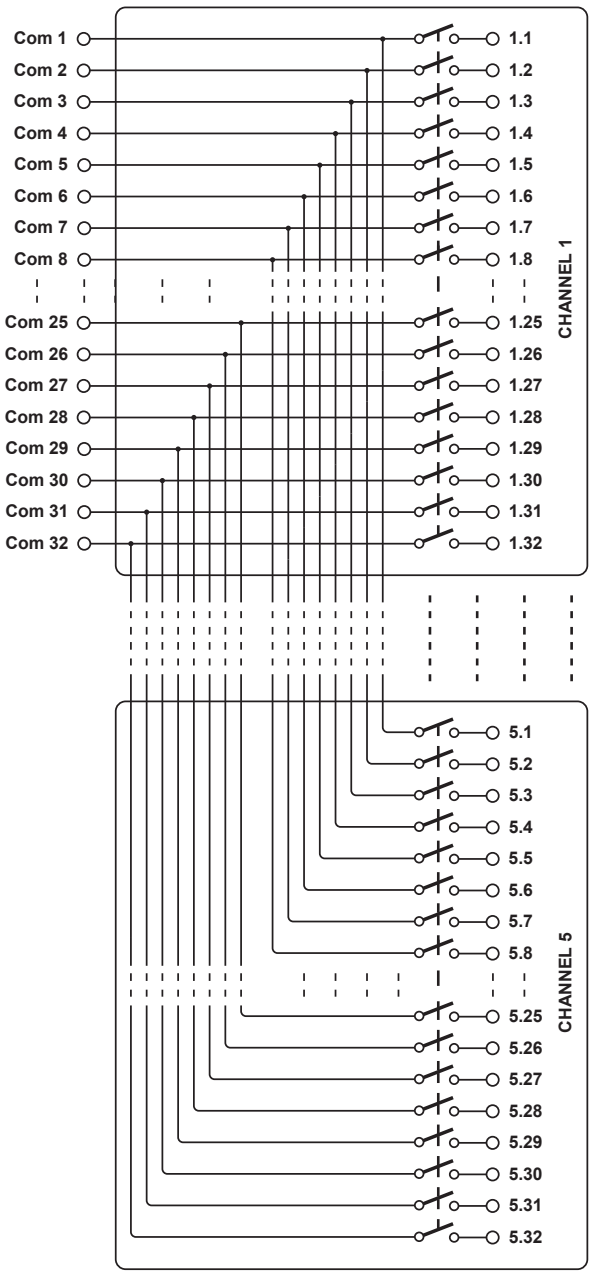
40-670A-022 49-Channel 4-Pole Multiplexer Mode



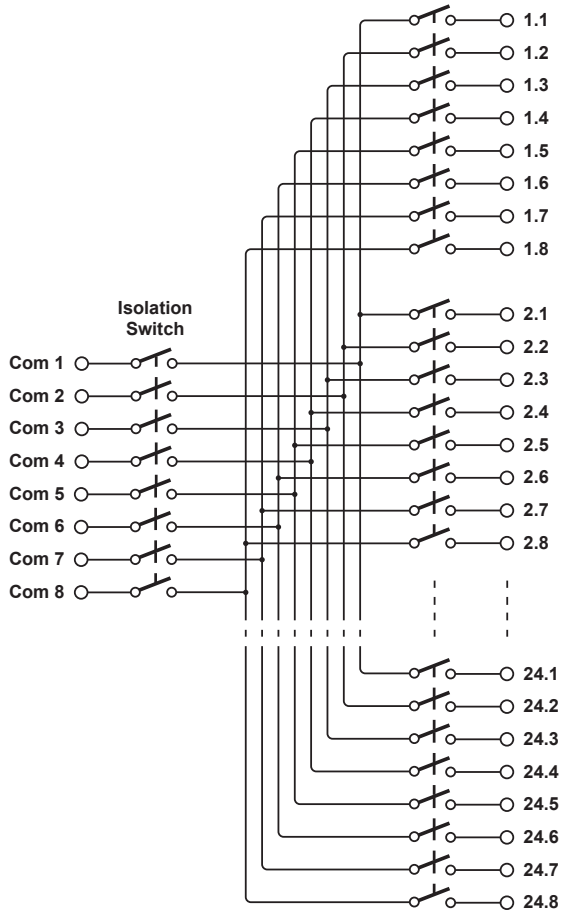
40-670A-022 99-Channel 2-Pole Multiplexer Mode



40-670A-022 10-Channel 16-Pole Multiplexer Mode



40-670A-022 5-Channel 32-Pole Multiplexer Mode



40-670A-022 24-Channel 8-Pole Multiplexer Mode

Switching Specification

Switch Type:	Ruthenium Reed
Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Initial Path Resistance On (Single Module): Off (Single Module): Differential Thermal Offset:	 <1200mΩ $>10^9$Ω <10µV
Bandwidth (3dB, 1 module)	>5MHz †
Operate Time: Release Time:	<0.5ms <0.5ms
Expected Life Low power load: Full power load:	 $1x10^9$ operations $>1x10^6$ operations

† Bandwidth is configuration dependent (please consult sales office for further information).

Power Requirements

+3.3V	+5V	+12V	-12V
0	1340mA (typ 300mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 200g (40-670A-022-99/2)
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via a front panel 200-way female LFH connector.

Product Order Codes

HD MUX 99-Channel, 1-Pole	**40-670A-021-99/1**
HD MUX 49-Channel, 2-Pole	**40-670A-021-49/2**
HD MUX 24-Channel, 4-Pole	**40-670A-021-24/4**
HD MUX 10-Channel, 8-Pole	**40-670A-021-10/8**
HD MUX 5-Channel, 16-Pole	**40-670A-021-5/16**
VHD MUX 198-Channel, 1-Pole †	**40-670A-022-198/1**
VHD MUX 99-Channel, 2-Pole	**40-670A-022-99/2**
VHD MUX 49-Channel, 4-Pole	**40-670A-022-49/4**
VHD MUX 24-Channel, 8-Pole	**40-670A-022-24/8**
VHD MUX 10-Channel, 16-Pole	**40-670A-022-10/16**
VHD MUX 5-Channel, 32-Pole	**40-670A-022-5/32**

When ordering please specify which shipping configuration you would like the module set to.

† Multiple channel selection not available for 40-670A-022-198/1

Model 40-670A is a minor update to the original 40-670 model, for details refer to the 40-670A operating manual.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
40-670A-021	**91-100-018**
40-670A-022	**91-100-013**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-670A range please refer to the **90-002D** 200-way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-675
Very High Density Multiplexer Module

- Very High Density Low Cost Multiplexer
- Up to 198 Switch Pins Available
- Available with 1, 2, 4, 8, 16 or 32-Pole Switching Formats
- High Density Electro-mechanical Relays
- Operating Speed 3ms Typical
- Switch up to 150 Volts, 1A with 60W Max Power
- Automatic Isolation Switches Reduce Capacitive Loading in Large Systems
- Single PCB Construction With Leaded Relays Allow Easy Maintenance
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-675 series of very high density low cost multiplexer modules are available in a versatile range of switching configurations. The modules are supplied pre-configured in one of six multiplexer modes suitable for signal routing in high channel count ATE and data acquisition systems. The modules use high quality electro-mechanical signal relays allowing each channel to switch current up to 1A or 150VDC/100VAC.

Each module is factory configured into one of the six multiplexer modes *(refer to schematic diagrams)*. Connections are made via a front panel 200 pin connector. Available multiplexer formats are:

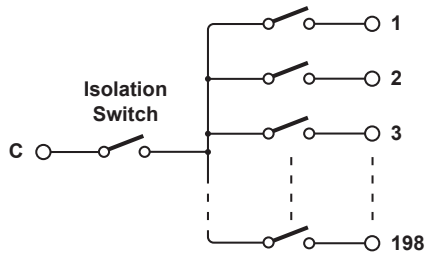
198-Channel, 1-Pole
99-Channel, 2-Pole
49-Channel, 4-Pole
24-Channel, 8-Pole
10-Channel, 16-Pole
5-Channel, 32-Pole.

The 40-675 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels may be simultaneously selected *(not available for 40-675-002-198/1 version)*.

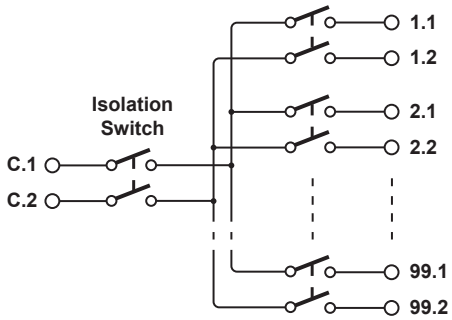
Built in Automatic Isolation Switching *(available in 1, 2 and 4-pole mode, see diagrams)* connects only the currently active multiplexer bank on to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Supported by eBIRST

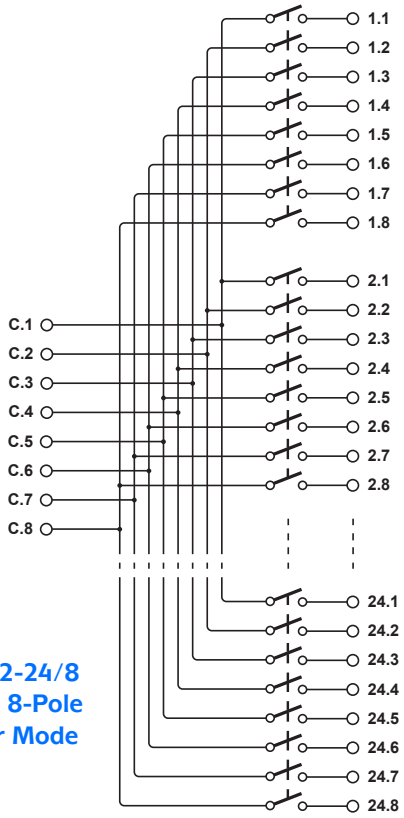
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



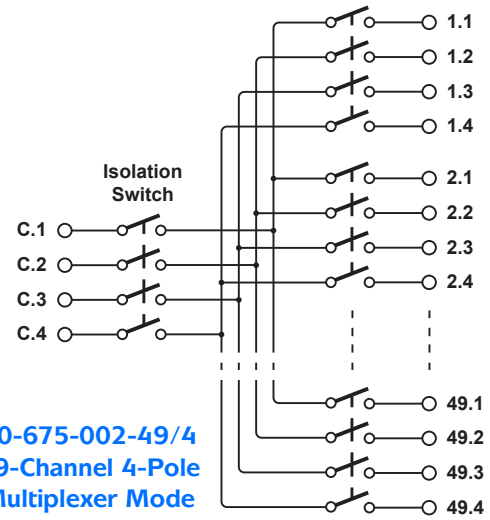
40-675-002-198/1 198-Channel 1-Pole Multiplexer Mode
(40-675-002-198/1 multiple channel selection not available)



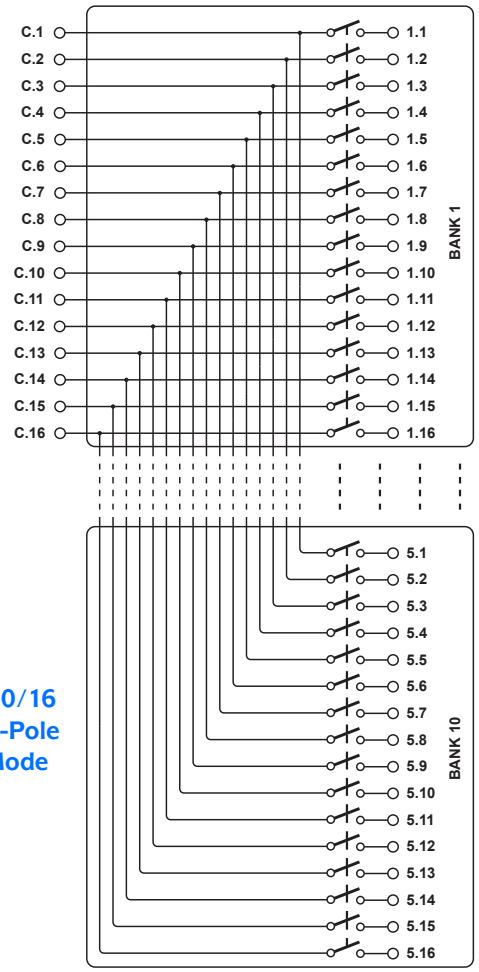
40-675-002-99/2 99-Channel 2-Pole Multiplexer Mode



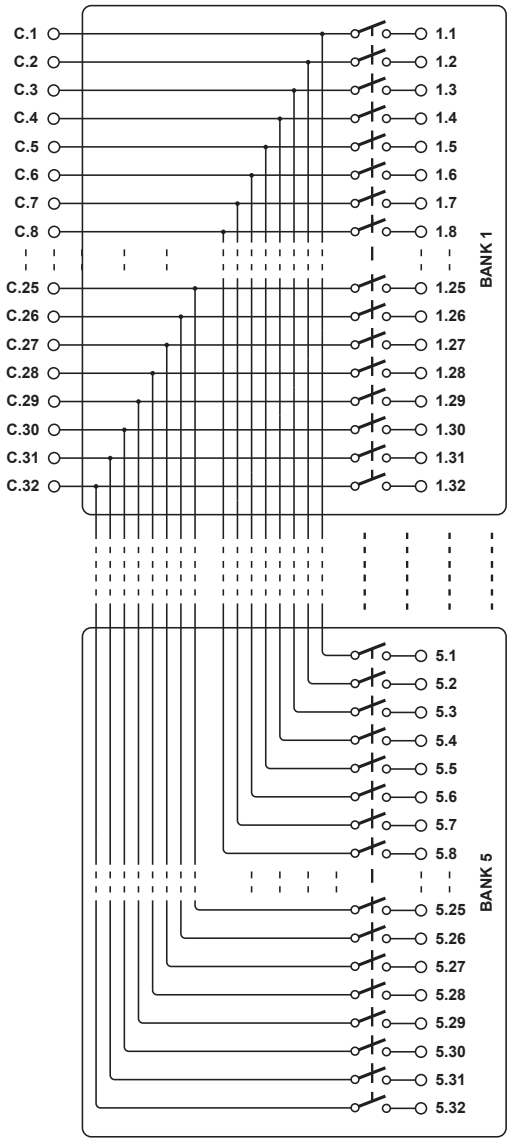
40-675-002-24/8
24-Channel 8-Pole
Multiplexer Mode



40-675-002-49/4
49-Channel 4-Pole
Multiplexer Mode



40-675-002-10/16
10-Channel 16-Pole
Multiplexer Mode



40-675-002-5/32 5-Channel 32-Pole
Multiplexer Mode

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-ruthenium, Gold Covered Bifurcated contact
Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current: Max Carry Current:	60W/62.5VA 1A 1A
Initial Path Resistance - On Path Resistance - Off Differential Thermal Offset:	<500mΩ $>10^9$Ω <10µV
Operate Time:	<3ms
Expected Life (operations) Very low power signal load: Low power load (2W): Medium power load (30W): Full power load (60W):	 $>1 \times 10^8$ $>1.5 \times 10^7$ (0.1A 20VDC) $>5 \times 10^6$ (1A 30VDC) $>1 \times 10^5$ (1A 60VDC)

Relay Type & Maintenance

The 40-675 module is fitted with electro-mechanical signal relays, palladium-ruthenium, gold covered contacts.
The module is of a single circuit board construction and uses leaded relays (not SMT relays) so in-field maintenance is greatly simplified. In addition a **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	300mA typical	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel 200-way female LFH connector.

40-961A-200
200-Way Mating Connector

40-971A-200 200-Way to 4x50-Way Cable Assembly

Pickering have a wide range of connector and cabling options please consult PXI connector & cabling datasheets or visit our web site

Product Order Codes

V H D MUX 198-Channel, 1-Pole †	**40-675-002-198/1**
V H D MUX 99-Channel, 2-Pole	**40-675-002-99/2**
V H D MUX 49-Channel, 4-Pole	**40-675-002-49/4**
V H D MUX 24-Channel, 8-Pole	**40-675-002-24/8**
V H D MUX 10-Channel, 16-Pole	**40-675-002-10/16**
V H D MUX 5-Channel, 32-Pole	**40-675-002-5/32**

† Multiple channel selection not available for 40-675-002-198/1

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**Not Required**

Spare Relay Kits

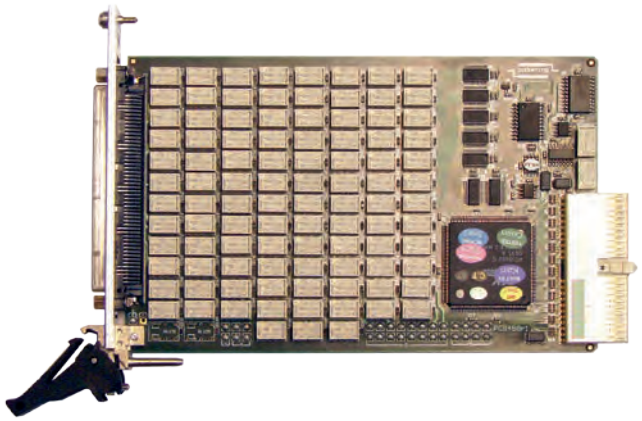
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-675 range please refer to the **90-002D** 200-way LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB Layout for the 40-675 Very High Density Multiplexer Module

40-611
Very High Density Multiplexer Module

- **HIGHEST DENSITY 2A MULTIPLEXERS IN PXI**
- **Available as a 158-Channel 1-Pole or a 79-Channel 2-Pole Multiplexer**
- **Low Cost per Channel**
- **Maximum Current 2A Hot or Cold Switching**
- **Switch up to 300VDC/250VAC and up to 60W Max Power**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **Supported by eBIRST**
- **3 Year Warranty**

The 40-611 Very High Density multiplexer module is available in 158-Channel 1-Pole or 79-Channel 2-Pole configurations. Both configurations use high quality electro-mechanical signal relays allowing each channel to switch current up to 2A and voltage up to 300VDC/250VAC.

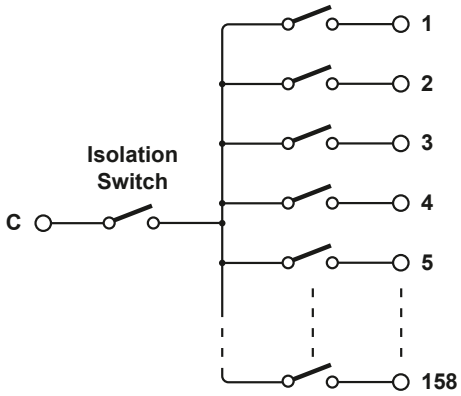
The module is suitable for signal routing in high channel count ATE and data acquisition systems. Connections are made via a front panel 160-pin DIN 41612 connector.

The 40-611 may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition, for the 79-channel 2-pole version, multiple channels may be simultaneously selected (not available for the 158-channel 1-pole version). It should be noted that the isolation relays operate automatically when a multiplexer channel is energized.

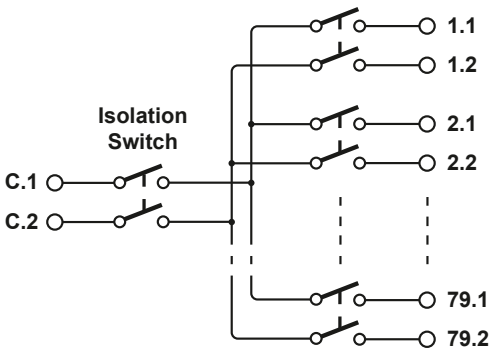
Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules (see example diagram overleaf). Built in Automatic Isolation Switching connects only the currently active multiplexer to the analogue common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-611-001 Multiplexer Module (158-Channel 1-Pole)



40-611-002 Multiplexer Module (79-Channel 2-Pole)

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance - On:	<500mΩ
Path Resistance - Off:	>10^9Ω
Thermal Offset:	<30µV (40-611-001)
Differential Thermal Offset:	<10µV (40-611-002)
Operate Time:	6ms typical, 3ms typical for 40-611-002 when used in multi-channel mode & isolation switch does not change state.
Expected Life (operations)	
Very low power signal load:	>1x10^8
Low power load (2W):	>1.5x10^7 (0.1A 20VDC)
Medium power load (30W):	>5x10^6 (1A 30VDC)
	>1x10^5 (0.1A 300VDC)
Full power load (60W):	>1x10^5 (2A 30VDC)

RF Specification

Bandwidth (-3dB):	5MHz	
Crosstalk (typical):	10kHz:	-70dB
	100kHz:	-55dB
	1MHz	-35dB
	10MHz:	-15dB
Isolation (typical):	10kHz:	95dB
	100kHz:	80dB
	1MHz	65dB
	10MHz:	45dB

Power Requirements

+3.3V	+5V	+12V	-12V
0	777mA (max)	30mA	0

Relay Type

The 40-611 is fitted with electro-mechanical relays with Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

Signals via front panel 160-way male DIN 41612 connector, for pin outs please refer to the operating manual.
We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

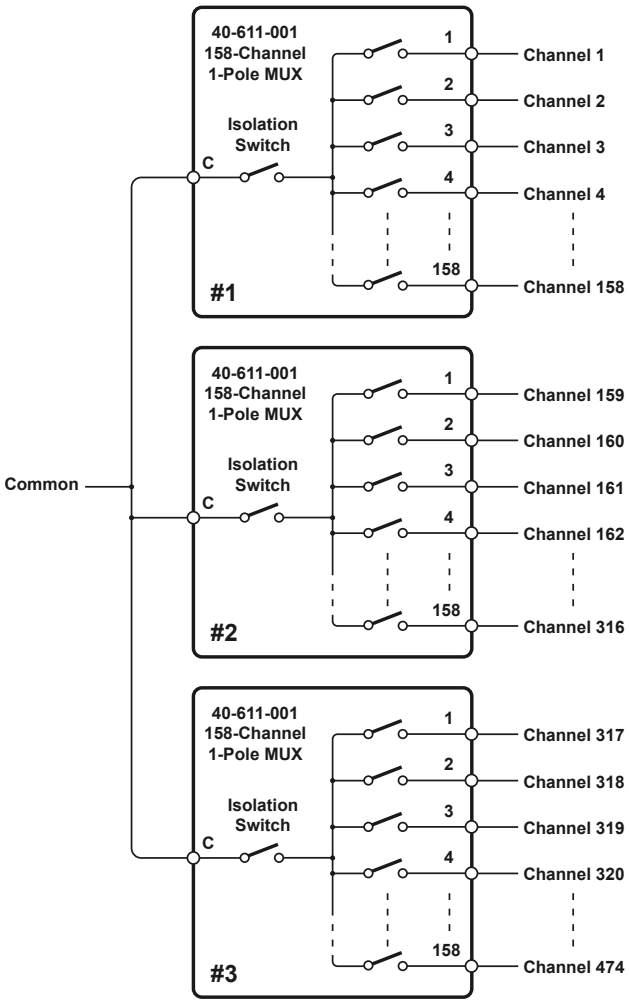


Diagram Showing How Three 40-611-001 Modules Can Be Daisy-Chained to Create a 474-Channel 1-Pole Multiplexer

Product Order Codes

Very High Density 2A MUX, 158-Ch/1-Pole	**40-611-001**
Very High Density 2A MUX, 79-Ch/2-Pole	**40-611-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-410**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

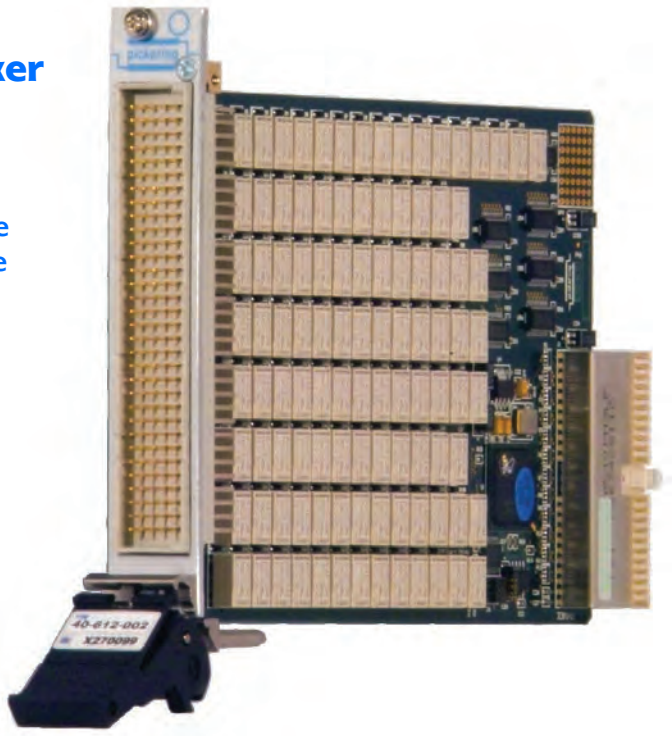
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-611 module please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-612
Very High Density Versatile Multiplexer

- **VERSATILE MULTIPLEXER - FOR NOW AND THE FUTURE**
- **Flexible Software Configured Architecture Can be Set To Different Configurations As Needs Change**
- **8-Bank 8-Channel 2-Pole Multiplexers,1-Pole Selection, Inter-bank Connection & Isolation Switching**
- **Many Different Configurations up to a Single 128-Channel 1-Pole Multiplexer, Including Mixed Channel Count & Custom Configurations**
- **Maximum Current 2A Hot or Cold Switching**
- **Switch up to 300VDC/250VAC and up to 60W Max Power**
- **Isolation Switches Reduce Capacitive Loading in Large Systems**
- **VISA, IVI and Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **Supported by eBIRST**
- **3 Year Warranty**



The 40-612 Very High Density Versatile Multiplexer module features a wide range of software selectable switching configurations. The 40-612 is especially useful where a high density MUX array is required that can adapt to different test configurations for different test targets, or where a test system may have to be reconfigured in the future. Typical applications include signal routing in ATE and data acquisition systems. The 40-612 module uses high quality electro-mechanical relays, connections are made via a front panel 160-pin DIN 41612 connector.

MUX Configurations

The module can be software configured into one of a large number of different multiplexer modes. Relays allow the multiplexer banks to be set in 1 or 2-pole mode and inter-bank switching enables the channel count to be increased up to a maximum of 128 (refer to schematic diagram overleaf).

Typical Configurations
8 Banks, 16 Channels, 1-Pole 8 Banks, 8 Channels, 2-Pole
4 Banks, 32 Channels, 1-Pole 4 Banks, 16 Channels, 2-Pole
2 Banks, 64 Channels, 1-Pole 2 Banks, 32 Channels, 2-Pole
1 Bank, 128 Channels, 1-Pole 1 Bank, 64 Channels, 2-Pole

Pickering's Range of Versatile Multiplexer Modules with the same switching architecture

Model No.	Max Voltage	Max Current	Operate Time	Relay Type
40-612	300VDC/ 250VAC	2A	3ms	Electro-mechanical
40-681	±60V	350mA	200µs	Solid State
40-682	±40V	250mA	80µs	Solid State
40-683	±100V	125mA	500µs	Solid State

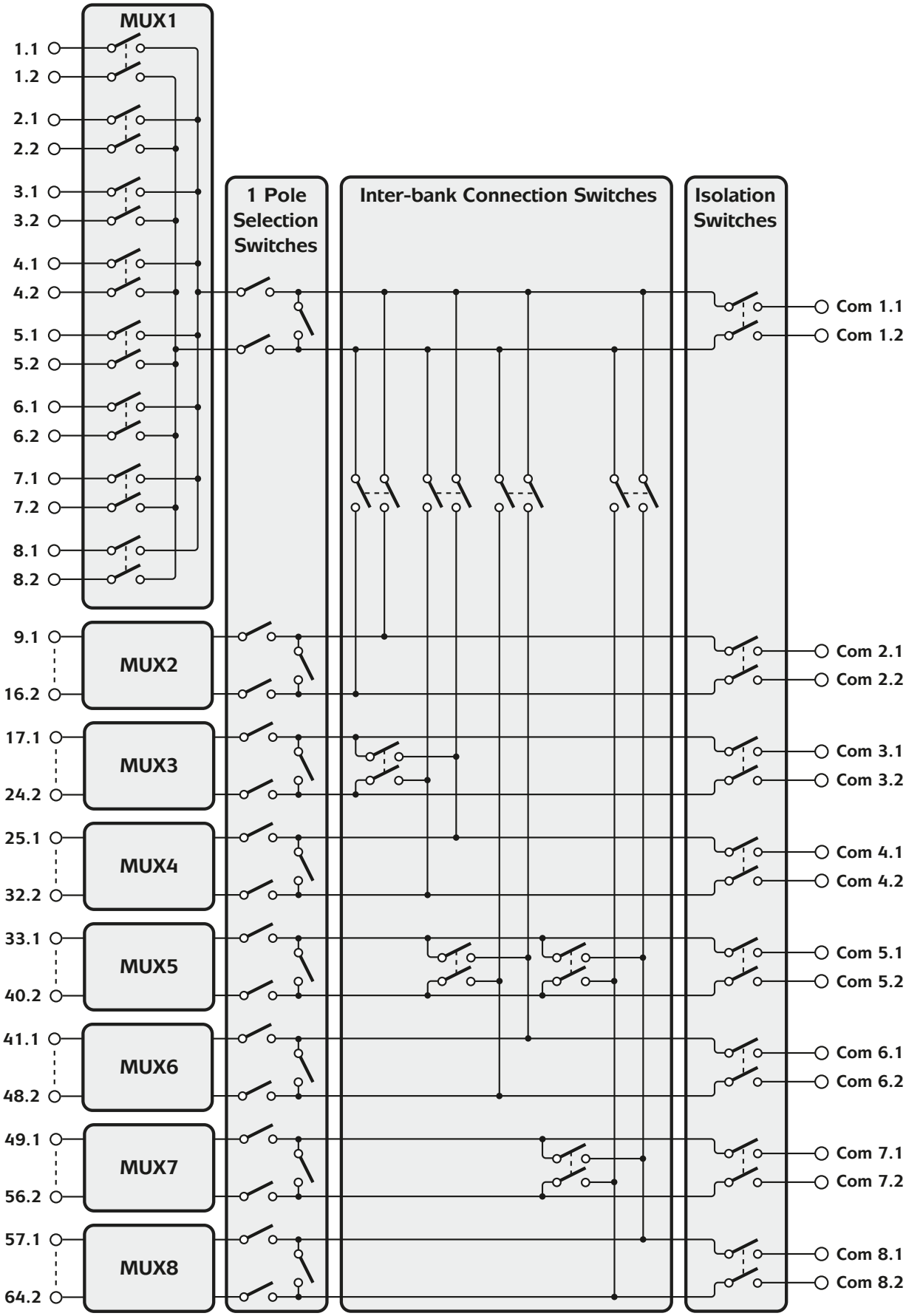
The versatility of the 40-612's architecture allows all multiplexer banks to be inter-linked and common connections used as extra signal inputs.

The 40-612 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. For 2-pole configurations multiple channels can be simultaneously selected without restriction, for 1-pole configurations the channels that can be simultaneously selected are limited by the use of 2-pole relays.

Isolation Switching connects only the currently active multiplexer bank to the analog common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Switching Diagram for the 40-612-002 Very High Density
8 Bank, 8 Channel, 2 Pole Versatile Multiplexer

Relay Type

The 40-612 is fitted with electro-mechanical double pole relays, Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
5mA	2A max (typ 280mA)	0	0

Mechanical Characteristics

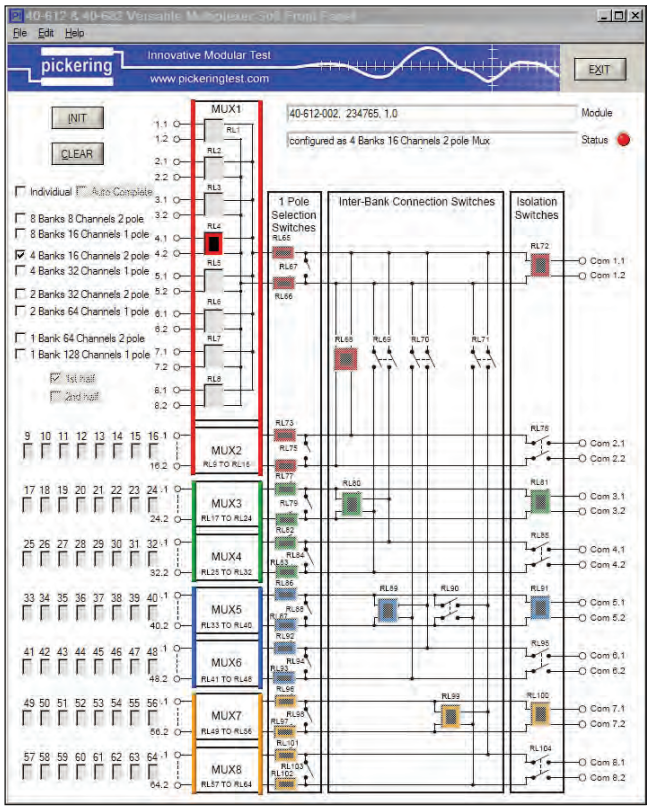
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

Signals via front panel 160 way male DIN 41612 connector, for pin outs please refer to the operating manual.
We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Soft Front Panel For The Versatile MUX

The Versatile Multiplexer Soft Front Panel for the 40-612-002, 40-681-001, 40-682-002 and 40-683-001 allows easy setting of various configurations from 8-bank 8-channels 2-pole multiplexers, up to 1-bank 128-channels 1-pole multiplexers as well as individual relay control for custom configurations. The schematic in the background of the SFP simplifies understanding of the selected topology. During configuration setting, all relay control information is logged in a text file which can be re-used in a programming environment.



Soft Front Panel for the 40-612, 40-681, 40-682 and 40-683 Very High Density Versatile Multiplexers

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance - On:	500mΩ max, 300mΩ typ†
Path Resistance - Off:	$>10^9\Omega$
Minimum Voltage:	100µV
Thermal Offset:	<10µV †
Bandwidth (-3dB insertion loss, 50Ω):	>10MHz
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)
	$>1x10^5$ (0.1A 300VDC)

† Path resistance & thermal offset are dependent upon the signal route selected.

Product Order Codes

8-Bank, 8-Channel, 2-Pole Versatile Multiplexer Module	**40-612-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-410**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

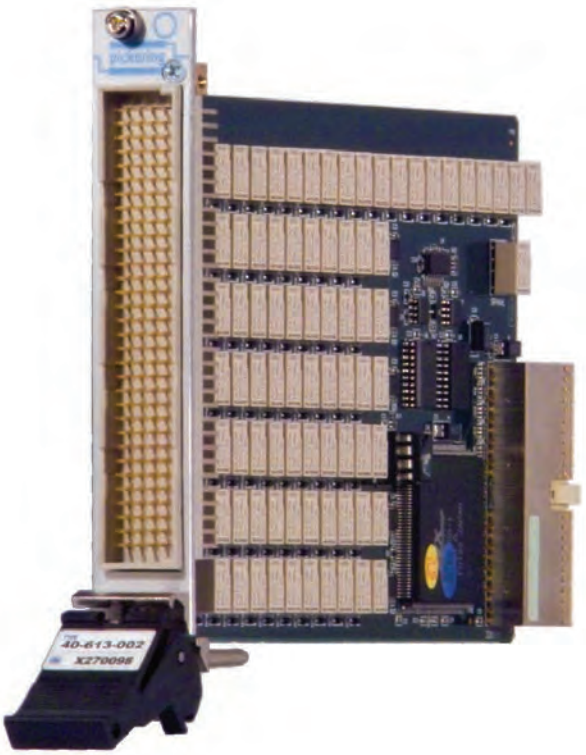
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-612 module please refer to the **90-001D** 160 way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-613
Very High Density Versatile 2-Pole MUX

- **VERSATILE MULTIPLEXER - FOR NOW AND THE FUTURE**
- **Flexible Software Configured Architecture Can be Set To Different Configurations As Needs Change**
- **16-Bank 4-Channel 2-Pole Multiplexers With Inter-bank Connection Switching**
- **Many Different Configurations up to a Single 64-Channel 2-Pole Multiplexer, Including Mixed Channel Count & Custom Configurations**
- **Maximum Current 2A Hot or Cold Switching**
- **Switch up to 300VDC/250VAC and up to 60W Max Power**
- **VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8**
- **Supported by PXI or LXI Chassis**
- **Supported by eBIRST**
- **3 Year Warranty**



The 40-613 Very High Density Versatile Multiplexer module features a wide range of software selectable switching configurations. The 40-613 is especially useful where a high density MUX array is required that can adapt to different test configurations for different test targets, or where a test system may have to be reconfigured in the future. Typical applications include signal routing in ATE and data acquisition systems. The 40-613 module uses high quality electro-mechanical relays, connections are made via a front panel 160 pin DIN41612 connector.

MUX Configurations

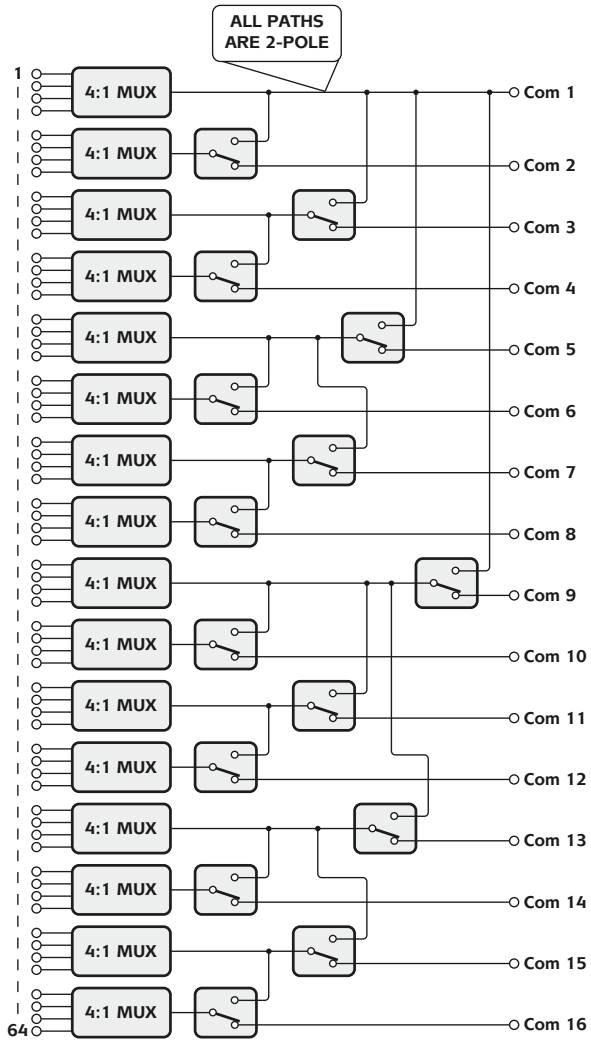
The module can be software configured into one of a large number of different 2-pole multiplexer modes. Inter-bank switching relays enable the channel count to be increased to a maximum of 64 (refer to schematic diagram). Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

The 40-613 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition multiple channels can be simultaneously selected without restriction.

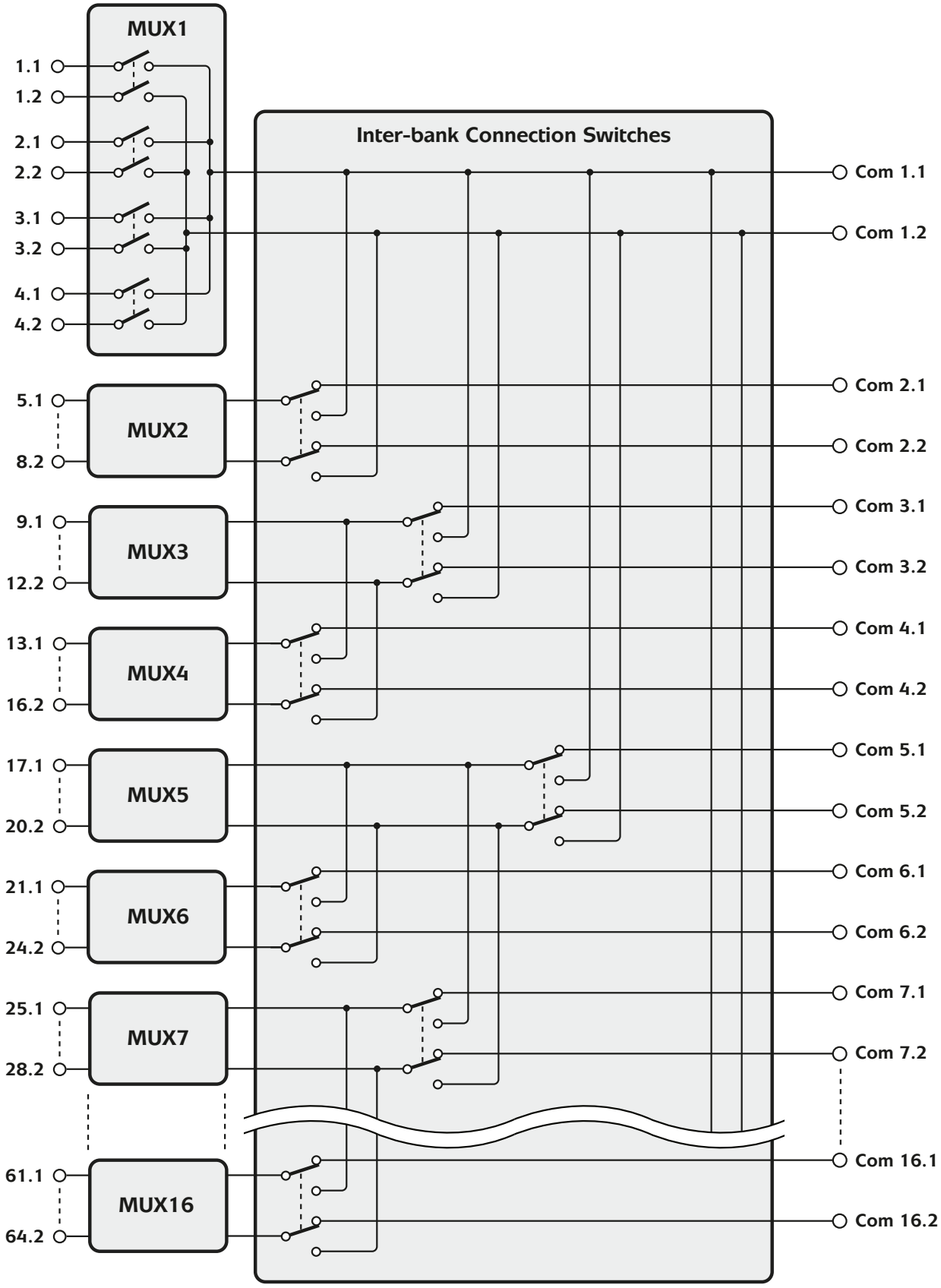
Typical Configurations
16 Banks, 4 Channels, 2-Pole
8 Banks, 8 Channels, 2-Pole
4 Banks, 16 Channels, 2-Pole
2 Banks, 32 Channels, 2-Pole
1 Bank, 64 Channels, 2-Pole

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Simplified Diagram for the 40-613-002 Multiplexer (see overleaf for a more detailed version)



Detailed Switching Diagram for the 40-613-002 Very High Density 16 Bank, 4 Channel, 2-Pole Versatile Multiplexer

Relay Type

The 40-613 is fitted with electro-mechanical double pole relays, Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
5mA	2A max (typ 280mA)	0	0

Mechanical Characteristics

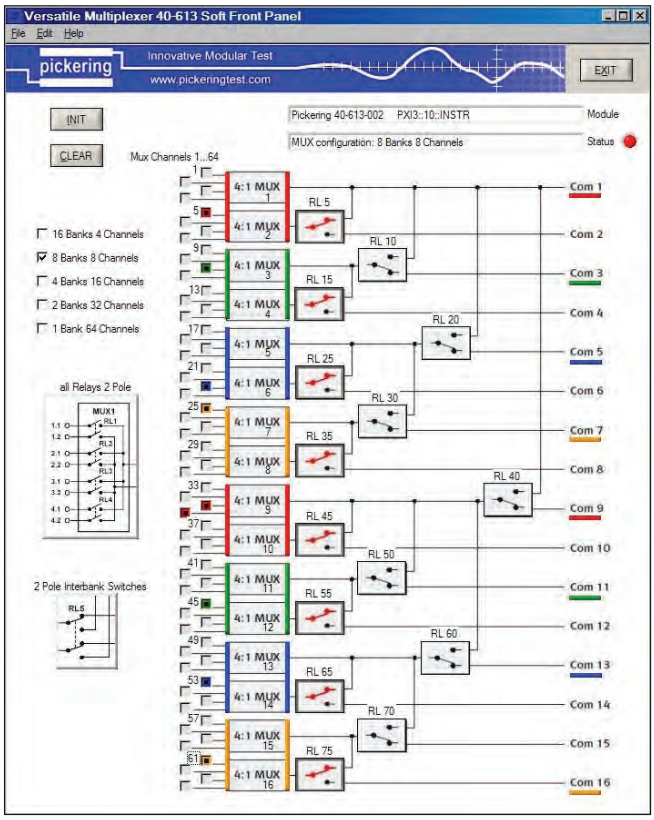
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

Signals via front panel 160-way male DIN 41612 connector, for pin outs please refer to the operating manual.
We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Soft Front Panel For The Versatile MUX

The Versatile Multiplexer Soft Front Panel for the 40-613-002 allows easy setting of various configurations from a 16-bank 4-channel 2-pole multiplexer, up to a 1-bank 64-channel 2-pole multiplexer as well as individual relay control for custom configurations. The schematic in the background of the SFP simplifies understanding of the selected topology. During configuration setting, all relay control information is logged in a text file which can be re-used in a programming environment.



Soft Front Panel for the 40-613 Very High Density

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance - On:	300mΩ max, 200mΩ typ†
Path Resistance - Off:	$>10^9\Omega$
Minimum Voltage:	100µV
Differential Thermal Offset:	<10µV †
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)
	$>1x10^5$ (0.1A 300VDC)

† Path resistance & thermal offset are dependent upon the signal route selected.

Product Order Codes

16-Bank, 4-Channel, 2-Pole Versatile Multiplexer Module	**40-613-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-410**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-613 module please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-614
High Density 2 Amp Multiplexer Module

- Low Cost Fixed Configuration Alternative to Versatile Solutions - Simpler to Program & Improved Isolation Between Banks
- 20 Configurations
- 1, 2, 4, 8 or 16 Multiplexer Banks
- Channel Counts of 4, 8, 16, 32, 64 or 128
- Available With 1, 2, 4, 8, 16 or 32 Poles
- 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

Available multiplexer formats are:
16 Banks, 8 Channels, 1-Pole 16 Banks, 4 Channels, 2-Pole
8 Banks, 16 Channels, 1-Pole 8 Banks, 8 Channels, 2-Pole 8 Banks, 4 Channels, 4-Pole
4 Banks, 32 Channels, 1-Pole 4 Banks, 16 Channels, 2-Pole 4 Banks, 8 Channels, 4-Pole 4 Banks, 4 Channels, 8-Pole
2 Banks, 64 Channels, 1-Pole 2 Banks, 32 Channels, 2-Pole 2 Banks, 16 Channels, 4-Pole 2 Banks, 8 Channels, 8-Pole 2 Banks, 4 Channels, 16-Pole
1 Bank, 128 Channels, 1-Pole 1 Bank, 64 Channels, 2-Pole 1 Bank, 32 Channels, 4-Pole 1 Bank, 16 Channels, 8-Pole 1 Bank, 8 Channels, 16-Pole 1 Bank, 4 Channels, 32-Pole

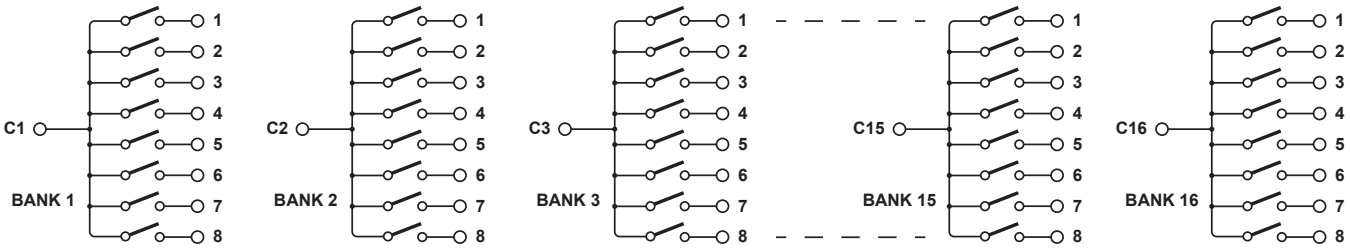
The 40-614 High Density 2 Amp Multiplexer module is available in 20 configurations as outlined in the table. They all use high quality electro-mechanical signal relays allowing each channel to switch current up to 2A and voltage up to 300VDC/250VAC.

The module is suitable for signal routing in ATE and data acquisition systems. Connections are made via a front panel 160-pin DIN 61412 connector.

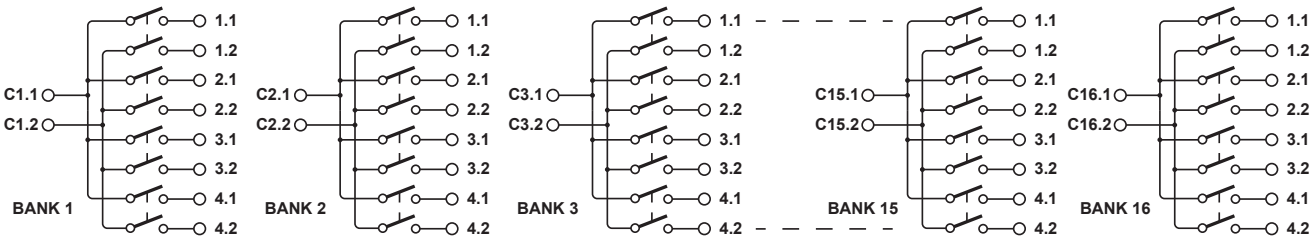
The 40-614 may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. In addition, for 2, 4, 8, 16 and 32-pole versions, multiple channels may be simultaneously selected (not available for 1-pole versions). Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Supported by eBIRST

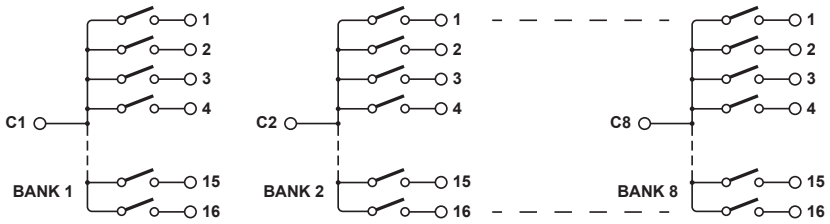
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf



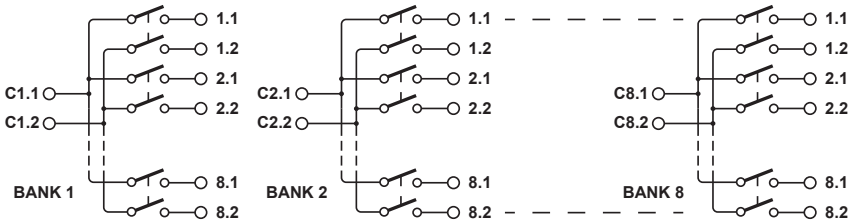
40-614-001 16-Bank, 8-Channel 1-Pole Multiplexer



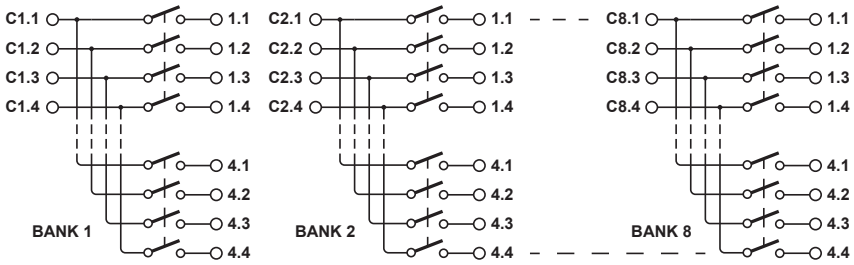
40-614-002 16-Bank, 4-Channel, 2-Pole Multiplexer



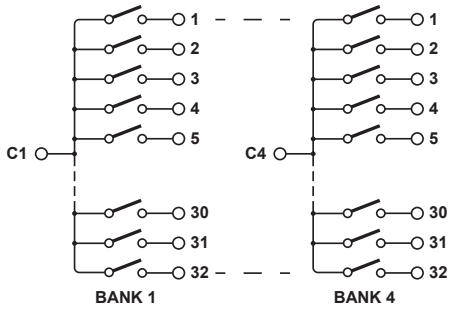
40-614-003 8-Bank, 16-Channel, 1-Pole Multiplexer



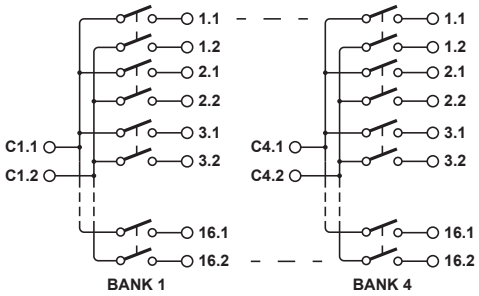
40-614-004 8-Bank, 8-Channel, 2-Pole Multiplexer



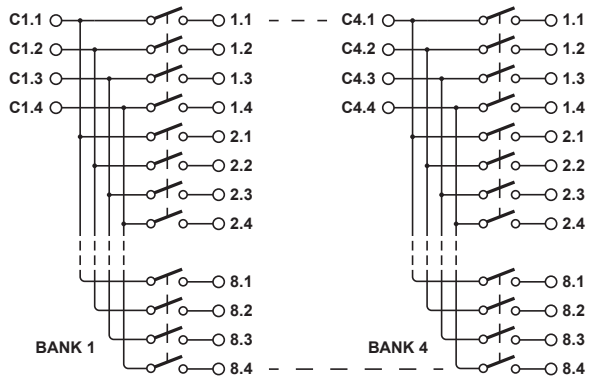
40-614-005 8-Bank, 4-Channel, 4-Pole Multiplexer



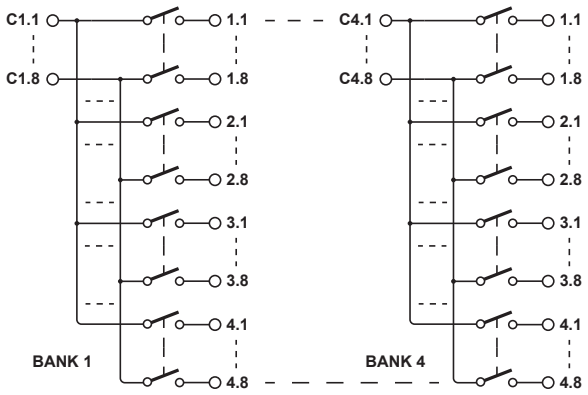
40-614-006 4-Bank, 32-Channel, 1-Pole Multiplexer



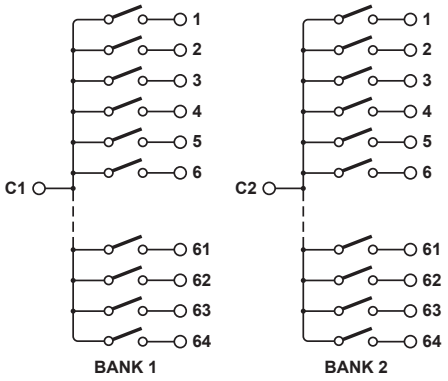
40-614-007 4-Bank, 16-Channel, 2-Pole Multiplexer



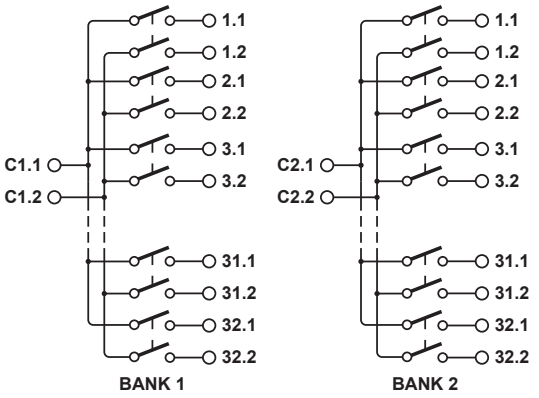
40-614-008 4-Bank, 8-Channel, 4-Pole Multiplexer



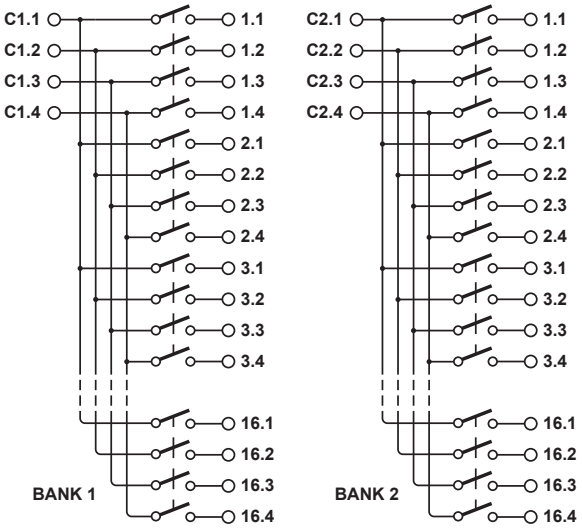
40-614-009 4-Bank, 4-Channel, 8-Pole Multiplexer



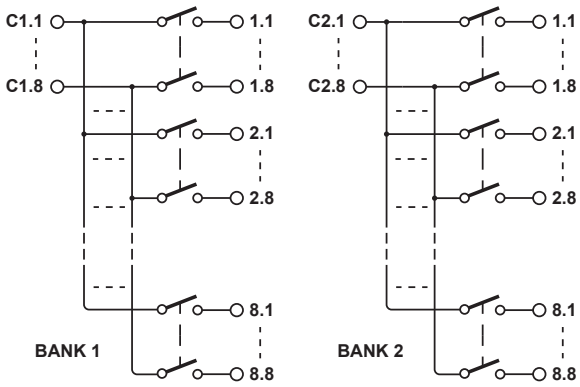
40-614-010 2-Bank, 64-Channel, 1-Pole Multiplexer



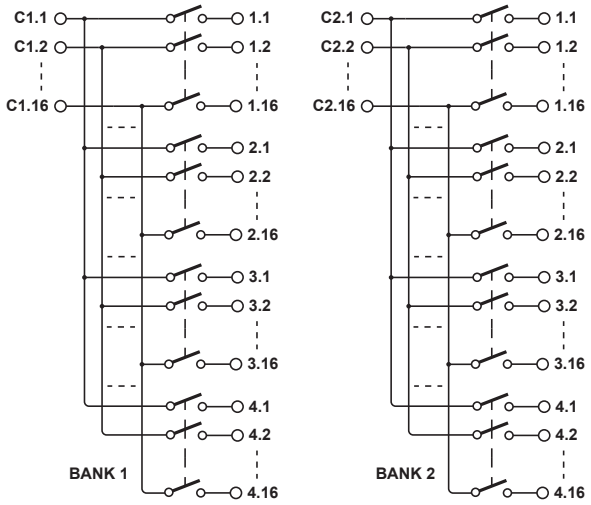
40-614-011 2-Bank, 32-Channel, 2-Pole Multiplexer



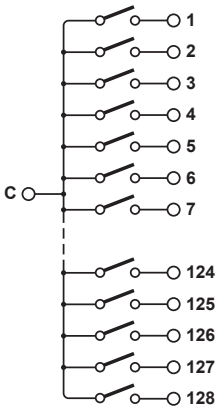
40-614-012 2-Bank, 16-Channel, 4-Pole Multiplexer



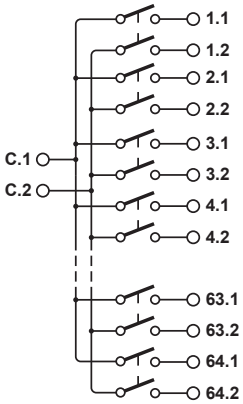
40-614-013 2-Bank, 8-Channel, 8-Pole Multiplexer



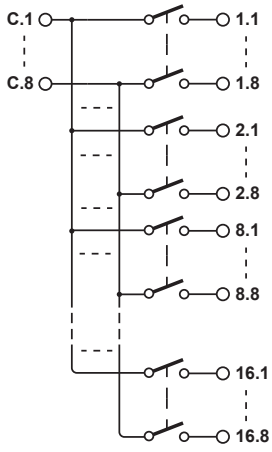
40-614-014 2-Bank, 4-Channel, 16-Pole Multiplexer



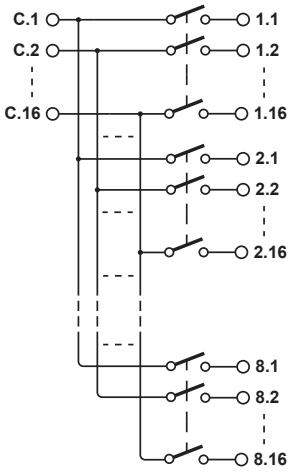
40-614-015 1-Bank, 128-Channel, 1-Pole Multiplexer



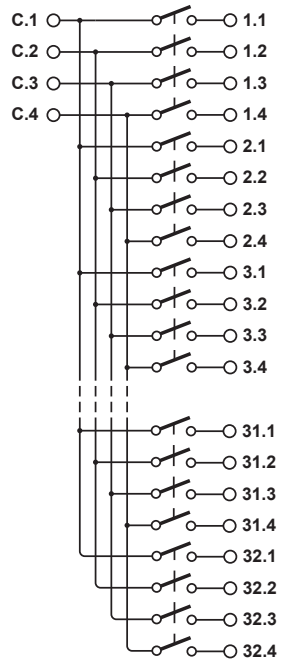
40-616-016 1-Bank, 64-Channel, 2-Pole Multiplexer



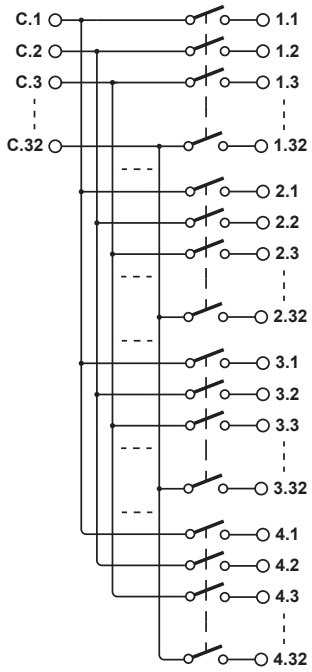
40-616-018 1-Bank, 16-Channel, 8-Pole Multiplexer



40-616-019 1-Bank, 8-Channel, 16-Pole Multiplexer



40-616-017 1-Bank, 32-Channel, 4-Pole Multiplexer



40-616-020 1-Bank, 4-Channel, 32-Pole Multiplexer

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance - On:	<450mΩ
Path Resistance - Off:	>10^9Ω
Thermal Offset:	<20µV
Operate Time:	3ms typical
Expected Life (operations)	
Very low power signal load:	>$1x10^8$
Low power load (2W):	>$1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	>$5x10^6$ (1A 30VDC)
	>$1x10^5$ (0.1A 300VDC)
Full power load (60W):	>$1x10^5$ (2A 30VDC)

Power Requirements

+3.3V	+5V	+12V	-12V
200mA	1A	0	0

RF Specification - In a 50Ω System

Bandwidth (-3dB):	40MHz	(40-614-001)
	TBD	(40-614-002)
	TBD	(40-614-003)
	TBD	(40-614-004)
	TBD	(40-614-005)
	TBD	(40-614-006)
	TBD	(40-614-007)
	TBD	(40-614-008)
	TBD	(40-614-009)
	TBD	(40-614-010)
	TBD	(40-614-011)
	TBD	(40-614-012)
	TBD	(40-614-013)
	TBD	(40-614-014)
	TBD	(40-614-015)
	TBD	(40-614-016)
	TBD	(40-614-017)
	TBD	(40-614-018)
	TBD	(40-614-019)
	TBD	(40-614-020)
Crosstalk (typical):	10kHz:	-90dB
	100kHz:	-70dB
	1MHz	-50dB
	10MHz	-30dB
Isolation (typical):	10kHz:	90dB
	100kHz:	70dB
	1MHz	50dB
	10MHz	30dB

Relay Type

The 40-614 is fitted with electro-mechanical relays with Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

Signals via front panel 160-pin male DIN 41612 connector, for pin outs please refer to the operating manual.

Product Order Codes - Standard Configurations

2 Amp MUX, 16 Bank, 8 Channel, 1-Pole	**40-614-001**
2 Amp MUX, 16 Bank, 4 Channel, 2-Pole	**40-614-002**
2 Amp MUX, 8 Bank, 16 Channel, 1-Pole	**40-614-003**
2 Amp MUX, 8 Bank, 8 Channel, 2-Pole	**40-614-004**
2 Amp MUX, 8 Bank, 4 Channel, 4-Pole	**40-614-005**
2 Amp MUX, 4 Bank, 32 Channel, 1-Pole	**40-614-006**
2 Amp MUX, 4 Bank, 16 Channel, 2-Pole	**40-614-007**
2 Amp MUX, 4 Bank, 8 Channel, 4-Pole	**40-614-008**
2 Amp MUX, 4 Bank, 4 Channel, 8-Pole	**40-614-009**
2 Amp MUX, 2 Bank, 64 Channel, 1-Pole	**40-614-010**
2 Amp MUX, 2 Bank, 32 Channel, 2-Pole	**40-614-011**
2 Amp MUX, 2 Bank, 16 Channel, 4-Pole	**40-614-012**
2 Amp MUX, 2 Bank, 8 Channel, 8-Pole	**40-614-013**
2 Amp MUX, 2 Bank, 4 Channel, 16-Pole	**40-614-014**
2 Amp MUX, 1 Bank, 128 Channel, 1-Pole	**40-614-015**
2 Amp MUX, 1 Bank, 64 Channel, 2-Pole	**40-614-016**
2 Amp MUX, 1 Bank, 32 Channel, 4-Pole	**40-614-017**
2 Amp MUX, 1 Bank, 16 Channel, 8-Pole	**40-614-018**
2 Amp MUX, 1 Bank, 8 Channel, 16-Pole	**40-614-019**
2 Amp MUX, 1 Bank, 4 Channel, 32-Pole	**40-614-020**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-410**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-614 module please refer to the **90-001D** 160-pin DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-570
High Density MUX BRIC™

- High Density Multiplexer With Multiple Configuration Options
- Wide Range of Sizes up to 6-Channel/160-Pole, 12-Channel/80-Pole, 24-Channel/40-Pole, 48-Channel/20-Pole, & 96-Channel/10-Pole
- Scalable (up to 6 relay cards)
- Expandable Via Common Loop-Thru Connector With Isolation Switching for Optimal Signal Integrity in Larger Systems
- Maximum Switch Current of 1A
- Switch up to 100V and up to 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

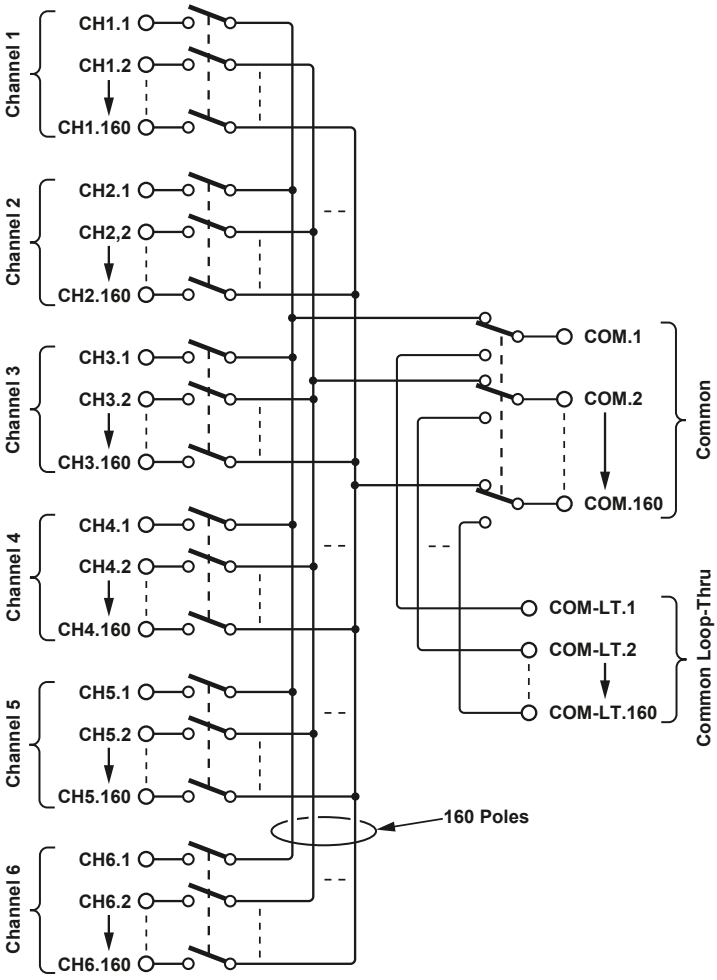
The 40-570 is a High Density Multiplexer designed to simplify the connection of a common set of test equipment to one of a number of different devices for testing (simultaneous multiple channel selection is also possible, without limitation). It is ideal for applications where the equipment needs to conduct the same test process on a series of similar devices one at a time. It is available in a variety of configurations that allow testing with differing number of devices to be tested and different connection widths to suit differing test equipment pin counts.

All versions of the 40-570 are supported in a BRIC8 construction that occupies 8 PXI 3U mechanical slots, one of which provides the PXI interface and power.

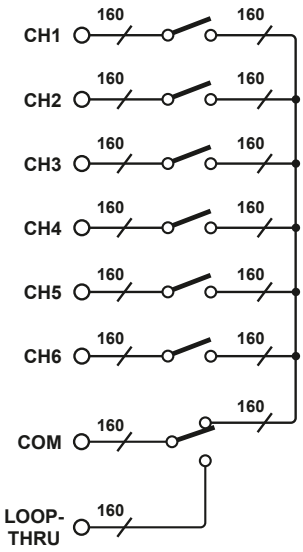
MUX size can be ordered with different widths (pole counts) and with different numbers of relay cards to support varying number of devices to be tested. For example, the fully populated 40-570 can be ordered in configurations that support:

- 6 test devices with 160 connections
- 12 test devices with 80 connections
- 24 test devices with 40 connections
- 48 test devices with 20 connections
- 96 test devices with 10 connections

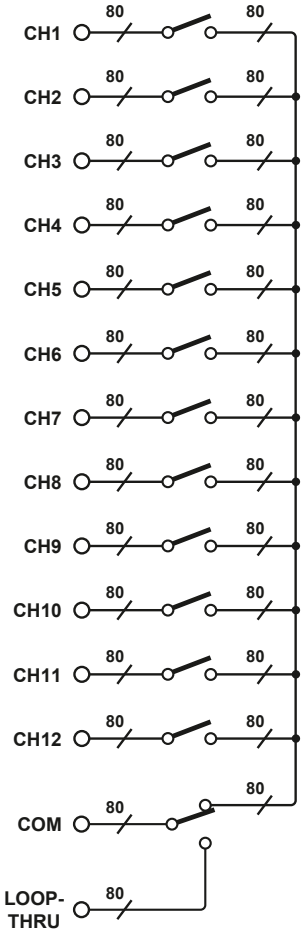
The pin layout of user connection is arranged to simplify the cabling design. All versions use high quality electro-mechanical relays with palladium-ruthenium gold covered contacts.



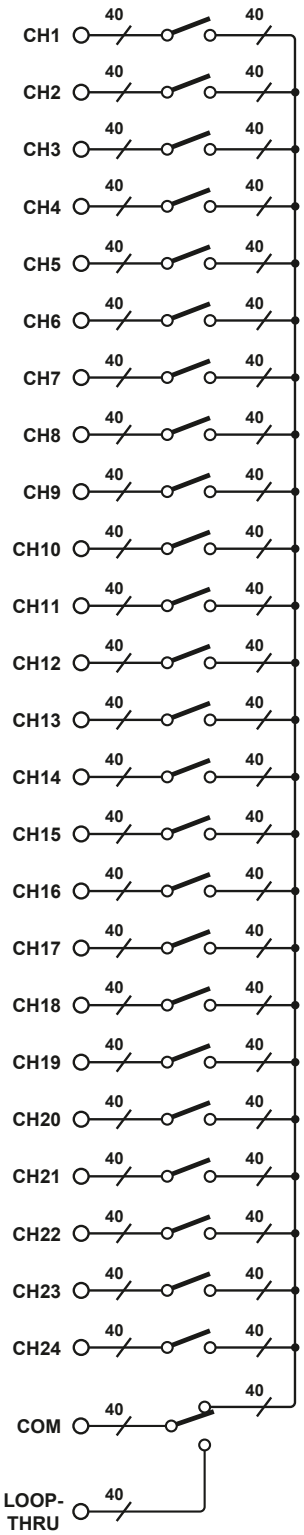
Switching Diagram for 40-570 High Density MUX In 6-Channel 160-Pole Format



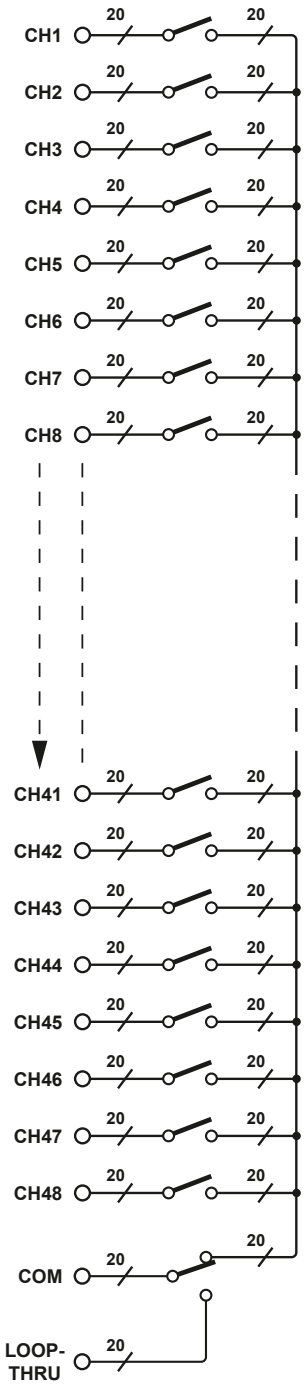
6-Channel, 160-pole
Multiplexer



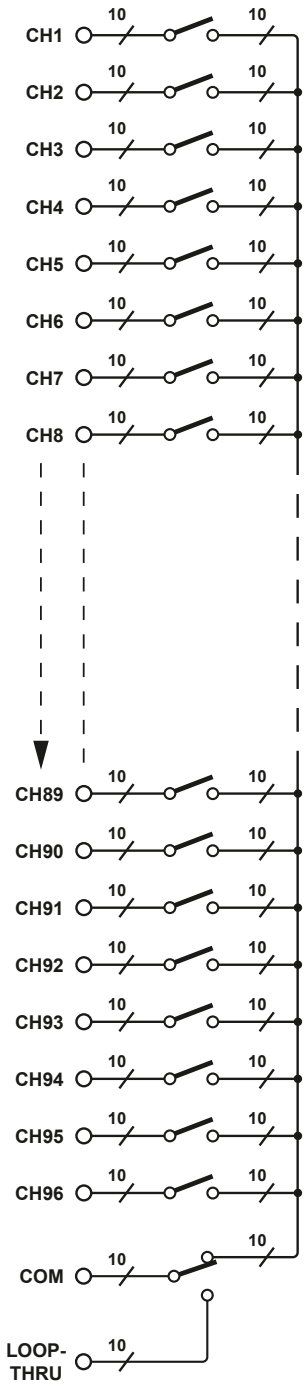
12-Channel, 80-pole
Multiplexer



24-Channel, 40-pole
Multiplexer



48-Channel, 20-pole
Multiplexer



96-Channel, 10-pole
Multiplexer

Switching Diagrams for the Five
Possible Fully Populated Switching
Configurations Available for the
40-570 High Density
BRIC Multiplexer

Switching Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	100V
Max Hot Switch Contact Power:	60W
Max Switch Current:	1A
Max Carry Current:	1A
Max Combined Switch Path Loading:	25W continuous power (for example: 160 x 395mA per path, 80 x 559mA per path, 40 x 791mA per path, or 25 x 1A per path)
Initial Path Resistance	
On:	<1Ω
Off:	>10^9Ω
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	>$1x10^8$
Low power load (2W):	>$1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	>$5x10^6$ (1A 30VDC)
Full power load (60W):	>$1x10^5$ (1A 60VDC)
Bandwidth - 40-570-116 (50Ω system):	3dB insertion loss @ 12MHz, -20dB crosstalk @ 2.5MHz, please contact sales office for advice concerning other configurations

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	6A max	0	0

Mechanical Characteristics

Eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

User connections are made via multiple front panel 160-way male DIN 41612 connectors (Up to 8 per module).

Note: We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Mating Connectors & Cabling

For connection accessories for the 40-570 module please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Product Order Codes

High Density MUX BRIC, 2-Channel, 160-Pole	**40-570-012**
High Density MUX BRIC, 3-Channel, 160-Pole	**40-570-013**
High Density MUX BRIC, 4-Channel, 160-Pole	**40-570-014**
High Density MUX BRIC, 5-Channel, 160-Pole	**40-570-015**
High Density MUX BRIC, 6-Channel, 160-Pole	**40-570-016**
High Density MUX BRIC, 2-Channel, 80-Pole	**40-570-111**
High Density MUX BRIC, 4-Channel, 80-Pole	**40-570-112**
High Density MUX BRIC, 6-Channel, 80-Pole	**40-570-113**
High Density MUX BRIC, 8-Channel, 80-Pole	**40-570-114**
High Density MUX BRIC, 10-Channel, 80-Pole	**40-570-115**
High Density MUX BRIC, 12-Channel, 80-Pole	**40-570-116**
High Density MUX BRIC, 4-Channel, 40-Pole	**40-570-211**
High Density MUX BRIC, 8-Channel, 40-Pole	**40-570-212**
High Density MUX BRIC, 12-Channel, 40-Pole	**40-570-213**
High Density MUX BRIC, 16-Channel, 40-Pole	**40-570-214**
High Density MUX BRIC, 20-Channel, 40-Pole	**40-570-215**
High Density MUX BRIC, 24-Channel, 40-Pole	**40-570-216**
High Density MUX BRIC, 8-Channel, 20-Pole	**40-570-311**
High Density MUX BRIC, 16-Channel, 20-Pole	**40-570-312**
High Density MUX BRIC, 24-Channel, 20-Pole	**40-570-313**
High Density MUX BRIC, 32-Channel, 20-Pole	**40-570-314**
High Density MUX BRIC, 40-Channel, 20-Pole	**40-570-315**
High Density MUX BRIC, 48-Channel, 20-Pole	**40-570-316**
High Density MUX BRIC, 16-Channel, 10-Pole	**40-570-411**
High Density MUX BRIC, 32-Channel, 10-Pole	**40-570-412**
High Density MUX BRIC, 48-Channel, 10-Pole	**40-570-413**
High Density MUX BRIC, 64-Channel, 10-Pole	**40-570-414**
High Density MUX BRIC, 80-Channel, 10-Pole	**40-570-415**
High Density MUX BRIC, 96-Channel, 10-Pole	**40-570-416**

Note: Configurations can be altered on a return to the factory basis, please contact Pickering sales office for details.

For the expansion of an existing BRIC multiplexer or replacement of faulty BRIC daughter cards please contact your local sales office.

40-571
Power MUX BRIC™

- Power Multiplexer With Multiple Configuration Options
- Wide Range of Sizes up to 6-Channel/48-Pole, 12-Channel/24-Pole, 18-Channel/16-Pole, 24-Channel/12-Pole, or 48-Channel/6-Pole
- Scalable (up to 6 relay cards)
- Expandable Via Common Loop-Thru Connector
- 3A Continuous With 5A Inrush Capability
- Switch up to 100V and up to 105W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

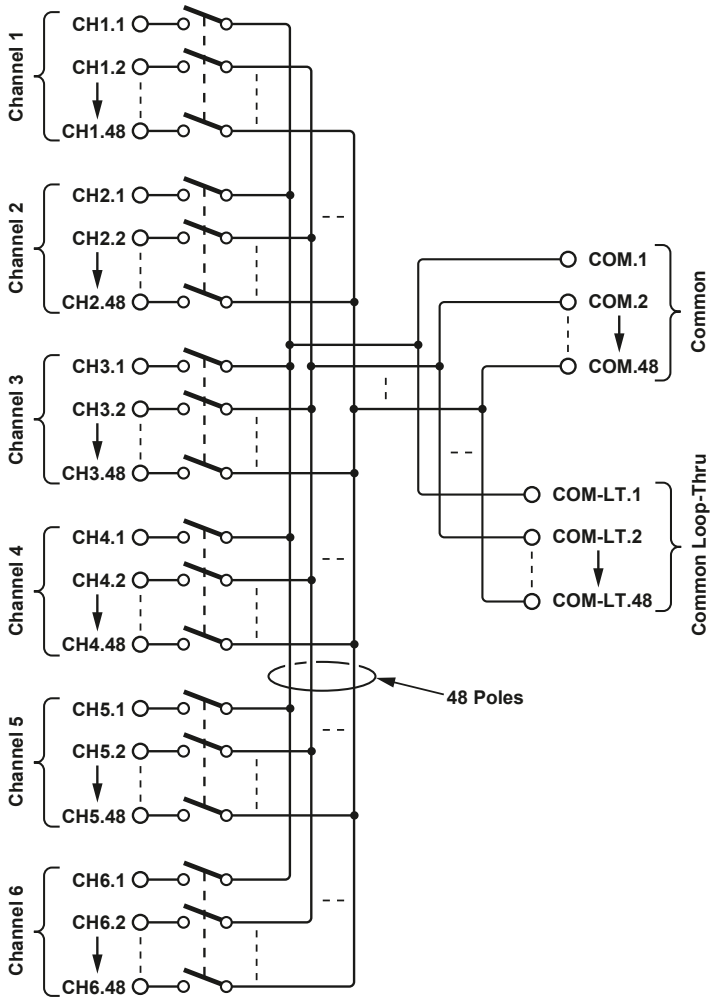
The 40-571 is a Power Multiplexer designed to simplify the connection of a common set of test equipment to one of a number of different devices for testing (simultaneous multiple channel selection is possible for most configurations, see switching specifications for restrictions). It is ideal for applications where the equipment needs to conduct the same test process on a series of similar devices one at a time. It is available in a variety of configurations that allow testing with differing number of devices to be tested and different connection widths to suit differing test equipment pin counts.

All versions of the 40-571 are supported in a BRIC8 construction that occupies 8 PXI 3U mechanical slots, one of which provides the PXI interface and power.

MUX size can be ordered with different widths (pole counts) and with different numbers of relay cards to support varying number of devices to be tested. For example, the fully populated 40-571 can be ordered in configurations that support:

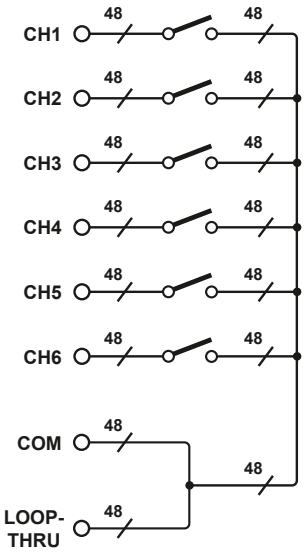
- 6 test devices with 48 connections
- 12 test devices with 24 connections
- 18 test devices with 16 connections
- 24 test devices with 12 connections
- 48 test devices with 6 connections

The pin layout of user connection is arranged to simplify the cabling design. All versions use high quality power electro-mechanical relays.

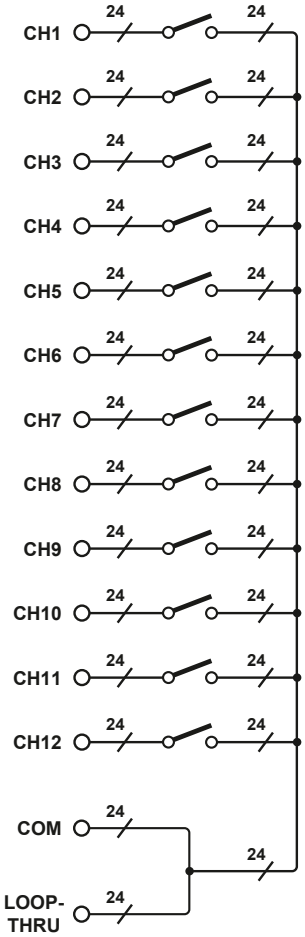


Switching Diagram for 40-571 Power MUX BRIC In 6-Channel 48-Pole Format

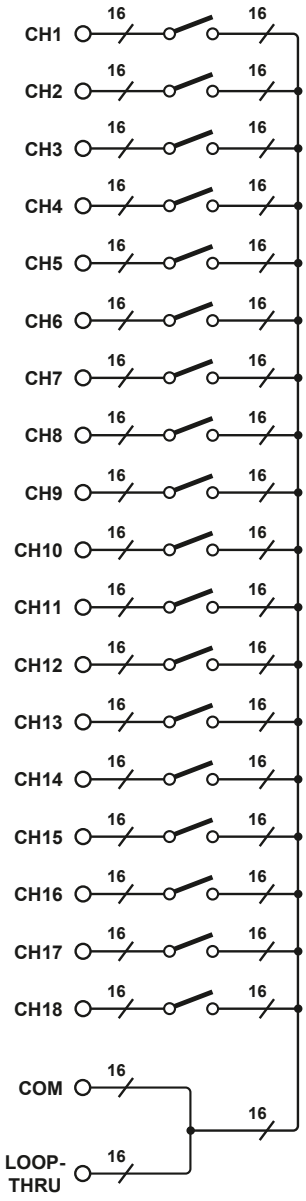
(Note: for multiple channel selection, please refer to switching specification for the maximum simultaneous channel limit)



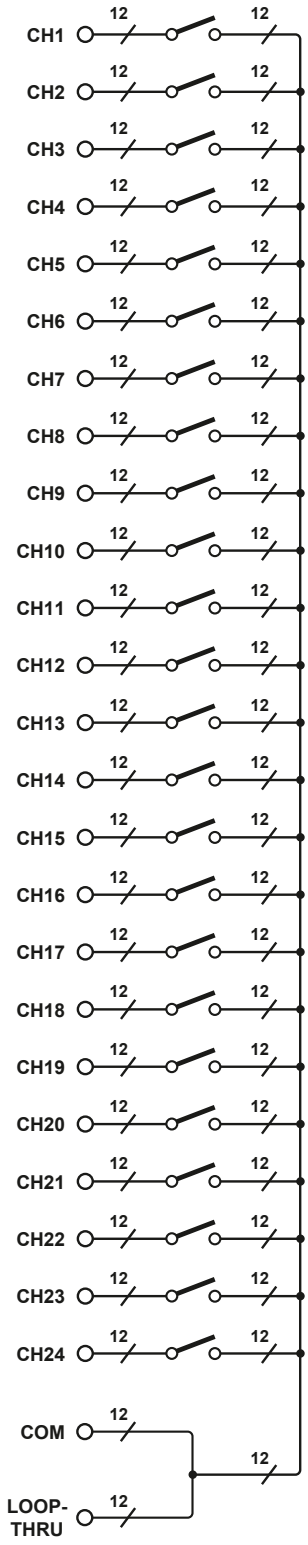
6-Channel, 48-Pole
Multiplexer



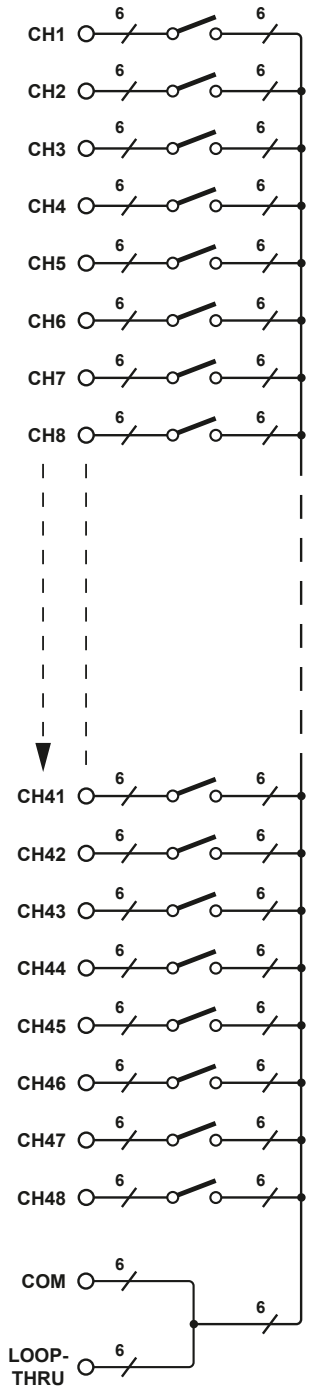
12-Channel, 24-Pole
Multiplexer



18-Channel, 16-Pole
Multiplexer



24-Channel, 12-Pole
Multiplexer



48-Channel, 6-Pole
Multiplexer

Switching Diagrams for the Five Possible Fully Populated Switching Configurations Available for the 40-571 Power Multiplexer BRIC

(Note: for multiple channel selection, please refer to switching specification for the maximum simultaneous channel limit)

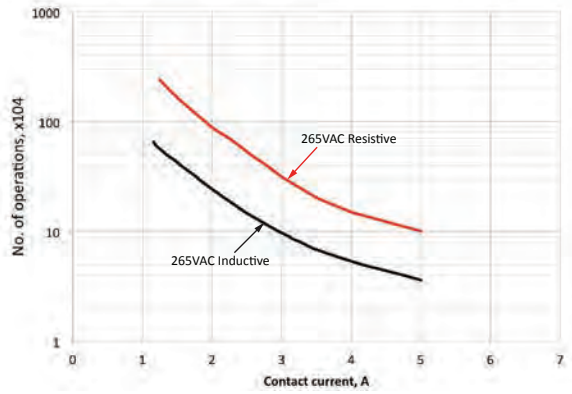
Switching Specification

Contact Type:	Gold flashed silver alloy
Cold Switching Capacity	
Maximum Current:	3A (continuous) 5A (inrush, 10ms)
Maximum Voltage:	100VDC/100VAC peak
Hot Switching Capacity	
Maximum Current:	3A (continuous), 5A (inrush)
Maximum Voltage:	100VDC/100VAC peak
Maximum Power:*	105W/210VA
Min. Switching Capacity:	10mA, 5VDC
Max Combined Switch Path Loading:	25W continuous power e.g. 48 x 1A per path
Initial Path Resistance, On:	<500mΩ
Path Resistance, Off:	$>10^9\Omega$
Operate Time:	10ms typical
Expected Life - resistive load	
Mechanical Life:	$>5x10^7$ operations
At Max. Switch Capacity:	$>1x10^5$ operations
Max number of simultaneously closed channels:	1 channel (48-pole versions) 3 channels (24-pole versions) 5 channels (16-pole versions) 6 channels (12-pole versions) 13 channels (6-pole versions)

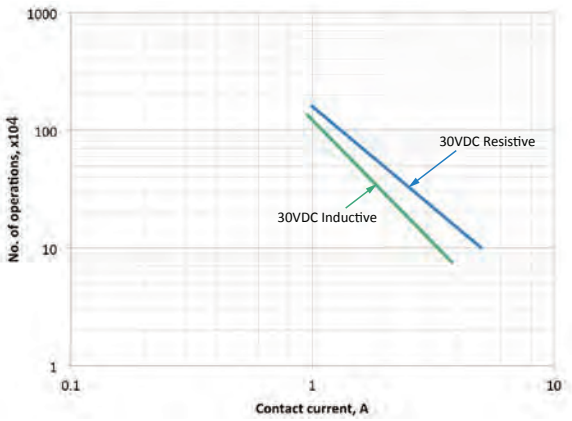
* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

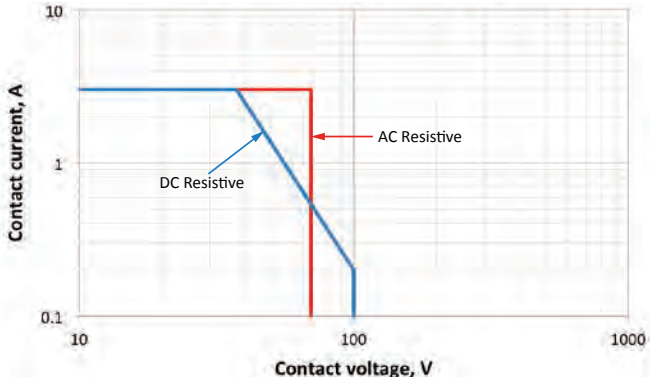
+3.3V	+5V	+12V	-12V
100mA	150mA max	1A max	0



40-571 AC Operating Life Curve



40-571 DC Operating Life Curve



40-571 Current/Voltage Curve

Mechanical Characteristics

Eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
User connections are made via multiple front panel 50-way male D-type connectors (Up to 8 per module).

Product Order Codes

3A Power MUX BRIC, 2-Channel, 48-Pole	**40-571-002**
3A Power MUX BRIC, 3-Channel, 48-Pole	**40-571-003**
3A Power MUX BRIC, 4-Channel, 48-Pole	**40-571-004**
3A Power MUX BRIC, 5-Channel, 48-Pole	**40-571-005**
3A Power MUX BRIC, 6-Channel, 48-Pole	**40-571-006**
3A Power MUX BRIC, 2-Channel, 24-Pole	**40-571-101**
3A Power MUX BRIC, 4-Channel, 24-Pole	**40-571-102**
3A Power MUX BRIC, 6-Channel, 24-Pole	**40-571-103**
3A Power MUX BRIC, 8-Channel, 24-Pole	**40-571-104**
3A Power MUX BRIC, 10-Channel, 24-Pole	**40-571-105**
3A Power MUX BRIC, 12-Channel, 24-Pole	**40-571-106**
3A Power MUX BRIC, 3-Channel, 16-Pole	**40-571-201**
3A Power MUX BRIC, 6-Channel, 16-Pole	**40-571-202**
3A Power MUX BRIC, 9-Channel, 16-Pole	**40-571-203**
3A Power MUX BRIC, 12-Channel, 16-Pole	**40-571-204**
3A Power MUX BRIC, 15-Channel, 16-Pole	**40-571-205**
3A Power MUX BRIC, 18-Channel, 16-Pole	**40-571-206**
3A Power MUX BRIC, 4-Channel, 12-Pole	**40-571-301**
3A Power MUX BRIC, 8-Channel, 12-Pole	**40-571-302**
3A Power MUX BRIC, 12-Channel, 12-Pole	**40-571-303**
3A Power MUX BRIC, 16-Channel, 12-Pole	**40-571-304**
3A Power MUX BRIC, 20-Channel, 12-Pole	**40-571-305**
3A Power MUX BRIC, 24-Channel, 12-Pole	**40-571-306**
3A Power MUX BRIC, 8-Channel, 6-Pole	**40-571-401**
3A Power MUX BRIC, 16-Channel, 6-Pole	**40-571-402**
3A Power MUX BRIC, 24-Channel, 6-Pole	**40-571-403**
3A Power MUX BRIC, 32-Channel, 6-Pole	**40-571-404**
3A Power MUX BRIC, 40-Channel, 6-Pole	**40-571-405**
3A Power MUX BRIC, 48-Channel, 6-Pole	**40-571-406**

Note: Configurations can be altered on a return to the factory basis, please contact Pickering sales office for details.

For the expansion of an existing BRIC multiplexer or replacement of faulty BRIC daughter cards please contact your local sales office.

Mating Connectors & Cabling

For connection accessories for the 40-571 module please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Multiplexer: High Power

- Versatile Multiplexer Range With Channel Counts From 3 to 1, Up To 64 to 1
- Versions Available With Between 1 & 8 Separate Banks
- One or Two Pole Versions Available
- Electromechanical Relay Versions Capable of Switching Up To 10 Amps
- Solid State Versions Capable of Switching Up To 30 Amps
- Power And Sense MUX Version Suitable For Power Distribution and Regulation Circuits
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-667 30A Solid State Power Multiplexer

Power Multiplexer Modules

Between 3 & 64 Channels, Between 1 & 8 Banks, 1 & 2 Poles

125VDC/250VAC 5A Max Current	Electro-mechanical	Single 16:1, 2-Pole 40-650-002	Page 24.2
	Electro-mechanical	1-Bank 48:1, 1-Pole 40-651-001 2-Bank 24:1, 1-Pole 40-651-002 4-Bank 11:1, 1-Pole 40-651-003 8-Bank 16:1, 1-Pole 40-651-004	Page 24.4
110VDC/250VAC 5A Max Current	Solid State	1-Bank 48:1, 1-Pole 40-652-001 2-Bank 24:1, 1-Pole 40-652-002 1-Bank 24:1, 2-Pole 40-652-003 1-Bank 24:1, 1-Pole 40-652-004	Page 24.6
±100V (DC or AC peak) 5A Max Current	Electro-mechanical	7-Bank 4:1, 2-Pole 40-655-002	Page 24.8
	Electro-mechanical	Single 38:1, 2-Pole 40-656-002	Page 24.10
220VDC/125VAC 2A Max Current	Electro-mechanical	8-Bank 8:1, 1-Pole 4-Bank 16:1, 1-Pole 2-Bank 32:1, 1-Pole Single 64:1, 1-Pole } 40-657-002	Page 24.12
110VDC/250VAC 2A Max Current			
200VDC/240VAC 1A Switch, 2A Carry	Ruthenium Reed	Dual 18:1, 2-Pole Power & Sense MUX 40-658-002	Page 24.14
300VDC/250VAC 2A Max Current	Electro-mechanical	8-Bank 8:1, 2-Pole 40-659-102	Page 24.16
125VDC/250VAC 8A Max Current	Electro-mechanical	Single 10:1, 2-Pole 40-660-002	Page 24.18
125VDC/250VAC 10A Max Current	Electro-mechanical	Single 10:1, 1-Pole 40-660-001 Single 18:1, 1-Pole 40-665-001	Page 24.18
	Electro-mechanical	8-Bank 4:1, 1-Pole 40-661-001 4-Bank 8:1, 1-Pole 40-661-002 2-Bank 16:1, 1-Pole 40-661-003 1-Bank 32:1, 1-Pole 40-661-004 5-Bank 6:1, 1-Pole 40-661-005 4-Bank 4:1, 1-Pole 40-661-101 2-Bank 8:1, 1-Pole 40-661-102 1-Bank 16:1, 1-Pole 40-661-103	Page 24.20
300VDC/250VAC 16A Max Current	Electro-mechanical	4-Bank 4:1, 1-Pole 40-662-001 2-Bank 8:1, 1-Pole 40-662-002 1-Bank 16:1, 1-Pole 40-662-003 4-Bank 2:1, 1-Pole 40-662-011 2-Bank 4:1, 1-Pole 40-662-012 1-Bank 8:1, 1-Pole 40-662-013 1-Bank 12:1, 1-Pole 40-662-014	Page 24.23
14VDC 40A Max Current	Electro-mechanical	Single 4:1, 1-Pole 40-664-001	Page 24.25
28VDC 20A Max Current	Electro-mechanical	Single 4:1, 1-Pole 40-664-002	Page 24.25
±200V (DC or AC peak) 10A Max Current	Solid State High Power	Dual 3:1, 1-Pole 40-666-011 Single 6:1, 1-Pole 40-666-012	Page 24.27
±40V (DC or AC peak) 30A Max Current	Solid State High Power	Dual 3:1, 1-Pole 40-667-011 Single 6:1, 1-Pole 40-667-012	Page 24.29

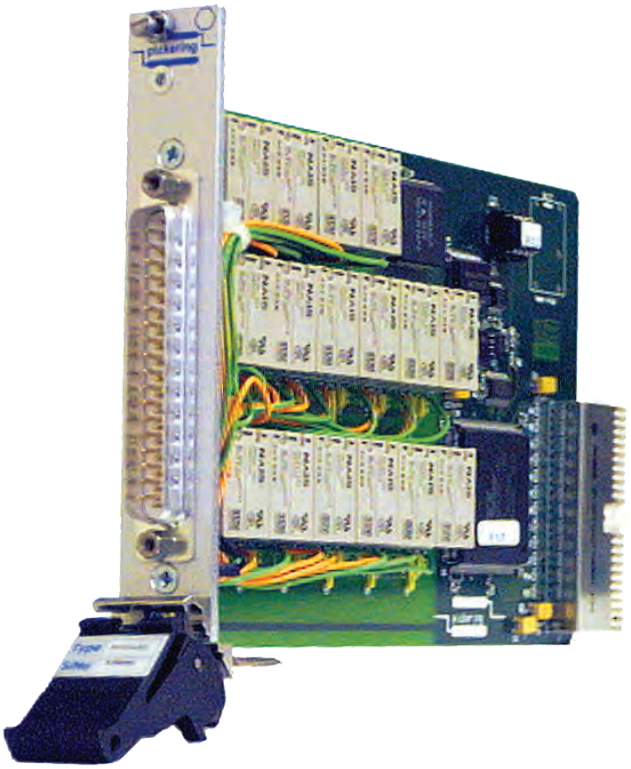
The power MUX range provides a selection of switching modules based on electromagnetic, reed and solid state relays capable of switching current up to 30A. Each module supports one or more signal channels between an input/output terminal and a selection of output/input terminals. To reduce through path resistance most of these multiplexers do not include isolation relays.

Each module uses connectors supported by the Pickering cable accessory range and relays have been carefully selected to ensure long service life under demanding load conditions.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.

40-650
Power Multiplexer Module

- 16-Channel Power Multiplexer
- 2-Pole Switching
- 5A Current Rating With 175W/1250VA Maximum Power
- Hot Switch to 125VDC/250VAC
- Cold Switch to 400VDC/250VAC
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



Pickering Interfaces have a range of power switching PXI modules, available in relay, matrix or multiplexer configurations. Connections are made via a front panel 37-Way D-Type male connector.

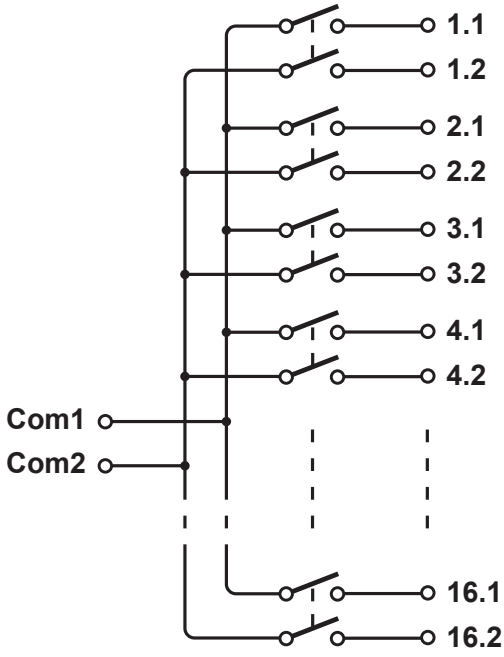
Model 40-650-002 is a 16-Channel Power Multiplexer, suitable for switching inductive/capacitive loads up to 5A at 125VDC/250VAC

Power Multiplexer Modules are intended for switching heavy AC or DC loads or for slaving up to large external relays, contactors and solenoids.

The 40-650 Power Relay Module is suitable for applications requiring switching of either AC mains or DC voltage.

Power Relay Type

The 40-650 is fitted with electro-mechanical power relays, gold-flash over silver alloy. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.

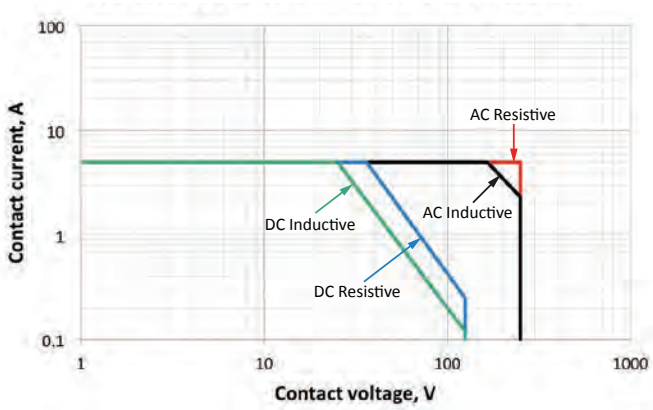


Schematic of 40-650 Power Multiplexer Module

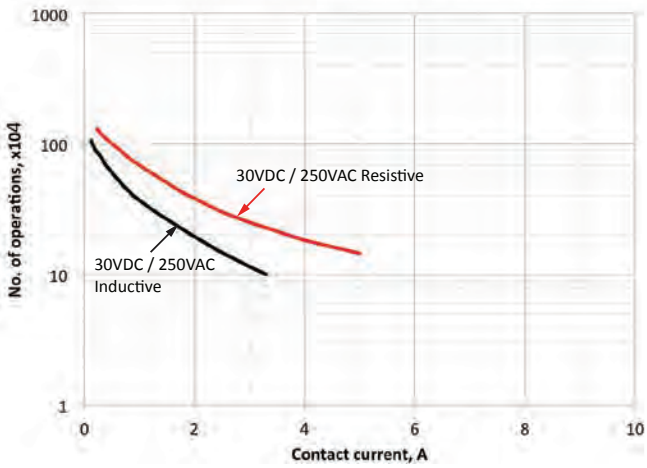
Switching Specification

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 5A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 5A 125VDC/250VAC 175W/1250VA 10mA, 5VDC
Max Standoff Voltage: Initial Path Resistance, On: Path Resistance, Off:	400VDC <250mΩ $>10^9$Ω
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 $>5x10^7$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.



40-650 Current/Voltage Curve



40-650 Current/Operating Life Curve

Power Requirements

+3.3V	+5V	+12V	-12V
0	360mA (280mA typ)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel 37-way male D-Type connector.

Product Order Codes

16-Channel Power Multiplexer, 2-Pole 40-650-002

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-650 module is as follows:

91-100-052 kit for 40-650-002

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-650 module please refer to the **90-007D** 37-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-651
5A Power EMR MUX Module

- High Density 1-Pole Power Multiplexer in 1-Bank 48-Channel, 2-Bank 24-Channel, 4-Bank 11-Channel & 8-Bank 5-Channel Formats
- 5A Current Rating With 150W/1250VA Maximum Power
- Switch up to 110VDC/250VAC
- High Quality Electro-mechanical Relays
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-651 is a high density power multiplexer module, suitable for switching inductive/capacitive loads up to 5A at 250VAC. It is available in 1-bank 48-channel, 2-bank 24-channel, 4-bank 11-channel or 8-bank 5-channel 1-pole multiplexer formats. Connections are made via a front panel 50-pin male D-type connector or a combination of 50-pin & 9-pin male D type connectors (in isolated common line versions). Power multiplexer modules are intended for switching heavy AC or DC loads or for slaving up to large external relays, contactors and solenoids.

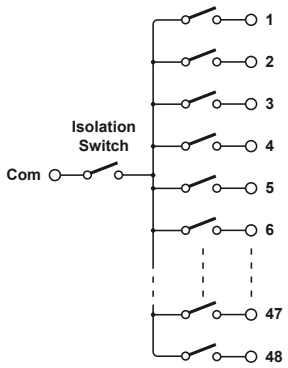
Isolation switching

Models 40-651-001 to 004 and 40-651-011 to 014 exhibit automatic sequenced isolation switching. Additionally models 40-651-101/102/111/112 are available with independent isolation switching, improving speed for scanning applications.

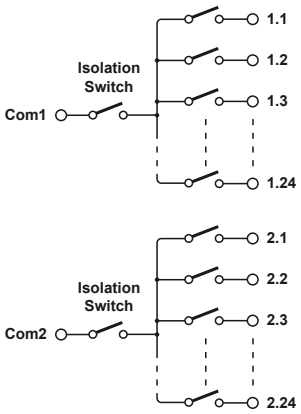
Isolated Common Lines

The 40-651 is also available with two connector arrangement (models 40-651-011 to 014 & 40-651-111/112). The single connector versions place all MUX connections on a single connector and require the fewest connection cables. The two connector versions place all MUX commons on one connector and all MUX channels on another, making it simpler to separate inputs and outputs.

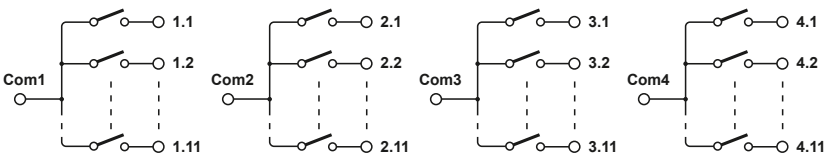
Larger multiplexers can be created by daisy-chaining the common connections from multiple modules. Isolation switching on 48 and 24 channel versions helps minimize capacitive loading and leakage current in large switching systems by switching unused multiplexers out of circuit.



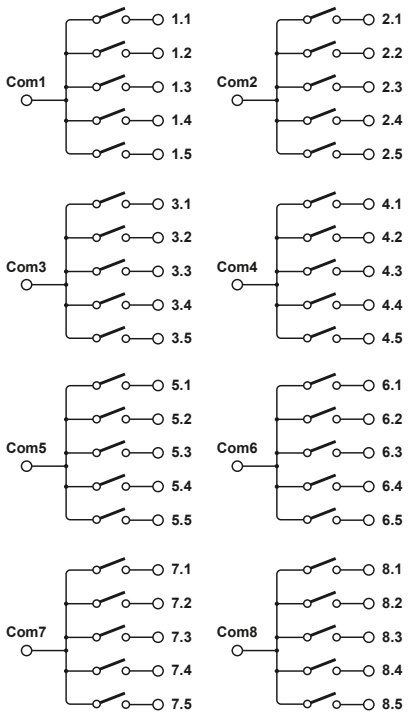
40-651-001/101/011/111 1-Bank, 48-Channel, 1-Pole Power MUX



40-651-002/102/012/112 2-Bank, 24-Channel, 1-Pole Power MUX



40-651-003/013 4-Bank, 11-Channel, 1-Pole Power MUX



40-651-004/014 8-Bank, 5-Channel, 1-Pole Power MUX

Power Relay Type

The 40-651 is fitted with electro-mechanical power relays with gold clad silver alloy contacts. A Spare Relay is included with each module to facilitate easy maintenance with minimum down time.

Switching Specification

Contact Type:	Gold Clad Silver Nickel
Nominal Switching Capacity:	5A @ 30VDC 5A @ 250VAC
Max Switching Power: *	150W, 1250VA
Max Switching Voltage:	110VDC, 250VAC
Max Standoff Voltage:	400VDC
Max Continuous Switching Current:	5A
Min Switching Capacity:	10mA, 5VDC
Typical Pulse Capability:	Cold Switch 10A for 100ms under low duty cycle conditions (please contact sales office for further advice).
Maximum Continuous Total Switch Path Loading: †	16W (Example allowed condition - 6 Banks at 5A, please contact sales office for any further advice).
Initial On Path Resistance:	<200mΩ (100mΩ typical)
Off Path Resistance:	$>10^9$Ω
Thermal Offset:	10µV (maximum)
Bandwidth:	>5MHz
Typical Operate Time:	10.5ms
Expected Life	
Low power load:	$>2x10^7$ operations
Full power load (resistive):	$>5x10^4$ operations (5A 30VDC, 5A 250VAC) $>1x10^5$ operations (3A 30VDC, 3A 250VAC)

* For variation of maximum hot switching capacity of voltage with current refer to plot.

† No loading restrictions when using Pickering 40-922/923A PXI & 60-102B/103B LXI chassis' (under initial path resistance conditions), please contact sales office for details.

Power Requirements

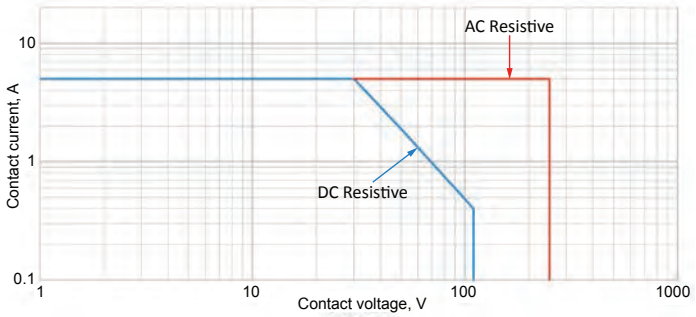
+3.3V	+5V	+12V	-12V
0	1.17A	0	0

Mechanical Characteristics

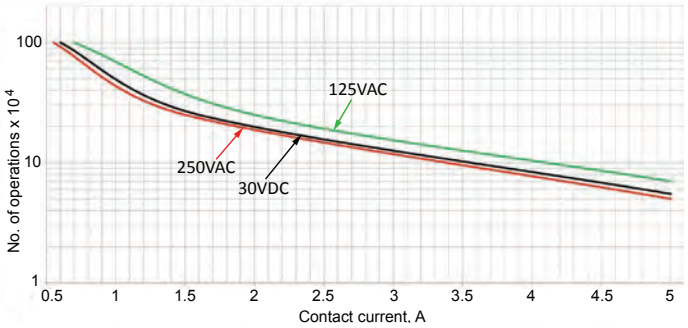
Single slot 3U PXI (CompactPCI card).
Note: Isolated COM versions are not fitted with a PXI handle.
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Multiplexer connections via front panel 50-pin male D-type connector. For isolated COM versions, the common connections are via a 9-pin male D-type connector.



40-651 Current/Voltage Curve



40-651 Current/Operating Life Curve

Product Order Codes

5A Power EMR MUX

1-Bank, 48-Channel, 1-Pole	**40-651-001**
2-Bank, 24-Channel, 1-Pole	**40-651-002**
4-Bank, 11-Channel, 1-Pole	**40-651-003**
8-Bank, 5-Channel, 1-Pole	**40-651-004**

5A Power EMR MUX with Independent Isolation Switching
(Improving speed for scanning applications)

1-Bank, 48-Channel, 1-Pole	**40-651-101**
2-Bank, 24-Channel, 1-Pole	**40-651-102**

5A Power EMR MUX with Isolated COM Access

1-Bank, 48-Channel, 1-Pole	**40-651-011**
2-Bank, 24-Channel, 1-Pole	**40-651-012**
4-Bank, 11-Channel, 1-Pole	**40-651-013**
8-Bank, 5-Channel, 1-Pole	**40-651-014**

5A Power EMR MUX with Isolated COM Access & Independent Isolation Switching
(Improving speed for scanning applications)

1-Bank, 48-Channel, 1-Pole	**40-651-111**
2-Bank, 24-Channel, 1-Pole	**40-651-112**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-651 is as follows:

Kit 20 (part no. 91-100-020) for 40-651-001/002/003/004, 40-651-101/102 and 40-651-011/012/013/014/111/112.

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-651 module please refer to the **90-005D** 50-pin D-type and **90-003D** 9-pin D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-652
5A Solid State Multiplexer Module

- Long Life Solid State Design
- 100V 5A Hot Switch Capacity
- Surge Current of 30A for 300µs
- Single, Dual, 1-Pole & 2-Pole Configurations
- Fast Operating Time
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

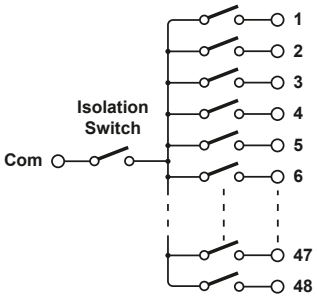
The 40-652 range of multiplexers uses solid state relays with high tolerance to surge currents and hot switching events. Each multiplexer provides an isolation relay in the common to minimize capacitive loading when expanding the multiplexer across multiple modules. The 40-652 can sustain 30A for 300µs on hot or cold switching.

The multiplexer module is available in single pole 48:1, two pole 24:1, single pole dual 24:1 or single pole 24:1 configurations.

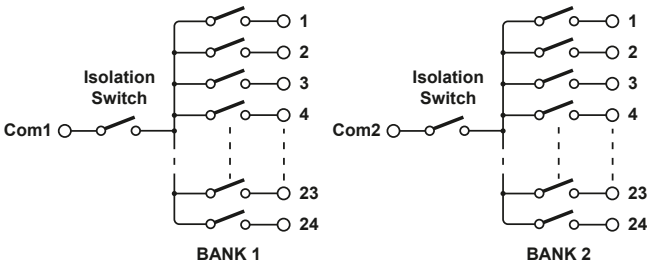
The module uses a male 50-way D-type connector which is supported by a full range of connector and cable accessories.

Supported by eBIRST

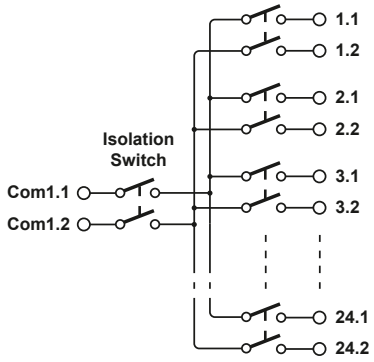
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



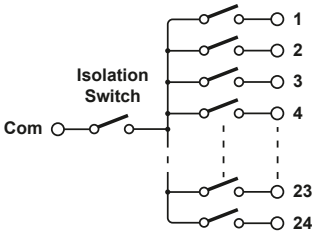
40-652-001 MUX 1-Bank 48-Channel 1-Pole



40-652-002 MUX 2-Bank 24-Channel 1-Pole



40-652-003 MUX 1-Bank 24-Channel 2-Pole



40-652-101 MUX 1-Bank 24-Channel 1-Pole

Switching Specification

Relay Type:	Isolated MOSFET
Switching Capacity:	5A at 100V
Maximum Switching Power: Maximum Switching Voltage: Maximum Continuous Current: Maximum Pulse Capacity: Maximum Switched Inductive Energy:	500W ±100V 5A 30A for 300µs 20mJ
Path Resistance: Off Path Leakage:	<0.15Ω, 0.11Ω typical <1µA at 25°C
Bandwidth: Isolation:	1MHz typical <20dB at 1MHz
Typical Operate Time: Rise/Fall Time:	85µs <10µs
Expected Life (operations):	Indefinite when used within ratings

Power Requirements

+3.3V	+5V	+12V	-12V
0.12A	0.82A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 250g
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel 50-way male D-Type connector.

Product Order Codes

1-Bank, 48-Channel, 1-Pole Solid State MUX	**40-652-001**
2-Bank, 24-Channel, 1-Pole Solid State MUX	**40-652-002**
1-Bank, 24-Channel, 2-Pole Solid State MUX	**40-652-003**
1-Bank, 24-Channel, 1-Pole Solid State MUX	**40-652-101**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST.**

Configuration	Test Tool	Adapter	Termination
All Types	**93-005-001**	**None**	**None**

Mating Connectors & Cabling

For connection accessories for the 40-652 module please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.
It should be noted that on this module pin1 is at the bottom of the connector when making accessory choices on cable exit directions.

40-655
7 Bank, 4 Channel Multiplexer Module

- High Density Multiplexer Suitable For Telecommunication Applications
- 7 Separate 4 Channel Multiplexers
- Configurable To Form Other Multiplexer Sizes Up To 56 Channel
- 2-Pole Switching
- 10MHz Typical Bandwidth
- Operating Speed <3ms
- Switch up to 220VDC/125VAC, 2 Amps with 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

Model 40-655-002 contains 7 separate 4-channel multiplexers, 2-pole switching, suitable for switching signals to 220VDC (125VAC).

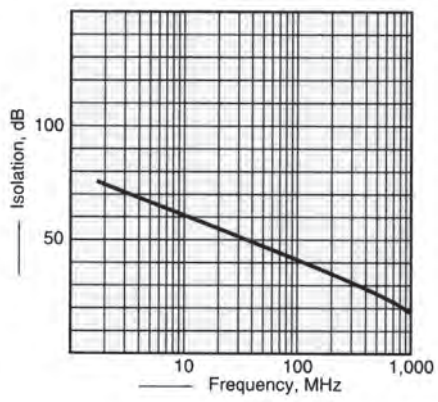
The 40-655 can be configured in many additional multiplexer switching formats (see schematic overleaf), for example 56-channel 1-pole, 28-channel 2-pole, etc. The 40-655 can be either factory configured or later re-configured by the user at any time to form a different multiplexer function.

The 40-655 has been specifically designed for switching POTS, ISDN or xDSL telephony signals.

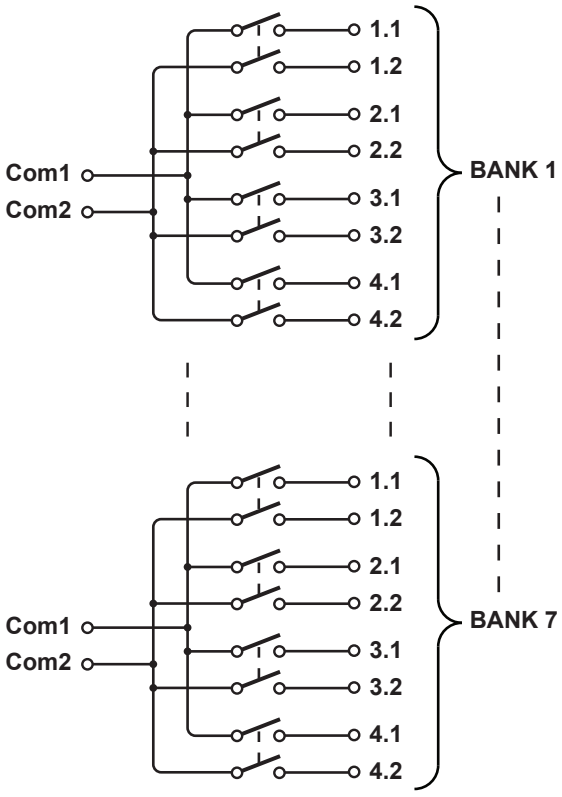
Please contact Pickering sales office for more assistance with Telecom switching applications.

Power Relay Type

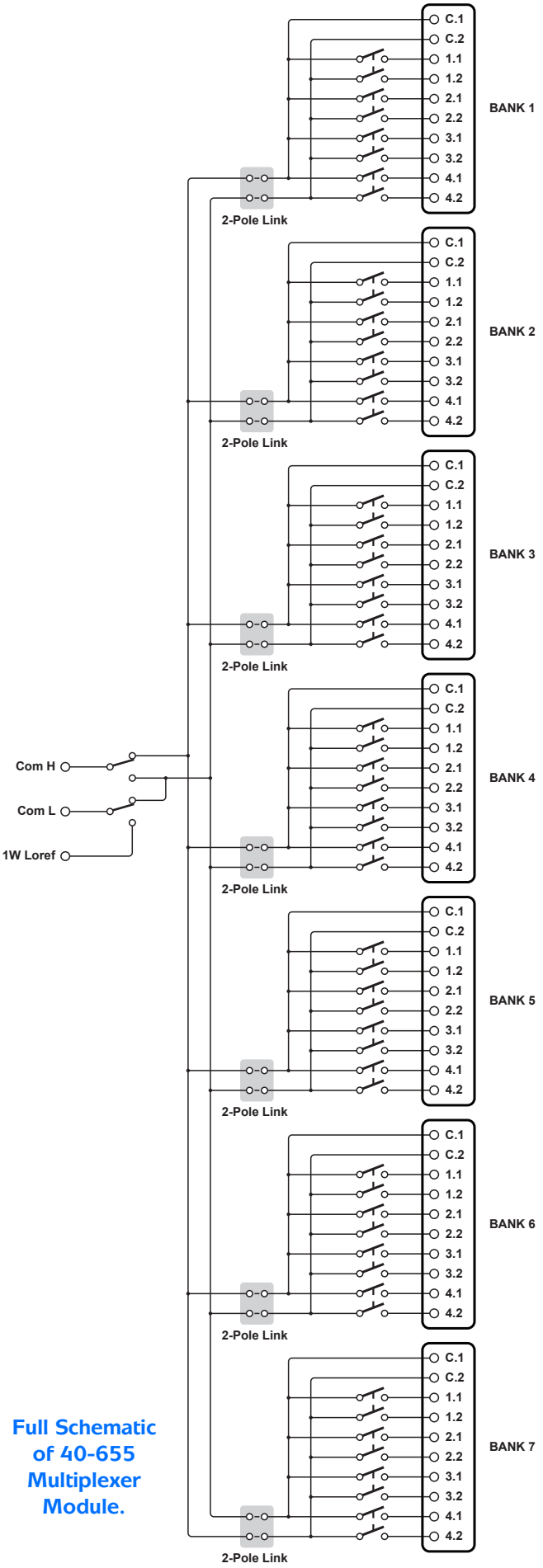
The 40-655 is fitted with electro-mechanical signal relays, gold clad silver alloy contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.



RF Crosstalk Performance



Schematic of 40-655 Multiplexer Module
7 Banks Of 4-Channel Are Shown (more detailed schematic overleaf)



Full Schematic of 40-655 Multiplexer Module.

Switching Specification

Switch Type:	Electromechanical Relay
Max Voltage:	220VDC/125VAC
Max Switch Current: Max Power:	2A 60W
Initial On Path Resistance: Off Path Resistance: Differential Thermal Offset:	<400mΩ $>10^9$Ω <5µV
Bandwidth:	>10MHz
Operate Time: Release Time:	3ms 2ms
Expected Life, low power: Expected Life, high power:	$>1x10^8$ ops. $>2x10^5$ (1A, 30VDC) ops.

Power Requirements

+3.3V	+5V	+12V	-12V
0	950mA (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32 bit P1/J1 backplane connector.
Signals via a front panel 78-way male D-Type connector.

Product Order Codes

7-Bank/4-Channel Multiplexer, 2-Pole 40-655-002

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-655 module is as follows:

91-100-037 kit for 40-655-002

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-655 module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-656
38 Channel 2 Amp Multiplexer Module

- High Density Multiplexer Suitable For Telecommunication Applications
- 38-Channel Multiplexer
- 2-Pole Switching
- Operating Speed <3ms
- Switch up to 220VDC/125VAC, 2 Amps With 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

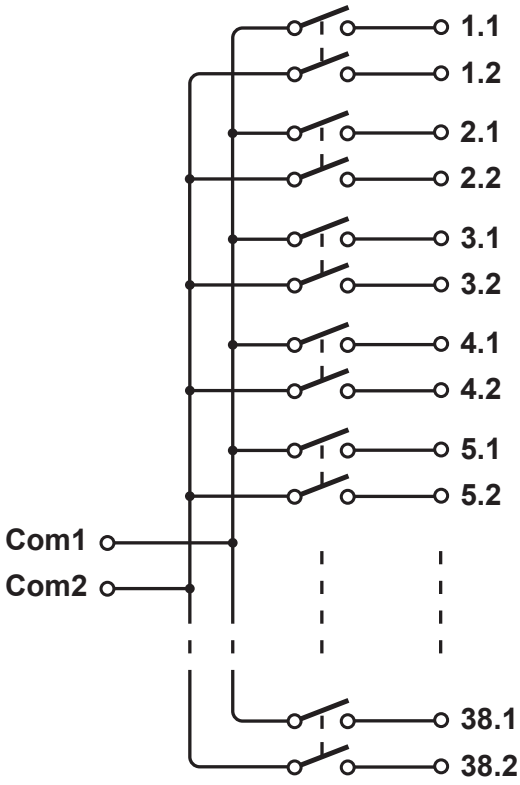
Model 40-656-001 is a 38-channel multiplexer, 2-pole switching, suitable for switching signals to 2 Amp, 220VDC/125VAC. It offers the highest switching density in it's class for medium power/voltage signals.

The 40-656 has been specifically designed for switching POTS, ISDN or xDSL telephony signals. Bandwidth for most configurations is typically >25MHz. It is paired with a very similar module, 40-655-002, a multi-banked multiplexer.

Please contact Pickering sales office for more assistance with Telecom switching applications.

Power Relay Type

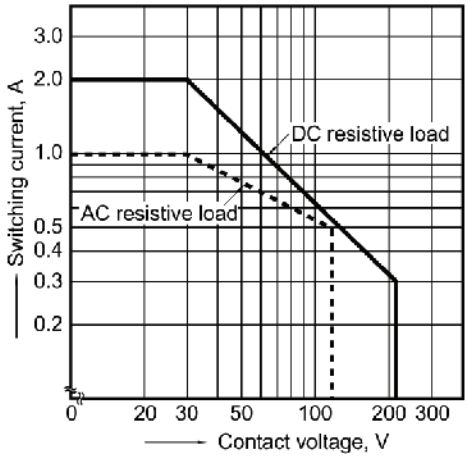
The 40-656 is fitted with electro-mechanical signal relays, gold clad silver alloy contacts.



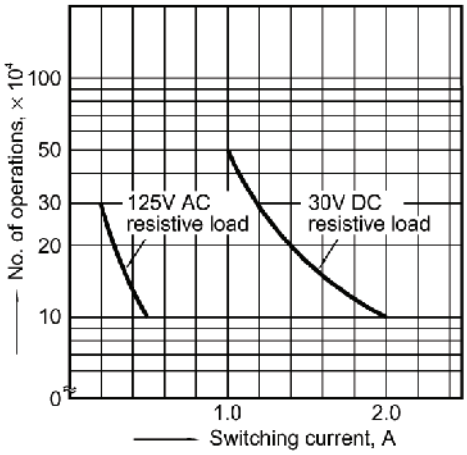
Schematic of 40-656 Multiplexer Module

Switching Specification

Switch Type:	Electro-mechanical Relay
Max Voltage:	125VAC/220VDC
Max Switch Current: Max Power:	2A 60W
Initial Path Resistance On: Off: Differential Thermal Offset:	 <200mΩ $>10^9$Ω <5µV
Bandwidth:	>25MHz
Operate Time: Release Time:	3ms 2ms
Expected Life (operations) Low power load: High power load:	 $>1x10^8$ $>2x10^5$ (1A, 30VDC)



Switch Voltage vs Current Plot



Switch Life vs Current Plot

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.06A (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel male 78-way male D-Type connector, for pin outs please refer to the operating manual.

Product Order Codes

38-Channel 2-Pole Multiplexer **40-656-001**

Note: *The 40-656-002 has been superseded by the 40-656-001 which has updated software, the 40-656-002 is still available for legacy requirements, however, it is not recommended for new designs.*

Support Products

Spare Relay Kits

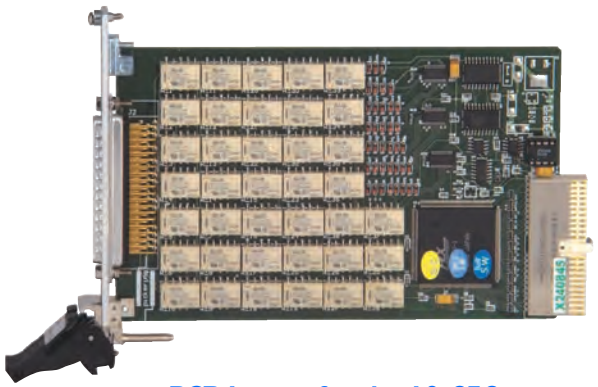
Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-656 module is as follows:

91-100-037 kit for 40-656-001

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-656 module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB Layout for the 40-656
38-Channel Multiplexer

40-657
2A Multi-Banked Multiplexer Module

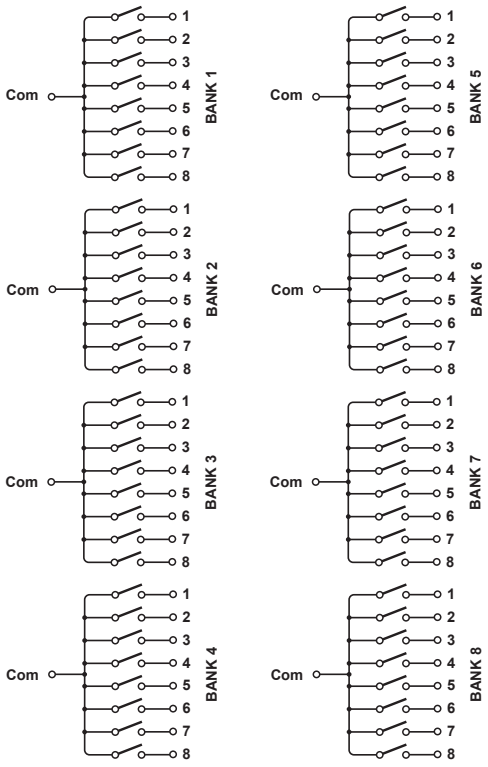
- High Density 2 Amp Multiplexer
- 8-Banks of 8-Chan, 4-Banks of 16, 2-Banks of 32 & Single 64-Chan Multiplexer
- 1-Pole Switching
- 2A Current Rating With 90W/500VA Maximum Power
- Hot Switch to 110VDC/250VAC
- Cold Switch to 400VDC/250VAC
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

40-657 High Density Power Multiplexer Modules are available in a choice of configurations, containing up to 8 separate multiplexers (see schematics), all 1-pole switching. They are suitable for switching signals to 110VDC/250VAC at 2 Amps, 90W.
The following configurations are available:-

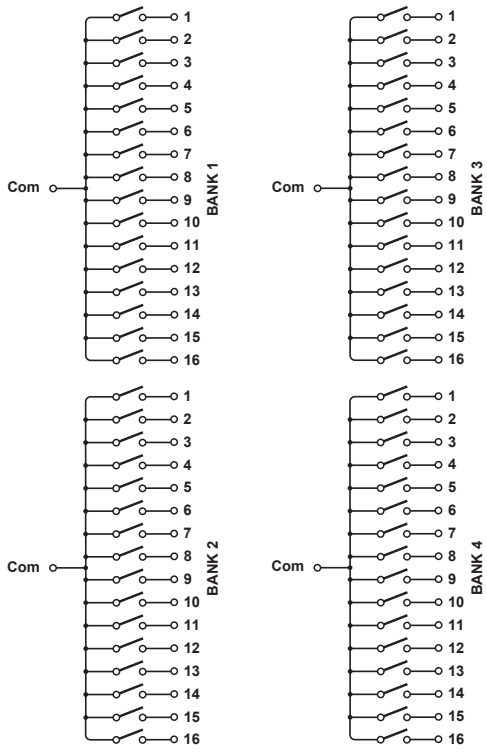
40-657-001-8/8/1	8-Banks of 8-Chan, 1-pole.
40-657-001-4/16/1	4-Banks of 16-Chan, 1-pole.
40-657-001-2/32/1	2-Banks of 32-Chan, 1-pole.
40-657-001-1/64/1	1-Bank of 64-Chan, 1-pole.

Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules. For example 7 PXI modules (64-Channels) will form a 448-Channel Multiplexer.

Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.



Schematic of 8-Banks of 8-Channel Multiplexer (40-657-001-8/8/1)

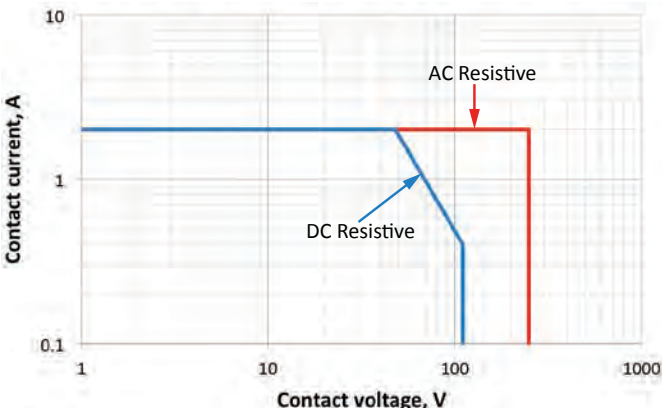


Schematic of 4-Banks of 16-Channel Multiplexer (40-657-001-4/16/1)

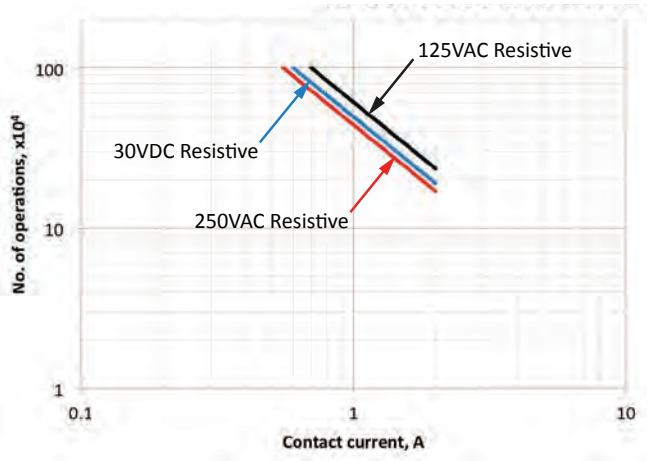
Switching Specification

Contact Type:	Gold clad silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 2A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Minimum Switching Capacity:	 2A 110VDC/250VAC 90W/500VA 10mA, 5VDC
Initial On Path Resistance: Off Path Resistance: Thermal Offset:	<250mΩ $>10^9$Ω <20µV
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load Mechanical Life: At Max. Switch Capacity:	 $>2x10^7$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.



40-657 Current/Voltage Plot



40-657 Current/Operating Life Plot

Power Relay Type

The 40-657 is fitted with electro-mechanical power relays, gold clad silver alloy. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.7A† (400mA typ)	0	0

† with all 64 relays operated

Width and Dimensions

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via a front panel 78-way male D-Type connector.

Product Order Codes

8-Banks of 8-Chan 1-Pole MUX	**40-657-001-8/8/1**
4-Banks of 16-Chan 1-Pole MUX	**40-657-001-4/16/1**
2-Banks of 32-Chan 1-Pole MUX	**40-657-001-2/32/1**
Single 64-Chan 1-Pole MUX	**40-657-001-1/64/1**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the 40-657 module is as follows:

91-100-020 Relay Kit 20 for 40-657-001

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-657 range please refer to the **90-006D** 78 way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-658
Power and Sense Multiplexer

- 2-Pole 18-Way Power MUX 2.8 Amps Peak Current
- 2-Pole 18-Way Sense MUX
- Compact Solution for 4-Wire Power Distribution and Regulation
- Ideal for 4-Wire Resistance Measurements
- Uses High Reliability Reed Relays
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-658 combines a 2-pole 18-way power distribution MUX with a second lower power 2-pole 18-way MUX in one convenient single slot PXI module.

The system is ideal for use with power supplies having a remote sensing capability to allow them regulate the voltage delivered to a device under test at a remote point. The 40-658 will allow a single power supply to be connected in turn to a number of devices under test, each device requiring a regulated input voltage to simulate a battery or local power supply. Combining the power and sense MUX in a single module can save space in the PXI chassis by eliminating the need for a second MUX module.

The 40-658 is also convenient for making 4-wire low resistance measurements by supplying the resistor under test with high current through the power MUX and sensing the voltage drop through the low power MUX.

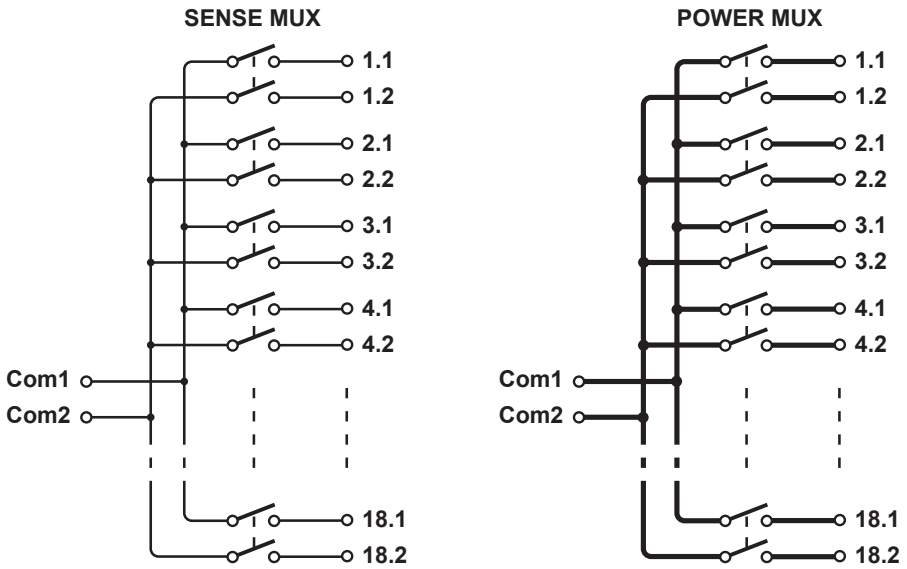
The module is ideal for the sequenced bulk testing of a wide variety of devices to derive environmental or manufacturing variance information.

The module can also be used as a general purpose dual 2-pole 18-way MUX.

Ruthenium Reed relays are used throughout in order to ensure a long service life.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Power and Sense MUX Block Diagram

Switching Specification - Power MUX

Switch Type:	Ruthenium Reed Relay
Max Switch Voltage:	200VDC/240VAC
Max Switch Current: Max Carry Current: Max Switching Power:	1A 2A Continuous, 2.8A Peak (50% duty cycle) 40W
Initial Path Resistance On: Off:	 <250mΩ $>10^9$Ω
Operating Time:	<0.5ms
Expected Life (operations) Low power load: Full power load:	 $>10^8$ $>10^6$

Switching Specification - Sense MUX

Switch Type:	Ruthenium Reed Relay
Max Switch Voltage:	200VDC
Max Switch Current: Max Carry Current: Max Switching Power:	1A 1.2A 20W
Initial Path Resistance On: Off:	 <150mΩ $>10^9$Ω
Operating Time:	<0.5ms
Expected Life (operations) Low power load: Full power load:	 $>10^8$ $5x10^6$

Power Requirements

+3.3V	+5V	+12V	-12V
0	150mA	70mA	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel 78-way male D-Type connector, for pin outs please refer to the operating manual.

Product Order Codes

2-Pole 18-Way Power MUX with 2-Pole 18-Way Sense MUX	**40-658-002**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-034**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-658 module please refer to the **90-006D** 78-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-659
8-Bank 8-Channel 2-Pole Multiplexer Module

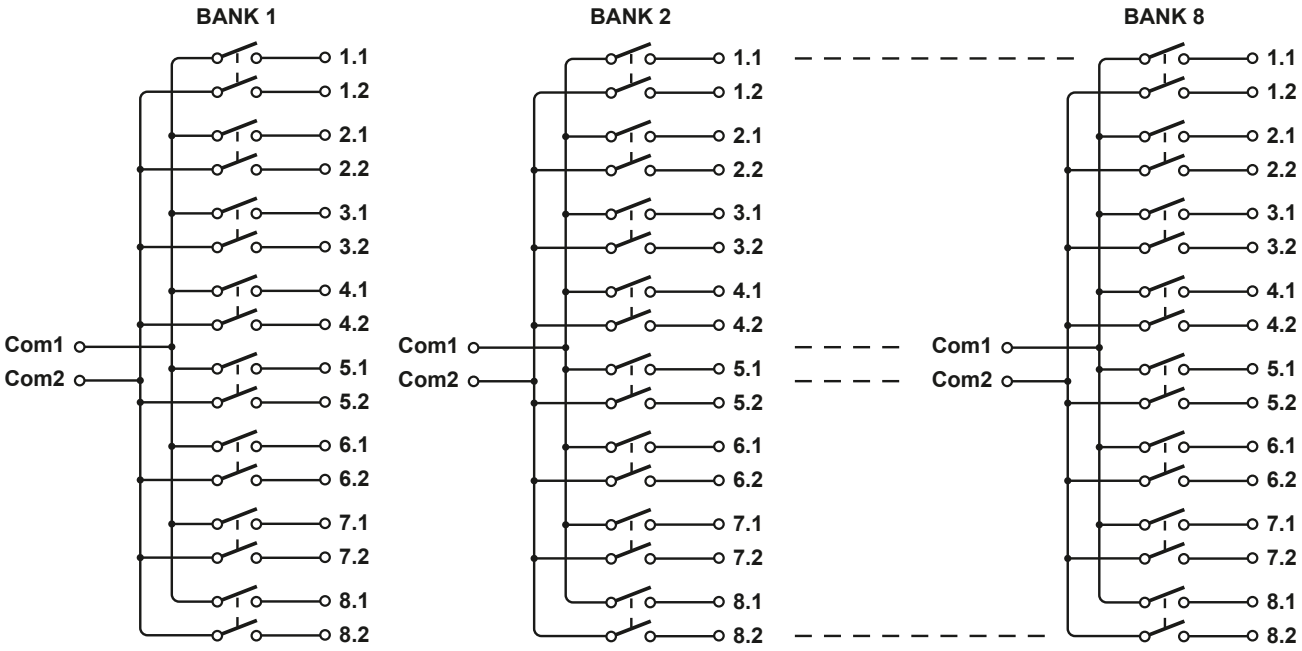
- High Density Multiplexer With 2 Amp Current Carrying Capability
- 8 Separate 8-Channel Multiplexer Banks
- 2-Pole Switching
- Operating Speed <3ms
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

Model 40-659 is an 8-Bank 8-Channel Multiplexer module with 2-pole switching, It uses high quality electro-mechanical relays and is suitable for switching signals up to 2Amp, 300VDC/250VAC.

The 40-659 module is suitable for multiplexer applications where two signals are required to be switched simultaneously, for example send and return signals in a telecoms system. It is also suitable for applications where reed relay based multiplexers do not have sufficient power handling capability such as switching medium power AC or DC loads or for slaving external relays, contactors and solenoids.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Schematic for the 40-659 Multiplexer Module

Switching Specification (40-659)

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Standoff Voltage:	300VDC/250VAC
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance	
On:	<200mΩ
Off:	>10^9Ω
Minimum Voltage:	100µV
Differential Thermal Offset:	<10µV
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	>$1x10^8$
Low power load (2W):	>$1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	>$5x10^6$ (1A 30VDC)
Full power load (60W):	>$1x10^5$ (2A 30VDC)
	>$1x10^5$ (0.1A 300VDC)

Power Relay Type

The 40-659 is fitted with electro-mechanical double pole relays, Palladium-Ruthenium Gold covered contacts. A **Spare Relay** is built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.06A (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel male 160-way DIN 41612 male connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Product Order Codes

8-Bank, 8-Channel 2-Pole Multiplexer	**40-659-102**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**93-002-410**

Spare Relay Kits

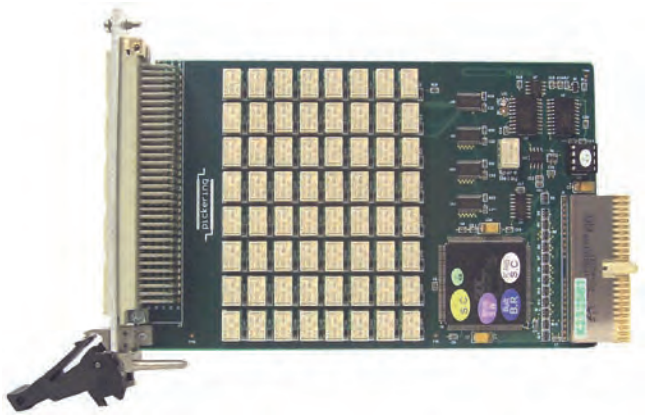
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

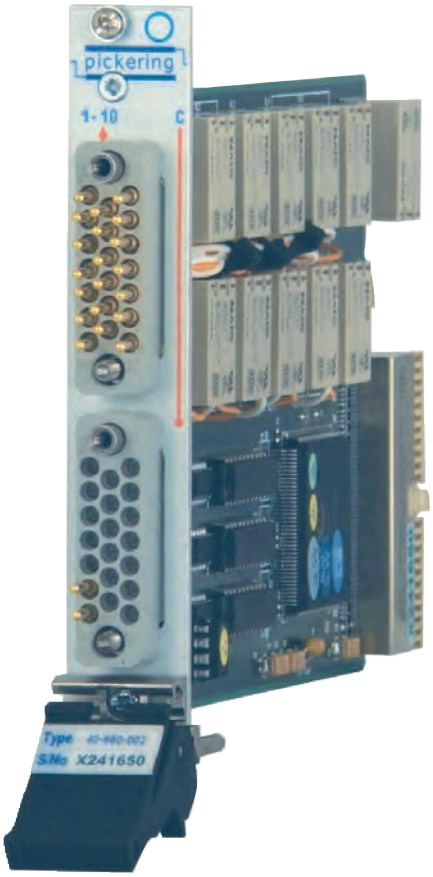
For connection accessories for the 40-659 module please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



PCB Layout for the 40-659-102
8-Bank, 8-Channel, 2-Pole MUX

40-660/665
Power Multiplexer Module

- 10-Channel Power Multiplexer, 1 or 2-Pole
- High Density 18-Channel Power Multiplexer, 1-Pole
- 10A Current Rating (1-Pole Versions)
  8A Current Rating (2-Pole Version)
- Hot Switch to 125VDC/250VAC, Cold Switch to 400VDC/250VAC
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



Pickering Interfaces have a range of power switching PXI modules, available in relay, matrix or multiplexer configurations.

Model 40-660 is a 10-Channel Power Multiplexer, suitable for switching inductive/capacitive loads up to 10A at 250VAC. It is available in 1-pole (10A) or 2-pole (8A) versions.

Model 40-665 is a higher density 18-Channel Power Multiplexer with the same specification as the 1-pole 40-660.

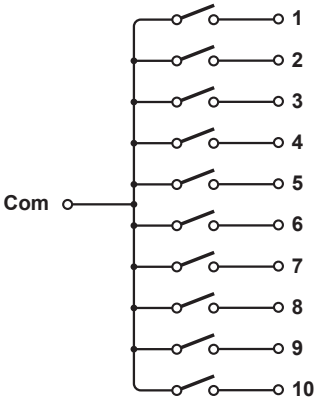
Power Multiplexer Modules are intended for switching heavy AC or DC loads or for slaving up to large external relays, contactors and solenoids.

The 40-660/665 Power Multiplexer Module is suitable for applications requiring switching of either AC mains or DC voltage.

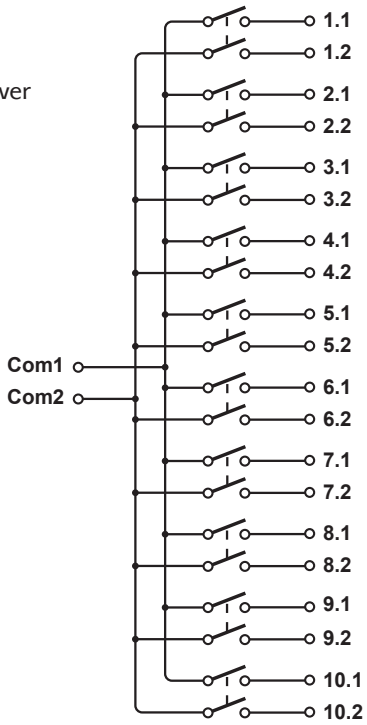
Mating power connectors are supplied with all versions.

Power Relay Type

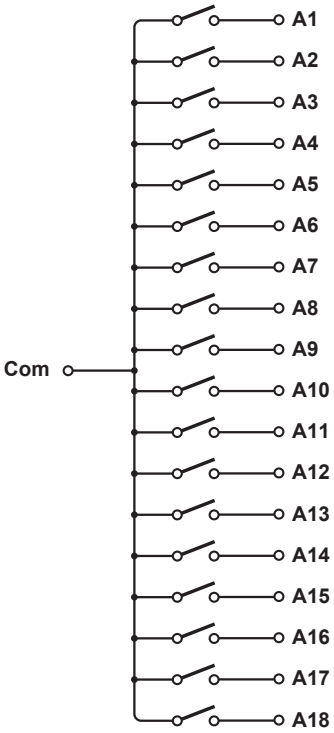
The 40-660/665 is fitted with electro-mechanical power relays, gold-flash over silver alloy. A **Spare Relay is** built onto the circuit board to facilitate easy maintenance with minimum downtime.



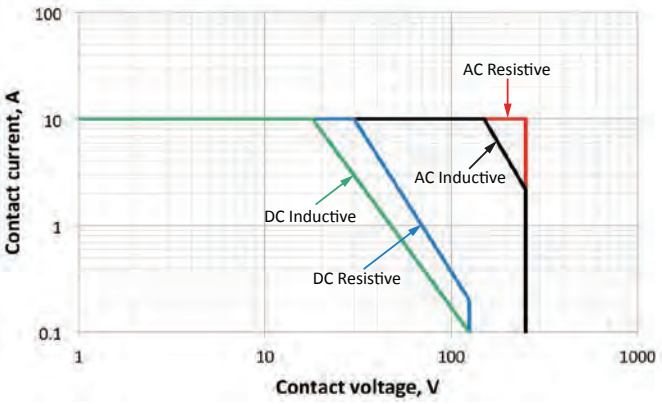
10-Channel 1-Pole Power Multiplexer 40-660-001



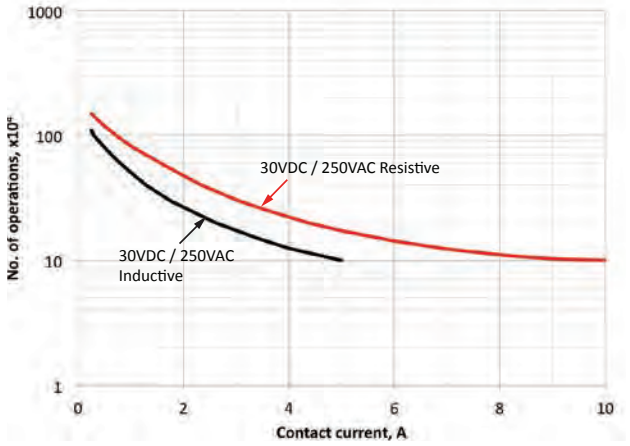
10-Channel 2-Pole Power Multiplexer 40-660-002



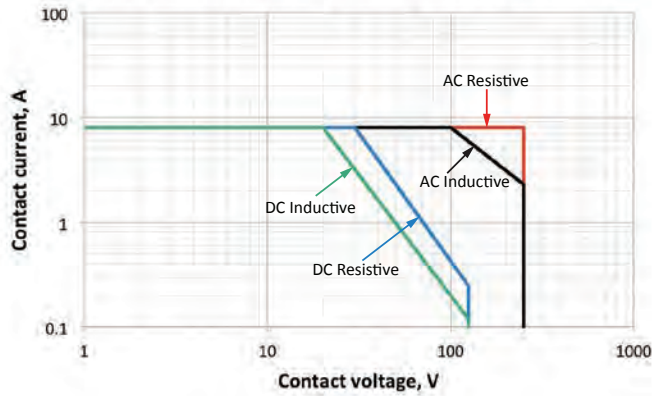
18-Channel High Density Power Multiplexer 40-665-001



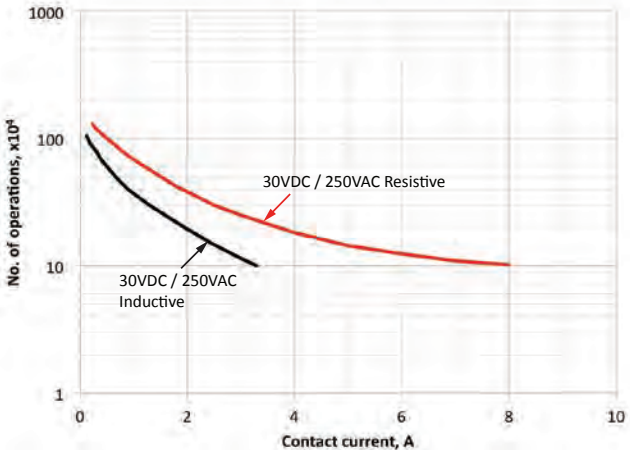
40-660/665 Current/Voltage Curve - 1-Pole



40-660/665 Current/Operating Life Curve - 1-Pole



40-660-002 Current/Voltage Curve - 2-Pole



40-660-002 Current/Operating Life Curve - 2-Pole

Switching Specification

Contact Type:	Gold flash over silver alloy
Cold Switching Capacity	
Maximum Current:	10A (1-pole) 8A (2-pole)
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity	
Maximum Current:	10A (1-pole) 8A (2-pole)
Maximum Voltage:	125VDC/250VAC
Maximum Power:*	300W/2500VA (1-pole) 240W/2000VA (2-pole)
Min. Switching Capacity:	10mA, 5VDC
Initial Path Resistance, On:	<50mΩ
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load	
Mechanical Life:	$>5x10^7$
At Max. Switch Capacity:	$>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

+3.3V	+5V	+12V	-12V
0	360mA (typ 280mA)	0	0

Width and Dimensions

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via a front panel 20-way GMCT type male connector (40-660-001/665-001) or 2 x 20-way GMCT type male connectors (40-660-002).

Product Order Codes

10-Channel Power MUX, 1-Pole	**40-660-001**
10-Channel Power MUX, 2-Pole	**40-660-002**
18-Channel Power MUX, 1-Pole	**40-665-001**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kits for the 40-660 range are as follows:

91-100-071 kit for 40-660-001
91-100-052 kit for 40-660-002
91-100-071 kit for 40-665-001

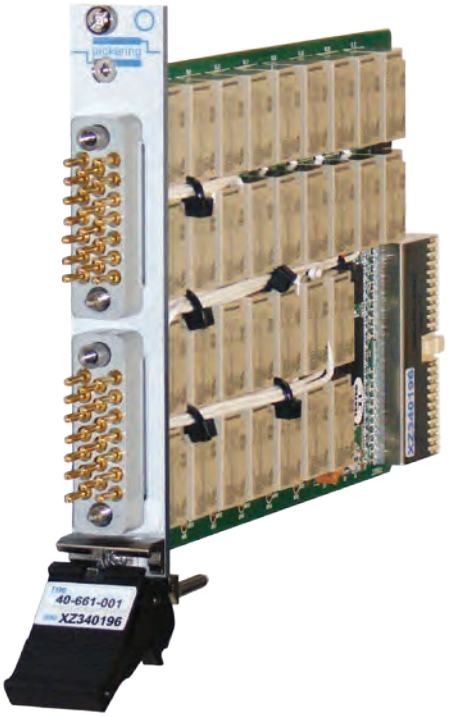
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-660/665 modules please refer to the **90-014D** 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-661
High Density 10A Power Multiplexer

- High Density, High Current Switching
- 1-Pole Power Multiplexer Available as 8-Bank 4-Channel, 5-Bank 6-Channel, 4-Bank 8-Channel, 2-Bank 16-Channel or 1-Bank 32-Channel
- 3 Half Density Options
- 10A Current Rating With 300W/2500VA Maximum Power
- Hot Switch to 125VDC/250VAC, Cold Switch to 400VDC/250VAC
- High Quality Electro-mechanical Relays
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



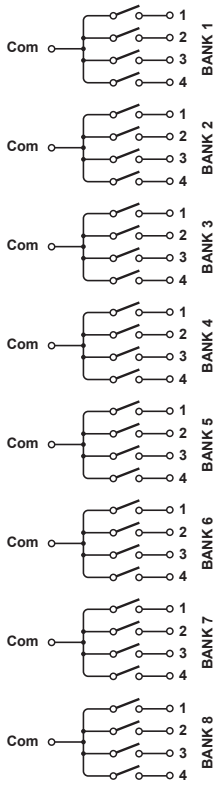
The 40-661 is a single pole power multiplexer module, suitable for switching inductive/capacitive loads up to 10A with 125VDC/250VAC hot switching and 400VDC/250VAC cold switching. The multiplexer is available in 8-bank 4-channel, 5-bank 6-channel, 4-bank 8-channel, 2-bank 16-channel and 1-bank 32-channel formats. Also, 4-bank 4-channel, 2-bank 8-channel and 1-bank 16-channel half density configurations are available.

Signal connections are made via front panel mounted 20-way GMCT plugs.

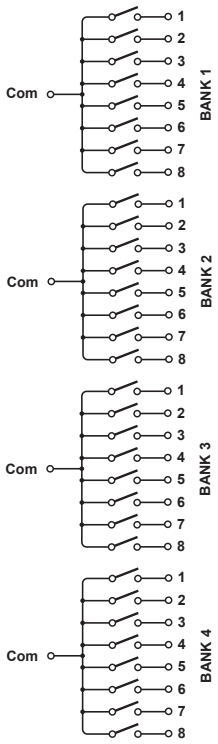
Power multiplexer modules are intended for switching heavy AC or DC loads or for slaving large external relays, contactors and solenoids. The module is suitable for applications requiring switching of either mains voltage or direct current.

Power Relay Type

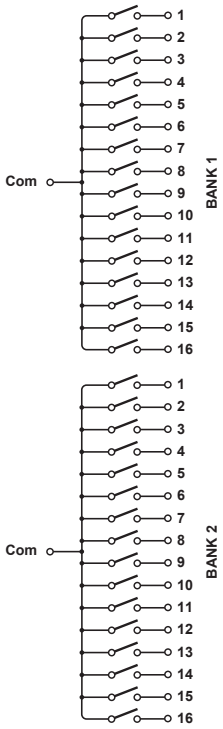
The 40-661 is fitted with high quality electro-mechanical power relays, gold-flash over silver alloy.



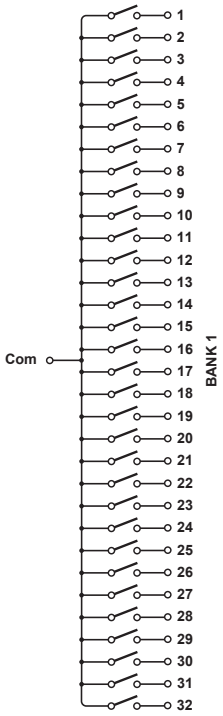
40-661-001
8-Bank 4-Channel,
1-Pole MUX



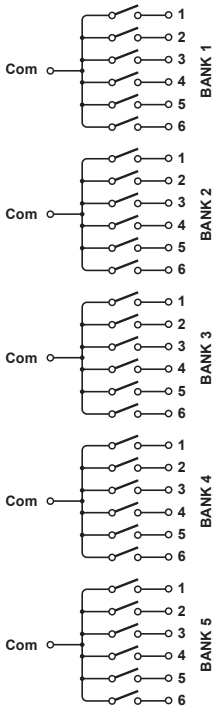
40-661-002
4-Bank 8-Channel,
1-Pole MUX



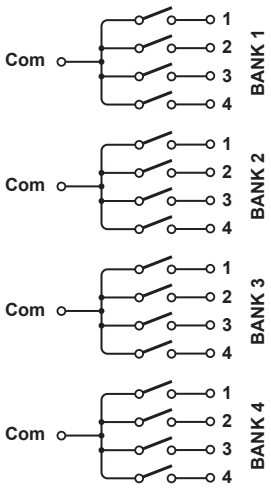
40-661-003
2-Bank 16-Channel,
1-Pole MUX



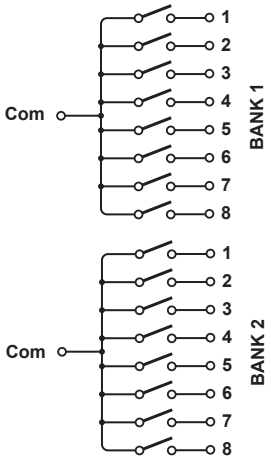
40-661-004
1-Bank 32-Channel,
1-Pole MUX



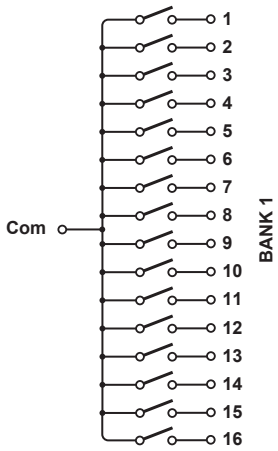
40-661-005
5-Bank 6-Channel,
1-Pole MUX



40-661-101 Half Density
4-Bank 4-Channel, 1-Pole MUX



40-661-102 Half Density
2-Bank 8-Channel, 1-Pole MUX



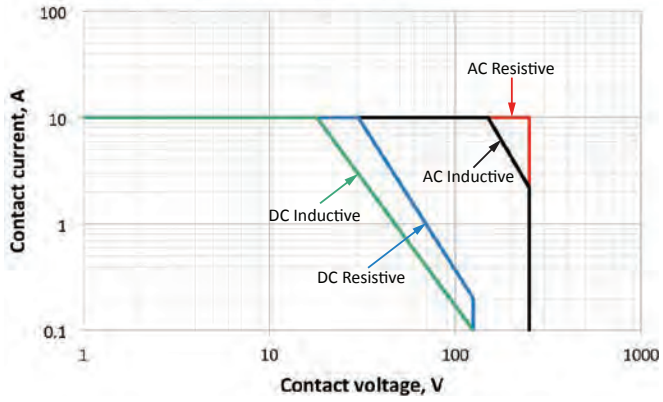
40-661-103 Half Density
1-Bank 16-Channel, 1-Pole MUX

Switching Specification

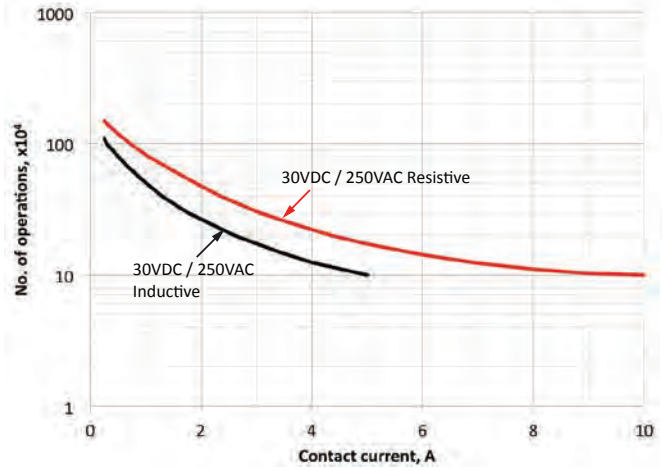
Contact Type:	Gold flash over silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 10A 400VDC/250VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Min. Switching Capacity:	 10A 125VDC/250VAC 300W/2500VA 10mA, 5VDC
Typical Pulse Capability: Max Continuous Total Switch Path Loading:	Cold Switch 20A for 100ms under low duty cycle conditions (please contact sales office for further advice) All multiplexer banks capable of carrying 10A at the same time.
Initial Path Resistance, On: Path Resistance, Off:	<50mΩ at 10A $>10^9\Omega$
Bandwidth:	10MHz
Operate Time:	10ms typical
Expected Life (operations) - resistive load † Mechanical Life: At Max. Switch Capacity:	 $>5x10^7$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

† Note: As switch life deteriorates rapidly when hot switching signals above 30VDC, it is advisable to only cold switch above this level.



40-661 Maximum Hot Switch Voltage Versus Current



40-661 Current/Operating Life Curve
Under Hot Switch Conditions

Power Requirements

+3.3V	+5V	+12V	-12V
0.17A	0	0.15A	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector.

Signal connections: Two (standard configurations) or one (half density configurations) 20-way male GMCT connectors.

Mating Connectors & Cabling

For connection accessories for the 40-661 module please refer to the **90-014D** 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Product Order Codes - Standard Configurations

10A Power MUX, 8-Bank, 4-Channel, 1-Pole	**40-661-001**
10A Power MUX, 4-Bank, 8-Channel, 1-Pole	**40-661-002**
10A Power MUX, 2-Bank, 16-Channel, 1-Pole	**40-661-003**
10A Power MUX, 1-Bank, 32-Channel, 1-Pole	**40-661-004**
10A Power MUX, 5-Bank, 6-Channel, 1-Pole	**40-661-005**

Product Order Codes - Half Density Configurations

10A Power MUX, 4-Bank, 4-Channel, 1-Pole	**40-661-101**
10A Power MUX, 2-Bank, 8-Channel, 1-Pole	**40-661-102**
10A Power MUX, 1-Bank, 16-Channel, 1-Pole	**40-661-103**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kit for the 40-661 range is as follows:

Kit 71 (part no. 91-100-071) for 40-661-001/002/003/004 and 40-661-101/102/103

For further assistance, please contact your local Pickering sales office.

20 Way GMCT Power Connector, type 40-960-020

40-662
16A Power Multiplexer Module

- High Density, High Current Switching
- Quad 4 Channel 1 Pole, Dual 8 Channel 1 Pole, or Single 16 Channel 1 Pole
- Partially Populated Versions Also Available
- 16A Maximum Switch Current
- Switch up to 300VDC or 250VAC
- 448W/4000VA Maximum Power
- 400VDC Standoff Voltage
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

20-Way 16 Amp Power Connector

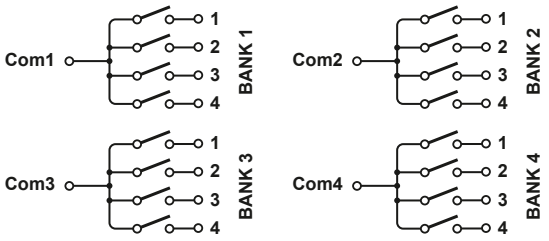
The 40-662 module range has a choice of 1-pole power multiplexers with the following configurations: Quad 4-Channel, Dual 8-Channel and Single 16-Channel. Also, the following partially populated configurations are available: Quad 2-Channel, Dual 4-Channel, Single 8-Channel and Single 12-Channel. All versions are suitable for switching loads up to 16A at 250VAC.

Power Multiplexer Modules are intended for switching heavy AC or DC loads or for the slave switching of large external relays, contactors and solenoids.

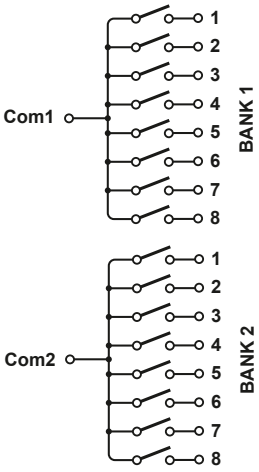
Power Relay Type

The 40-662 is fitted with electro-mechanical power relays with silver alloy contacts.

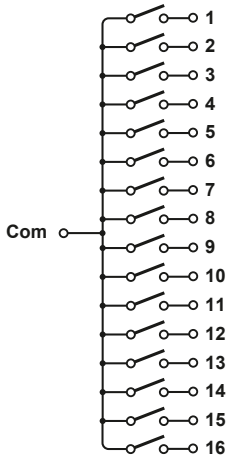
Fully Populated Multiplexer Modules



40-662-001 MUX Quad 4-Channel 1-Pole

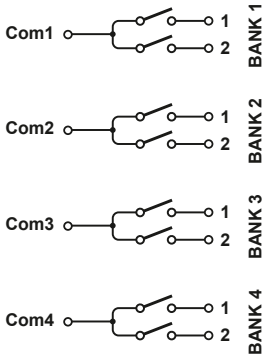


40-662-002 MUX
Dual 8-Channel 1-Pole

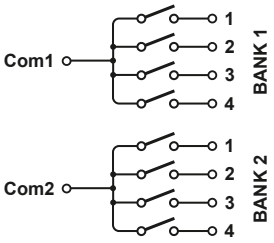


40-662-003 MUX
Single 16-Channel 1-Pole

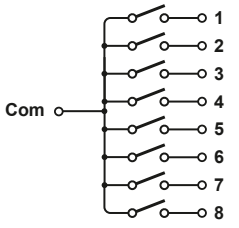
Partially Populated Multiplexer Modules



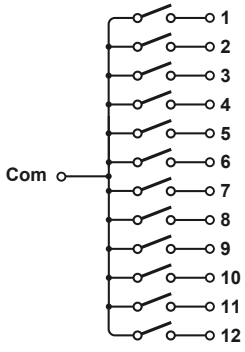
40-662-011 MUX
Quad 2-Channel 1-Pole



40-662-012 MUX
Dual 4-Channel 1-Pole



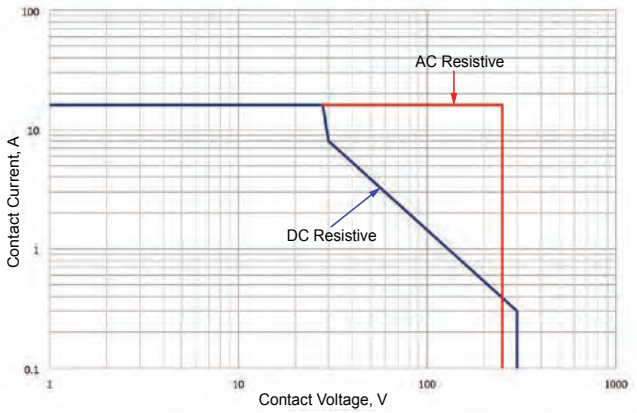
40-662-013 MUX
Single 8-Channel 1-Pole



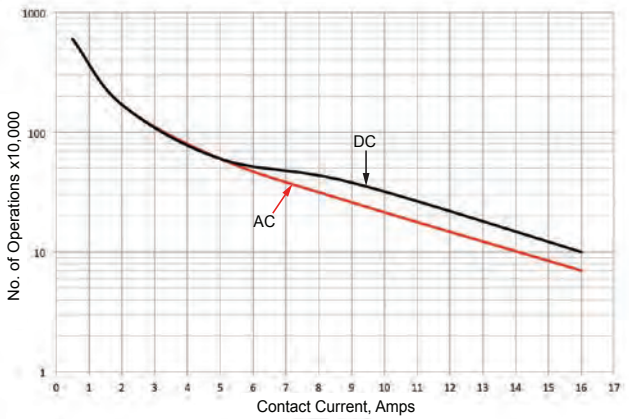
40-662-014 MUX
Single 12-Channel 1-Pole

Switching Specification

Relay Type:	Electro-mechanical Power Relay
Contact Type:	Silver Alloy (AgNi)
Cold Switching Capacity	
Maximum Current:	16A
Maximum Voltage:	400VDC/250VAC
Hot Switching Capacity (Resistive Load)	
Maximum Current:	16A
Maximum Voltage:	300VDC/250VAC
Maximum Power:	448W/4000VA
Minimum Switching Capacity:	100mA, 12V
Maximum Continuous Total Switch Path Loading:	Can carry 16A on all MUXs at the same time
Module Thermal Time Constant:	4 minutes typical
Maximum Standoff Voltage:	400VDC
Initial Path Resistance, On:	<20mΩ (12mΩ typical)
Path Resistance, Off:	$>10^9\Omega$
Bandwidth:	>10MHz
Typical Operate Time:	10ms
Expected Life (operations)	
Mechanical Endurance:	$>3x10^7$
Maximum Switch Capacity (Resistive Load)	
16A @ 250VAC (4000VA):	$1x10^5$
8A @ 30VDC (240W):	$>1x10^5$ (NC/NO Contacts, Frequency of Operation 0.1Hz, Duty Cycle 90%)
16A @ 28VDC (448W):	$>1x10^5$ (NC/NO Contacts, Frequency of Operation 0.1Hz, Duty Cycle 90%)



40-662 Maximum Switching Capacity



40-662 Operations Versus Hot Switch Current at Rated Power

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.3A max	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 400g Typical
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Front Panel Connector: 20-way male GMCT.

Product Order Codes

Fully Populated:

Quad 4-Channel, 1-Pole 16A MUX Module	**40-662-001**
Dual 8-Channel, 1-Pole 16A MUX Module	**40-662-002**
Single 16-Channel, 1-Pole 16A MUX Module	**40-662-003**

Partially Populated:

Quad 2-Channel, 1-Pole 16A MUX Module	**40-662-011**
Dual 4-Channel, 1-Pole 16A MUX Module	**40-662-012**
Single 8-Channel, 1-Pole 16A MUX Module	**40-662-013**
Single 12-Channel, 1-Pole 16A MUX Module	**40-662-014**

Mating Connectors & Cabling

For connection accessories for the 40-662 please refer to the **90-014D** 20-way GMCT Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

Support Products

Spare Relay Kits

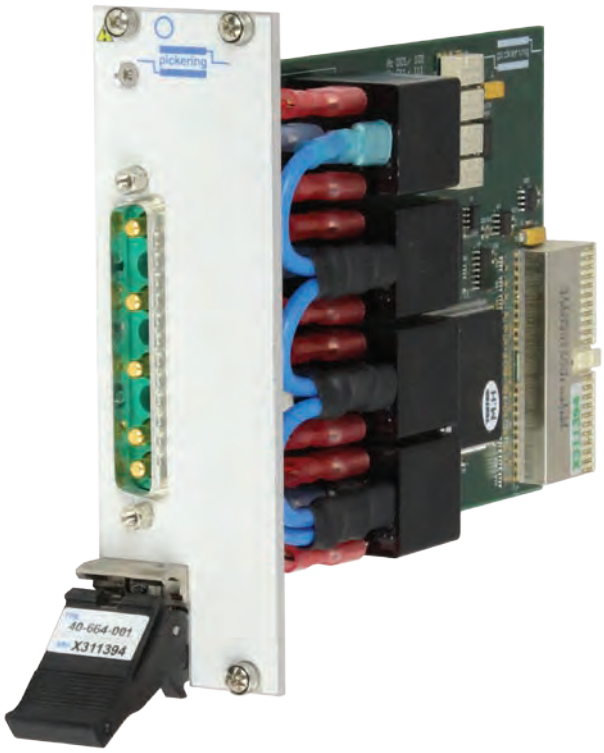
Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kits for the 40-662 range are as follows:

91-100-092 Spare Relay Kit for 40-662 family

For further assistance, please contact your local Pickering sales office.

40-664
Very High Power Automotive D.C. Multiplexer Module

- Very High Power EMR Multiplexer Module
- Available in 20 Amp and 40 Amp Versions
- Capable of Switching up to 14 Volts DC For Automotive Test Applications
- 28 Volt DC Version Suitable for Truck Applications
- 2 Slot PXI Module
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-664 is a high power switching module configured as a four channel multiplexer. It is capable of switching inductive/capacitive loads up to 40A at 14VDC or 20A at 28VDC The product range is as follows:

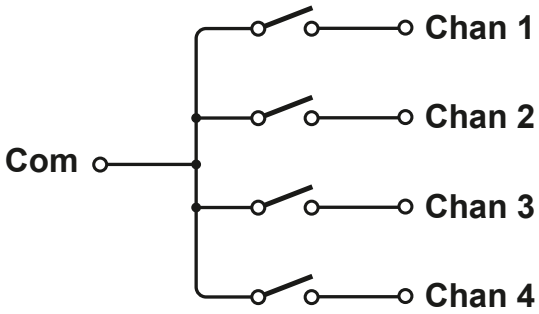
40-664-001	4 Channel MUX, 40A 14VDC
40-664-002	4 Channel MUX, 20A 28VDC

The multiplexer is suitable for switching heavy loads or for slaving large external relays, contactors and solenoids. In particular these relay modules are designed for automotive test applications requiring the switching of DC voltage at high current. The 28V version is suitable for truck system test applications.

The Module is fully compliant with PXI and cPCI specifications and occupies two 3U slot positions. Connection to the relays is made via a front panel high power D-type connector.

Power Relay Type

The 40-664 is fitted with electro-mechanical power relays, with silver alloy contact material.



40-664 Very High Power
4 Channel Multiplexer Module

Switching Specification 14 Volt Versions

Contact Type:	Silver Alloy
Cold Switching Capacity	
Maximum Current:	40A
Maximum Voltage:	14VDC
Hot Switching Capacity	
Maximum Current:	40A
Maximum Voltage:	14VDC
Maximum Power:*	560W
Minimum Switching Capacity:	1A, 12VDC
Max Standoff Voltage:	500VDC
Initial Path Resistance - On:	15mΩ
Path Resistance - Off:	>20MΩ
Bandwidth (50Ω)	10MHz
Typical Operate Time:	15ms
Expected Life (operations) - resistive load	
Mechanical Life:	$>1x10^6$
At Maximum Switch Capacity:	$>5x10^4$

Switching Specification 28 Volt Versions

Contact Type:	Silver Alloy
Cold Switching Capacity	
Maximum Current (N.O. Contacts):	20A
Maximum Voltage:	28VDC
Hot Switching Capacity	
Maximum Current (N.O. Contacts):	20A
Maximum Voltage:	28VDC
Maximum Power:*	560W
Minimum Switching Capacity:	1A, 24VDC
Max Standoff Voltage:	500VDC
Initial Path Resistance - On:	15mΩ
Path Resistance - Off:	>20MΩ
Bandwidth (50Ω)	10MHz
Typical Operate Time:	15ms
Expected Life (operations) - resistive load	
Mechanical Life:	$>1x10^6$
At Maximum Switch Capacity:	$>5x10^4$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

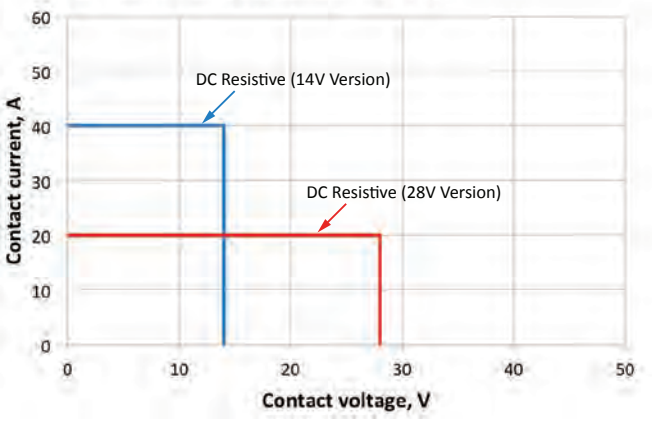
+3.3V	+5V	+12V	-12V
0	150mA typ.	500mA typ.	TBA

Mechanical Characteristics

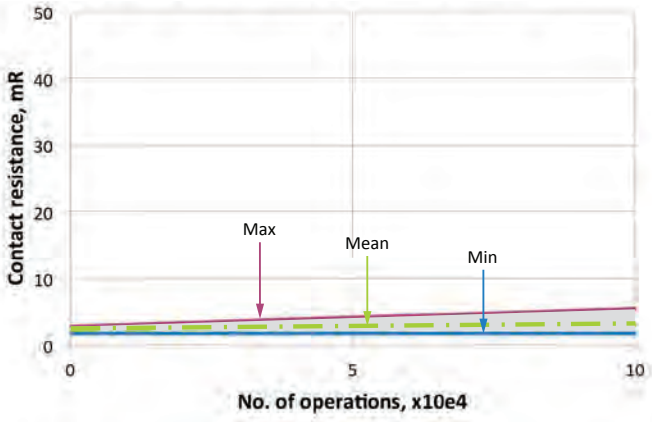
Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector.
Front panel connector: High Power 8-way male D-Type.



Maximum Switching Capability Switching a Resistive Load



Change in Contact Resistance for Number of Operations (at full current capacity switching an Inductive load)

Product Order Codes

4 Channel 40A, 14VDC Power MUX Module	**40-664-001**
4 Channel 20A, 28VDC Power MUX Module	**40-664-002**

Mating Connectors & Cabling

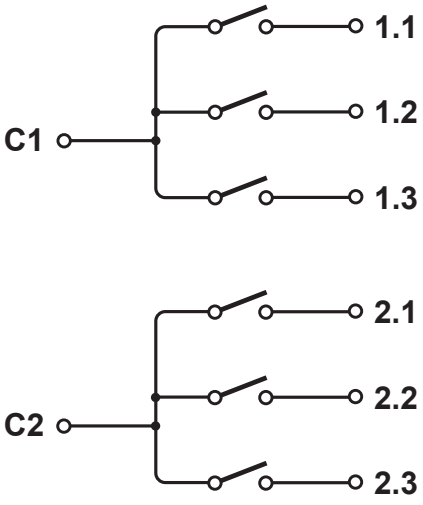
For connection accessories for the 40-664 modules please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connections Solutions catalog.

40-666
10A Solid State Multiplexer

- Available as a Dual 3-Channel or Single 6-Channel Multiplexer
- 10 Amp Rating at 200 Volts
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA. IVI and Kernel Drivers Supplied For Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-666 is a high current multiplexer available in dual 3-channel or single 6-channel configurations occupying two slots of PXI chassis. Each multiplexer switch uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each multiplexer channel can support 10A of continuous current and switch up to 200V signals. The switches can sustain inrush currents in excess of 50A. AC or DC signals can be switched since the switch is polarity insensitive.

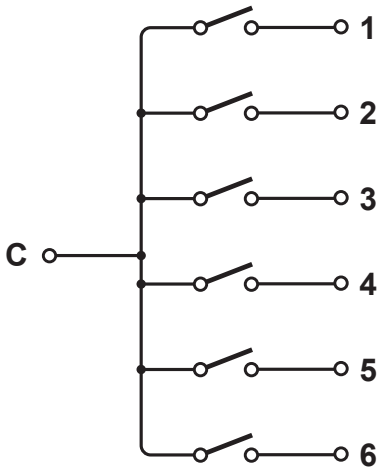


40-666-011 Dual 3-Channel Solid State Multiplexer Schematic Diagram.

The 40-666 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf



40-666-012 Single 6-Channel Solid State Multiplexer Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±200V (DC or AC peak)
Continuous Switch Current:	10A
Peak Current:	50A for 200µs
Max Common Current:	40A
Path Resistance - On:	60mΩ at 25˚C typical
Rise/Fall Time:	20µs typical
Operate Time:	70µs on, 120µs off
Recommended Maximum Cycle Rate (on, then off):	150 operations/sec
Expected Life (operations):	Indefinite when used within ratings

Relay Type

The 40-666 is fitted with solid state MOSFET switches

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	350mA	0	0

Mechanical Characteristics

Dual slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel mounted 8-way male power D-type connectors (2 for the dual 3-channel version, 1 for the single 6-channel version), for pin outs please refer to the operating manual.

Product Order Codes

Dual 3-Channel 10A Solid State MUX: 40-666-011
Single 6-Channel 10A Solid State MUX: 40-666-012

Note: The 40-666-011 supersedes the 40-666-001 and the 40-666-012 supersedes the 40-666-002. The new and old versions are functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. The 40-666-011 requires a single tool, the 40-666-012 requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	93-005-001	93-005-236	93-012-103

Mating Connectors & Cabling

For connection accessories for the 40-666 module please refer to the **90-012D** 8 way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-667
30A Solid State Multiplexer

- Available as a Dual 3-Channel or Single 6-Channel Multiplexer
- 30 Amp Rating at 40 Volts
- 40 Amp With Single Relay Closure
- Very High Hot Switch Capacity
- Very High Inrush Current Rating
- Fast Operating Speed
- Long Service Life
- VISA. IVI and Kernel Drivers Supplied For Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

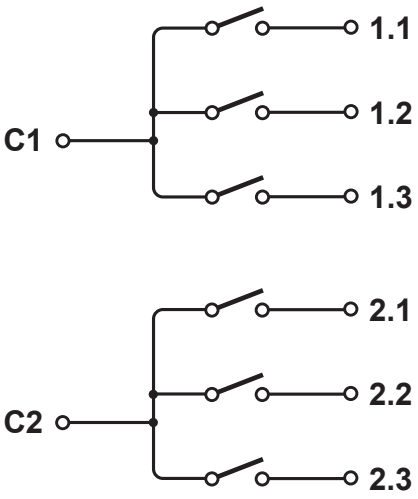
The 40-667 is a high current multiplexer available in dual 3-channel or single 6-channel configurations occupying two slots of PXI chassis. Each multiplexer switch uses a fully isolated solid state relay which has been designed to offer fast operation under hot switching conditions and high inrush current with no operational life degradation.

Each multiplexer channel can support 30A of continuous current and switch up to 40V signals. The MUX can support 40A continuous operation for a single relay closure. The switches can sustain inrush currents in excess of 120A. AC or DC signals can be switched since the switch is polarity insensitive.

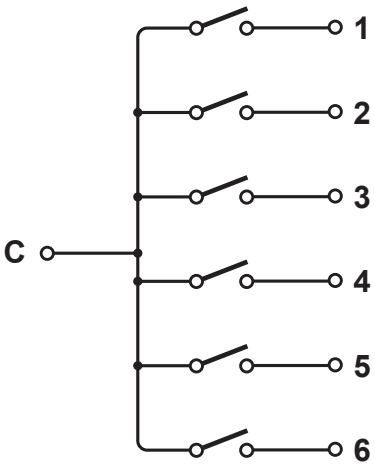
The 40-667 is particularly well suited to automotive and aerospace applications where the switching of high capacity loads is required. The module is supplied with a comprehensive package of drivers, including support for selected RT operating systems.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-667-011 Dual 3-Channel Solid State Multiplexer Schematic Diagram.



40-667-012 Single 6-Channel Solid State Multiplexer Schematic Diagram.

Switching Specification

Switch Type	Solid State MOSFET
Max Switch Voltage:	±40V (DC or AC peak)
Continuous Switch Current:	30A continuous, 40A continuous with single relay per module closed
Peak Current:	120A for 200µs
Max Common Current:	40A
Path Resistance - On:	6mΩ at 25˚C typical
Leakage Current (at ±40V):	<1µA at 25˚C and switch cold, <250µA at max temperature immediately after switch has carried maximum current for >10 minutes.
Rise/Fall Time:	40µs/140µs (typical)
Operate Time:	250µs
Max Operating Speed at nominal load:	60 operations/sec
Expected Life (operations):	Indefinite when used within ratings

Relay Type

The 40-667 is fitted with solid state MOSFET switches

Power Requirements

+3.3V	+5V	+12V	-12V
100mA	350mA	0	0

Mechanical Characteristics

Dual slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel mounted 8-way male power D-type connectors (2 for the dual 3-channel version, 1 for the single 6-channel version), for pin outs please refer to the operating manual.

Product Order Codes

Dual 3-Channel 30A Solid State MUX: **40-667-011**
Single 6-Channel 30A Solid State MUX: **40-667-012**

Note: The 40-667-011 supersedes the 40-667-001 and the 40-667-012 supersedes the 40-667-002. The new and old versions are functionally the same.

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. The 40-667-011 requires a single tool, the 40-667-012 requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter	Termination
All Types	**93-005-001**	**93-005-236**	**93-012-103**

Mating Connectors & Cabling

For connection accessories for the 40-667 module please refer to the **90-012D** 8-way power D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Multiplexer: Solid State

- Versatile Multiplexer Range With Channel Counts From 8 to 1, Up To 160 to 1
- Versions Available With Between 1 and 20 Separate Banks
- 1 or 2-Pole Configurations
- Solid State Switching Gives Fast Operation and Long Service Life
- Ideal For Low current and Low Voltage Applications
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

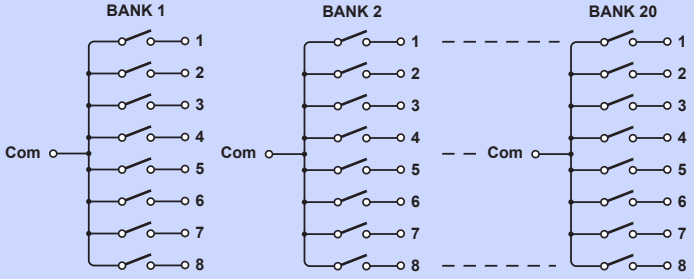
40-682 Solid State Versatile Multiplexer Module

This range of high density multiplexers is based on solid state switching devices. They suitable for applications that require fast operation and a long service life with frequent switch operation. They are ideal for routing low current, low voltage signals such as DMM measurements or data acquisition. Also, they have the advantages of no switch bounce and no wear out mechanism.

The range provide a compact array of multiplexer solutions with differing combinations of channel counts and poles. The 40-682 has a versatile software configurable architecture and is the solid state equivalent of the relay based 40-612.

The modules use high density connectors that are fully supported by the Pickering Interfaces range of connector and cable accessories.

40-680 Solid State Multiplexer Module



Schematic of 40-680 Multiplexer Module (20 bank 8 to 1 configuration)

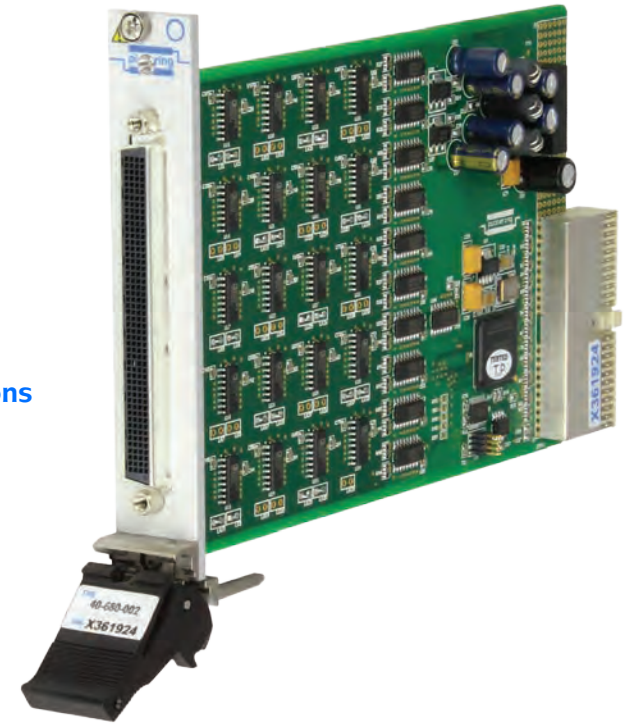
Solid State Multiplexer Modules

Between 8 & 160 Channels, Between 1 & 20 Banks, 1 & 2 Poles

	Solid State Switch		
±15V, 20mA Carry, 40mA Surge	20-Bank 8:1, 1-Pole	40-680-001	Page 25.2
	10-Bank 16:1, 1-Pole	40-680-002	
	5-Bank 32:1, 1-Pole	40-680-003	
	4-Bank 40:1, 1-Pole	40-680-004	
	2-Bank 80:1, 1-Pole	40-680-005	
	1-Bank 160:1, 1-Pole	40-680-006	
	1-Bank 40:1, 4-Pole	40-680-404	
±60V, 350mA Carry, 1.5A Surge	Solid State Switch		Page 25.4
	Software Configurable between Single 128:1, 1-Pole & 8-Bank 8:1, 2-Pole:	40-681	
±40V, 250mA Carry, 750mA Surge	Solid State Switch		Page 25.6
	Software Configurable between Single 128:1, 1-Pole & 8-Bank 8:1, 2-Pole:	40-682	
±100V, 125mA Continuous	Solid State Switch		Page 25.10
	Software Configurable between Single 128:1, 1-Pole & 8-Bank 8:1, 2-Pole:	40-683	

40-680
Solid State Multiplexer Module

- Choice of Multiplexer Configurations Available
- Up to 160-Way Multiplexer
- Up to 20-Banks of 8-Way Multiplexer
- Fast Operation
- Long Service Life
- Fault Protection to Greater Than 40V
- Ideal for Low Current and Low Voltage Applications
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



The 40-680 is ideal for applications requiring fast operation and a long service life with frequent switch operation. Based on FET switches the multiplexers have no wear out mechanism and include fault protection that ensures the multiplexer automatically disconnects when PXI power is not applied.

Available configurations for the 40-680 vary from a single 160 to 1 MUX to a 20-bank, 8 to 1 MUX in a single PXI module.

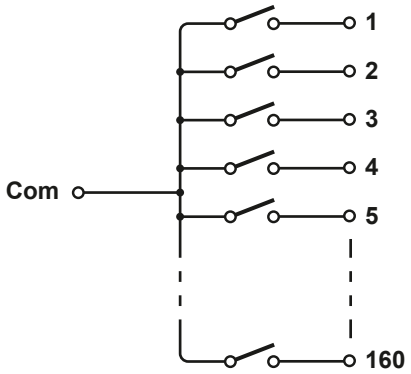
The multiplexer can support currents up to 20mA and has a typical on channel resistance of 150Ω. The module can switch voltages to greater than ±15V.

Applications for the 40-680 include supporting DMM measurements of resistance and voltage or data acquisition systems. The 40-680 is suitable for low current low voltage applications where cost, speed, zero contact bounce and the ability to withstand frequent operation is essential.

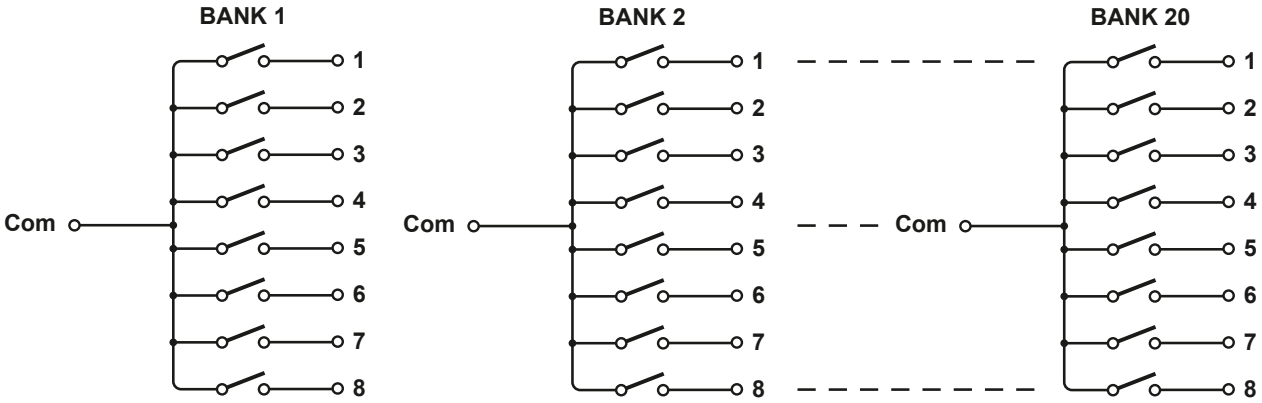
Pickering Interfaces is able to offer PXI solid state switching solutions in a variety of configurations. If you have a different requirement for solid state switching contact your local sales office for a quotation.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



40-680 Multiplexer Module
(1-bank, 1 to 160 configuration)



40-680 Multiplexer Module (20-bank, 1 to 8 configuration)

Specification

Recommended voltage switching range:	±15V
Maximum Continuous Current:	20mA
Maximum Peak Current:	40mA
Typical Leakage Current (off state):	1nA
Path Resistance:	150Ω typical, 350Ω maximum.
Fault Protection:	Turns MUX off if the applied voltage exceeds ±18V with module power on. Maximum voltage range -43V to +55V.
Switch Operation Speed:	200ns, no bounce, excluding driver.
Useable Bandwidth:	5MHz
Isolation:	40dB at 5MHz
Thermal EMF:	<2µV

Power Requirements

+3.3V	+5V	+12V	-12V
0	60mA	35mA	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request

Connectors

PXI bus via 32 bit P1/J1 backplane connector.

Signals via a front panel 200-pin female LFH connector.

Product Order Codes

20-bank, 8-channel Solid State MUX	**40-680-001**
10-bank, 16-channel Solid State MUX	**40-680-002**
5-bank, 32-channel Solid State MUX	**40-680-003**
4-bank, 40-channel Solid State MUX	**40-680-004**
2-bank, 80-channel Solid State MUX	**40-680-005**
1-bank, 160-channel Solid State MUX	**40-680-006**
4-pole, 40-channel Solid State MUX	**40-680-404**

Support Products

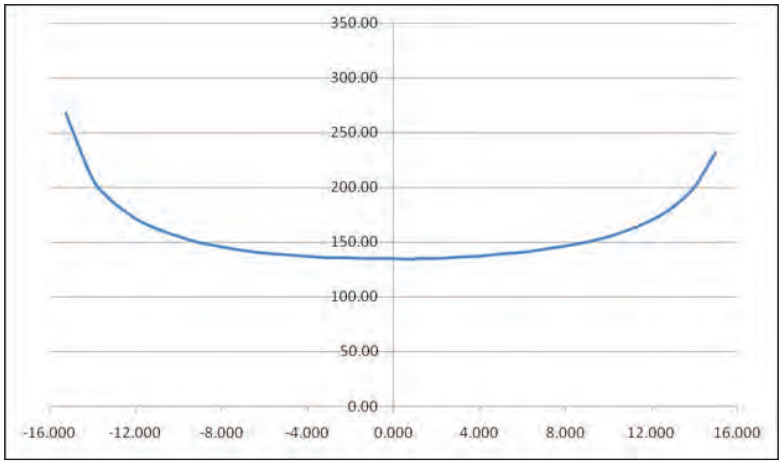
eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-002-001**	**Not Required**

Mating Connectors & Cabling

For connection accessories for the 40-680 range please refer to the **90-002D** 200-pin LFH Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Typical channel on resistance (ohms, vertical) versus applied voltage (horizontal) for 40-680

40-681
Solid State Versatile Multiplexer

- Versatile Solid State Multiplexer
- Configurable Architecture
- 350mA Hot or Cold Switching
- Surge Current of 1.5A for 100ms
- 60 Volt Switching
- Fast Switch Operation and Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty

The 40-681 Very High Density Versatile Multiplexer module features a wide range of selectable switching configurations. The 40-681 is especially useful where a high density MUX array is required that can adapt to different test configurations for different test targets, or where a test system may have to be reconfigured in the future. The 40-681 uses high performance solid state relays which ensures long service life even when hot switching into capacitive loads. The 40-681 can sustain 1.5A for 100ms on hot or cold switching.

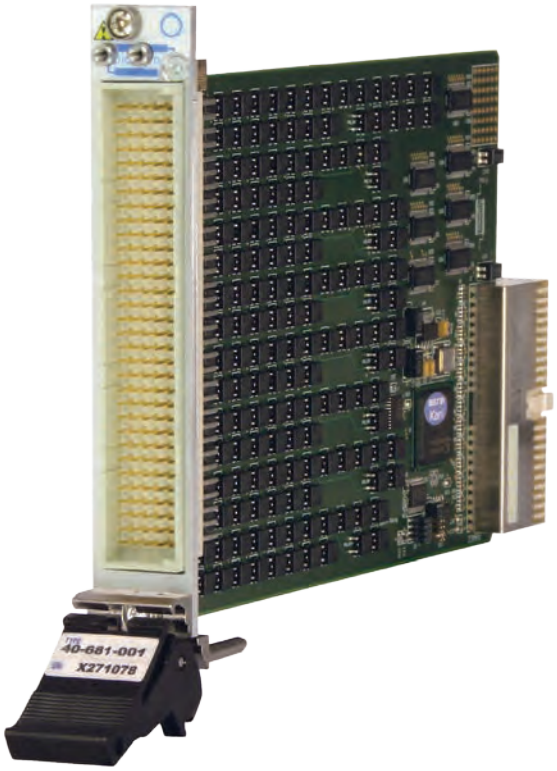
MUX Configurations

The module can be software configured into a large number of different multiplexer modes. Relays allow the multiplexer banks to be set in 1 or 2-pole mode and inter-bank switching enables the channel count to be increased up to a maximum of 128 (refer to schematic diagram overleaf).

Typical Configurations
8-Banks, 16-Channel, 1-Pole 8-Banks, 8-Channel, 2-Pole
4-Banks, 32-Channel, 1-Pole 4-Banks, 16-Channel, 2-Pole
2-Banks, 64-Channel, 1-Pole 2-Banks, 32-Channel, 2-Pole
1-Bank, 128-Channel, 1-Pole 1-Bank, 64-Channel, 2-Pole

The versatility of the 40-681's architecture allows all multiplexer banks to be inter-linked and common connections used as extra signal inputs.

The 40-681 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. For 2-pole configurations multiple channels can be simultaneously selected without restriction, for 1-pole configurations the channels that can be simultaneously selected are limited by the use of 2-pole switching.



Pickering's Range of Versatile Multiplexer Modules with the same switching architecture

Model No.	Max Voltage	Max Current	Operate Time	Relay Type
40-612	300VDC/ 250VAC	2A	3ms	Electro-mechanical
40-681	±60V	350mA	200µs	Solid State
40-682	±40V	250mA	80µs	Solid State
40-683	±100V	125mA	500µs	Solid State

Isolation Switching connects only the currently active multiplexer bank to the analog common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Pickering Interfaces is able to offer PXI solid state switching solutions in a variety of configurations. If you have a different requirement for solid state switching contact your local sales office for a quotation.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Switching Characteristics

Switch Type	Solid State Switch
Max Switch Voltage:	±60V (AC peak or DC)
Max Standoff Voltage:	60V (between any two points)
Max Switch Current:	350mA continuous 1.5A for 100ms
Path Resistance - On: Leakage Current (off state):	3Ω typical input to common Typically less than 10nA at 60V
Operate Time: Switch Rise/Fall Time:	200µs typical <20µs, no bounce
Multiplexer Bandwidth:	1MHz

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.06A (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request

Connectors

Signals via front panel 160-way DIN 41612 male connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Product Order Codes

Solid State Versatile MUX Module	**40-681-001**

Support Products

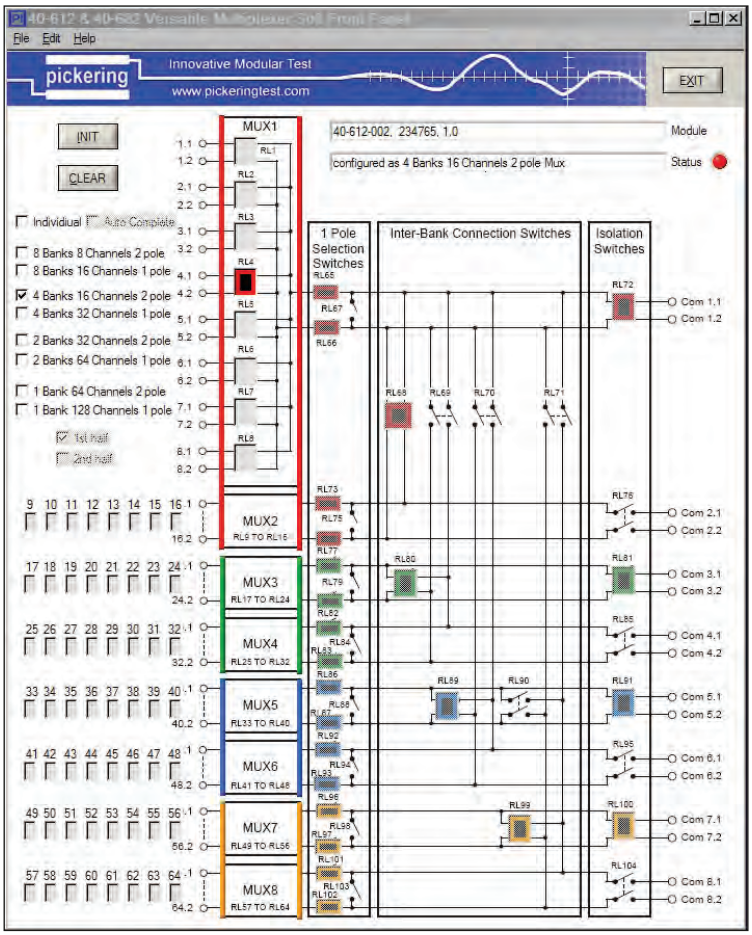
eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
All Types	**93-002-001**	**93-002-410**

Mating Connectors & Cabling

For connection accessories for the 40-681 module please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



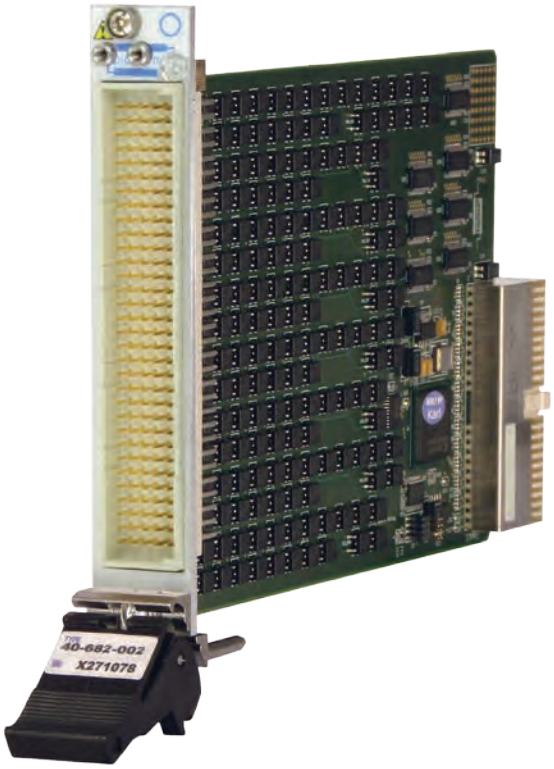
Soft Front Panel for the 40-612, 40-681, 40-682 and 40-683 Very High Density Versatile Multiplexers

Soft Front Panel For The Versatile MUX

The Versatile Multiplexer Soft Front Panel for the 40-612-002, 40-681-001, 40-682-002 and 40-683-001 allows easy setting of various configurations from 8-bank 8-channels 2-pole multiplexers, up to 1-bank 128-channels 1-pole multiplexers as well as individual relay control for custom configurations. The schematic in the background of the SFP simplifies understanding of the selected topology. During configuration setting, all relay control information is logged in a text file which can be re-used in a programming environment.

40-682
Solid State Versatile Multiplexer

- Versatile Solid State Multiplexer
- Configurable Architecture
- Functionally Equivalent to 40-612
- 250mA Hot or Cold Switching
- 40 Volt Switching
- Fast Switch Operation and Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



The 40-682 Very High Density Versatile Multiplexer module features a wide range of selectable switching configurations. The 40-682 is especially useful where a high density MUX array is required that can adapt to different test configurations for different test targets, or where a test system may have to be reconfigured in the future. The 40-682 uses high performance solid state switching to ensure a service life of greater than 10 years and fast operation.

MUX Configurations

The module can be software configured into a large number of different multiplexer modes. Relays allow the multiplexer banks to be set in 1 or 2-pole mode and inter-bank switching enables the channel count to be increased up to a maximum of 128 (refer to schematic diagram overleaf).

Typical Configurations
8-Banks, 16-Channel, 1-Pole 8-Banks, 8-Channel, 2-Pole
4-Banks, 32-Channel, 1-Pole 4-Banks, 16-Channel, 2-Pole
2-Banks, 64-Channel, 1-Pole 2-Banks, 32-Channel, 2-Pole
1-Bank, 128-Channel, 1-Pole 1-Bank, 64-Channel, 2-Pole

The versatility of the 40-682's architecture allows all multiplexer banks to be inter-linked and common connections used as extra signal inputs.

The 40-682 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. For 2-pole configurations multiple channels can be simultaneously selected without restriction, for 1-pole configurations the channels that can be simultaneously selected are limited by the use of 2-pole switching.

Pickering's Range of Versatile Multiplexer Modules with the same switching architecture

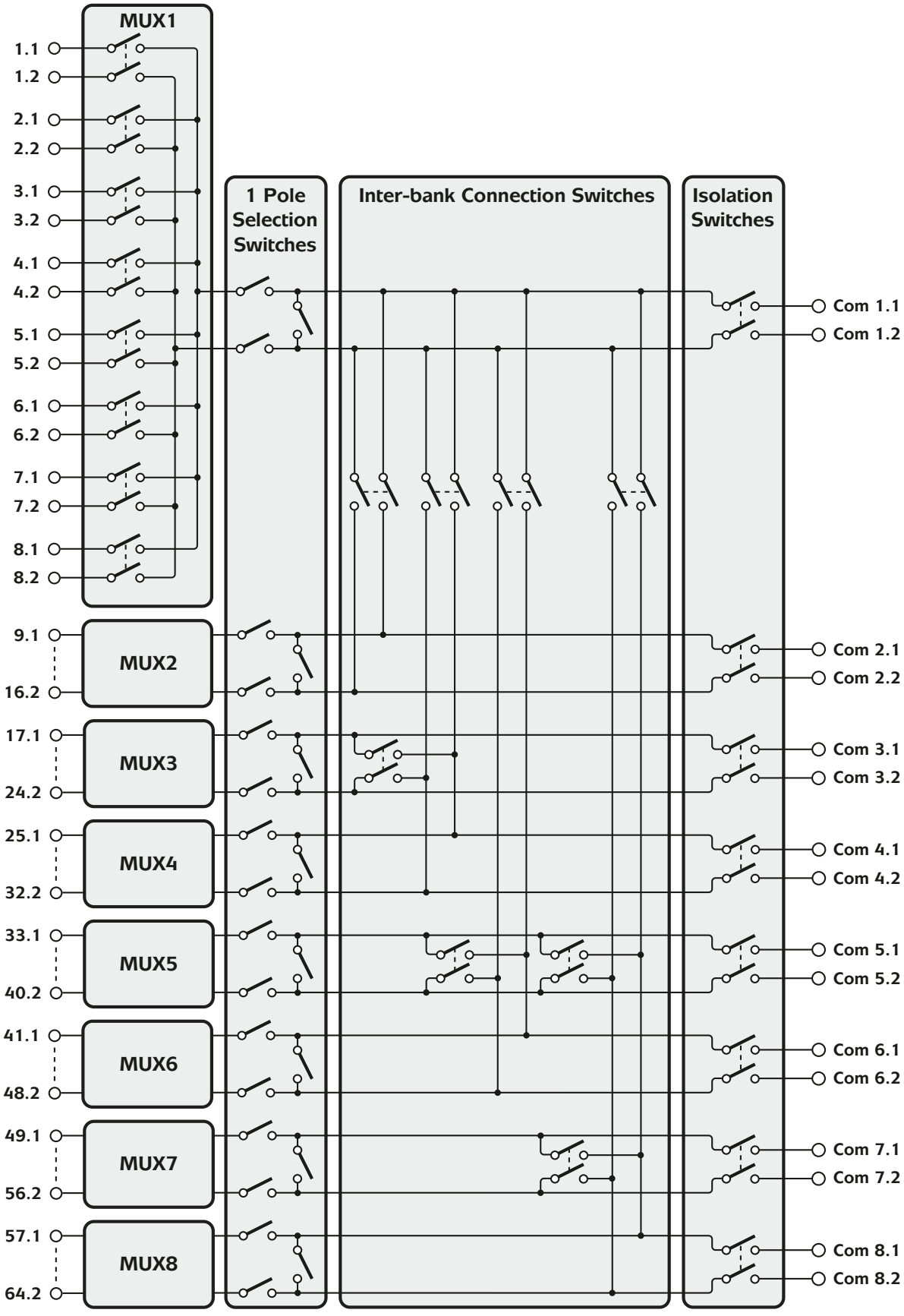
Model No.	Max Voltage	Max Current	Operate Time	Relay Type
40-612	300VDC/ 250VAC	2A	3ms	Electro-mechanical
40-681	±60V	350mA	200µs	Solid State
40-682	±40V	250mA	80µs	Solid State
40-683	±100V	125mA	500µs	Solid State

Isolation Switching connects only the currently active multiplexer bank to the analog common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

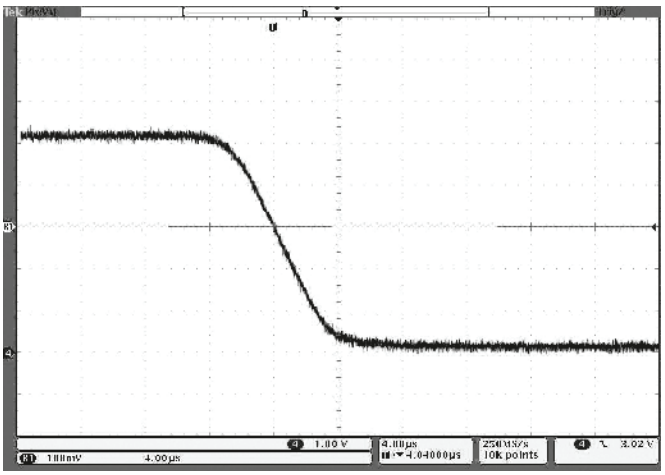
Pickering Interfaces is able to offer PXI solid state switching solutions in a variety of configurations. If you have a different requirement for solid state switching contact your local sales office for a quotation.

Supported by eBIRST

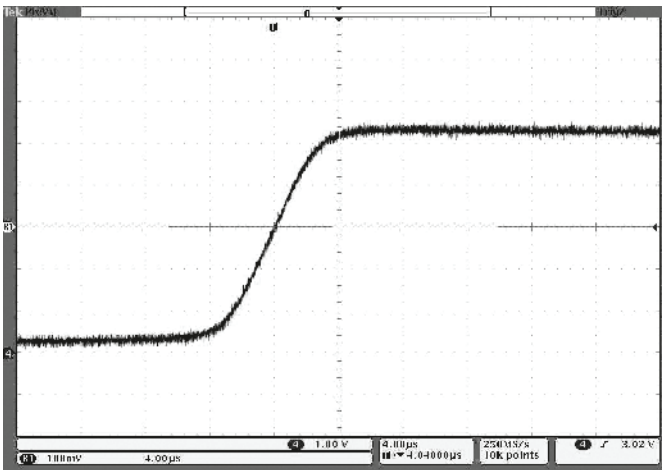
This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Functional Diagram of 40-682 Solid State Versatile Multiplexer

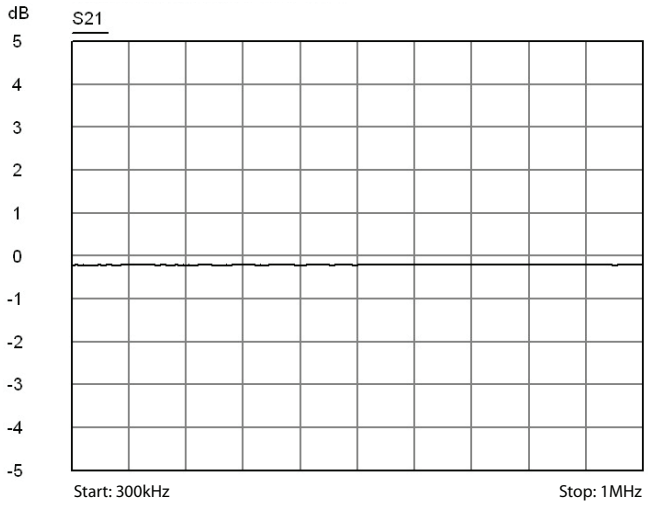


Turn On Characteristics of 40-682
(4µs/division horizontal, 40µs span)

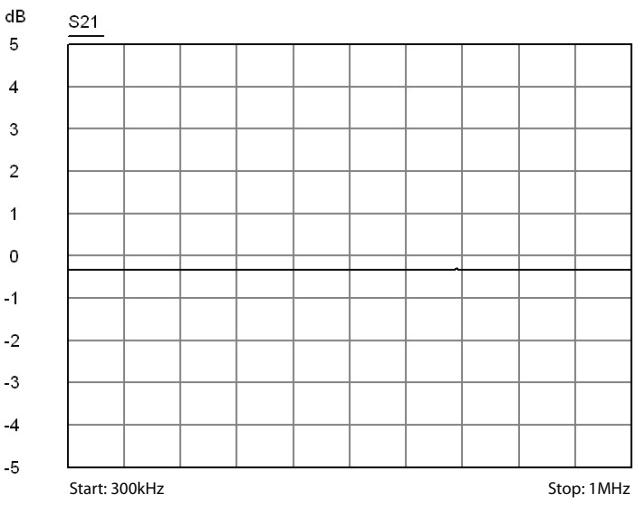


Turn Off Characteristics of 40-682
(4µs/division horizontal, 40µs span)

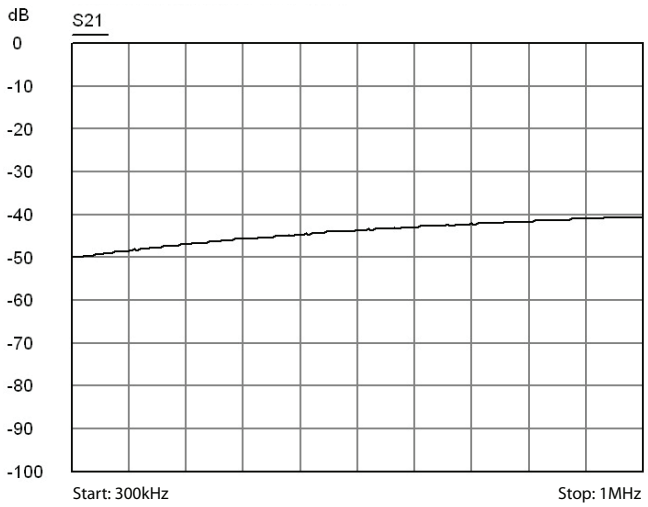
Note: Switching measurements were taken by switching a 5.2V signal to ground via a 51Ω load resistor, the response shown is measured across the switching element.



Insertion Loss Plot for 40-682 with 3 switches in path (between C1.1 and 1.1)



Insertion Loss Plot for 40-682 with 5 switches in path (between 1.1 and 1.2)



Isolation Plot for 40-682 with 3 switches in path (between C1.1 and 1.1 with one switch open)

Isolation Plot for 40-682 with 5 switches in path (between 1.1 and 1.2 with one switch open)

Note: Isolation response can be improved further by turning off more than one switch in the signal path.

Switching Characteristics

Switch Type	Solid State Switch
Max Switch Voltage:	±40V
Max Switch Current:	250mA continuous 750mA for 100ms
Path Resistance - On: Switch Leakage Capacitance: Leakage Current (off state):	3.2Ω typical, input to common 13pF typical, input to output voltage at 0V <10nA at 40V
Switching Time: Switch Rise/Fall Time:	80µs typical <20µs, no bounce
Multiplexer Bandwidth:	1MHz

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.06A (typ 280mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request

Connectors

Signals via front panel 160-way DIN 41612 male connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Product Order Codes

Solid State Versatile MUX Module	**40-682-002**

Support Products

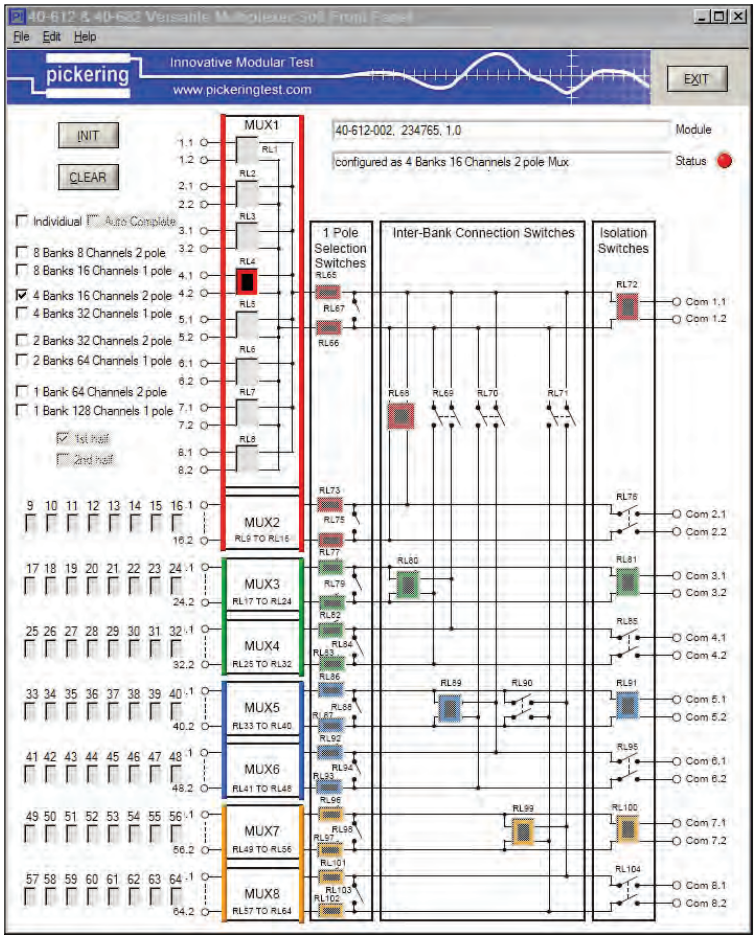
eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
All Types	**93-002-001**	**93-002-410**

Mating Connectors & Cabling

For connection accessories for the 40-682 modules please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



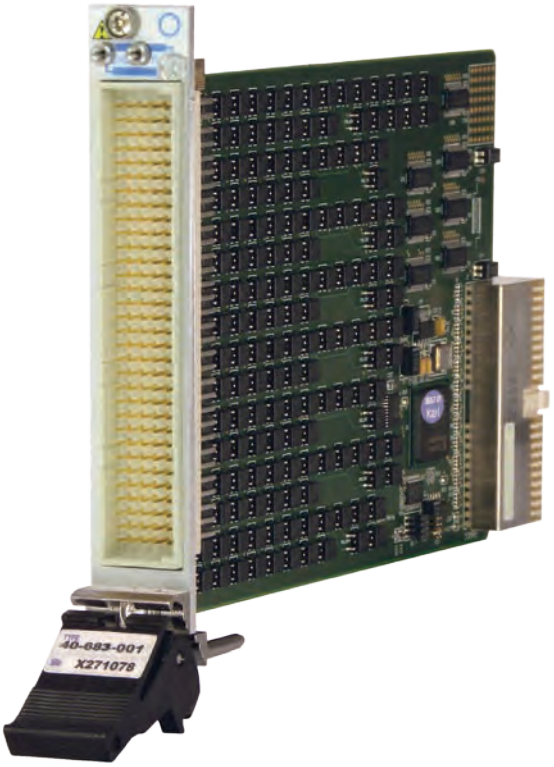
Soft Front Panel for the 40-612, 40-681, 40-682 and 40-683 Very High Density Versatile Multiplexers

Soft Front Panel For The Versatile MUX

The Versatile Multiplexer Soft Front Panel for the 40-612-002, 40-681-001, 40-682-002 and 40-683-001 allows easy setting of various configurations from 8-bank 8-channels 2-pole multiplexers, up to 1-bank 128-channels 1-pole multiplexers as well as individual relay control for custom configurations. The schematic in the background of the SFP simplifies understanding of the selected topology. During configuration setting, all relay control information is logged in a text file which can be re-used in a programming environment.

40-683
Solid State Versatile Multiplexer

- Versatile Solid State Multiplexer
- Configurable Architecture
- 125mA Hot or Cold Switching
- 100 Volt Switching
- Fast Switch Operation and Long Service Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



The 40-683 Very High Density Versatile Multiplexer module features a wide range of selectable switching configurations. The 40-683 is especially useful where a high density MUX array is required that can adapt to different test configurations for different test targets, or where a test system may have to be reconfigured in the future. The 40-683 uses high performance solid state switching to ensure a service life of greater than 10 years and fast operation.

MUX Configurations

The module can be software configured into a large number of different multiplexer modes. Relays allow the multiplexer banks to be set in 1 or 2-pole mode and inter-bank switching enables the channel count to be increased up to a maximum of 128 (refer to schematic diagram overleaf).

Typical Configurations
8-Banks, 16-Channel, 1-Pole 8-Banks, 8-Channel, 2-Pole
4-Banks, 32-Channel, 1-Pole 4-Banks, 16-Channel, 2-Pole
2-Banks, 64-Channel, 1-Pole 2-Banks, 32-Channel, 2-Pole
1-Bank, 128-Channel, 1-Pole 1-Bank, 64-Channel, 2-Pole

The versatility of the 40-683's architecture allows all multiplexer banks to be inter-linked and common connections used as extra signal inputs.

The 40-683 multiplexer may be operated as a conventional multiplexer with break-before-make action when a new channel is selected. For 2-pole configurations multiple channels can be simultaneously selected without restriction, for 1-pole configurations the channels that can be simultaneously selected are limited by the use of 2-pole switching.

Pickering's Range of Versatile Multiplexer Modules with the same switching architecture

Model No.	Max Voltage	Max Current	Operate Time	Relay Type
40-612	300VDC/ 250VAC	2A	3ms	Electro-mechanical
40-681	±60V	350mA	200µs	Solid State
40-682	±40V	250mA	80µs	Solid State
40-683	±100V	125mA	500µs	Solid State

Isolation Switching connects only the currently active multiplexer bank to the analog common, thereby keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. Larger multiplexers may be constructed by Daisy Chaining the common signals from multiple PXI modules.

Pickering Interfaces is able to offer PXI solid state switching solutions in a variety of configurations. If you have a different requirement for solid state switching contact your local sales office for a quotation.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

Switching Characteristics

Switch Type	Solid State Switch
Max Switch Voltage:	±100V
Max Standoff Voltage:	100V (between any two points)
Max Switch Current:	125mA continuous
Path Resistance - On:	<25Ω, typically 15Ω depending on path selected
Leakage Current (off state):	1µA @ 100V
Operate Time:	500µs
Switch Rise/Fall Time:	200µs
Multiplexer Bandwidth:	Typically 10MHz

Power Requirements

+3.3V	+5V	+12V	-12V
0	1.36A (typ 540mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request

Connectors

Signals via front panel 160-way DIN 41612 male connector, for pin outs please refer to the operating manual.

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Product Order Codes

Solid State Versatile MUX Module	**40-683-001**

Support Products

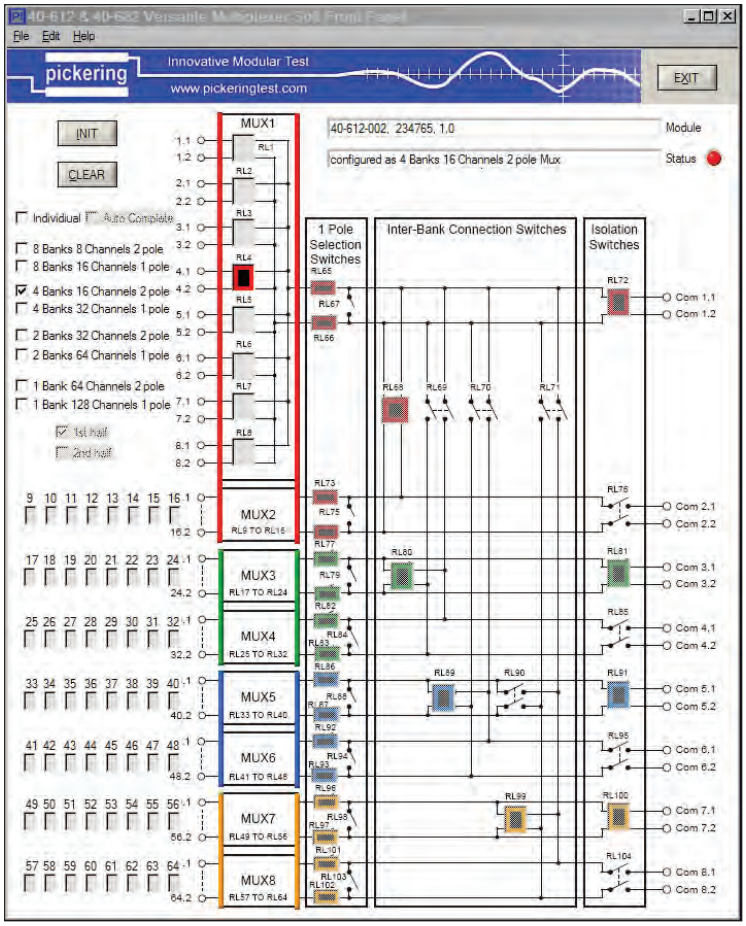
eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
All Types	**93-002-001**	**93-002-410**

Mating Connectors & Cabling

For connection accessories for the 40-683 module please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Soft Front Panel for the 40-612, 40-681, 40-682 and 40-683 Very High Density Versatile Multiplexers

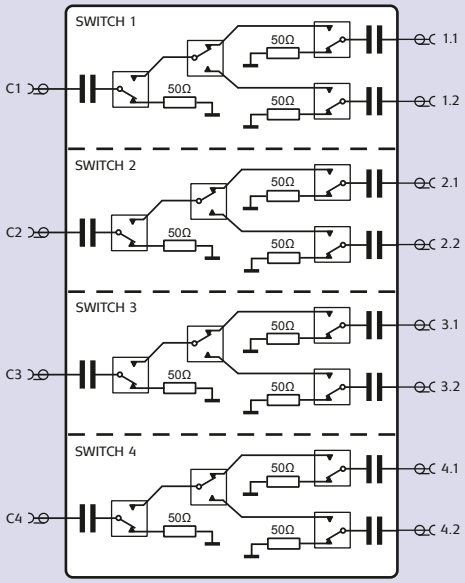
Soft Front Panel For The Versatile MUX

The Versatile Multiplexer Soft Front Panel for the 40-612-002, 40-681-001, 40-682-002 and 40-683-001 allows easy setting of various configurations from 8-bank 8-channels 2-pole multiplexers, up to 1-bank 128-channels 1-pole multiplexers as well as individual relay control for custom configurations. The schematic in the background of the SFP simplifies understanding of the selected topology. During configuration setting, all relay control information is logged in a text file which can be re-used in a programming environment.

RF Switch Modules

- Comprehensive Range of RF Switch Modules Including Relays, Matrices and Multiplexers
- 50Ω and 75Ω Versions Available
- Bandwidths Up To 6GHz
- Wide Range of Signal Connectors Including BNC, SMB, SMA, SMZ, 1.0/2.3 and MCX
- Power Handling Up To 15 Watts
- 75Ω Version Suitable for Telecoms and High Quality Video Switching
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-880 Range of RF Switch Modules with Frequency Coverage to 6GHz



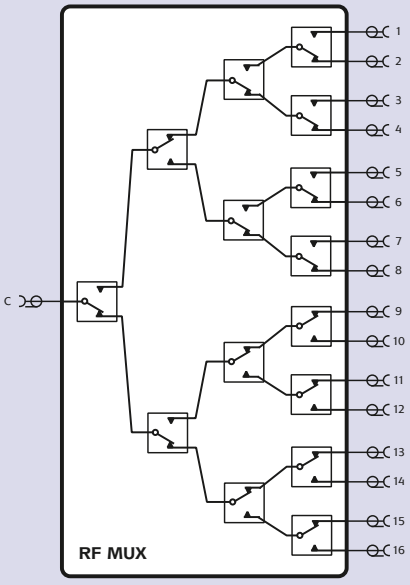
Schematic Diagram for the 40-880 Quad SPDT RF Switch

Pickering has a range RF switches capable of providing economic switching for frequencies up to 6GHz. For higher frequency applications, or applications requiring high performance levels, Pickering also offer a variety of microwave switching modules.

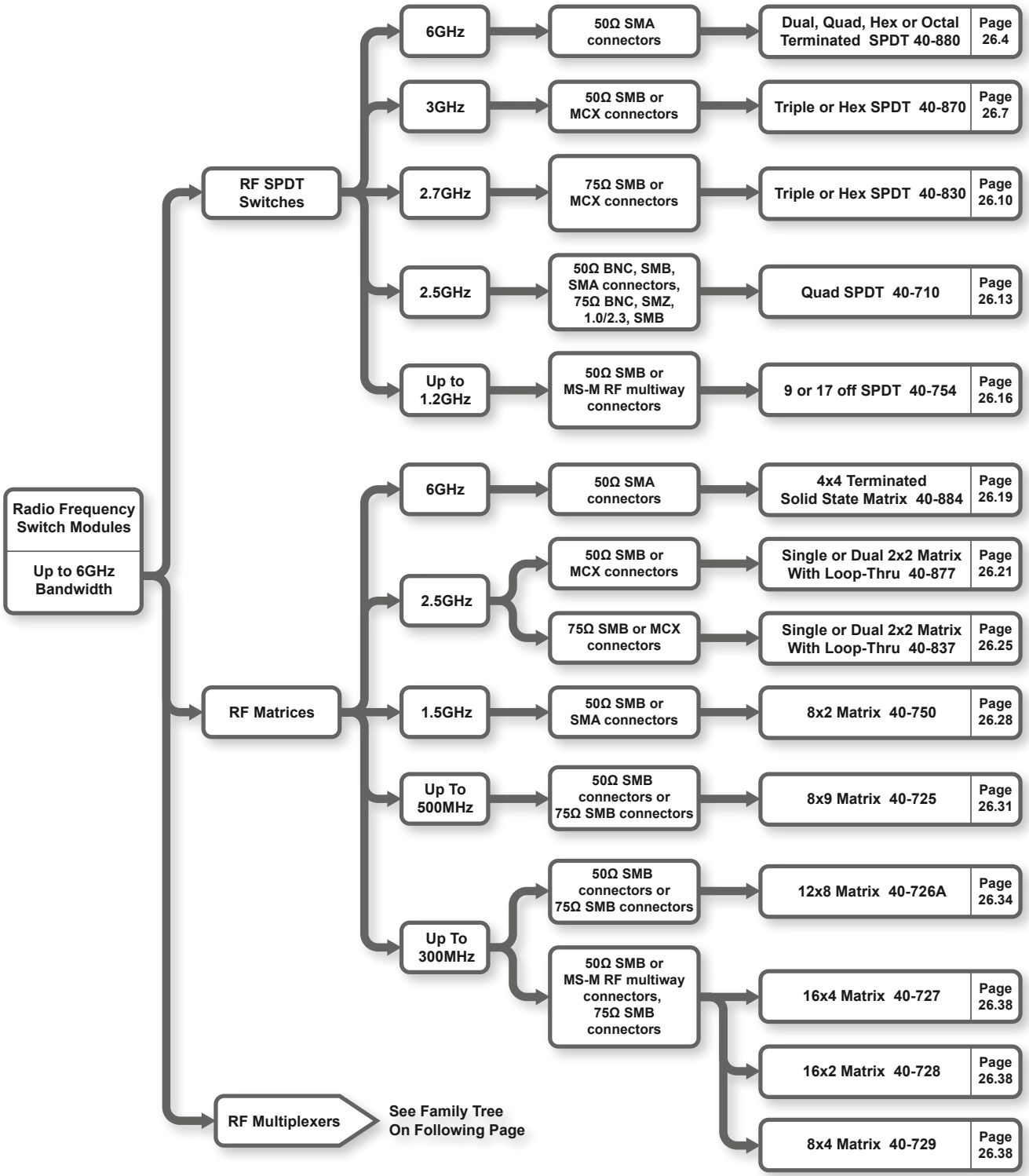
The modules offer a range of relay, multiplexer and matrix functions. Some matrices include the facility for externally cabled expansion by providing a loop-through facility.

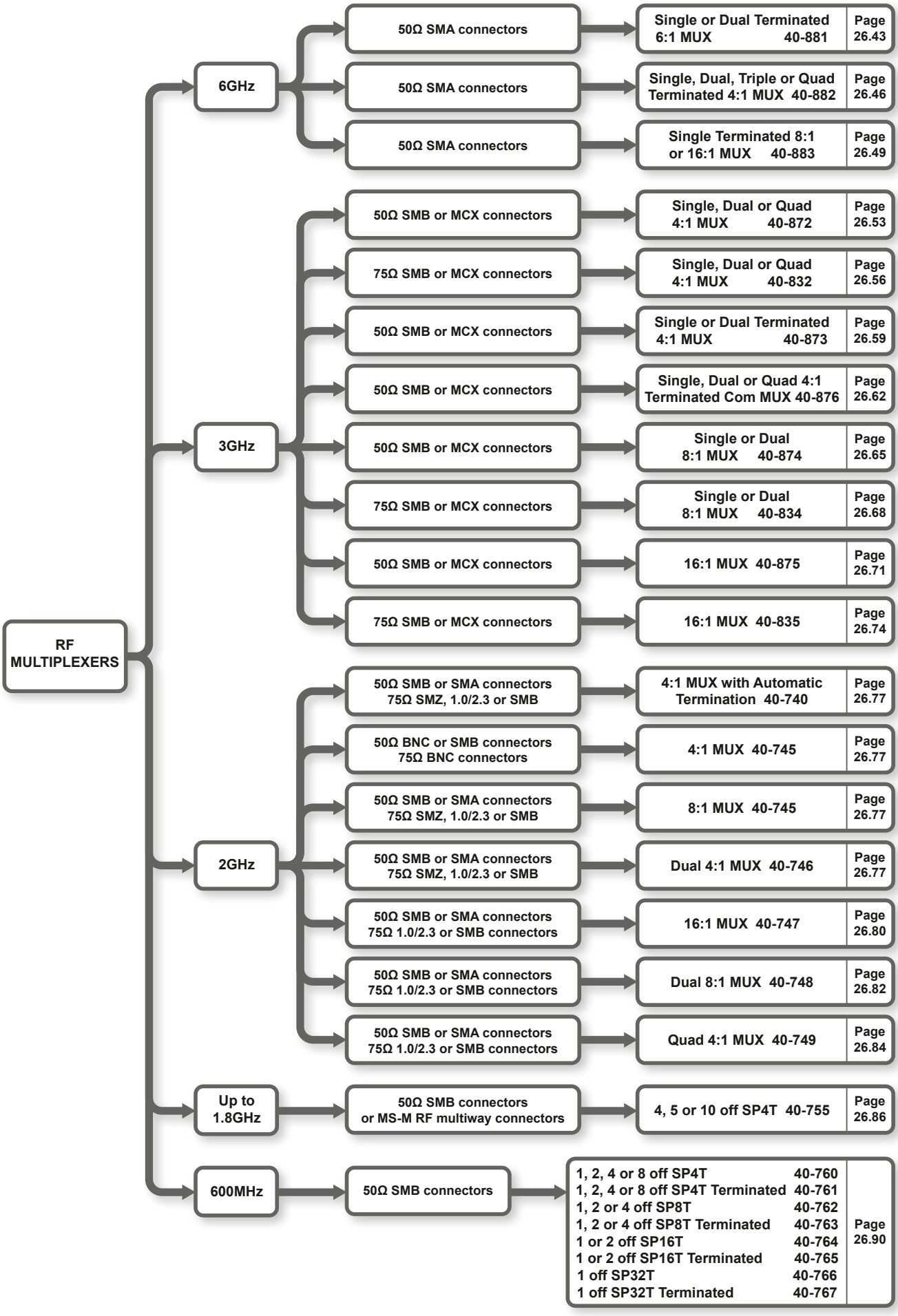
The modules can be provided with a variety of output connectors to suit the application, they are also supported by a comprehensive range of cable and connector accessories.

40-830 Range of 50Ω RF Switch Modules



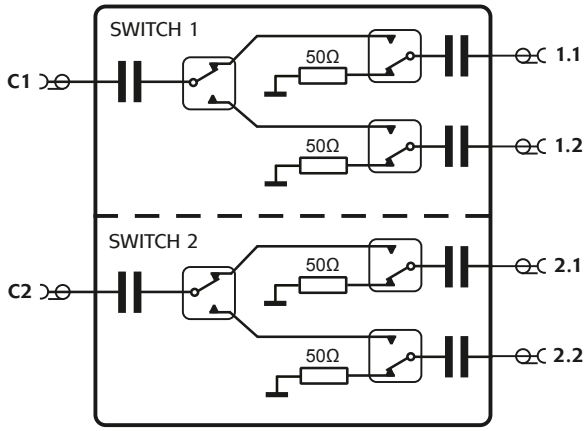
Schematic Diagram for the 40-835 16 to 1 RF Multiplexer


Radio Frequency Switch Modules
Up to 6GHz Bandwidth
RF SPDT Switches
6GHz
50Ω SMA connectors
Dual, Quad, Hex or Octal Terminated SPDT 40-880
Page 26.4
3GHz
50Ω SMB or MCX connectors
Triple or Hex SPDT 40-870
Page 26.7
2.7GHz
75Ω SMB or MCX connectors
Triple or Hex SPDT 40-830
Page 26.10
2.5GHz
50Ω BNC, SMB, SMA connectors, 75Ω BNC, SMZ, 1.0/2.3, SMB
Quad SPDT 40-710
Page 26.13
Up to 1.2GHz
50Ω SMB or MS-M RF multiway connectors
9 or 17 off SPDT 40-754
Page 26.16
RF Matrices
6GHz
50Ω SMA connectors
4x4 Terminated Solid State Matrix 40-884
Page 26.19
2.5GHz
50Ω SMB or MCX connectors
Single or Dual 2x2 Matrix With Loop-Thru 40-877
Page 26.21
75Ω SMB or MCX connectors
Single or Dual 2x2 Matrix With Loop-Thru 40-837
Page 26.25
1.5GHz
50Ω SMB or SMA connectors
8x2 Matrix 40-750
Page 26.28
Up To 500MHz
50Ω SMB connectors or 75Ω SMB connectors
8x9 Matrix 40-725
Page 26.31
Up To 300MHz
50Ω SMB connectors or 75Ω SMB connectors
12x8 Matrix 40-726A
Page 26.34
50Ω SMB or MS-M RF multiway connectors, 75Ω SMB connectors
16x4 Matrix 40-727
Page 26.38
16x2 Matrix 40-728
Page 26.38
8x4 Matrix 40-729
Page 26.38
RF Multiplexers
See Family Tree On Following Page


RF MULTIPLEXERS
6GHz
50Ω SMA connectors
Single or Dual Terminated 6:1 MUX 40-881
Page 26.43
50Ω SMA connectors
Single, Dual, Triple or Quad Terminated 4:1 MUX 40-882
Page 26.46
50Ω SMA connectors
Single Terminated 8:1 or 16:1 MUX 40-883
Page 26.49
3GHz
50Ω SMB or MCX connectors
Single, Dual or Quad 4:1 MUX 40-872
Page 26.53
75Ω SMB or MCX connectors
Single, Dual or Quad 4:1 MUX 40-832
Page 26.56
50Ω SMB or MCX connectors
Single or Dual Terminated 4:1 MUX 40-873
Page 26.59
50Ω SMB or MCX connectors
Single, Dual or Quad 4:1 Terminated Com MUX 40-876
Page 26.62
50Ω SMB or MCX connectors
Single or Dual 8:1 MUX 40-874
Page 26.65
75Ω SMB or MCX connectors
Single or Dual 8:1 MUX 40-834
Page 26.68
50Ω SMB or MCX connectors
16:1 MUX 40-875
Page 26.71
75Ω SMB or MCX connectors
16:1 MUX 40-835
Page 26.74
2GHz
50Ω SMB or SMA connectors 75Ω SMZ, 1.0/2.3 or SMB
4:1 MUX with Automatic Termination 40-740
Page 26.77
50Ω BNC or SMB connectors 75Ω BNC connectors
4:1 MUX 40-745
Page 26.77
50Ω SMB or SMA connectors 75Ω SMZ, 1.0/2.3 or SMB
8:1 MUX 40-745
Page 26.77
50Ω SMB or SMA connectors 75Ω SMZ, 1.0/2.3 or SMB
Dual 4:1 MUX 40-746
Page 26.77
50Ω SMB or SMA connectors 75Ω 1.0/2.3 or SMB connectors
16:1 MUX 40-747
Page 26.80
50Ω SMB or SMA connectors 75Ω 1.0/2.3 or SMB connectors
Dual 8:1 MUX 40-748
Page 26.82
50Ω SMB or SMA connectors 75Ω 1.0/2.3 or SMB connectors
Quad 4:1 MUX 40-749
Page 26.84
Up to 1.8GHz
50Ω SMB connectors or MS-M RF multiway connectors
4, 5 or 10 off SP4T 40-755
Page 26.86
600MHz
50Ω SMB connectors
1, 2, 4 or 8 off SP4T 40-760
1, 2, 4 or 8 off SP4T Terminated 40-761
1, 2 or 4 off SP8T 40-762
1, 2 or 4 off SP8T Terminated 40-763
1 or 2 off SP16T 40-764
1 or 2 off SP16T Terminated 40-765
1 off SP32T 40-766
1 off SP32T Terminated 40-767
Page 26.90

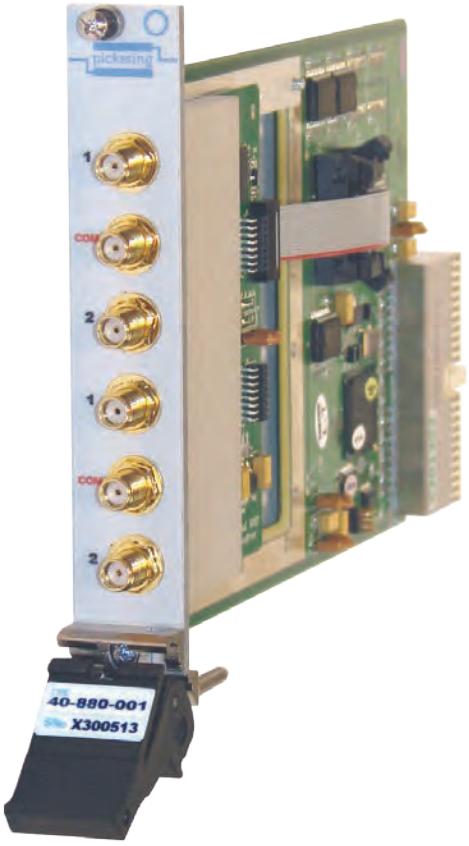
40-880
50Ω Terminated SPDT RF Switch

- Wide Frequency Range 10MHz to 6GHz
- High Performance Solid State Switch
- Dual, Quad, Hex and Octal Versions
- Automatic Termination of Unused Channels
- High Isolation
- SMA Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



40-880-001 Dual SPDT Terminated RF Switch Functional Diagram

40-880-003 Hex SPDT Terminated 6GHz Switch

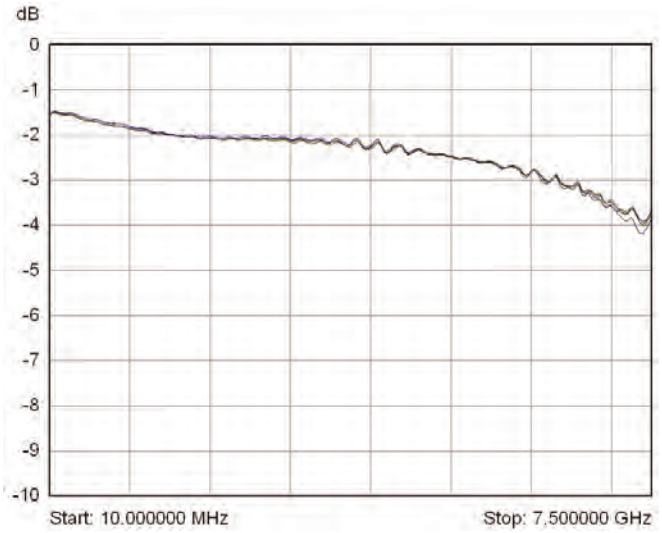


The 40-880 is a 50Ω SPDT RF switch with automatic termination of unused channels. It is available in dual format in a 1 slot PXI module, quad format in a two slot PXI module or hex and octal formats in a three slot PXI module.

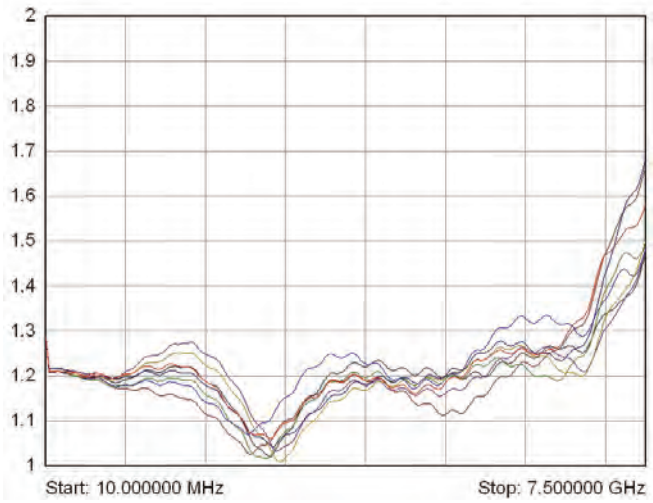
The switch exhibits low insertion loss and VSWR through the use of high performance solid state switches. Solid state switches ensure a long service life with no wear out mechanism, making the 40-880 ideal for ATE systems requiring frequent and fast operating RF switching. The 40-880 can handle RF input powers of up to +30dBm and is able to sustain frequent hot switching without performance degradation.

The module is fitted with SMA connectors, ensuring module compatibility with commonly used cables.

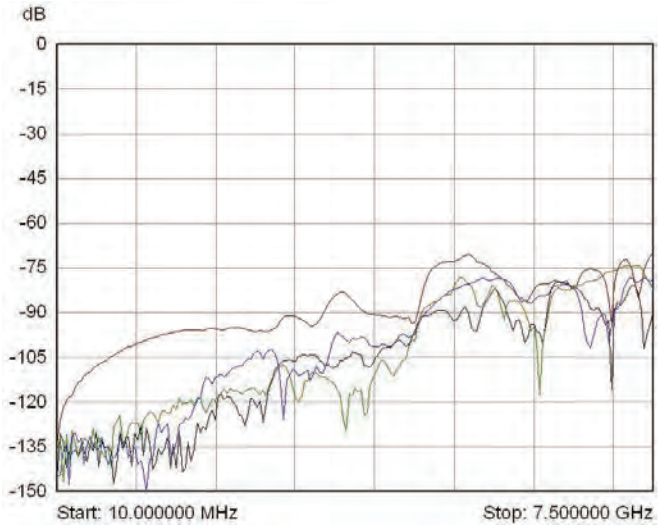
The 40-880 is supplied with drivers that allow users to support the module in all popular PXI software environments. In addition the 40-880 can be supported in Pickering Interfaces 60-100 series LXI Modular Switching chassis, permitting users to choose their switching platform.



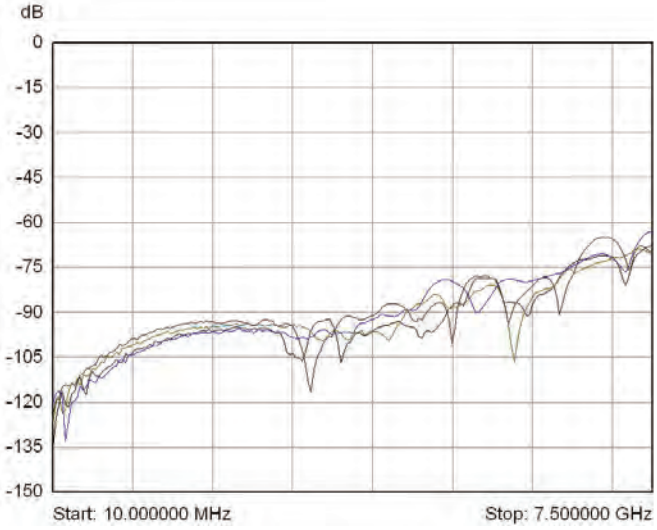
Insertion loss for 40-880-001
showing all paths up to 7.5GHz



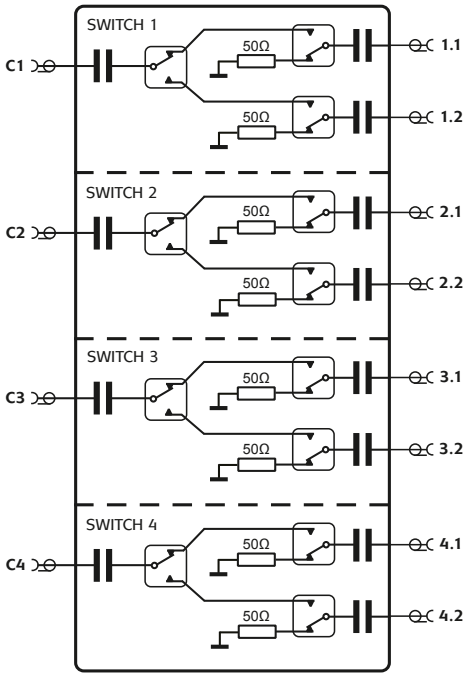
VSWR Channel to COM for 40-880-001
showing all paths up to 7.5GHz



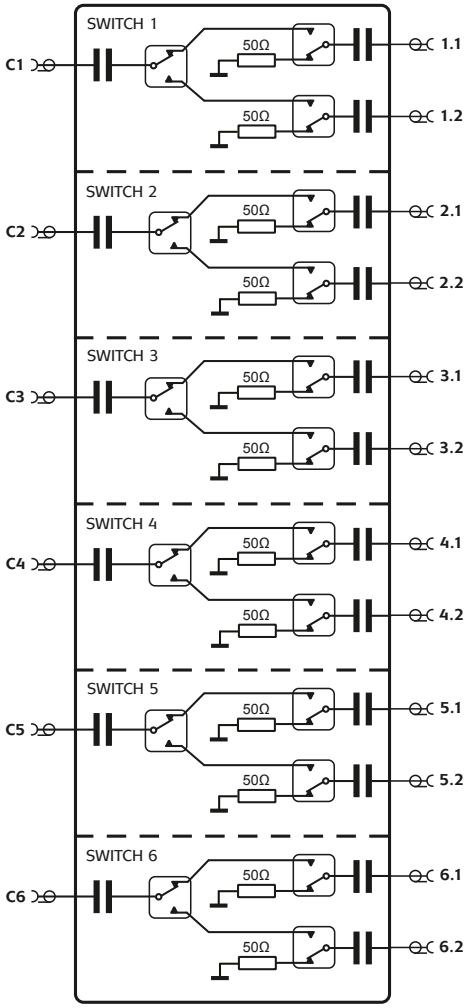
Crosstalk between banks for
40-880-001 showing all paths up to 7.5GHz



Max isolation for each channel with distant path
selected for 40-880-001 up to 7.5GHz



40-880-002 Quad SPDT Terminated RF Switch Functional Diagram



RF Specification

RF Frequency Range:	10MHz to 6GHz (useable to 7GHz)
Insertion Loss:	Typically <2dB @ 10MHz Typically 2.5dB to 3GHz Typically 3dB to 6GHz
VSWR thru path:	Typically <1.35:1 to 3GHz Typically <1.4:1 to 6GHz
VSWR Internal termination:	Typically <1.4:1 to 6GHz
Isolation:	Typically >85dB to 3GHz Typically >75dB to 6GHz
Crosstalk bank to bank:	Typically <-85dB to 3GHz Typically <-65dB to 6GHz
Maximum RF Power:	+30dBm (hot or cold switching)
Life Expectancy:	Indefinite when used within ratings
Operate Time:	50µs
RF Switching Time:	10µs typical rise and fall time
RF Connectors:	SMA

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
30mA	100mA	0	0

Mechanical Characteristics

Dual version: 1 slot 3U PXI module (40-880-001)
Quad version: 2 slot 3U PXI module (40-880-002)
Hex version: 3 slot 3U PXI module (40-880-003)
Octal version: 3 slot 3U PXI module (40-880-004)
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

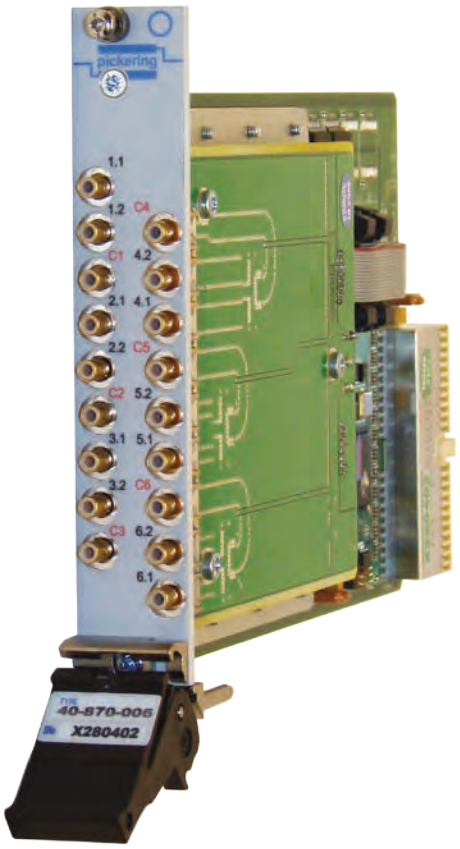
Dual SPDT RF Switch SMA, terminated	**40-880-001**
Quad SPDT RF Switch SMA, terminated	**40-880-002**
Hex SPDT RF Switch SMA, terminated	**40-880-003**
Octal SPDT RF Switch SMA, terminated	**40-880-004**

Mating Connectors & Cabling

For connection accessories for the 40-880 series please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-870
50Ω SPDT RF Switch

- 3GHz RF Single-Pole Changeover Switch
- Triple and Hex Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



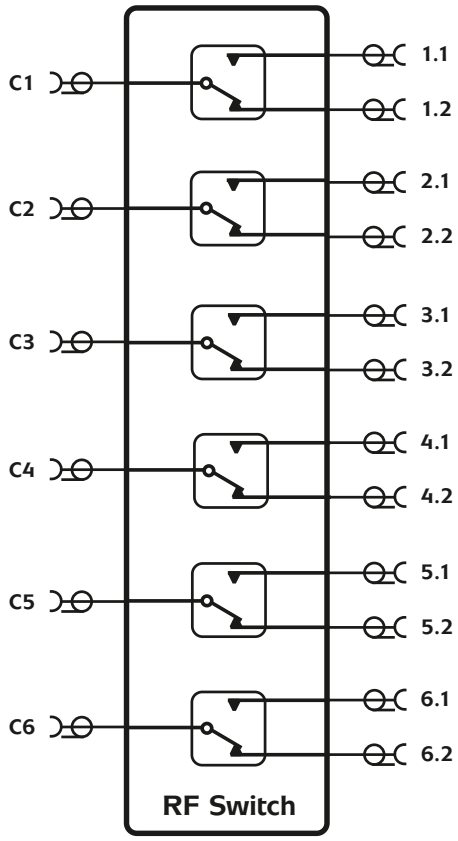
The 40-870 is a 50Ω RF Switch available with 3 or 6 separate SPDT relays in a single PXI slot.

Both versions exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. The switch banks been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz. The injection of noise and unwanted signals into the signal paths of the 40-870 has been minimized by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors.

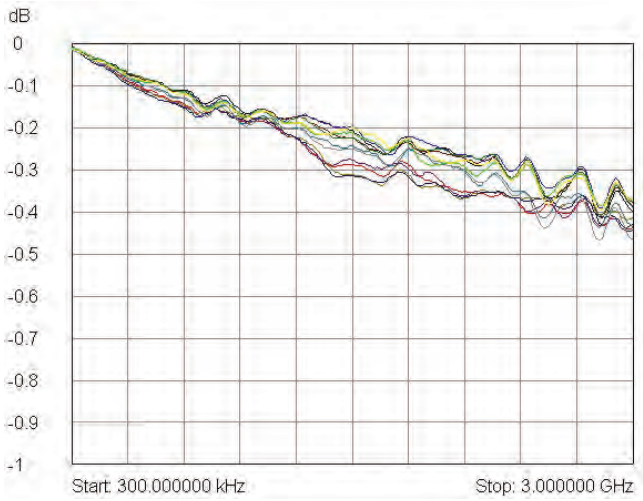
The 40-870 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-870 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 75Ω version of the 40-870 is also available, the 40-830

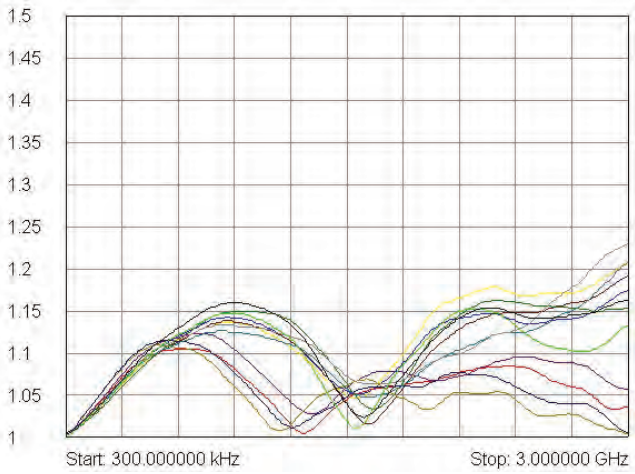


40-870 Hex SPDT RF Switch Functional Diagram (Default Switch Paths Shown)

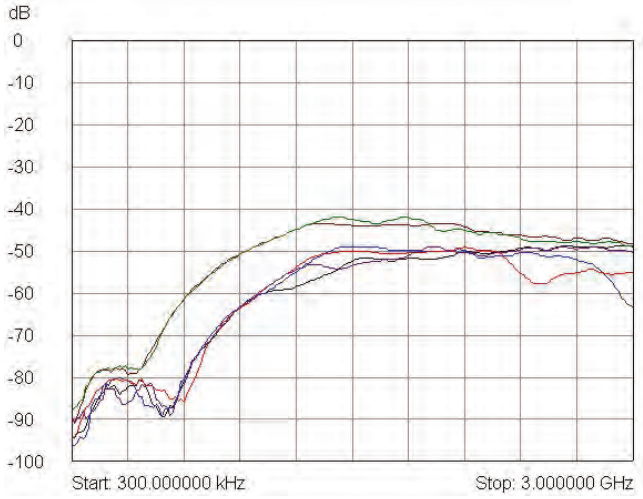
40-870 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



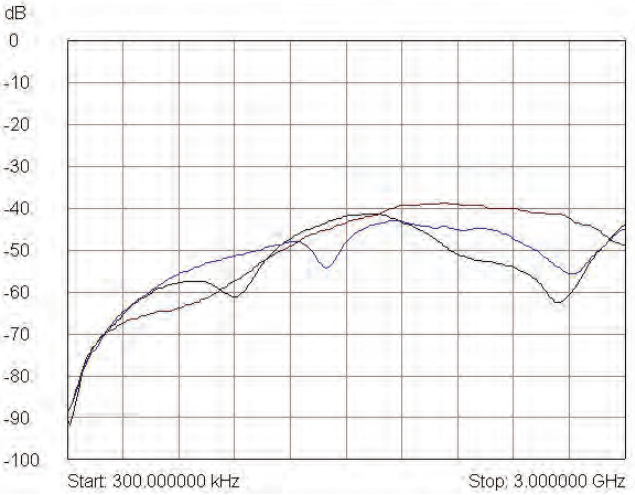
40-870 Typical Insertion Loss Plot For Each Signal Path



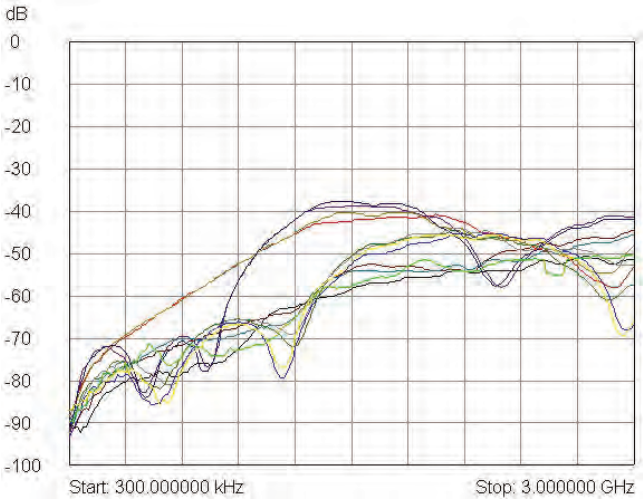
40-870 Typical VSWR Plot For Each Signal Path



40-870 Typical Crosstalk Plot Between Relay Inputs



40-870 Typical Crosstalk Plot Between Adjacent Teminals



40-870 Typical Isolation Plots for each input channel

RF Specification

RF Frequency Range:	DC to 3GHz, usable to 3.5GHz
Insertion Loss:	Typically <0.2dB to 1GHz Typically <0.4dB to 2GHz Typically <0.5dB to 3GHz
VSWR:	Typically <1.2:1 to 2GHz Typically <1.25:1 to 3GHz
Isolation:	Typically >50dB to 1GHz Typically >36dB to 3GHz
Crosstalk:	Typically <-48dB to 1GHz Typically <-38dB to 3GHz
Maximum RF Power:	10W at 3GHz

Other Switching Specifications

Maximum DC Voltage:	30V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.15A	0	0

Mechanical Characteristics

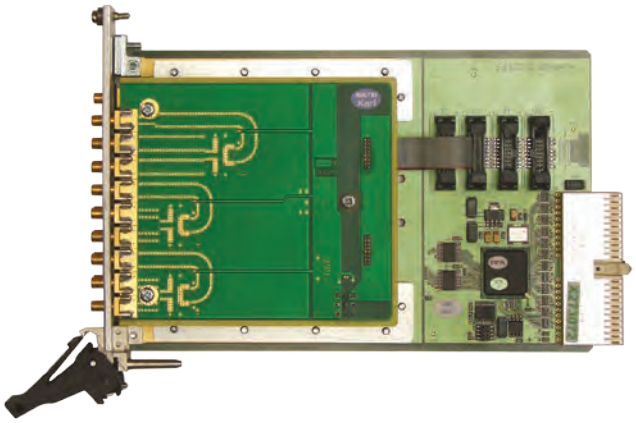
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Triple SPDT RF Switch SMB	**40-870-003**
Hex SPDT RF Switch SMB	**40-870-006**
Triple SPDT RF Switch MCX	**40-870-103**
Hex SPDT RF Switch MCX	**40-870-106**

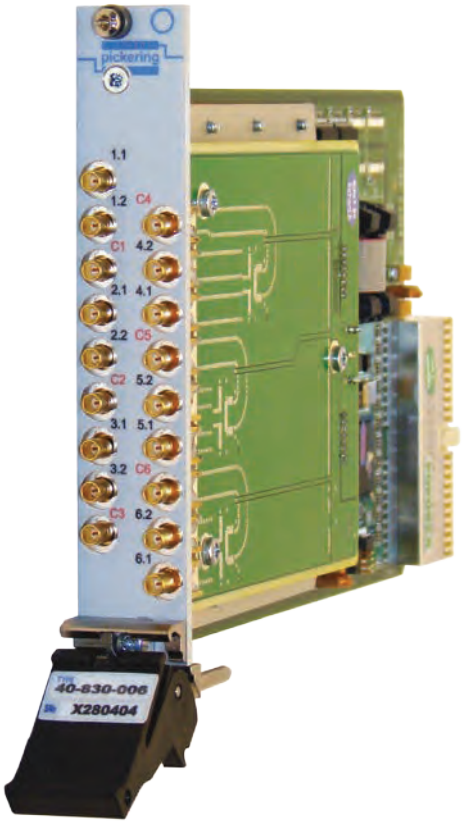
Mating Connectors & Cabling

For connection accessories for the 40-870 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-830
75Ω SPDT RF Switch

- 2.7GHz RF Single-Pole Changeover Switch
- Triple and Hex Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



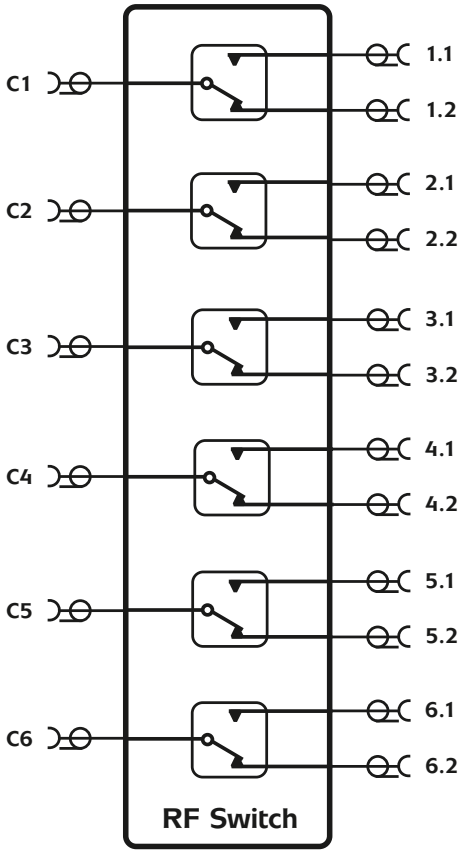
The 40-830 is a 75Ω RF Switch available with 3 or 6 separate SPDT relays in a single PXI slot.

Both versions have been designed to exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. The switch banks have been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz with each path having a nominally equal insertion loss. The design of the 40-830 minimizes the injection of noise and unwanted signals into the signal path by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

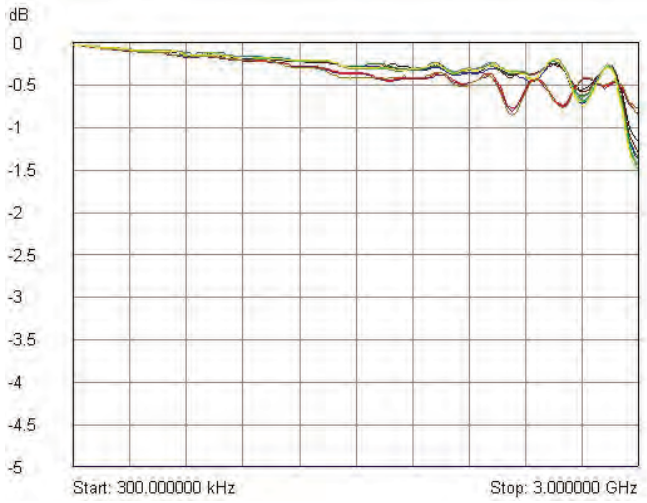
The 40-830 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-830 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 50Ω version of the 40-830 is also available, the 40-870.

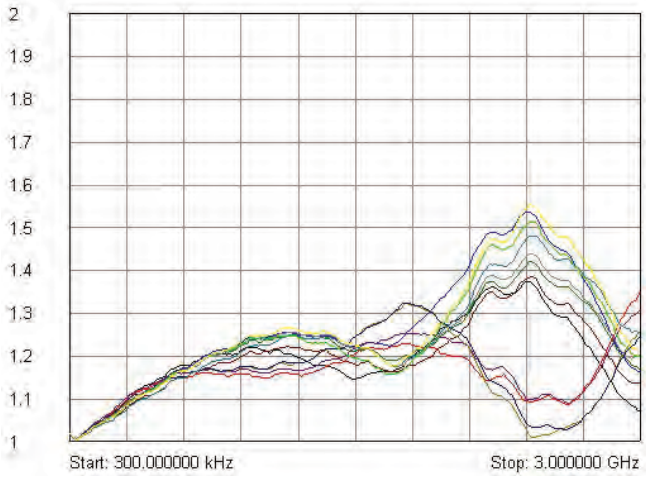


40-830 Hex SPDT RF Switch Functional Diagram (Default Switch Paths Shown)

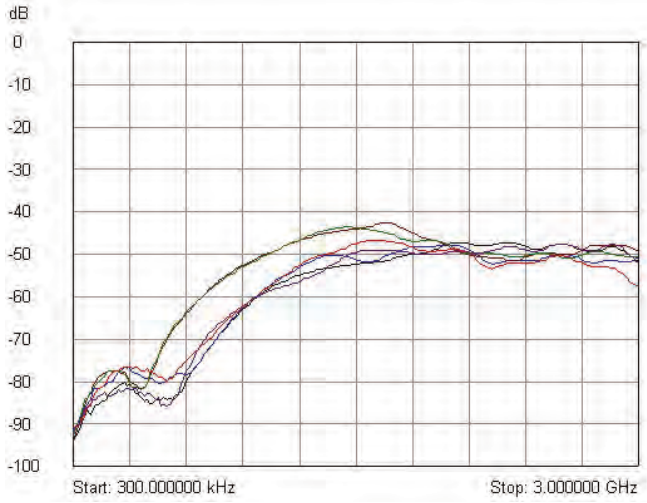
40-830 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



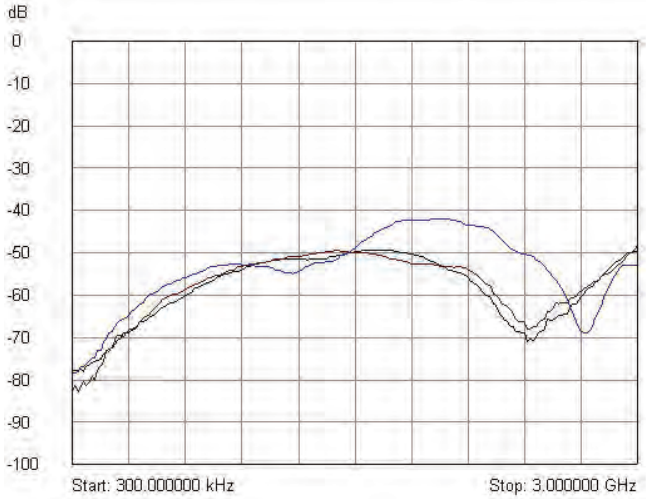
40-830 Typical Insertion Loss Plot For Each Signal Path



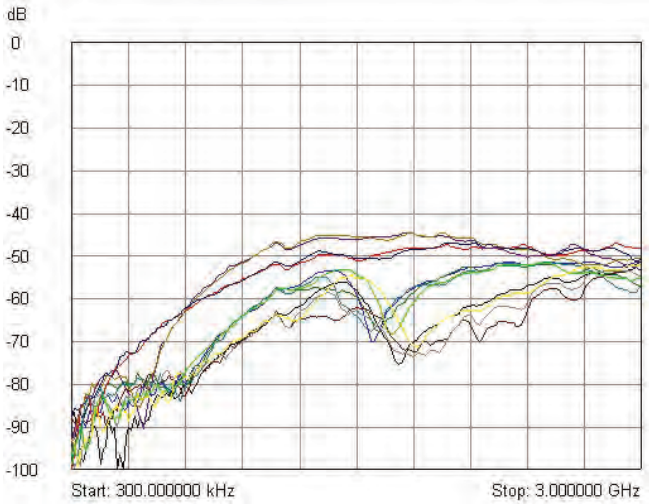
40-830 Typical VSWR Plot For Each Signal Path



40-830 Typical Crosstalk Plot Between Relay Inputs



40-830 Typical Crosstalk Plot Between Adjacent Teminals



40-830 Typical Isolation Plot Between Signal Paths

RF Specification

RF Frequency Range:	DC to 3GHz
Insertion Loss:	Typically <0.25dB to 1GHz Typically <0.5dB to 2GHz Typically <0.9dB to 2.7GHz
VSWR:	Typically <1.3:1 to 1GHz Typically <1.4:1 to 2GHz Typically <1.6:1 to 2.7GHz

Note: VSWR measurements were carried out for each selected input with a 75Ω load fitted to the common terminal of the multiplexer.

Isolation:	Typically >46dB to 1GHz Typically >42dB to 3GHz
Crosstalk:	Typically <-47dB to 1GHz Typically <-42dB to 3GHz
Maximum RF Power:	10W at 3GHz

Other Switching Specifications

Maximum DC Voltage:	100V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.15A	0	0

Mechanical Characteristics

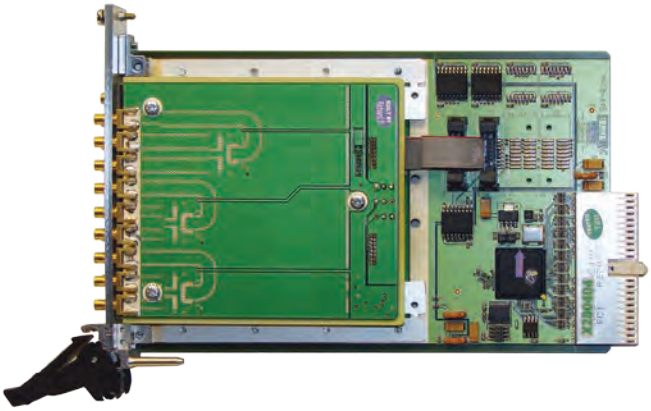
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Triple SPDT RF Switch SMB	**40-830-003**
Hex SPDT RF Switch SMB	**40-830-006**
Triple SPDT RF Switch MCX	**40-830-103**
Hex SPDT RF Switch MCX	**40-830-106**

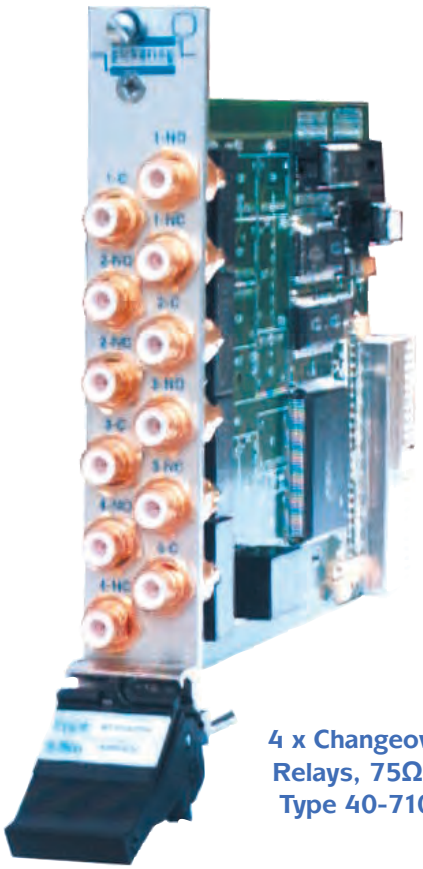
Mating Connectors & Cabling

For connection accessories for the 40-830 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-710
RF Relay Module

- 4 Changeover RF Relays Per Module
- Up To 2.5GHz Bandwidth in 50Ω
- Up To 1GHz Bandwidth in 75Ω Suitable For Telecoms or Video Applications
- Tree Networks may be Constructed by Inter-Linking Individual Modules
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



4 x Changeover RF Relays, 75Ω SMZ, Type 40-710-714

Model 40-710 RF switching module has a bank of 4 individual high performance R.F. changeover switches (50Ω or 75Ω, Bi-directional) with very low insertion loss, suitable for handling signals up to 2.5GHz. Applications include aerial switching, routing high frequency signals into oscilloscopes and analysers.

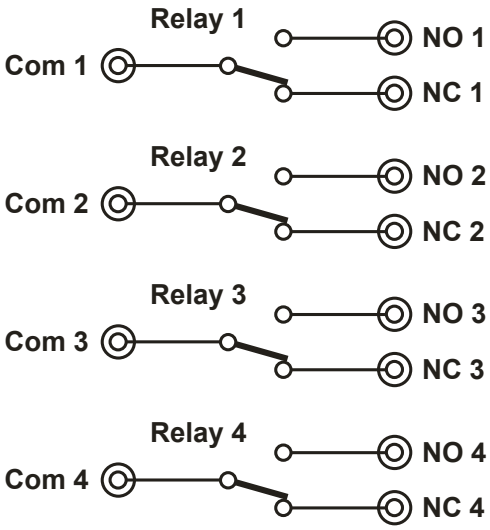
Available with a choice of connectors: SMA, SMB and Siemens 1.0/2.3 versions. In addition BNC connectors are offered with reduced bandwidth performance which requires a 2 slot width module.

The 75Ω versions are suitable for high frequency video and telecommunication signals up to 1GHz.

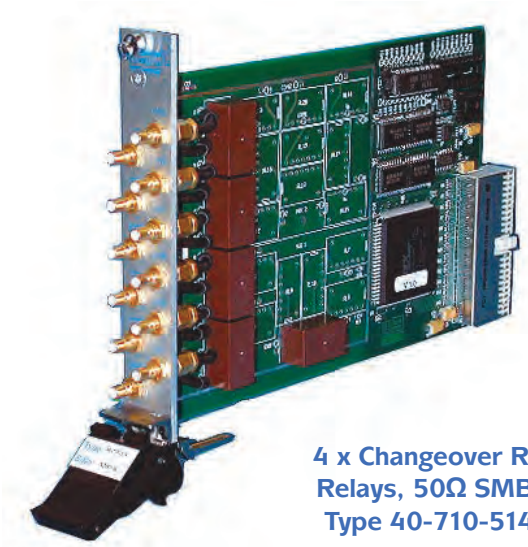
Relay Type

The 40-710 is fitted with high reliabillty RF Relays, these offer long life with good low level switching performance.

Spare RF Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

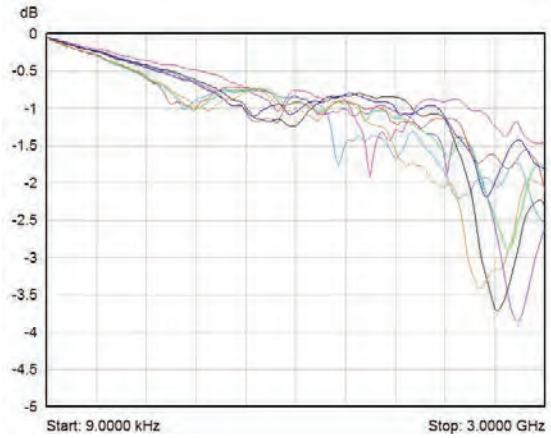


Switching Diagram for 40-710, 4 x SPDT RF Relays

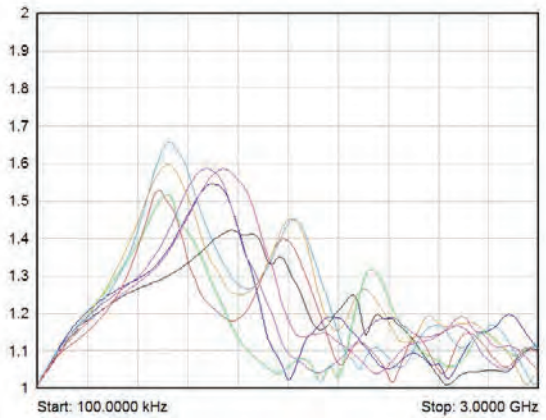


4 x Changeover RF Relays, 50Ω SMB, Type 40-710-514

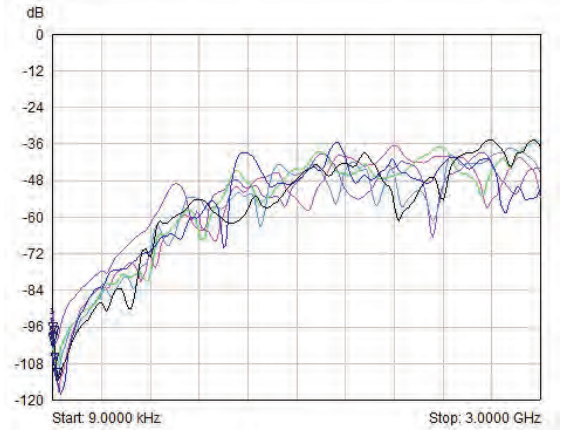
40-710-514 (50Ω SMB) Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



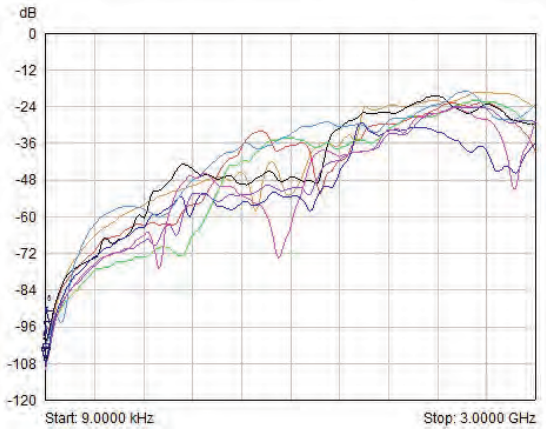
Typical insertion loss plots for all NO and NC inputs.



Typical VSWR plots for all NO and NC inputs.

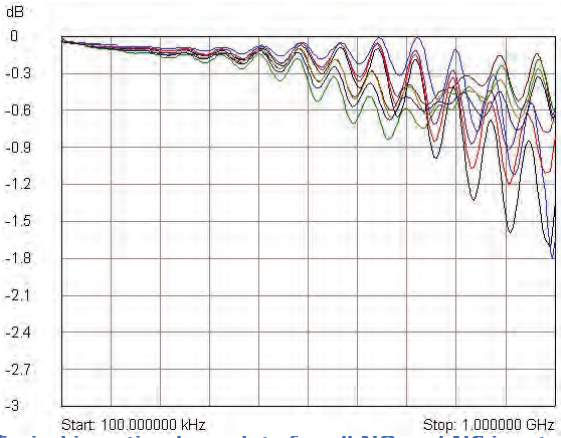


Typical crosstalk plots between neighbouring channels.

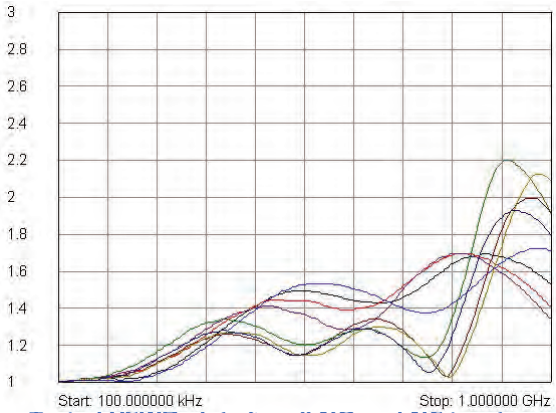


Typical isolation plots for all NO and NC inputs.

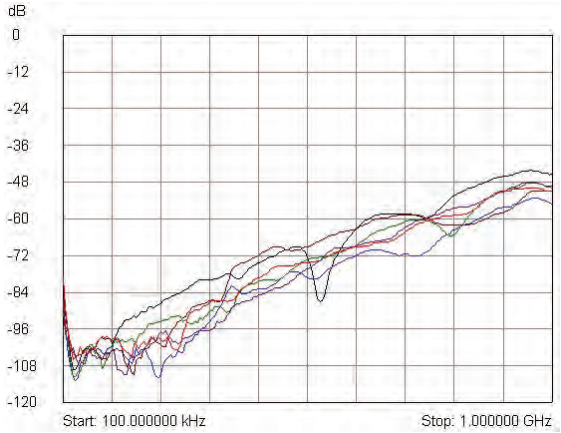
40-710-704 (75Ω BNC) Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



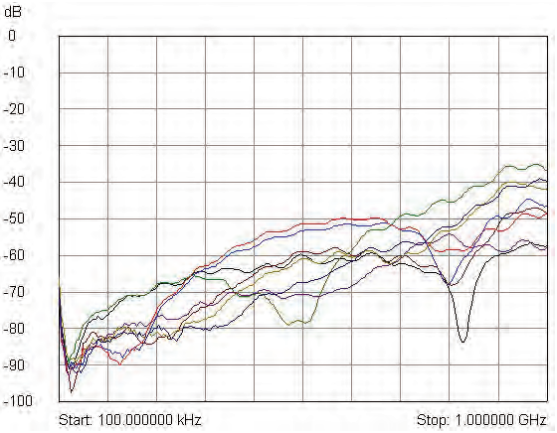
Typical insertion loss plots for all NO and NC inputs.



Typical VSWR plots for all NO and NC inputs.



Typical crosstalk plots between neighbouring channels.



Typical isolation plots for all NO and NC inputs.

General Specification - All Versions

Max Switching Power:	10W
Max Switching Voltage:	30VDC
Max Switching Current:	0.5A
Nominal Switching Capacity:	0.01A, 24VDC, 10W@1.2GHz
Initial On Path Resistance:	<200mΩ
Off Path Resistance:	>1x10^{8}Ω
Thermal Offset:	<20µV
Expected Life, Mechanical:	>1x10^{6} ops
Expected Life, Electrical:	>3x10^{5} ops (10mA@24VDC) >3x10^{5} ops (1W@2.6GHz)
Switching Time:	10ms
Rise Time:	<0.2ns (50Ω) <0.3ns (75Ω)

50Ω Specification - SMB and SMA Versions

Bandwidth:	2.5GHz
Maximum Switching Power:	10W
Isolation:	Typically >27dB (0-1GHz) Typically >17dB (1GHz-2.5GHz)
Crosstalk:	Typically <-46dB (0-1GHz) Typically <-32dB (1GHz-2.5GHz)
Insertion Loss:	Typically <1.5dB (0-1GHz) Typically <3dB (1GHz-2.5GHz)
VSWR:	<1.7:1

50Ω Specification - BNC Version

Bandwidth:	1GHz
Maximum Switching Power:	10W
Isolation:	Typically >27dB (0-1GHz)
Crosstalk:	Typically <-46dB (0-1GHz)
Insertion Loss:	Typically <3dB (0-1GHz)
VSWR:	<1.7:1

75Ω Specification - All Versions

Bandwidth:	1GHz
Maximum Switching Power:	10W
Isolation:	Typically >30dB (0-1GHz)
Crosstalk:	Typically <-40dB (0-1GHz)
Insertion Loss:	Typically <3dB (0-1GHz)
VSWR:	<2.4:1

Power Requirements

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). Except BNC version which is 2-slot width.

Module weight: 240g (40-710-734)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector. Signals via front panel mounted coaxial connectors, type dependant upon product code.

Product Order Codes

4x Changeover Switch, 1GHz, 50Ω, BNC	**40-710-504**
4x Changeover Switch, 2.5GHz, 50Ω, SMB	**40-710-514**
4x Changeover Switch, 2.5GHz, 50Ω, SMA	**40-710-524**
4x Changeover Switch, 1GHz, 75Ω, BNC	**40-710-704**
4x Changeover Switch, 1GHz, 75Ω, SMZ/Type43	**40-710-714**
4x Changeover Switch, 1GHz, 75Ω, 1.0/2.3	**40-710-734**
4x Changeover Switch, 1GHz, 75Ω, SMB	**40-710-754**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kits for the 40-710 range is as follows:

All 50Ω versions: 91-100-096 Relay Kit 96
All 75Ω versions: 91-100-029 Relay Kit 29

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-710 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-754
17off SPDT 50Ω RF Switches, 1.2GHz

- 1.2GHz Switching (SMB Version)
- 17off SPDT & 9off SPDT Versions
- SMB and MS-M RF Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

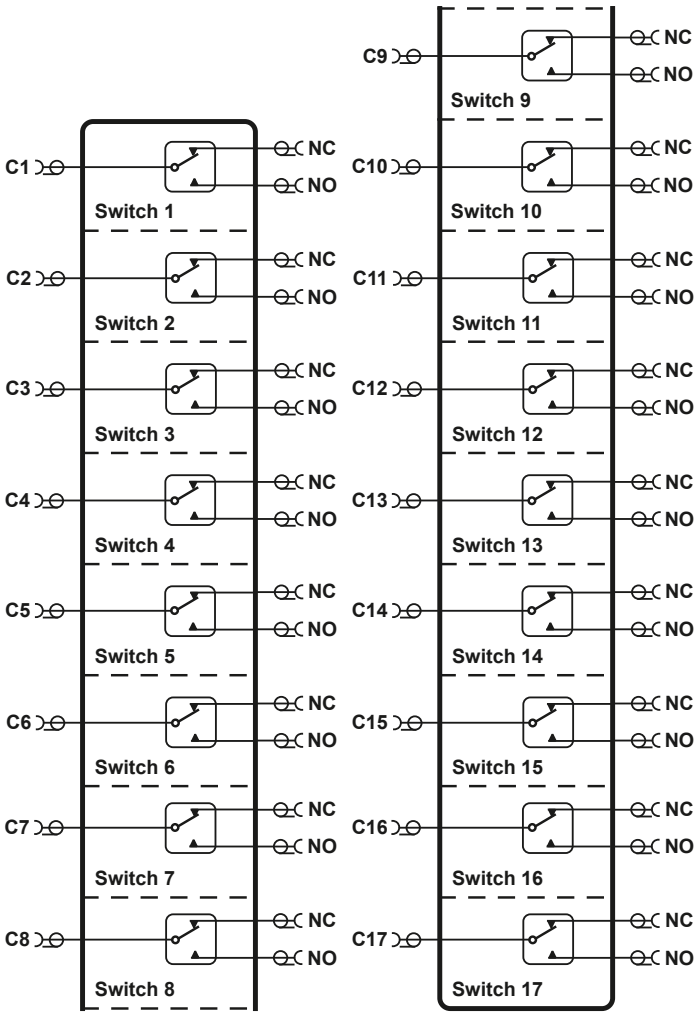
The 40-754 is a 50Ω High Density RF switch available with 17 or 9 SPDT relays in a single PXI module. The 40-754 is available with two connector options; an SMB connector that provides a frequency range of 1.2GHz (usable to 1.8GHz) occupying two PXI slots, or an MS-M RF multiway connector which limits the bandwidth to 500MHz but offers a high density solution occupying just one PXI slot. The RF switch design is identical in each case.

Each design offers low insertion loss and low VSWR through its usable frequency range and each SPDT has been designed to have approximately equal loss on each of its paths. Careful attention to the mechanical and electrical design results in low levels of unwanted noise in the signal path.

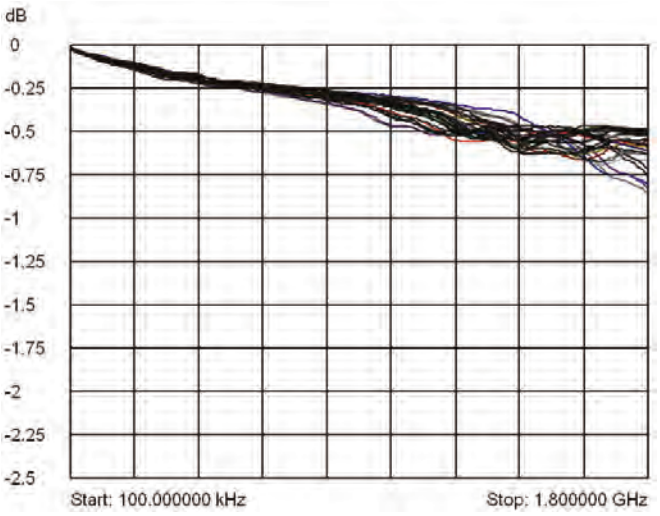
The array of SPDT switches can be configured into alternative configurations through the use of external cabling.

The RF connectors used are fully supported by the range of Pickering Interfaces connection solutions.

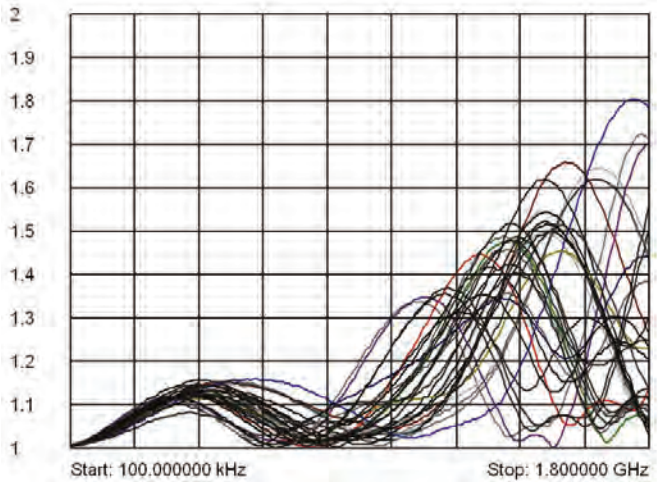
The 40-754 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-754 can be supported in the 60-102 or 60-103 LXI Modular Chassis, permitting users to freely choose to use PXI or LAN controlled switching solutions with the same high levels of performance.



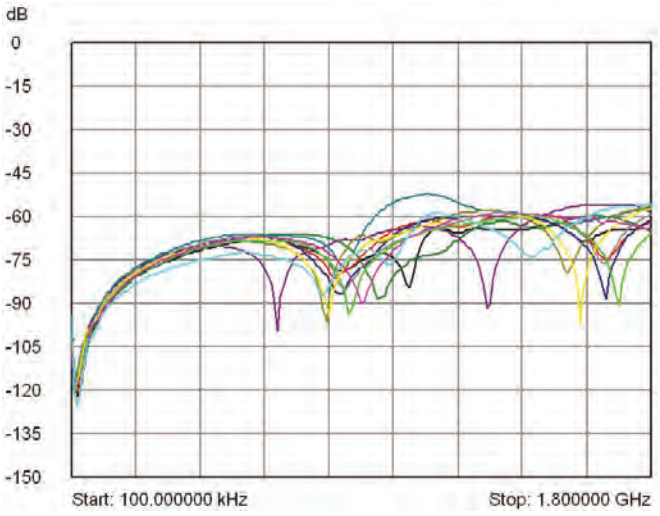
40-754-017/117 17off SPDT RF Switch Functional Diagram (Default Switch Paths Shown)



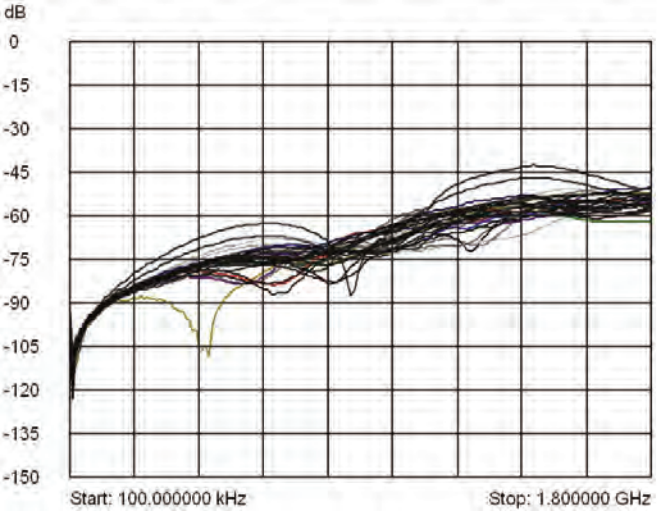
Typical insertion loss plot for all channels of
40-754-117 (17-off SPDT with SMB connectors)



Typical VSWR plot for all channels of
40-754-117 (17-off SPDT with SMB connectors)



Typical crosstalk plot for
40-754-117 (17-off SPDT with SMB connectors)



Typical isolation plot for all channels of
40-754-117 (17-off SPDT with SMB connectors)

40-754 17-off SPDT RF Switch with MS-M
connectors - side view

RF Specification - MS-M RF Multiway Connector Versions

Impedance:	50Ω
RF Frequency Range:	DC to 500MHz
Insertion Loss:	<0.6dB to 500MHz (typically 0.3dB)
VSWR:	<1.8:1 to 500MHz (typically 1.5:1 max)
Isolation:	>50dB to 500MHz
Crosstalk:	<-55dB to 500MHz
Maximum RF Power:	10W

RF Specification - SMB Connector Version

Impedance:	50Ω
RF Frequency Range:	DC to 1.2GHz (usable to1.8GHz)
Insertion Loss:	<0.75dB to 1.2GHz (typically 0.5dB)
VSWR:	<1.5:1 to 1.2GHz
Isolation:	>45dB to 1.2GHz
Crosstalk:	<-50dB to 1.8GHz
Maximum RF Power:	10W

Other Switching Specifications

Maximum Hot Switch Voltage:	200VDC or AC peak
Maximum Hot Switch Current:	1A
Maximum Cold Switch Current:	1A
Maximum Hot Switch Power:	10W
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
1A	0.65A	0	0

Mechanical Characteristics - MS-M RF Connector Versions

Width & Dimensions:	Single slot 3U PXI (CompactPCI card). 3D models in a variety of popular file formats are available on request.
PXI Bus Connector:	32-bit P1/J1 backplane connector
User RF Connections:	2off 26-way high density MS-M RF coaxial connectors.

Mechanical Characteristics - SMB Connector Versions

Width & Dimensions:	2 slot 3U PXI (CompactPCI card). 3D models in a variety of popular file formats are available on request.
PXI Bus Connector:	32-bit P1/J1 backplane connector
User RF Connections:	51off SMB (-117), 27off SMB (-109) coaxial connectors.

Product Order Codes

17off RF SPDT Switch, 500MHz MS-M RF	**40-754-017**
9off RF SPDT Switch, 500MHz MS-M RF	**40-754-009**
17off RF SPDT Switch, 1.2GHz SMB	**40-754-117**
9off RF SPDT Switch, 1.2GHz SMB	**40-754-109**

Support Products

Spare Relay Kits

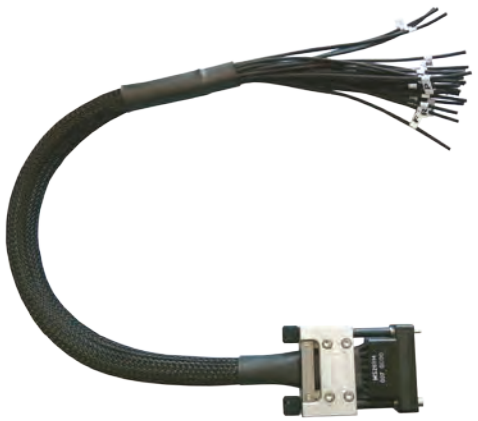
Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the X40-754 range is as follows:

91-100-014 Relay Kit 14 for X40-754-017/009/117/109

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

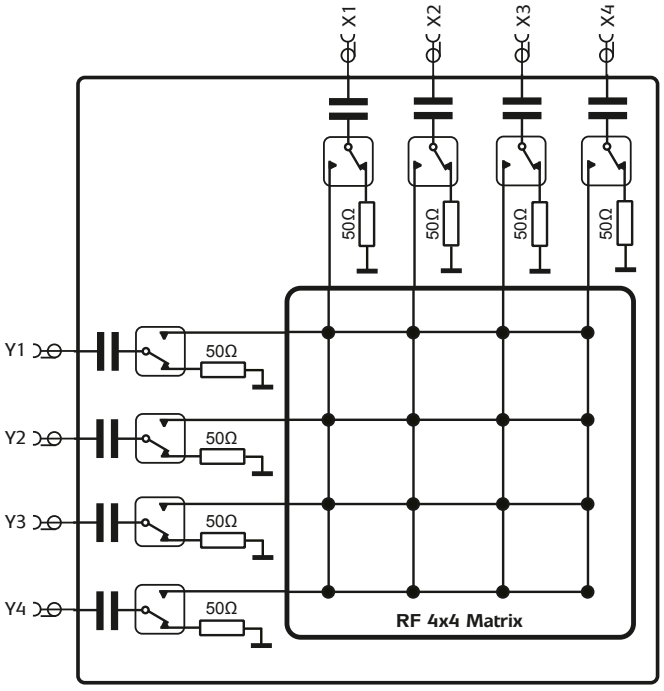
For connection accessories for the SMB version of the 40-754 please refer to the **90-011D** RF Cable Assemblies data sheet, or for the multiway MS-M RF connector version please refer to the **90-017D** Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Pickering can supply cable assemblies for all its modules. The 40-979-526 shown (MS-M RF to unterminated coax) is suitable for multiway connector versions of the 40-754.

40-884
6GHz Solid State 4x4 Matrix

- 4x4 Matrix
- Automatic Termination
- +30dBm Input Power Handling
- Excellent Crosstalk & Isolation
- Compact 3 Slot Form Factor
- Fast Operating Speed
- Long Servce Life
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



40-884-001 4x4 Terminated 6GHz Matrix
Simplified Functional Diagram

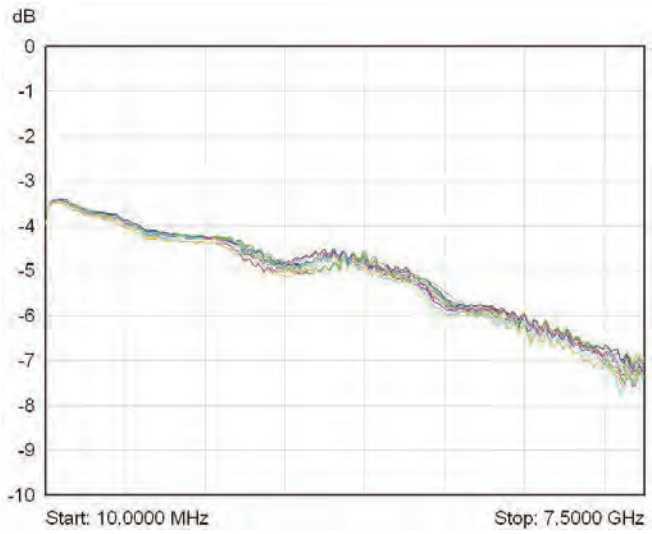
The 40-884 is an all solid state microwave matrix which can operate to frequencies beyond 6GHz and handle RF powers to +30dBm. The matrix supports up 4 point to point connections across the matrix at the same time.

An innovative construction method ensures the 40-884 provides a compact 3 slot solution which has excellent RF performance. A 4x4 matrix aids the concurrent testing of up to 4 devices with 4 different sets of test equipment, improving speed of test in RF systems and making more efficient use of expensive test equipment.

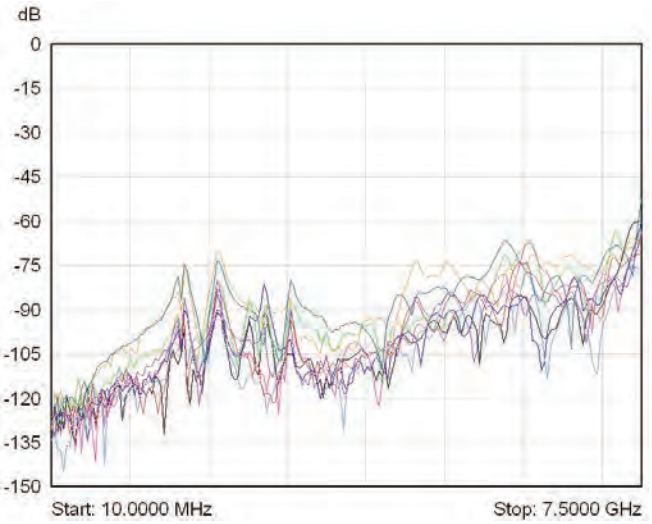
The design provides a high isolation between the selected paths, ensuring a high degree of independence in the test processes. Fast operating speed reduces the time taken in setting switches for the next test run. With the ability to handle signals up to +30dBm and an IP3 of typically +60dBm the design can handle the signal levels found in most applications without introducing appreciable distortion.

RF connections are made thru SMA connectors to ensure cabling solutions maintain the high performance of the 40-884.

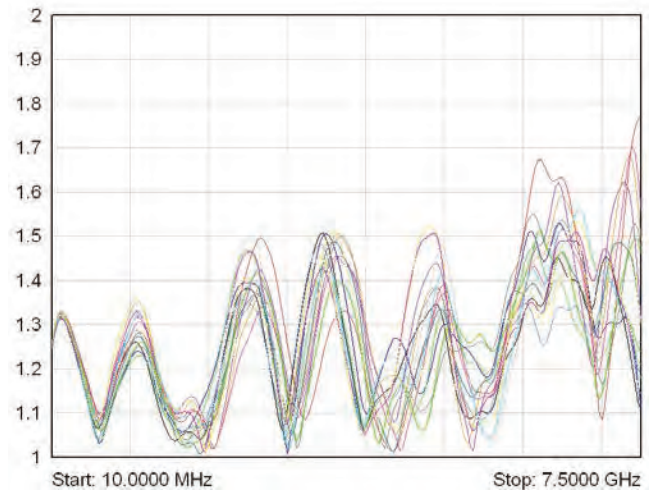
The 40-884 is supplied with drivers that allow users to support the module in all popular PXI software environments. In addition the 40-884 can be supported in Pickering Interfaces' **LXI/PXI Modular Chassis**, permitting users to choose an LXI or PXI switching platform while retaining the same high performance characteristics and driver environment.



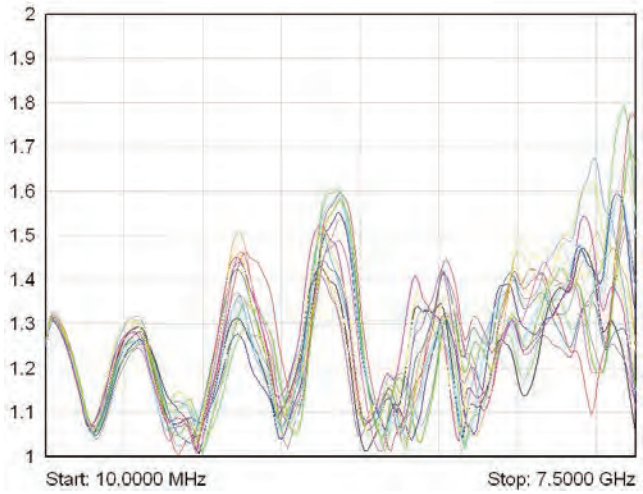
Insertion loss for 40-884-001 for all matrix paths up to 7.5GHz



Crosstalk for 40-884-001 for adjacent paths up to 7.5GHz



VSWR for 40-884-001 for Y to X paths up to 7.5GHz



VSWR for 40-884-001 for X to Y paths up to 7.5GHz

RF Specification

RF Frequency Range:	10MHz to 6GHz (useable to 7GHz)
Insertion Loss:	Typically <4dB @ 10MHz Typically <5.5dB to 3GHz Typically <6.5dB to 6GHz
VSWR thru path Y to X:	Typically <1.6:1 to 6GHz
VSWR thru path X to Y:	Typically <1.65:1 to 6GHz
VSWR Internal termination:	Typically <1.4:1 to 6GHz
Crosstalk:	Typically <-60dB to 6GHz
Maximum RF Power:	+30dBm
Maximum DC Voltage:	16V (AC coupled)
Life Expectancy:	Indefinite when used within ratings
Operate Time:	50µs
RF Switching Time:	10µs typical rise and fall time
RF Connectors:	SMA

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
30mA	100mA	0	0

Mechanical Characteristics

3 slot 3U PXI module
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

6GHz Solid State 4x4 Matrix	**40-884-001**

Mating Connectors & Cabling

For connection accessories for the 40-884 module please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-877
50Ω Expandable 2X2 RF Matrix

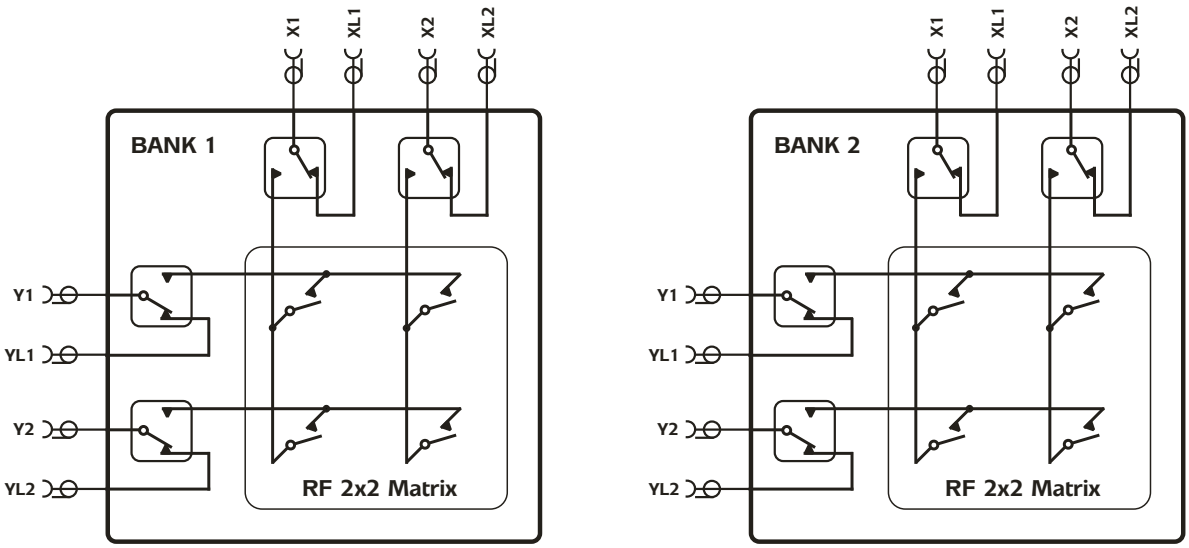
- 2.5GHz RF Matrix
- Single or Dual 2x2 Matrix
- Loop-Thru on X and Y Axis
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

The 40-877 is a 50Ω 2x2 RF matrix available with 1 or 2 banks in a single PXI slot. Loop-thru connections are provided on both the X and Y axis allowing the attachment of terminations for unused signals or for expansion to other matrices. Larger matrices are easily built with varied X and Y dimensions, such as 8x2 and 4x4 using multiple 40-877 modules.

All versions exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each matrix has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 2.5GHz. The injection of noise and unwanted signals into the signal paths of the 40-877 has been minimized by careful attention to the mechanical and electrical design.

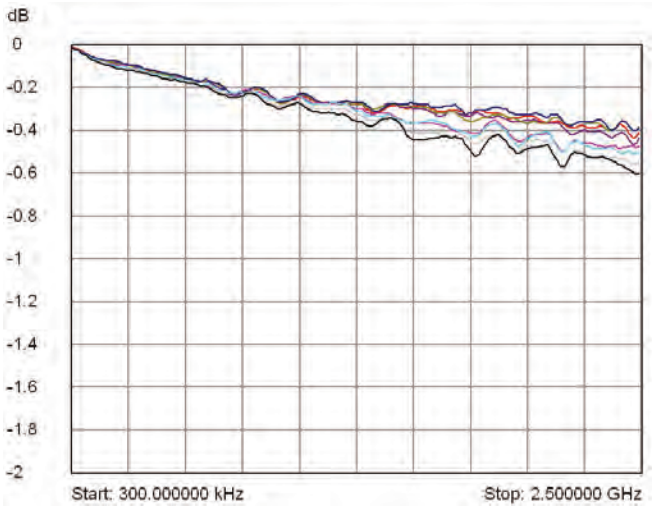
MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

The 40-877 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-877 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

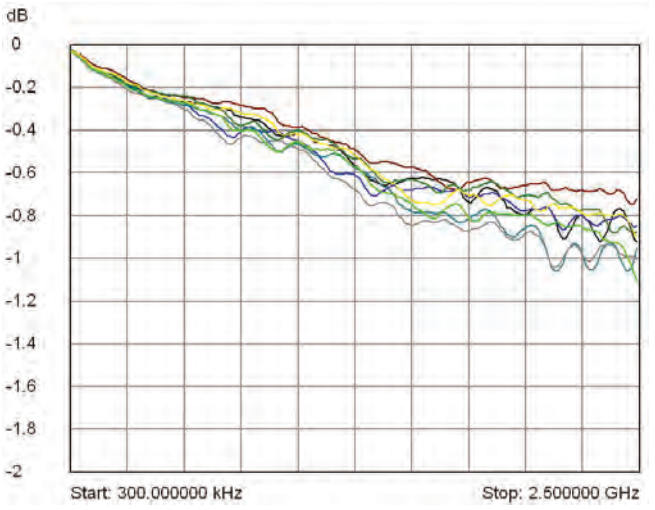


40-877 Dual 2x2 RF Matrix Functional Diagram (Default Switch Paths Shown)

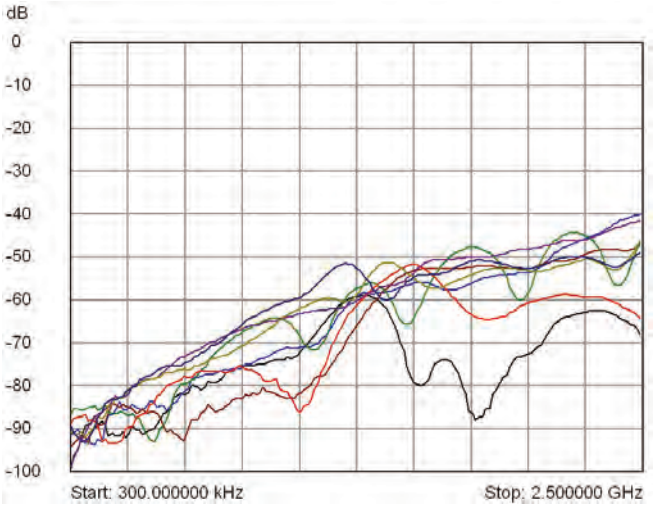
40-877 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



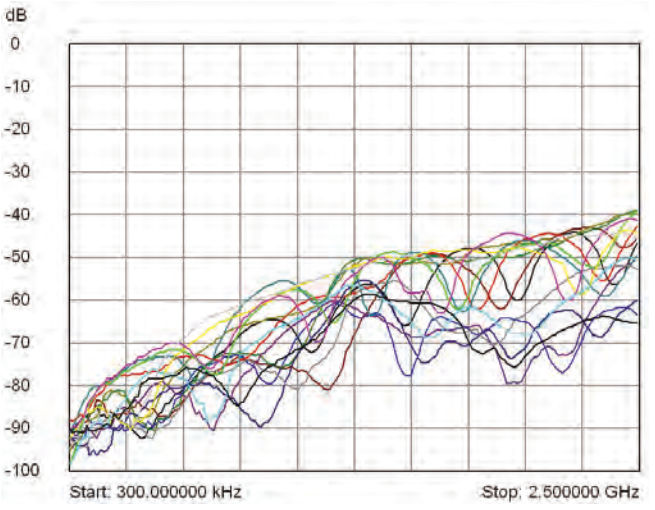
40-877 Typical Insertion Loss Plot - Loop-thru



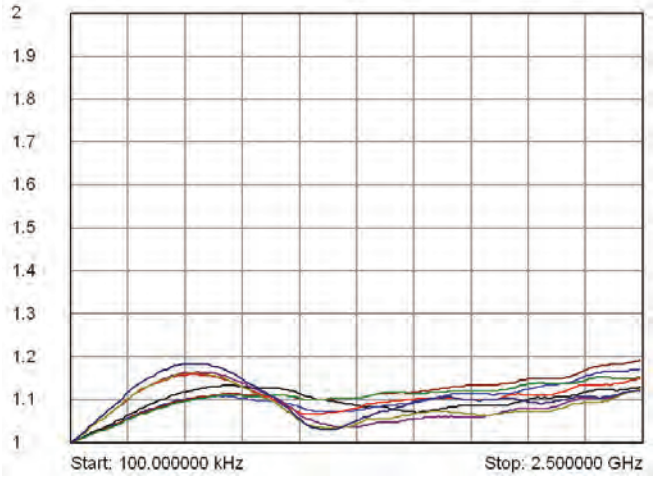
40-877 Typical Insertion Loss Plot - Matrix Path



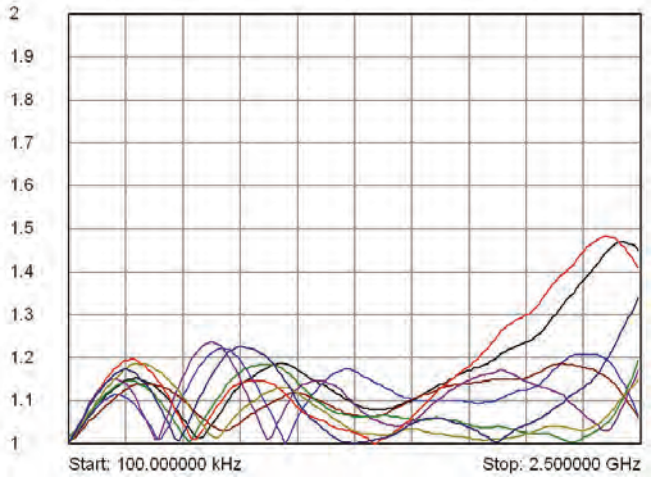
40-877 Typical Crosstalk Plot -Matrix Path



40-877 Typical Isolation Plot - Matrix Path



40-877 Typical VSWR Plot - Loop-thru



40-877 Typical VSWR Plot - Matrix Path

RF Specification

RF Frequency Range:	DC to 2.5GHz
Insertion Loss:	Typically <0.6dB to 1GHz Typically <1.0dB to 2GHz Typically <1.4dB to 2.5GHz
VSWR:	Typically <1.3:1 to 1GHz Typically <1.5:1 to 2.5GHz
Isolation:	Typically >55dB to 1GHz Typically >44dB to 2GHz Typically >32dB to 2.5GHz
Crosstalk:	Typically <-55dB to 1GHz Typically <-46dB to 2GHz Typically <-32dB to 2.5GHz
Loop-thru Insertion loss:	Typically <0.3dB to 1GHz Typically <0.6dB to 2GHz Typically <0.8dB to 2.5GHz
Loop-thru VSWR:	Typically <1.25:1 to 1GHz Typically <1.3:1 to 2GHz Typically <1.3:1 to 2.5GHz
Loop-thru Isolation:	Typically >60dB to 1GHz Typically >50dB to 2GHz Typically >38dB to 2.5GHz
Maximum RF Power:	10W at 2.5GHz

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.3A	0	0

Other Switching Specifications

Maximum DC Voltage:	30V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Mechanical Characteristics

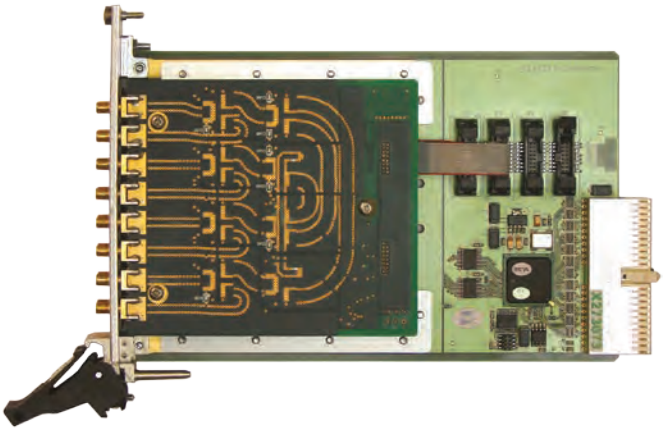
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

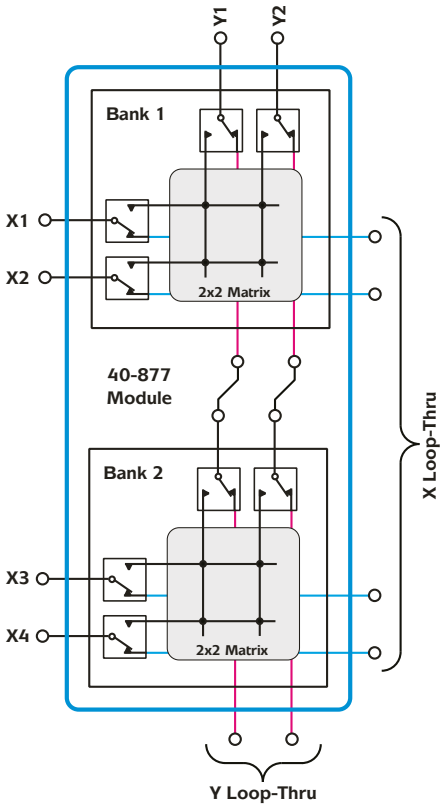
Single 2x2 RF Matrix with loop-thru, SMB	**40-877-001**
Dual 2x2 RF Matrix with loop-thru, SMB	**40-877-002**
Single 2x2 RF Matrix with loop-thru, MCX	**40-877-101**
Dual 2x2 RF Matrix with loop-thru, MCX	**40-877-102**

Mating Connectors & Cabling

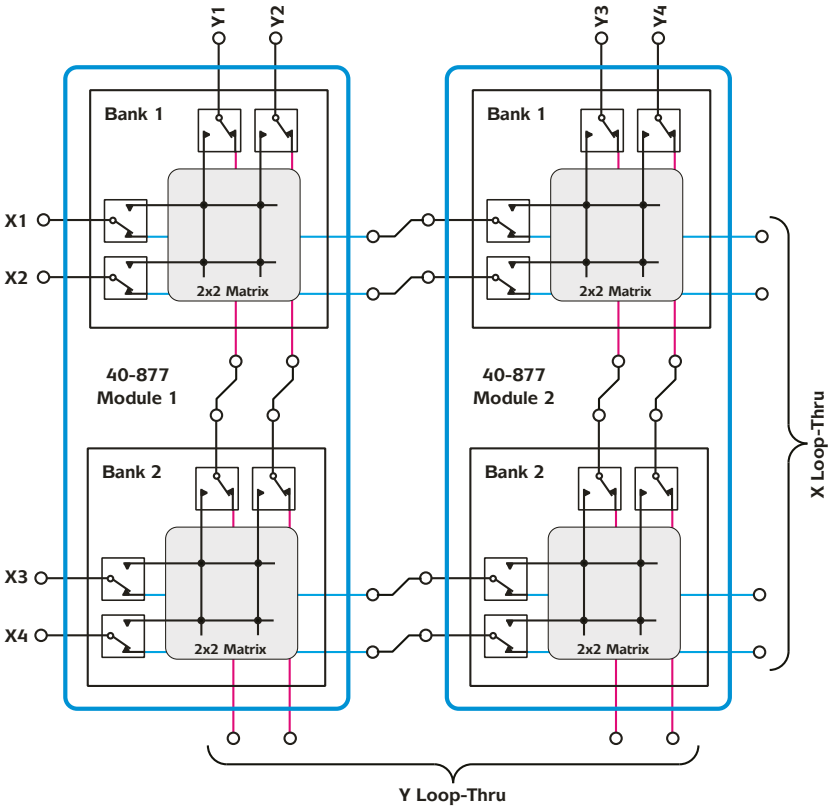
For connection accessories for the 40-877 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



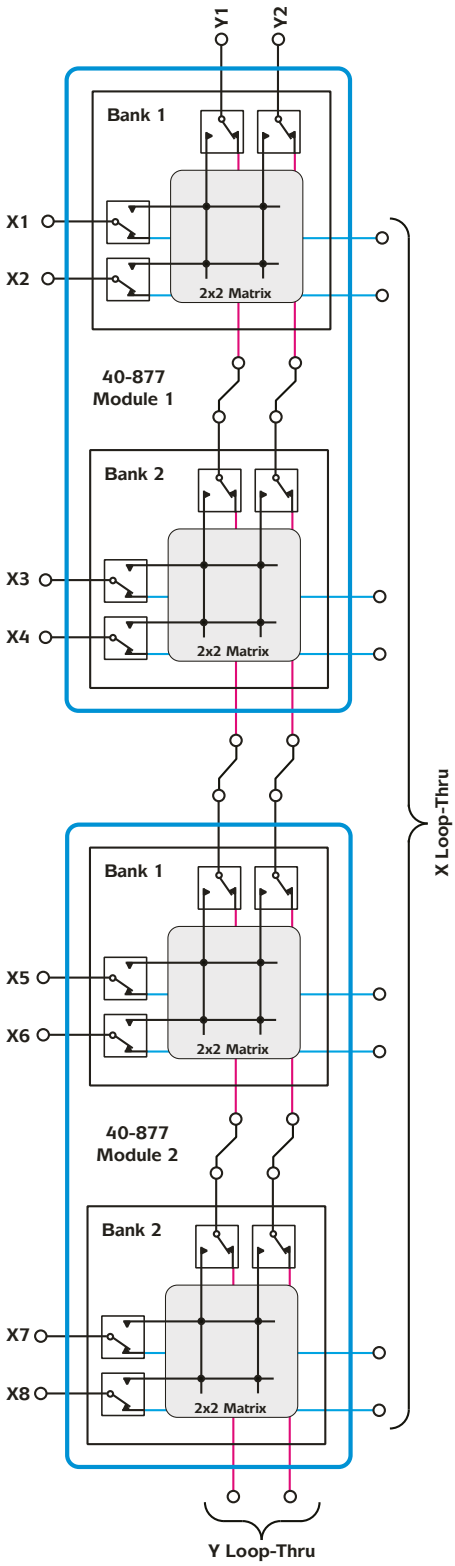
Interconnecting the 40-877 to Produce Larger RF Matrices



40-877 Module With Banks
Interconnected as a 4x2 Matrix



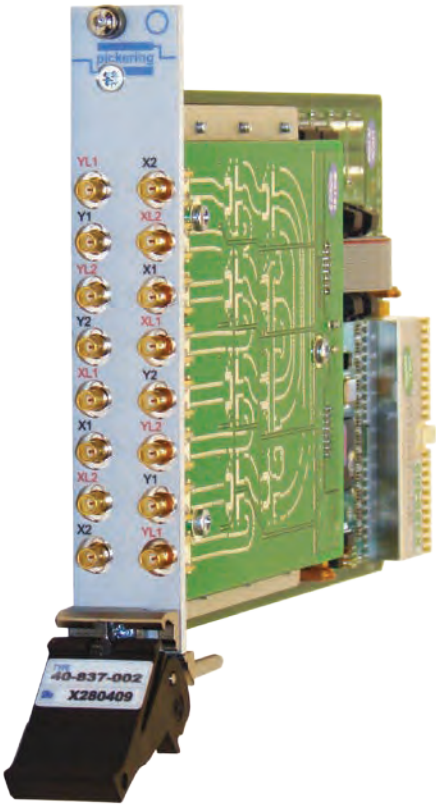
Two 40-877 Modules Interconnected as a 4x4 Matrix



Two 40-877 Modules
Interconnected as an 8x2 Matrix

40-837
75Ω Expandable 2X2 RF Matrix

- 2.5GHz RF Matrix
- Single or Dual 2x2 Matrix
- Loop-Thru on X and Y Axis
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

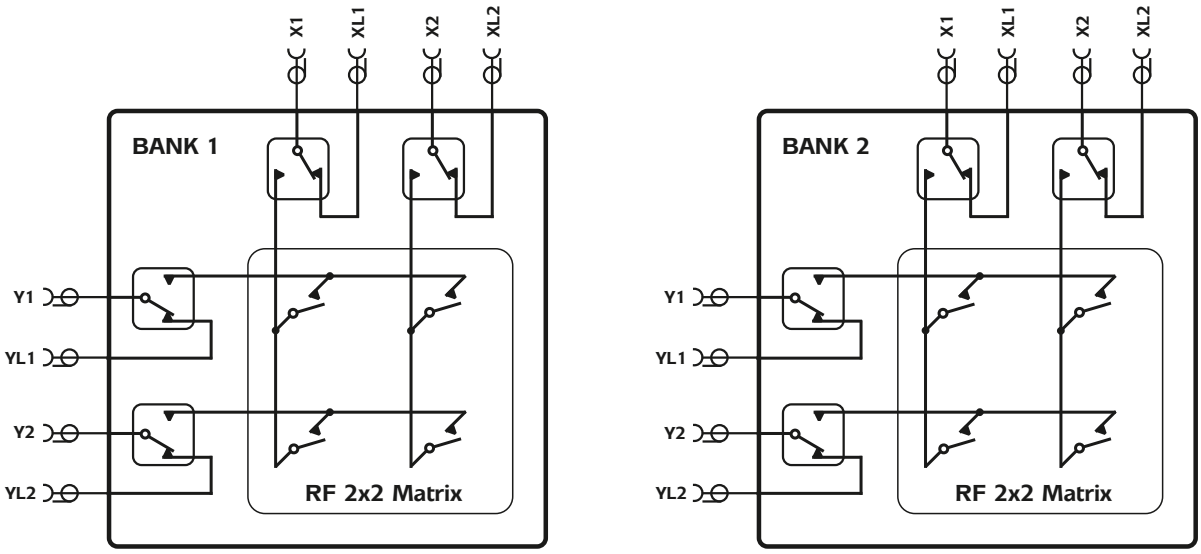


The 40-837 is a 75Ω 2x2 RF matrix available with 1 or 2 banks in a single PXI slot. Loop-thru connections are provided on both the X and Y axis allowing the attachment of terminations for unused signals or for expansion to other matrices. Larger matrices are easily built with varied X and Y dimensions, such as 8x2 and 4x4 using multiple 40-837 modules.

All versions exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each matrix has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 2.5GHz. The injection of noise and unwanted signals into the signal paths of the 40-837 has been minimized by careful attention to the mechanical and electrical design.

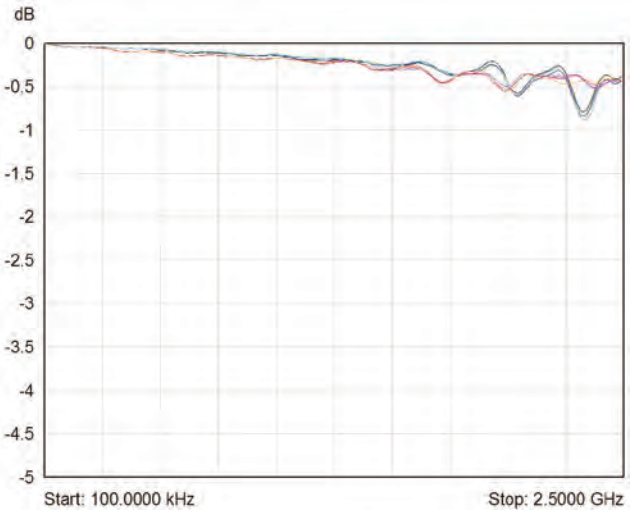
MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

The 40-837 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-837 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

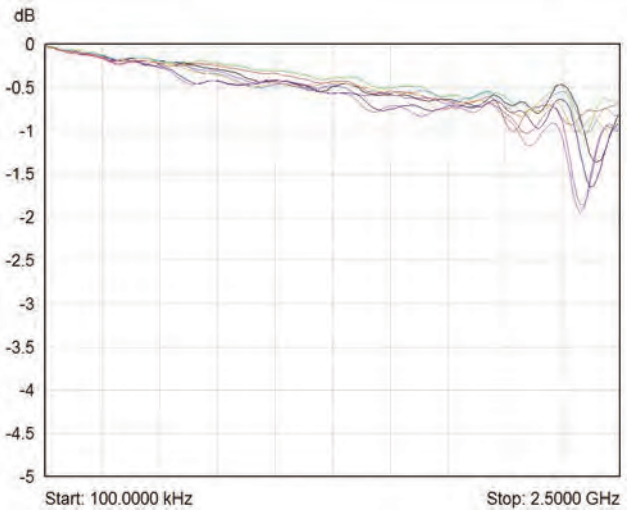


40-837 Dual 2x2 RF Matrix Functional Diagram (Default Switch Paths Shown)

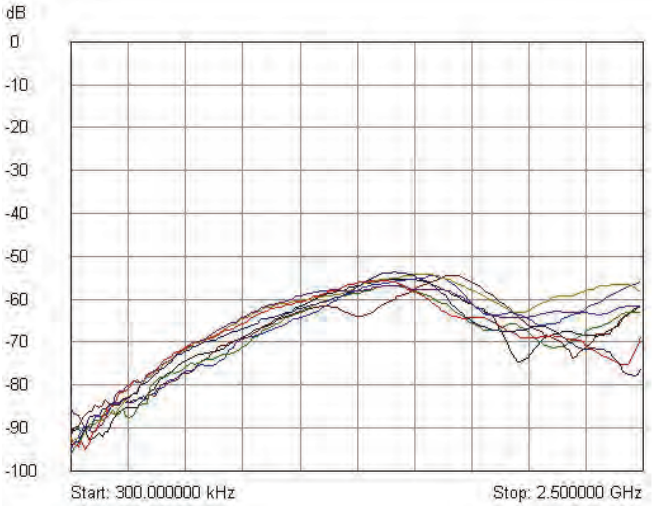
40-837 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



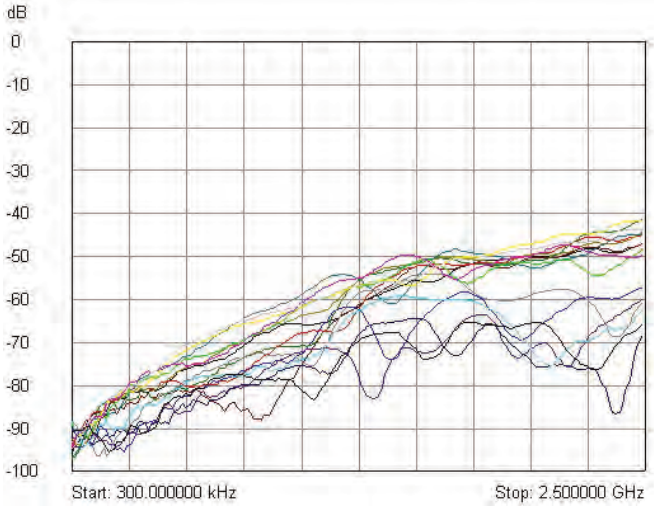
40-837 Typical Insertion Loss Plot - Loop-thru



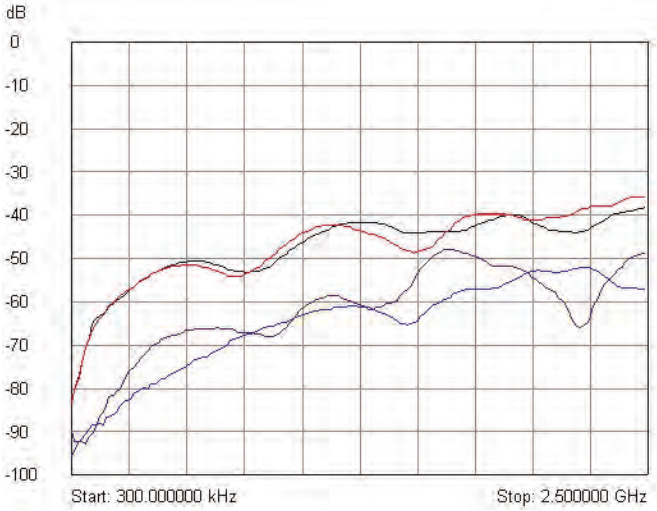
40-837 Typical Insertion Loss Plot - Matrix Path



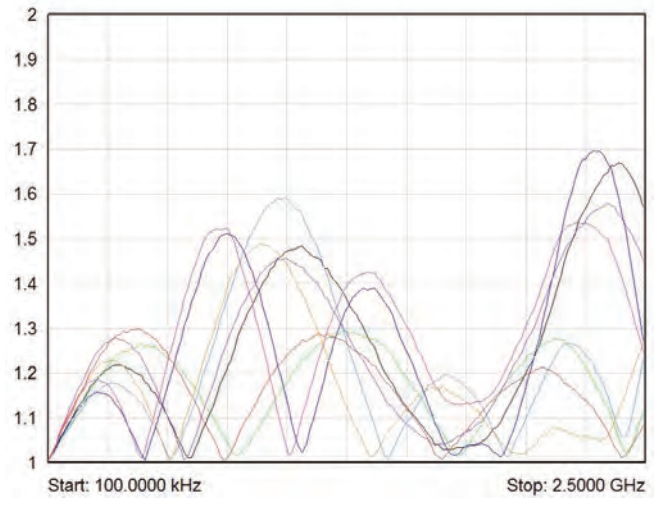
40-837 Typical Isolation Plot - Loop-thru



40-837 Typical Isolation Plot - Matrix Path



40-837 Typical Crosstalk Plot



40-837 Typical VSWR Plot - Matrix Path

RF Specification

RF Frequency Range:	DC to 2.5GHz
Insertion Loss, loop-thru:	Typically <0.3dB to 1GHz Typically <1.0dB to 2.5GHz
Insertion Loss, signal path:	Typically <0.6dB to 1GHz Typically <2.0dB to 2.5GHz
VSWR:	Typically <1.6:1 to 1GHz Typically <1.8:1 to 2.5GHz
Isolation, loop-thru:	Typically >58dB to 1GHz Typically >52dB to 2.5GHz
Isolation, signal path:	Typically >58dB to 1GHz Typically >40dB to 2.5GHz
Crosstalk:	Typically <-42dB to 1GHz Typically <-35dB to 2.5GHz
Maximum RF Power:	10W at 2.5GHz

Other Switching Specifications

Maximum DC Voltage:	100V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.3A	0	0

Mechanical Characteristics

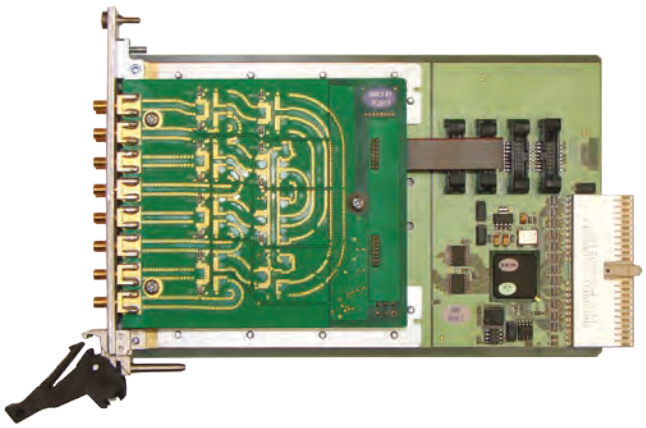
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Single 2x2 RF Matrix with loop-thru, SMB	**40-837-001**
Dual 2x2 RF Matrix with loop-thru, SMB	**40-837-002**
Single 2x2 RF Matrix with loop-thru, MCX	**40-837-101**
Dual 2x2 RF Matrix with loop-thru, MCX	**40-837-102**

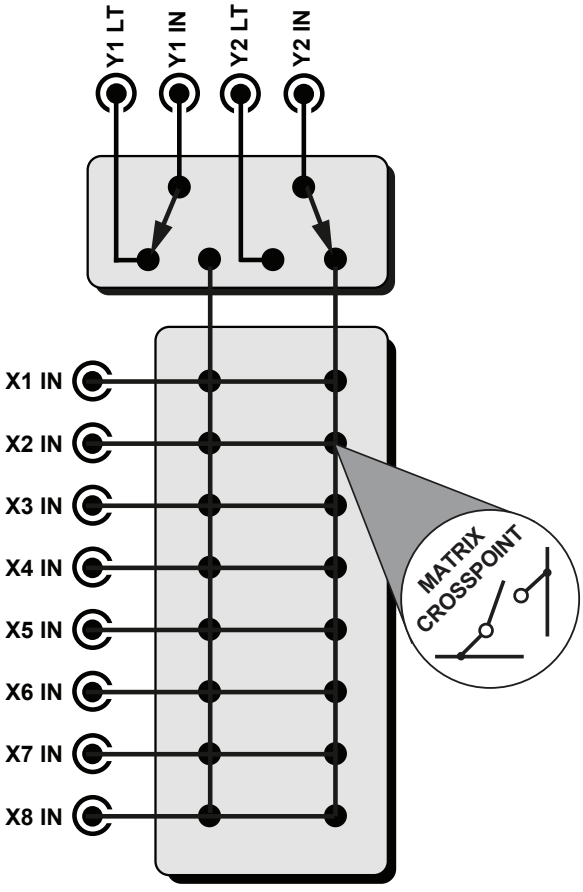
Mating Connectors & Cabling

For connection accessories for the 40-837 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-750
8x2 RF Coaxial Matrix

- 8x2 RF Coaxial Matrix
- 1.5GHz Bandwidth
- 50Ω Characteristic Impedance
- Built-in Y-Axis Loop-Thru Simplifies the Construction of Larger RF Matrices
- High Density SMA or SMB Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

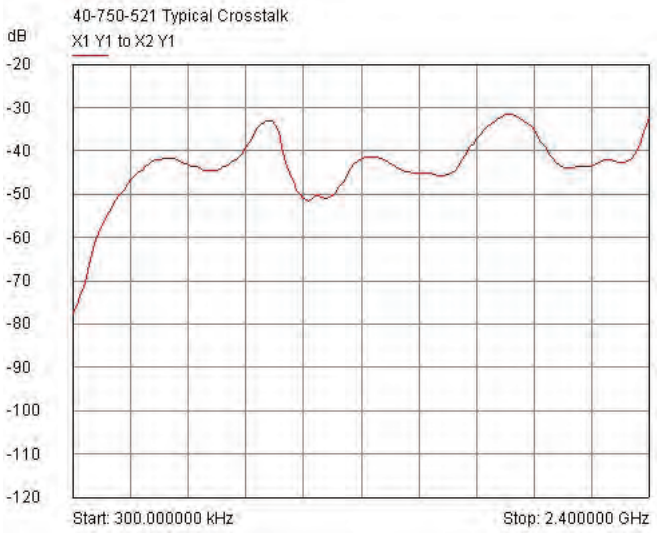


8x2 Coaxial Matrix Schematic Diagram

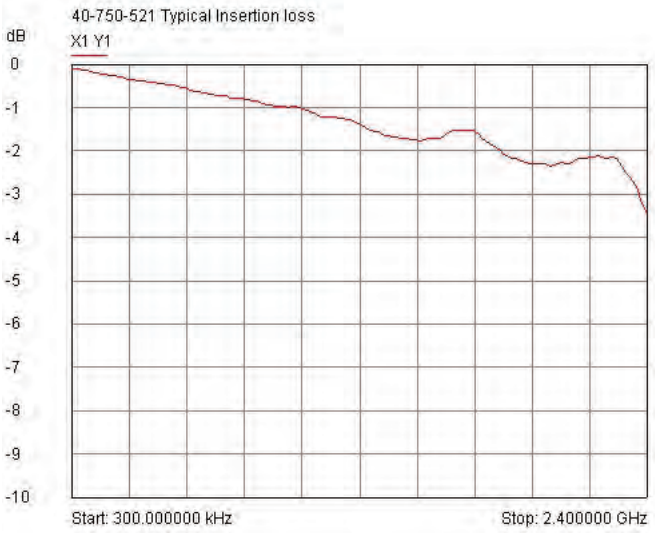
The 40-750 is an 8x2 RF Matrix Module suitable for switching frequencies up to 1500MHz. It has a 50Ω characteristic impedance with front panel mounted SMA or SMB coaxial connectors. The matrix intended for the easy construction of high performance bidirectional switching systems.

Automatic loop-thru of signals on the Y-axis is also provided. This allows the switching of Y signals that are not routed through the matrix to connectors on the front panel. In this way Y signals can be routed to adjacent modules for matrix expansion or to 50Ω terminators

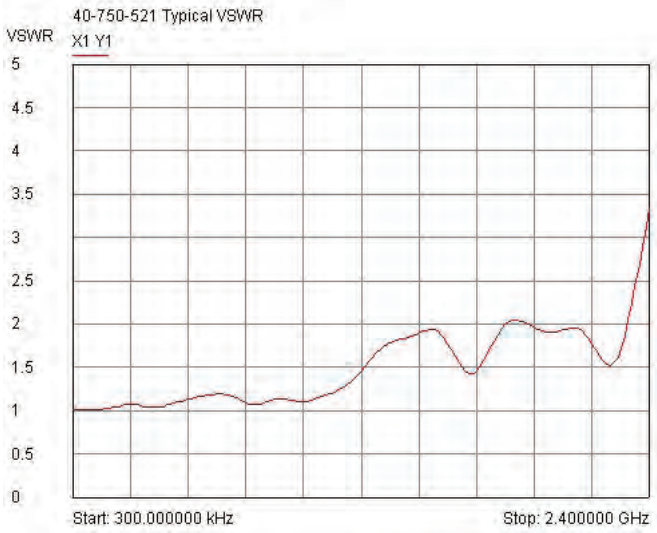
Applications include routing high frequency signals to and from oscilloscopes, network/spectrum analysers, signal generators and synthesizers, switching high frequency logic and many other situations involving coaxial switching.



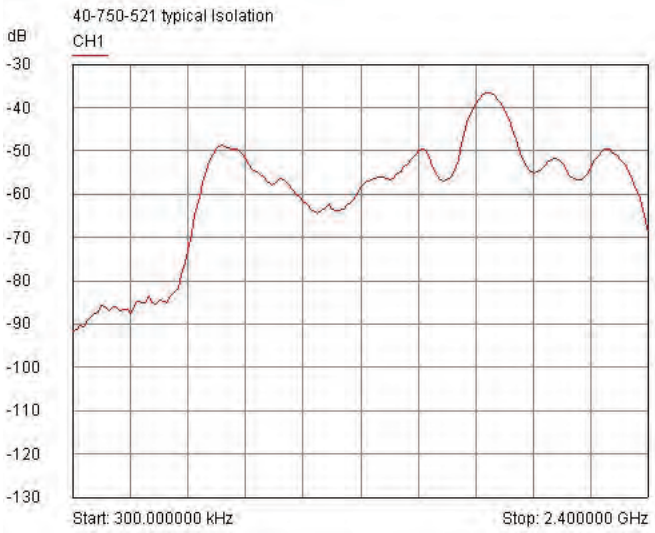
40-750-521 RF Matrix Typical Crosstalk Plot



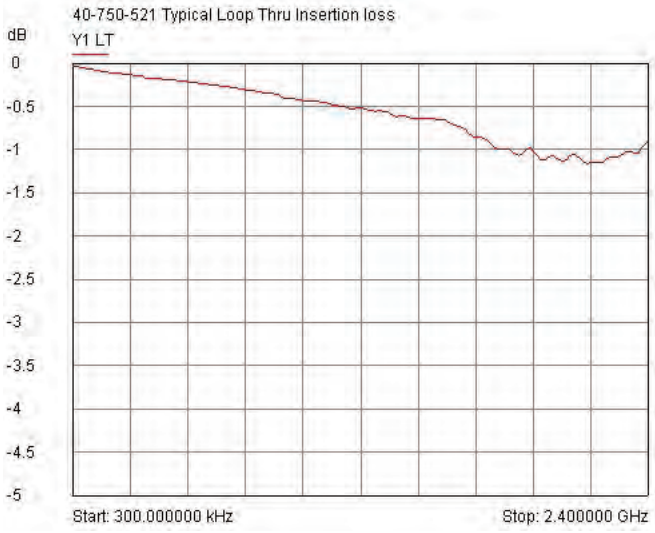
40-750-521 RF Matrix Typical Insertion Loss Plot



40-750-521 RF Matrix Typical VSWR Plot



40-750-521 RF Matrix Typical Isolation Plot



40-750-521 RF Matrix Typical Insertion Loss Plot Using Loop Thru

General Switching Specification

Maximum Voltage:	60VDC
Maximum Power:	10W
Maximum Carry Power (900MHz):	10W
Maximum Switch Current:	0.1A
Characteristic Impedance:	50Ω
Initial On Path Resistance:	<600mΩ
Off Path Resistance:	>1x10^{8}Ω
Thermal Offset:	<30µV
Expected Life (Low power):	>2x10^7 operations
Expected Life (Max power):	>3x10^5 operations
Operate Time:	<5ms
Release Time:	<5ms

RF Specification (50Ω SMA)

Maximum Frequency:	1.5GHz
Typical Rise Time:	500ps
Insertion Loss (<1500MHz):	<3dB
VSWR (<1500MHz):	1:1.8
Isolation (<1500MHz):	>50dB
Crosstalk (<1500MHz):	>35dB

Power Requirements

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector. Signals via 12 front panel mounted coaxial connectors.

Product Order Codes

PXI 8x2 1.5GHz Coaxial Matrix	
SMA Connectors, 50Ω	**40-750-521**
SMB Connectors, 50Ω	**40-750-511**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

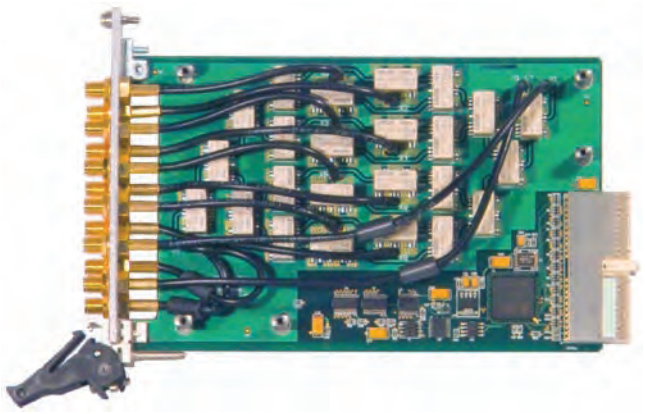
The relay kit for the 40-750 module is as follows:

91-100-014 kit for 40-750-521/511

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-750 module please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Side View of the 40-750 RF Matrix Module With the Cover Removed

40-725
8x9 RF Coaxial Matrix

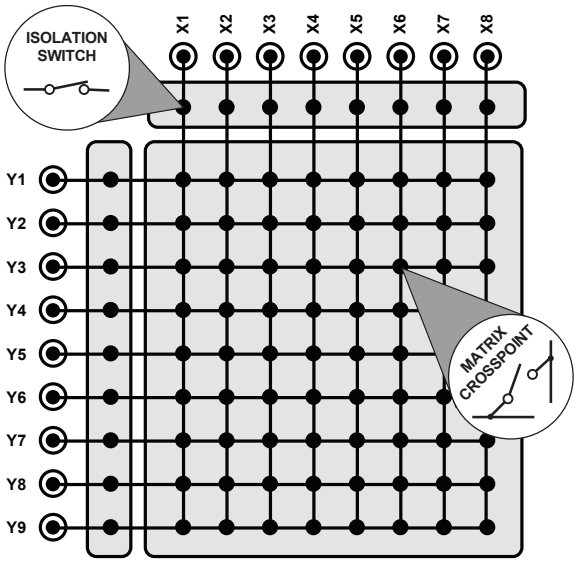
- 8x9 RF Coaxial Matrix
- Up to 500MHz Bandwidth
- 50Ω and 75Ω Versions Available
- High Quality Ruthenium Reed Relays
- High Density SMB Front Panel Mounted Coaxial Connectors
- 75Ω Version Suitable for Telecoms and High Quality Video Switching
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- Selected Builds Supported by eBIRST
- 3 Year Warranty

The 40-725 is an 8x9 RF Matrix Module suitable for switching frequencies up to 500MHz. The 40-725 is available in either 50Ω or 75Ω versions with SMB coaxial connectors. It is intended for the easy construction of high performance bidirectional matrix switching systems.

Automatic Isolation Switches are located on all coaxial connectors (refer to drawing), these disconnect the matrix from the external test fixture. This maximizes isolation and RF performance.

Matrix Operation

The 40-725 is a true 8x9 high density matrix, any combination of crosspoints may be selected. Only the signal is switched, all grounds are common.



8x9 Coaxial Matrix Schematic Diagram

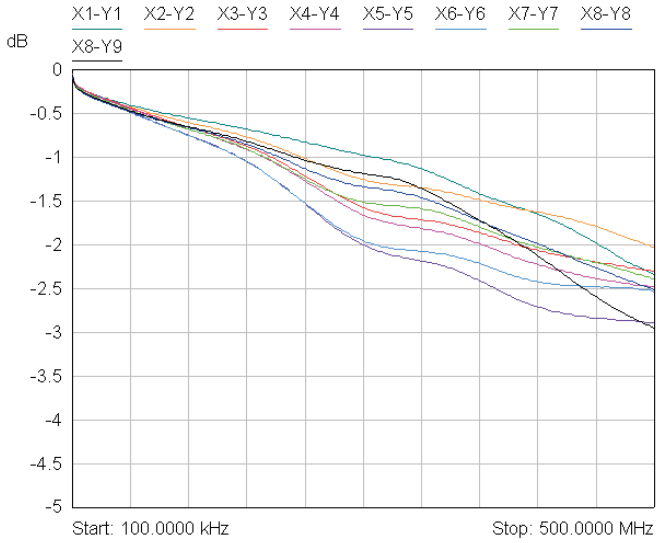
Other RF Matrix Modules in Pickering's PXI Range:

- **40-726A** - 12x8 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-727** - 16x4 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-728** - 16x2 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-729** - 8x4 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-750** - 8x2 1.5GHz, 50Ω/75Ω - Y Loop-Thru
- **40-872** - single/dual 2x2 3GHz, 50Ω
- **40-832** - single/dual 2x2 3GHz, 75Ω
- **45-720A** - 6U, 16x16 250MHz, 50Ω/75Ω - Y Loop-Thru

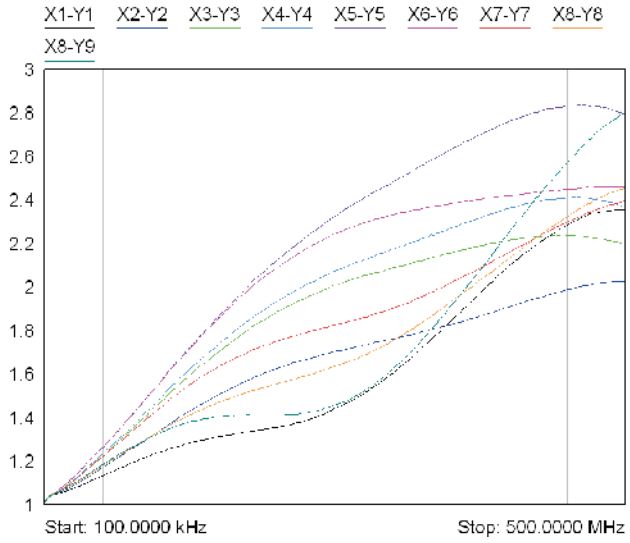
Relay Type

The 40-725 matrix uses Sputtered Ruthenium Reed Relays, these offer very stable switch contact resistance with expected life of 10^9 operations when switching typical RF signals.

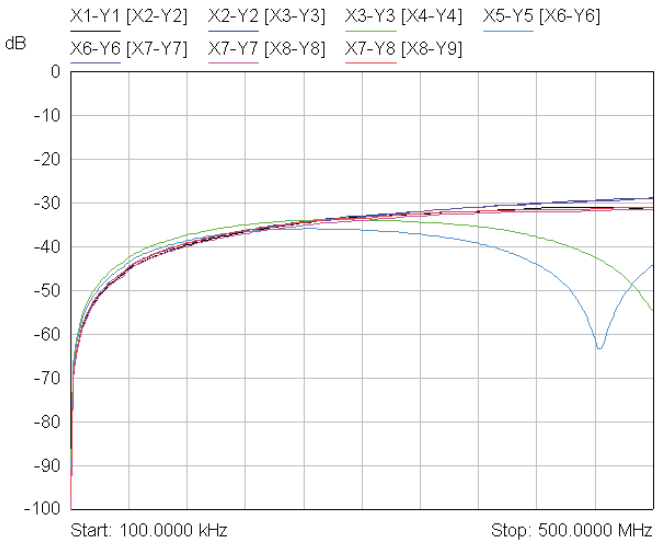
Spare RF Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.



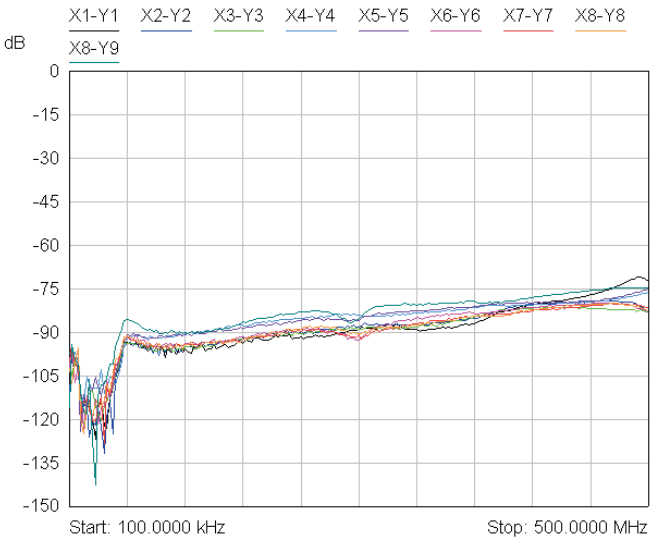
40-725-511 (50Ω Version) Insertion Loss Plot to 500MHz



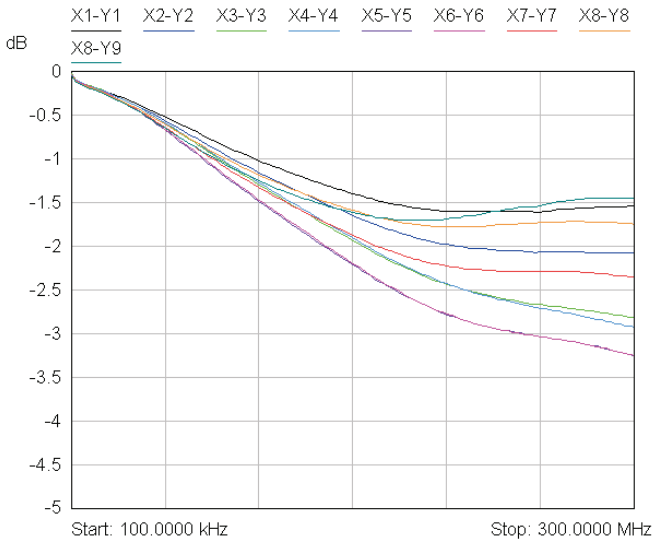
40-725-511 (50Ω Version) VSWR Plot to 500MHz



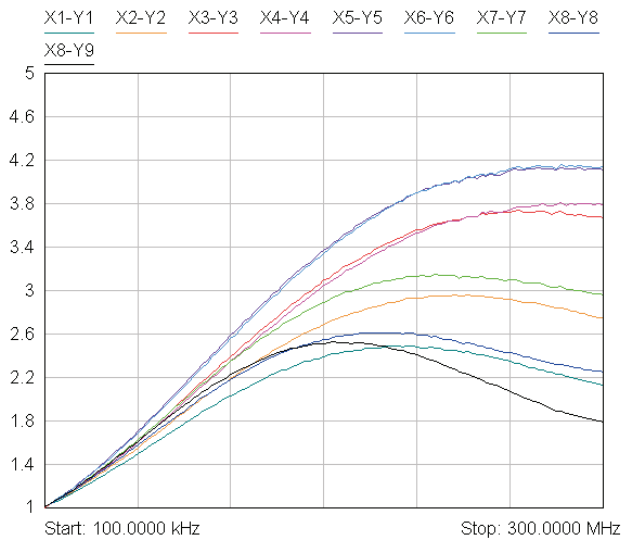
40-725-511 (50Ω Version) Crosstalk Plot to 500MHz



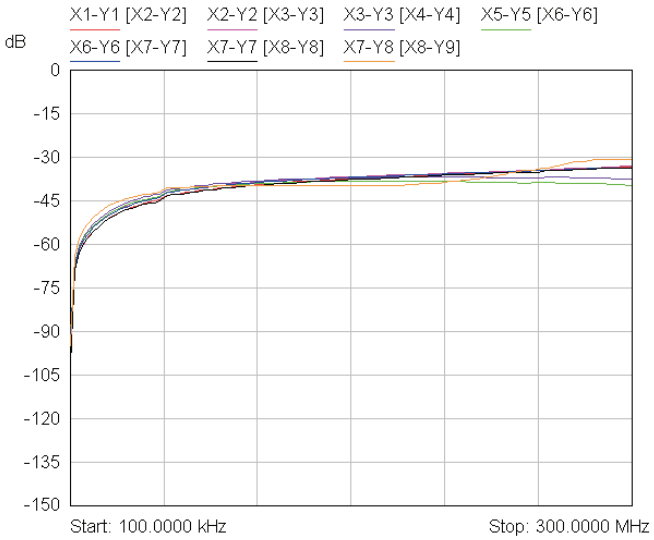
40-725-511 (50Ω Version) Isolation Plot to 500MHz



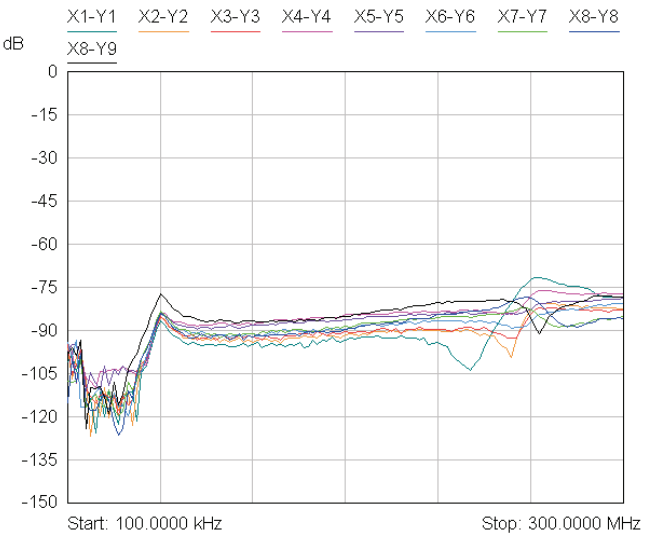
40-725-751 (75Ω Version) Insertion Loss Plot to 300MHz



40-725-751 (75Ω Version) VSWR Plot to 300MHz



40-725-751 (75Ω Version) Crosstalk Plot to 300MHz



40-725-751 (75Ω Version) Isolation Plot to 300MHz

General Switching Specification

Maximum Voltage:	100VDC
Maximum Power:	10W
Maximum Switch Current:	0.5A
Maximum Carry Current:	0.5A
Characteristic Impedance:	50Ω or 75Ω
Initial On Path Resistance:	<500mΩ
Off Path Resistance:	$>10^8$Ω
Thermal Offset:	<30µV
Expected Life (Low Power):	$1x10^9$ operations
Expected Life (Max Power):	$>5x10^6$ operations
Operate Time:	<1ms, 0.5ms typical

RF Specification

Maximum Frequency - 50Ω Version:	500MHz
Maximum Frequency - 75Ω Version:	250MHz
Typical Rise Time:	800ps †
Insertion Loss:	<3dB †
V.S.W.R. - 50Ω Version:	<3:1 to 500MHz †
V.S.W.R. - 75Ω Version:	<3:1 to 100MHz †
Isolation:	>70dB
Crosstalk - 50Ω Version:	<40dB at 50MHz <25dB at 500MHz
Crosstalk - 75Ω Version:	<40dB at 50MHz <30dB at 250MHz
40-725-721 Version	
Insertion Loss to 200MHz:	<3dB typical
Insertion Loss to 400MHz:	<4.5dB typical

† Matrix RF Performance is entirely dependant upon the combination of crosspoints currently selected, these figures are for **one** selected crosspoint on any X or Y channel only, refer to graphs.

Power Requirements

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

X and Y signals are via 17 front panel mounted coaxial SMB connectors.

Product Order Codes

PXI 8x9 Coaxial Matrix	
SMB Version, 50Ω	**40-725-511**
SMB Version, 75Ω	**40-725-751**
Special version of the 75Ω Coaxial Matrix, 75Ω Impedance (but using 50Ω SMB connectors)	**40-725-721**

Support Products

eBIRST Switching System Test Tool

40-725-511 is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
40-725-511	**93-005-001**	**93-005-202**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-004**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-725 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-726A
12x8 RF Coaxial Matrix

- 12x8 RF Coaxial Matrix
- Up to 300MHz Bandwidth
- 50Ω and 75Ω Versions Available
- Easy To Use Loop Thru Options, Enabling Simple Expansion Via Built-In Cabling With No Hidden Expense
- High Density SMB Coaxial Connectors
- 75Ω Version Suitable for Telecoms and High Quality Video Switching
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Selected Builds Supported by eBIRST
- 3 Year Warranty

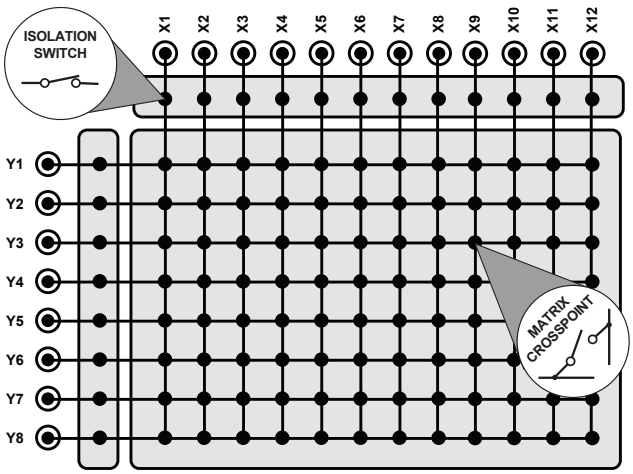
The 40-726A is a 12x8 RF Matrix Module suitable for switching frequencies up to 300MHz. The 40-726A is available in either 50Ω or 75Ω versions with a choice of coaxial connectors. The module is designed to provide a simple and scalable bidirectional matrix to RF frequencies. It is intended for the easy construction of high performance bidirectional matrix switching systems.

Isolation Switches are located on all coaxial connectors (refer to drawing), these disconnect the matrix from the external test fixture. This maximises isolation and RF performance.

Matrix Operation

The 40-726A is a true 12x8 high density matrix, any combination of crosspoints may be selected. Only the signal is switched, all grounds are common.

This module is based on the same construction as the popular 40-725 RF matrix module, but has increased capacity and optional built in loop thru on the Y axis to allowing easy expansion with a minimum loss of bandwidth.



12x8 Coaxial Matrix Schematic Diagram

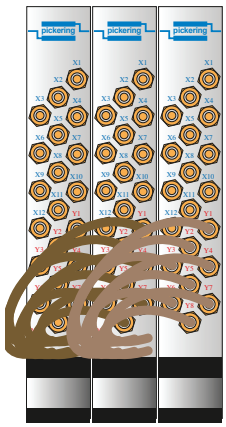
Other RF Matrix Modules in Pickering's PXI Range:

- **40-725** - 8x9 500MHz, 50Ω/75Ω
- **40-727** - 16x4 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-728** - 16x2 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-729** - 8x4 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-750** - 8x2 1.5GHz, 50Ω/75Ω - Y Loop-Thru
- **40-872** - single/dual 2x2 3GHz, 50Ω
- **40-832** - single/dual 2x2 3GHz, 75Ω
- **45-720A** - 6U, 16x16 250MHz, 50Ω/75Ω - Y Loop-Thru

Option For Loop Thru on Y Axis

The easy to use loop thru option allows 40-726A modules to be cascaded to form larger matrices whilst minimizing impact on RF performance, for example 8 modules can be used to construct a 96x8 matrix with bandwidth preserved at over 200MHz.

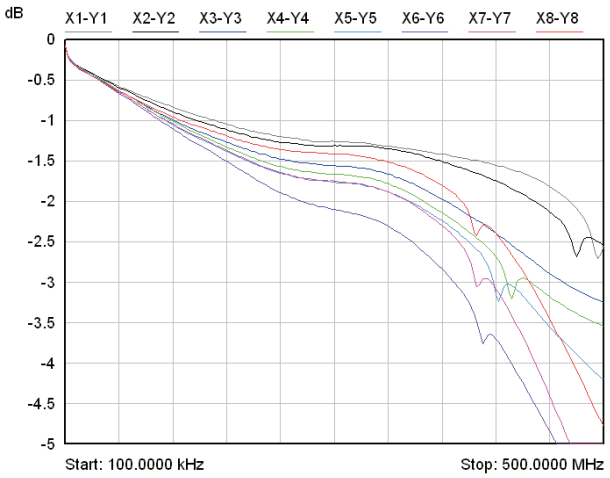
The Loop Thru Cables are already built into the loop thru version, they pass thru a slot in front panel and are simply connected to the next matrix module in the chain.



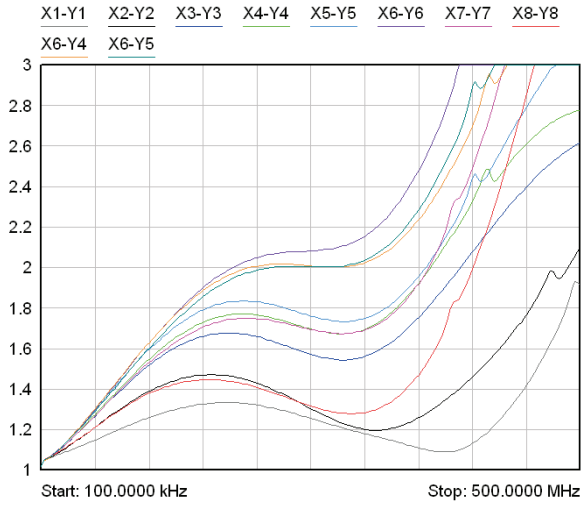
Schematic Showing Construction of a 36x8 RF Matrix (Loop-Thru cables interconnect each 12 x 8 Matrix module)

RF Performance Plots for 40-726A RF Matrix Module

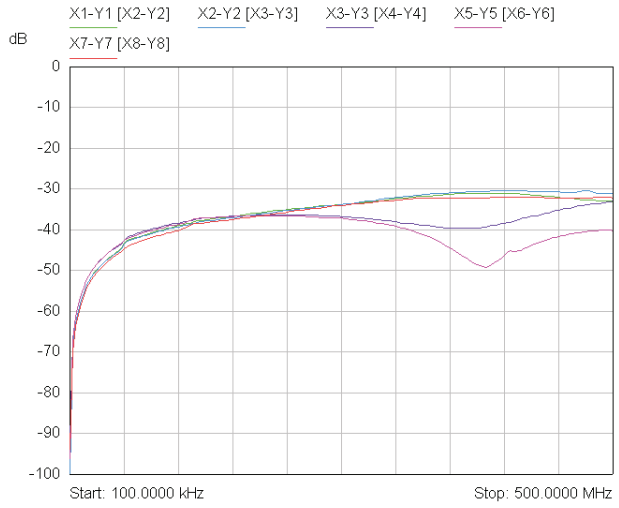
Typical curves are shown for matrix rows/columns with 1 crosspoint set. For optimum insertion loss and VSWR (reflection) performance ensure only one crosspoint is set in any one row/column. **Multiple crosspoints can be set on any one row or column but this will seriously degrade RF performance.** The performance is also dependent upon the area of the matrix where the crosspoint is set. Best performance is obtained at the corners (for example a X1-Y1 path), worse performance is obtained in the center (a X6-Y4 path). This is outlined in the Insertion Loss and VSWR plots below which also include the performance of a typical signal path between X3 and Y3. For more information on how performance is distributed throughout the matrix, please refer to the User Manual



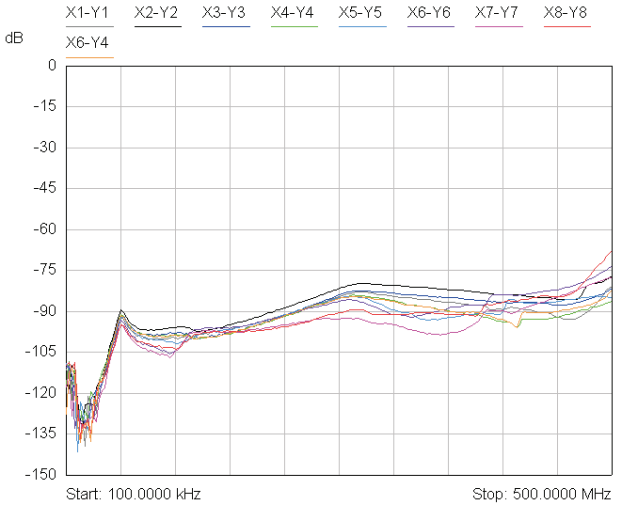
40-726A-511-L (50Ω Version) Insertion Loss Plot to 500MHz



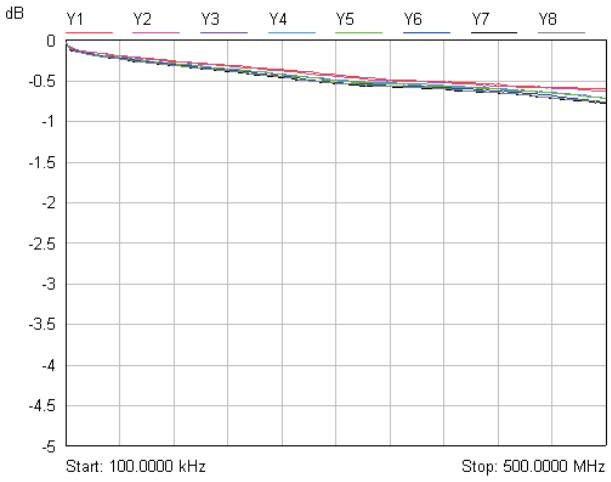
40-726A-511-L (50Ω Version) VSWR Plot to 500MHz



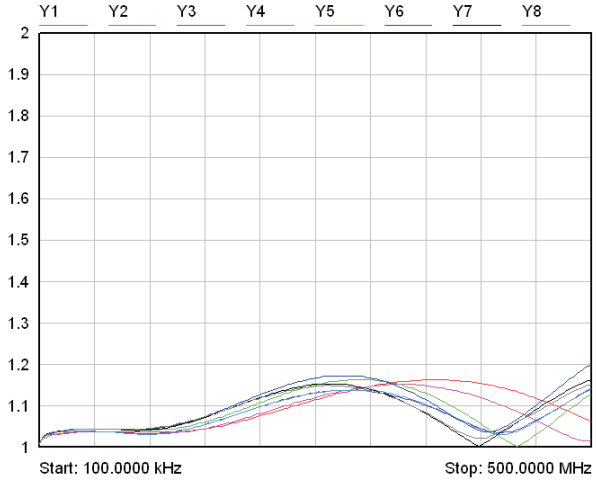
40-726A-511-L (50Ω Version) Crosstalk Plot to 500MHz



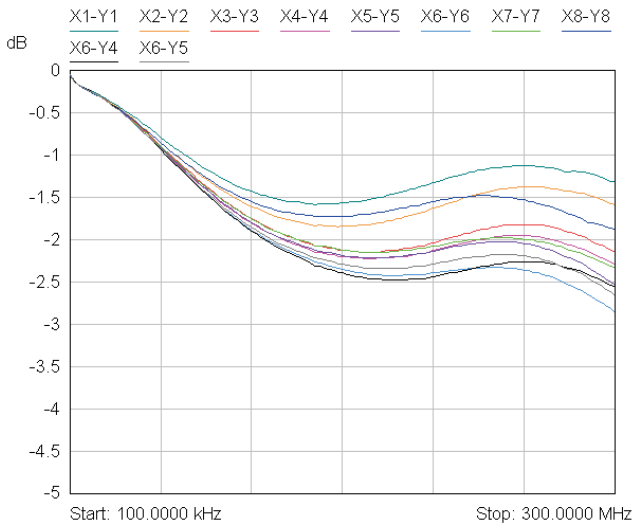
40-726A-511-L (50Ω Version) Isolation Plot to 500MHz



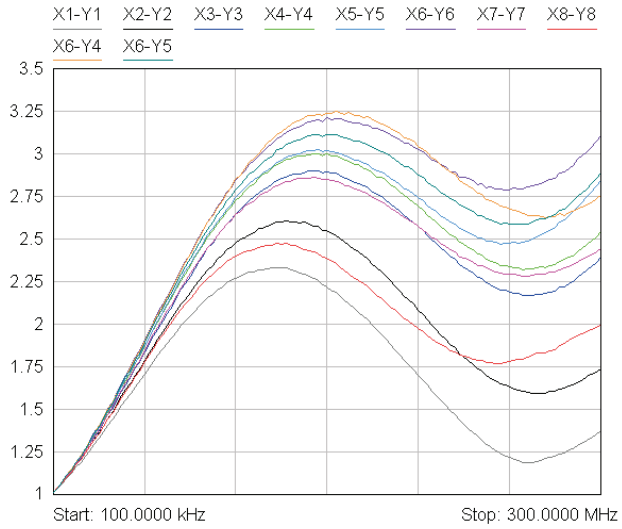
40-726A-511-L (50Ω Version) Loop-Thru Insertion Loss Plot to 500MHz



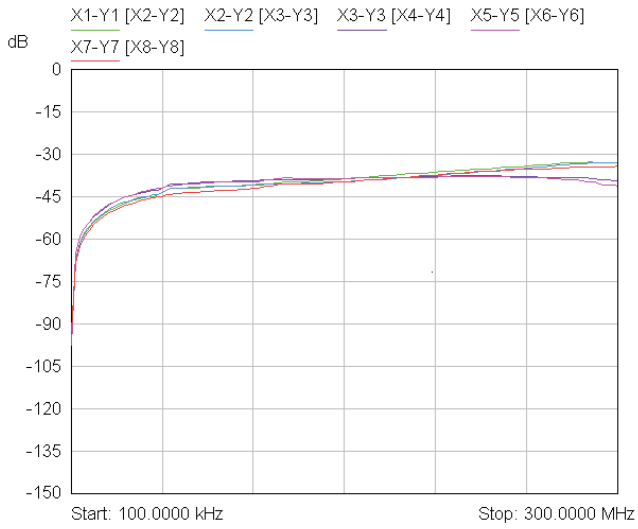
40-726A-511-L (50Ω Version) Loop-Thru VSWR Plot to 500MHz



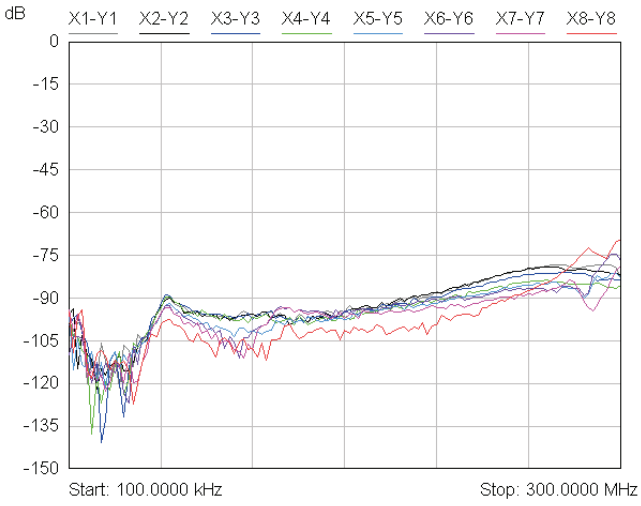
40-726A-751-L (75Ω Version) Insertion Loss Plot to 300MHz



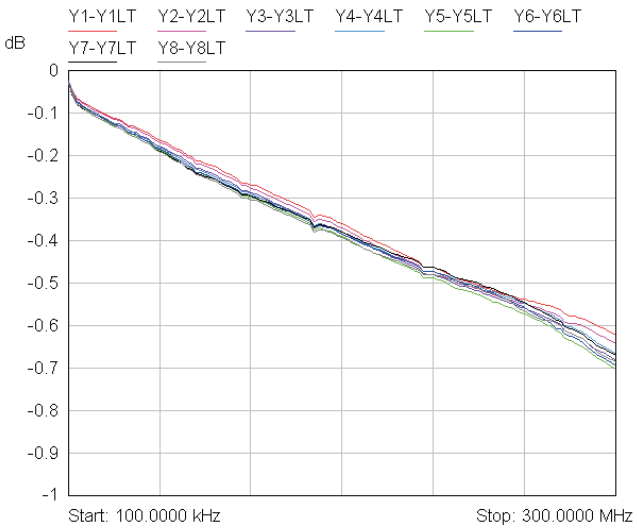
40-726A-751-L (75Ω Version) VSWR Plot to 300MHz



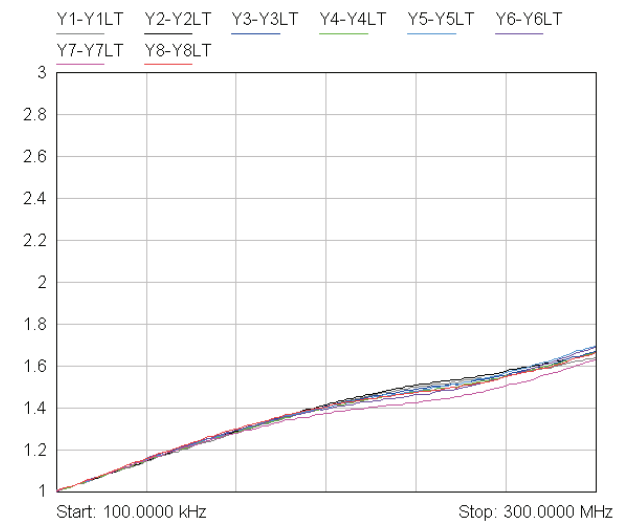
40-726A-751-L (75Ω Version) Crosstalk Plot to 300MHz



40-726A-751-L (75Ω Version) Isolation Plot to 300MHz



40-726A-751-L (75Ω Version) Loop-Thru Insertion Loss Plot to 300MHz



40-726A-751-L (75Ω Version) Loop-Thru VSWR Plot to 300MHz

General Matrix Switching Specification

Maximum Voltage:	100VDC
Maximum Power:	10W
Maximum Switch Current:	0.5A
Maximum Carry Current:	0.5A
Characteristic Impedance:	50Ω or 75Ω
Initial On Path Resistance:	<1000mΩ
Off Path Resistance:	$>10^8$Ω
Thermal Offset:	<30µV
Expected Life (Low Power):	$1x10^9$ operations
Expected Life (Max Power):	$>5x10^6$ operations
Operate Time:	<1ms, 0.5ms typical

RF Specification

Maximum Frequency - 50Ω Version:	300MHz
Maximum Frequency - 75Ω Version:	250MHz
Typical Rise Time:	800ps †
Insertion Loss - 50Ω Version:	<3dB to 300MHz †
Insertion Loss - 75Ω Version:	<3dB to 250MHz †
V.S.W.R. - 50Ω Version:	<2.8:1 to 300MHz †
V.S.W.R. - 75Ω Version:	<3:1 to 100MHz †
Crosstalk - 50Ω Version:	<40dB at 50MHz † <28dB at 300MHz
Crosstalk - 75Ω Version:	<40dB at 50MHz <30dB at 250MHz

Loop Thru RF Specification

Insertion Loss (<100MHz):	<1dB
V.S.W.R. (<100MHz):	<1:1.05
Isolation (<300MHz):	>70dB
Operate Time:	<1ms, 0.5ms typical

† Matrix RF Performance is entirely dependant upon the combination of crosspoints currently selected, these figures are for **one** selected crosspoint on any X or Y channel only, refer to graphs. For further assistance on getting maximum performance using the 40-726A please refer to the Operating Manual.

Power Requirements

+3.3V	+5V	+12V	-12V
0	500mA (typ 350mA)	0	0

Optional Y-axis loop-thru allows easy expansion. Shown here is a 60x8 RF matrix with over 200MHz bandwidth.

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 340g (40-726A-511)
400g (40-726A-751-L)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

X and Y signals are via 20 front panel mounted coaxial SMB connectors.

Versions with **-L** suffix have Y signal loop-thru via 8 off SMB flying leads with a nominal length of 120mm.
A clearance of 80mm from the front panel of the module is required for routing the leads to an adjacent module.

Product Order Codes

PXI 12x8 RF Coaxial Matrix	
SMB, 50Ω	**40-726A-511**
SMB, 50Ω with loop-thru on Y axis	**40-726A-511-L**
SMB, 75Ω	**40-726A-751**
SMB, 75Ω with loop-thru on Y axis	**40-726A-751-L**

Support Products

eBIRST Switching System Test Tool

40-726A-511 is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
40-726A-511	**93-005-001**	**93-005-202**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-004**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-726A range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-727/728/729
Expandable RF Coaxial Matrix

- 16x4, 16x2 and 8x4 RF Coaxial Matrices
- 300MHz Usable Bandwidth
- 50Ω and 75Ω Versions Available
- Easy To Use Loop Thru Option To Allow Unlimited X Axis Expansion
- High Density SMB and Multiway Connector Versions
- 75Ω Version Suitable for Telecoms and Video Switching
- VISA & IVI Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Selected Builds Supported by eBIRST
- 3 Year Warranty

40-727/728/729 are RF Matrix Modules suitable for switching frequencies to 300MHz. The modules are available in either 50Ω or 75Ω versions with a choice of coaxial connectors. The 40-727/728/729 are designed to provide a simple and scalable bidirectional matrix to RF frequencies. They are intended for the easy construction of high performance bidirectional matrix switching systems.

Isolation Switches are located on all coaxial connectors (refer to drawing), these disconnect the matrix from the external test fixture. This maximises isolation and RF performance.

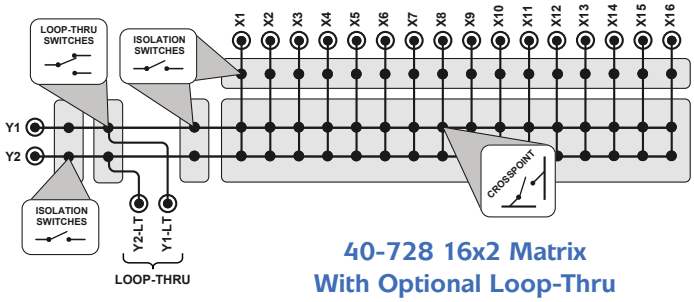
Matrix Operation

The 40-727/8/9 are high density matrices designed primarily to provide a Y to X connection to maximize matrix bandwidth. It can also support limited X to X connectivity as shown in the manual.

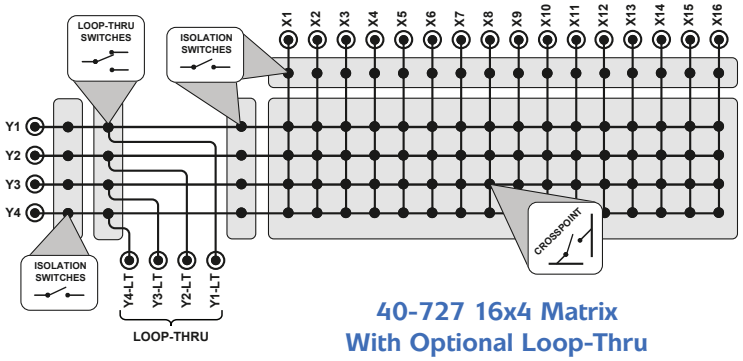
This module is based on the same construction as the popular 40-725 RF matrix module, but has increased capacity and optional built in loop thru on the Y axis to allowing easy expansion with a minimum loss of bandwidth.

Other RF Matrix Modules in Pickering's PXI Range:

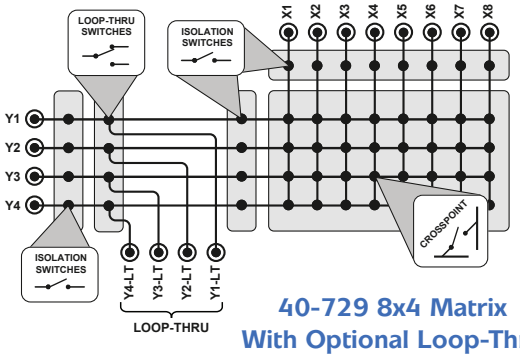
- **40-725** - 8x9 500MHz, 50Ω/75Ω
- **40-726A** - 12x8 300MHz, 50Ω/75Ω - Optional Y Loop-Thru
- **40-750** - 8x2 1.5GHz, 50Ω/75Ω - Y Loop-Thru
- **40-872** - single/dual 2x2 3GHz, 50Ω
- **40-832** - single/dual 2x2 3GHz, 75Ω
- **45-720A** - 6U, 16x16 250MHz, 50Ω/75Ω - Y Loop-Thru



40-728 16x2 Matrix
With Optional Loop-Thru



40-727 16x4 Matrix
With Optional Loop-Thru



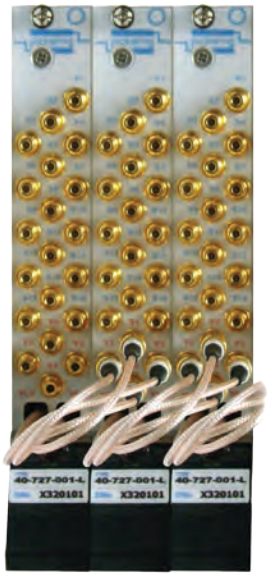
40-729 8x4 Matrix
With Optional Loop-Thru

Option For Loop Thru on Y Axis

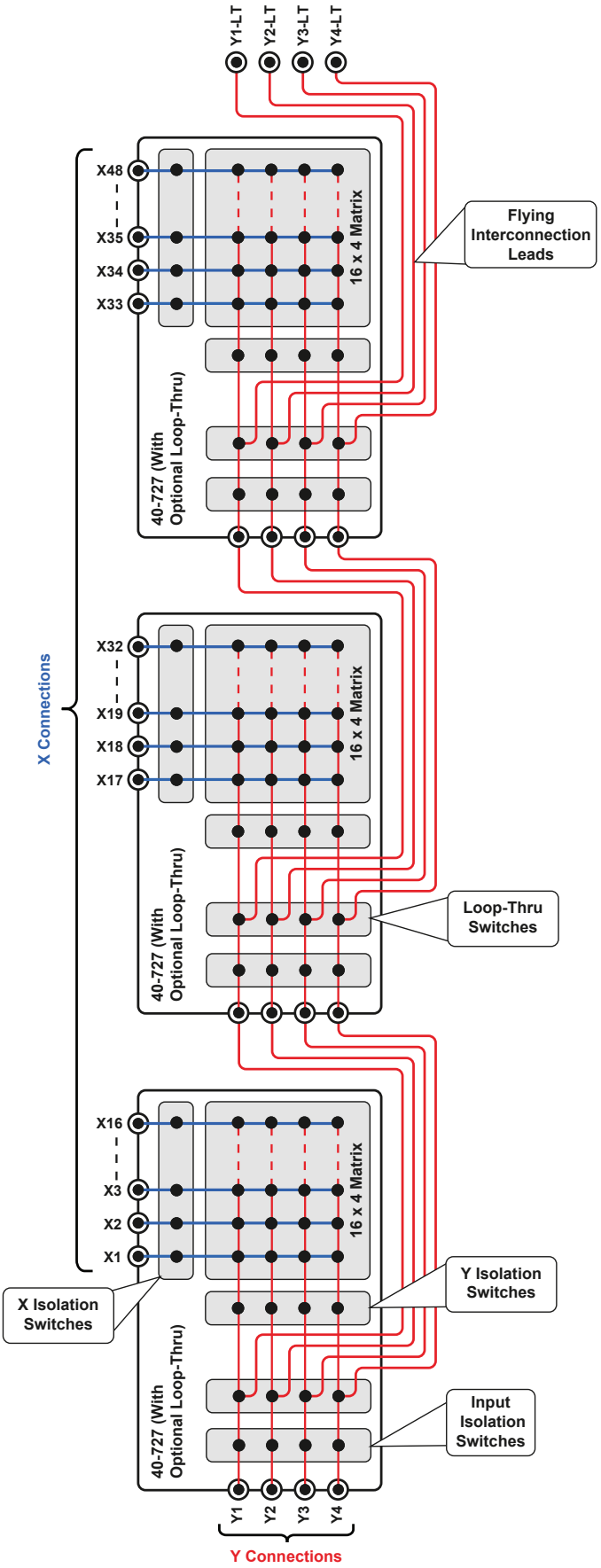
The easy to use loop thru option allows 40-727/728/729 modules to be cascaded to form larger matrices whilst minimizing impact on RF performance.

The Loop Thru Cables are already built into the SMB loop thru version, they pass thru a slot in front panel and are simply connected to the next matrix module in the chain. Multiway connector versions include pins for loop-thru on the front panel connector.

The loop thru system is designed to provide an extended connection from Y to X , it does not support an X to X connection where the X connections are in different modules.



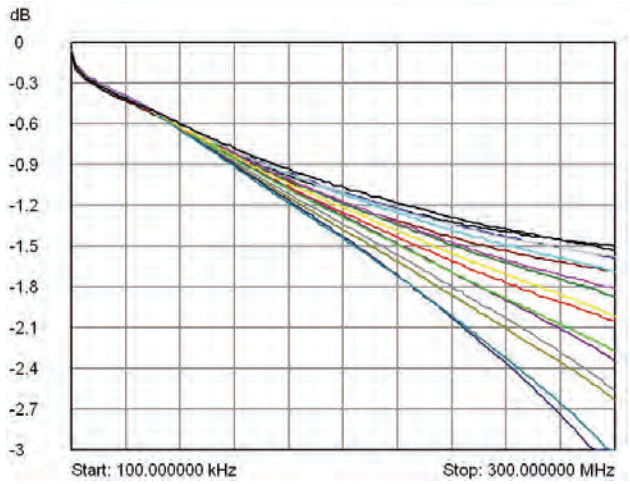
48x4 RF Matrix Created from 3-off 40-727-001-L
(Loop-Thru cables interconnect each 16x4 Matrix module)



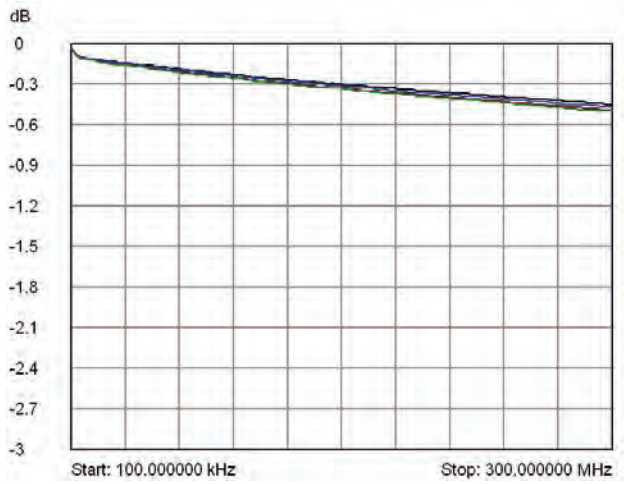
3 off 40-727-001-L 16x4 RF Matrix Modules Interconnected as a 48x4 Matrix

RF Performance Plots for 40-727 300MHz RF Matrix Module

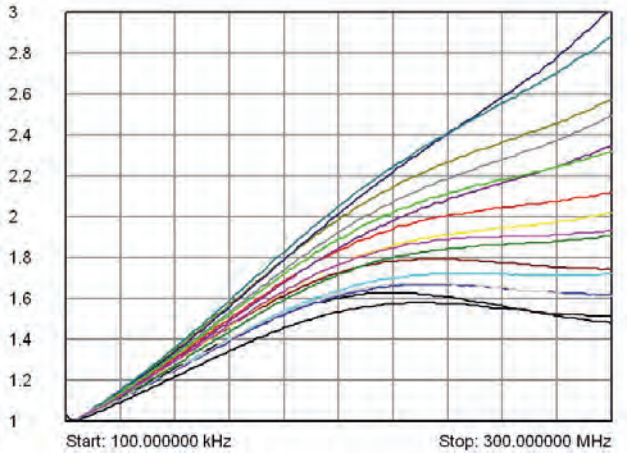
Typical curves are shown for matrix rows/columns with 1 crosspoint set. For optimum insertion loss and VSWR (reflection) performance ensure only one crosspoint is set in any one row/column. **Multiple crosspoints can be set on any one row or column but this will seriously degrade RF performance.** The performance is also dependent upon the area of the matrix where the crosspoint is set. Best performance is obtained at the corners (for example a X1-Y1 path), worse performance is obtained in the center (a X8-Y2 path). This is outlined in the Insertion Loss and VSWR plots below which also include the performance of a typical signal path between X4 and Y2. For more information on how performance is distributed throughout the matrix, please refer to the User Manual



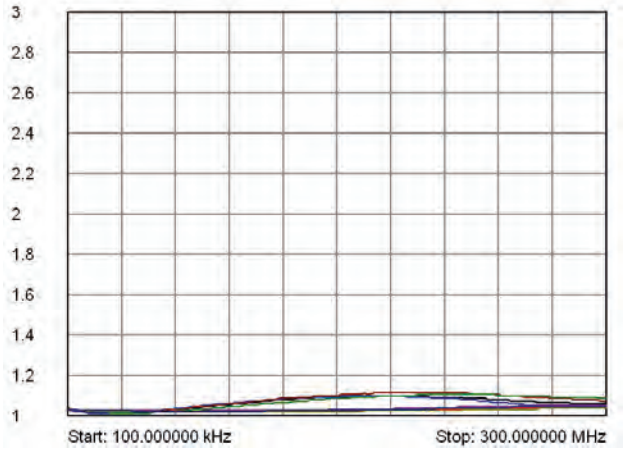
40-727 50Ω Insertion Loss For X to Y Signal Paths



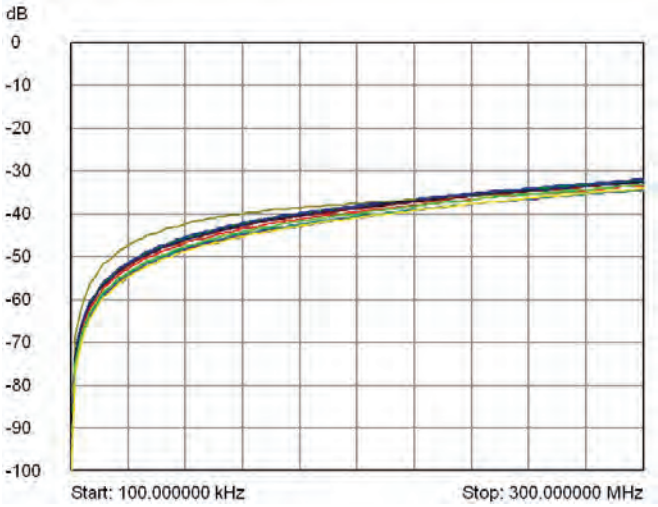
40-727 50Ω Insertion Loss For Y Loop-Thru Paths



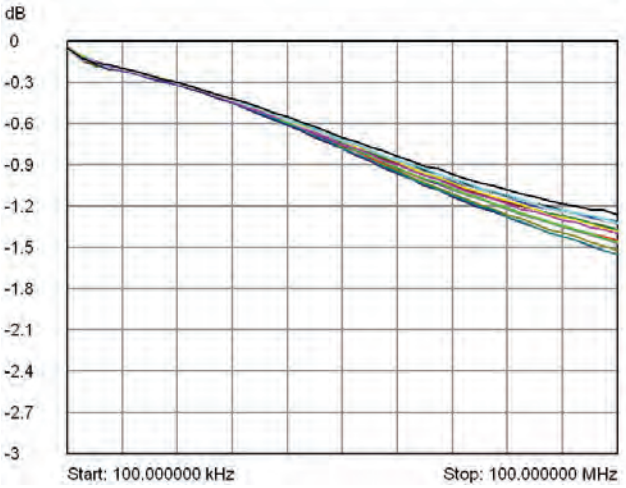
40-727 50Ω VSWR For X to Y Signal Paths



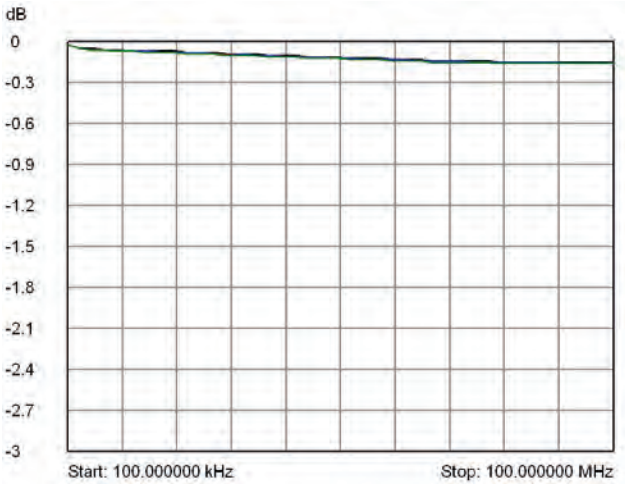
40-727 50Ω Loop-Thru Paths VSWR



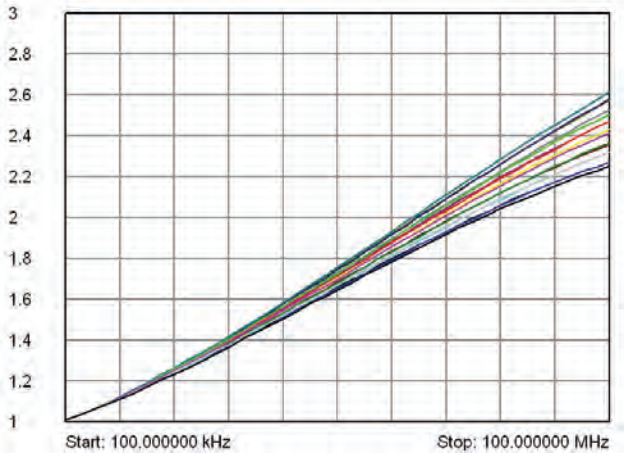
40-727 50Ω Crosstalk Between Signal Paths



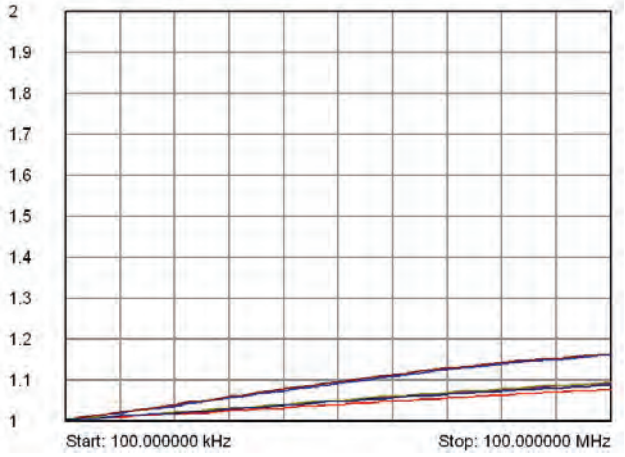
40-727 75Ω Insertion Loss For X to Y Signal Paths



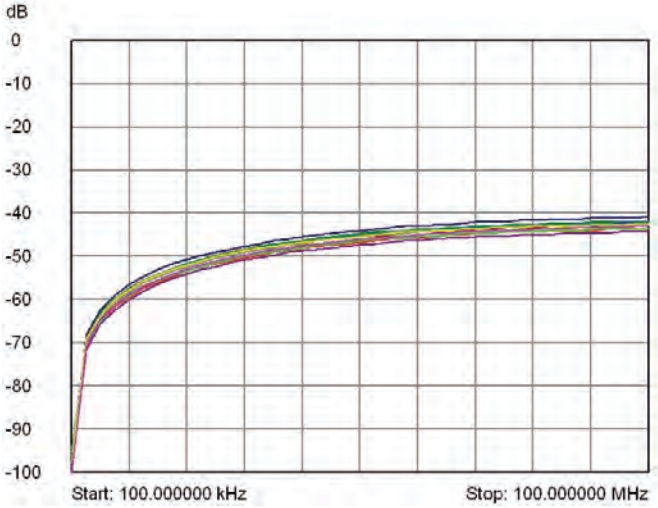
40-727 75Ω Insertion Loss For Y Loop-Thru Paths



40-727 75Ω VSWR For X to Y Signal Paths



40-727 75Ω Loop-Thru Paths VSWR



40-727 75Ω Crosstalk Between Signal Paths

General Matrix Switching Specification

Maximum Switch Voltage: Maximum Switch Current: Maximum Switch Power:	100V 0.5A 10W
Characteristic Impedance:	50Ω or 75Ω
On Path Resistance: Off Path Resistance:	<500mΩ $>10^8$Ω
Expected Life - Matrix: Expected Life - Loop-Thru:	$1x10^9$ operations $1x10^7$ operations
Operate Time: Release Time:	5ms typical 5ms typical

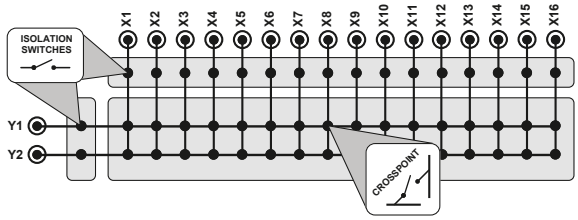
RF Specification

Maximum Frequency:	Usable to 300MHz, 50Ω Usable to 100MHz, 75Ω
Insertion Loss (typical):	<3dB for 50Ω at 300MHz† <3dB for 75Ω at 150MHz†
V.S.W.R. (typical):	<2.0 for 50Ω at 150MHz† <2.0 for 75Ω at 60MHz†
Crosstalk (typical):	>45dB at 50MHz
Isolation (typical):	Better than 70dB

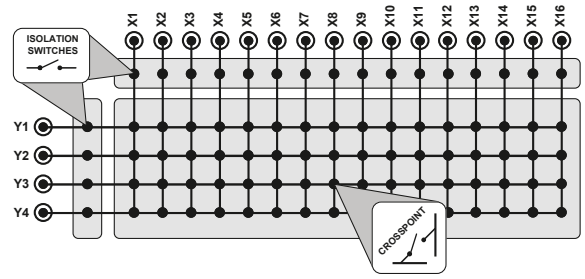
Loop Thru RF Specification

Insertion Loss: Isolation:	0.6dB typical at 300MHz >70dB
Operate Time: Release Time:	5ms typical 5ms typical

† Matrix RF Performance is entirely dependant upon the combination of crosspoints currently selected, these figures are for **one** selected crosspoint on any X or Y channel only, refer to graphs. For further assistance on getting maximum performance using the 40-727/728/729 please refer to the Operating Manual.

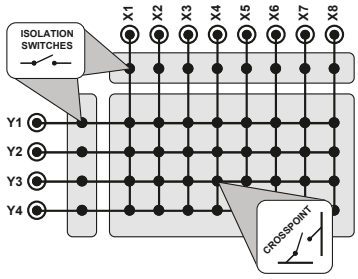


40-728 16x2 Matrix Without Loop-Thru



40-727 16x4 Matrix Without Loop-Thru

40-729 8x4 Matrix Without Loop-Thru



Power Requirements

+3.3V	+5V	+12V	-12V
100mA	500mA (typ 350mA)	0	0

Width and Dimensions

Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

40-727 SMB versions: X and Y Signals via 20 front panel mounted coaxial connectors (Y loop-thru via 4 flying leads).

40-728 SMB versions: X and Y Signals via 18 front panel mounted coaxial connectors (Y loop-thru via 2 flying leads).

40-729 SMB versions: X and Y Signals via 12 front panel mounted coaxial connectors (Y loop-thru via 4 flying leads).

40-727/728/729 Multiway versions: X, Y and Y loop-thru signals via one 26-way high density MS-M RF multiway coaxial connector.

Product Order Codes

PXI 16x4 RF Coaxial Matrix	
SMB, 50Ω	**40-727-001**
SMB, 50Ω with loop-thru on Y axis	**40-727-001-L**
Multiway, 50Ω	**40-727-002**
Multiway, 50Ω with loop-thru on Y axis	**40-727-002-L**
SMB, 75Ω	**40-727-101**
SMB, 75Ω with loop-thru on Y axis	**40-727-101-L**
PXI 16x2 RF Coaxial Matrix	
SMB, 50Ω	**40-728-001**
SMB, 50Ω with loop-thru on Y axis	**40-728-001-L**
Multiway, 50Ω	**40-728-002**
Multiway, 50Ω with loop-thru on Y axis	**40-728-002-L**
SMB, 75Ω	**40-728-101**
SMB, 75Ω with loop-thru on Y axis	**40-728-101-L**
PXI 8x4 RF Coaxial Matrix	
SMB, 50Ω	**40-729-001**
SMB, 50Ω with loop-thru on Y axis	**40-729-001-L**
Multiway, 50Ω	**40-729-002**
Multiway, 50Ω with loop-thru on Y axis	**40-729-002-L**
SMB, 75Ω	**40-729-101**
SMB, 75Ω with loop-thru on Y axis	**40-729-101-L**

Support Products

eBIRST Switching System Test Tool

40-727-001, 40-728-001, 40-729-001 are supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

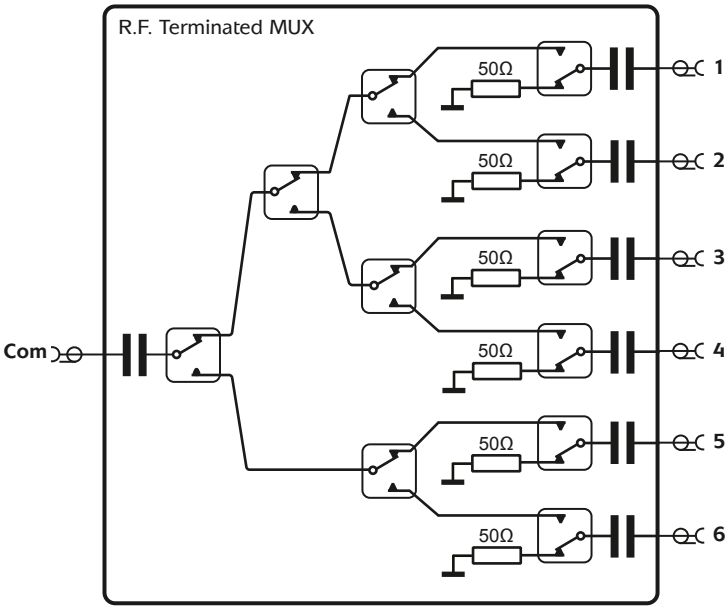
Products	Test Tool	Adapter
40-727-001	**93-005-001**	**93-005-202**
40-728-001	**93-005-001**	**93-005-202**
40-729-001	**93-005-001**	**93-005-202**
Other Products	**Not Supported**	

Mating Connectors & Cabling

For connection accessories for the SMB versions of the 40-727/728/729 range please refer to the **90-011D** RF Cable Assemblies data sheet or for multiway MS-M connector versions, please refer to the **90-017D** Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-881
50Ω SP6T Terminated 6GHz Multiplexer

- Wide Frequency Range 10MHz to 6GHz
- High Performance Solid State Switch
- 6 Channel Multiplexer
- Single and Dual Versions
- Automatic Termination of Unused MUX Channels
- SMA Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



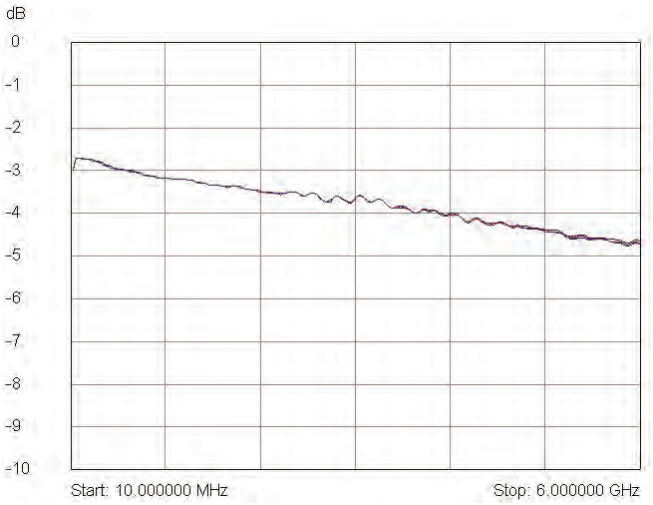
40-881-001 Single SP6T Terminated 6GHz MUX Functional Diagram

The 40-881 is a 50Ω SP6T 6GHz multiplexer available as a single or dual version in one and two PXI slots respectively.

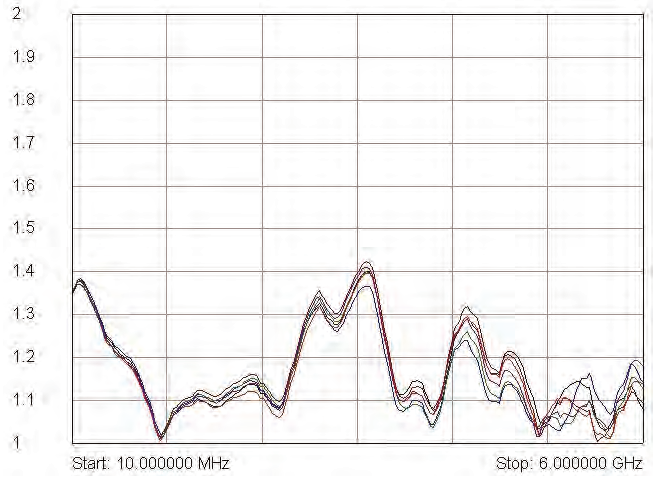
The 40-881 exhibits low VSWR characteristic over the full operating frequency range and consistent insertion loss characteristics. The use of solid state switches ensure a long service life with no wear out mechanism, making the 40-881 ideal for ATE systems requiring frequent and fast operating RF switching with no contact bounce. The 40-881 can handle RF input powers of up to +30dBm and is able to sustain frequent hot switching without performance degradation.

The module is fitted with SMA connectors, ensuring module compatibility with commonly used cables.

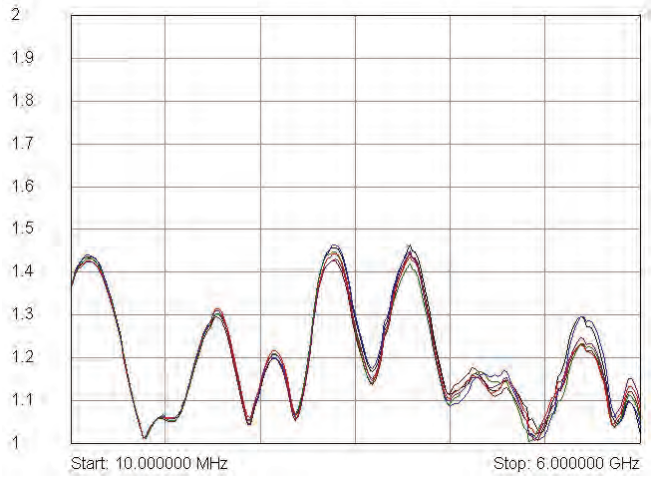
The 40-881 is supplied with drivers that allow users to support the module in all popular PXI software environments. In addition the 40-881 can be supported in Pickering Interfaces 60-100 series LXI Modular Switching chassis, permitting users to choose their switching platform while retaining the same high performance characteristics and driver environment.



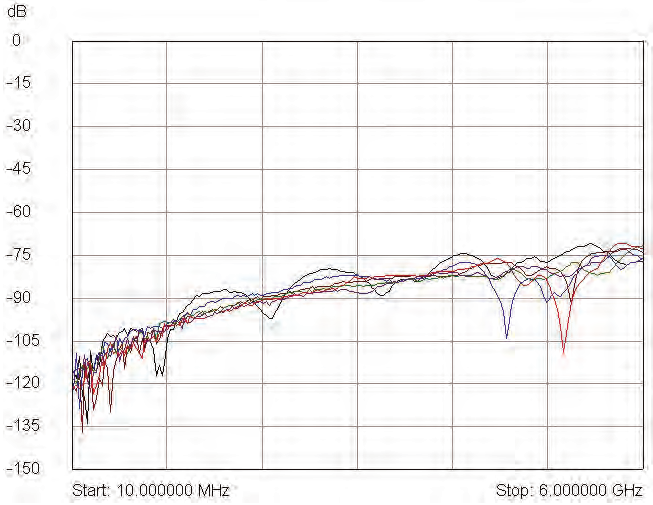
Insertion loss for 40-881-001 showing all paths up to 6GHz



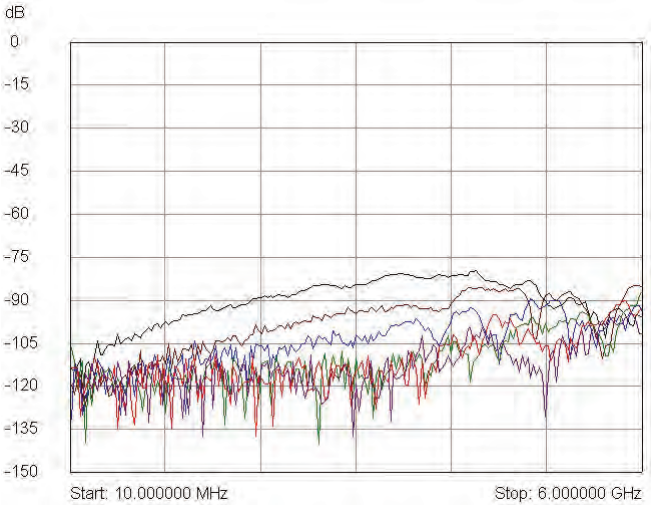
VSWR Channel to COM for 40-881-001 showing all paths up to 6GHz



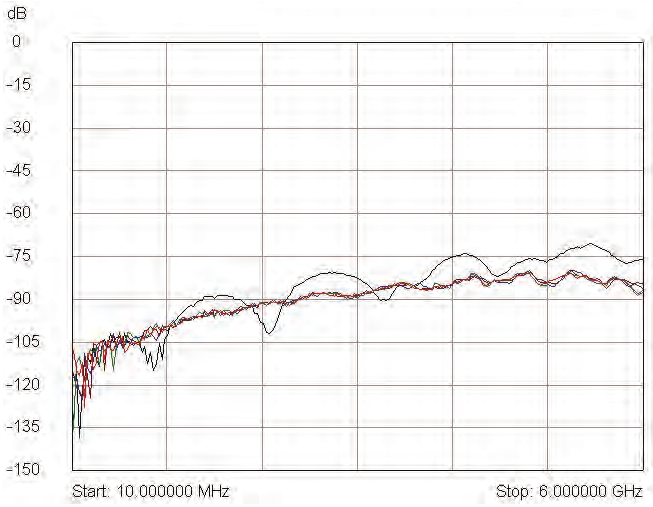
VSWR COM to Channel for 40-881-001 showing all paths up to 6GHz



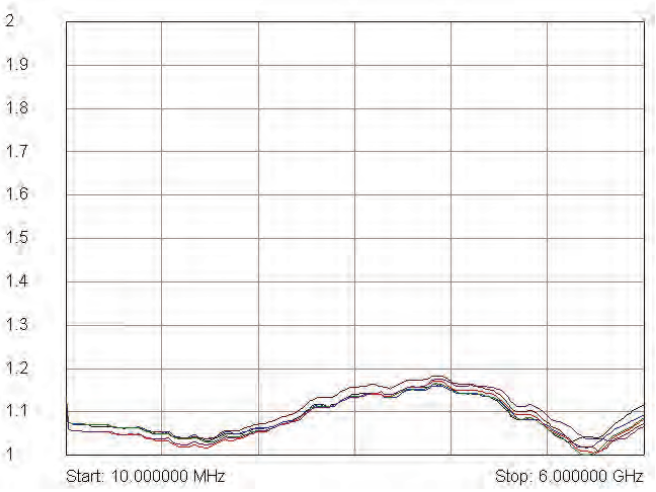
Isolation between adjacent channels for 40-881-001 showing all paths up to 6GHz



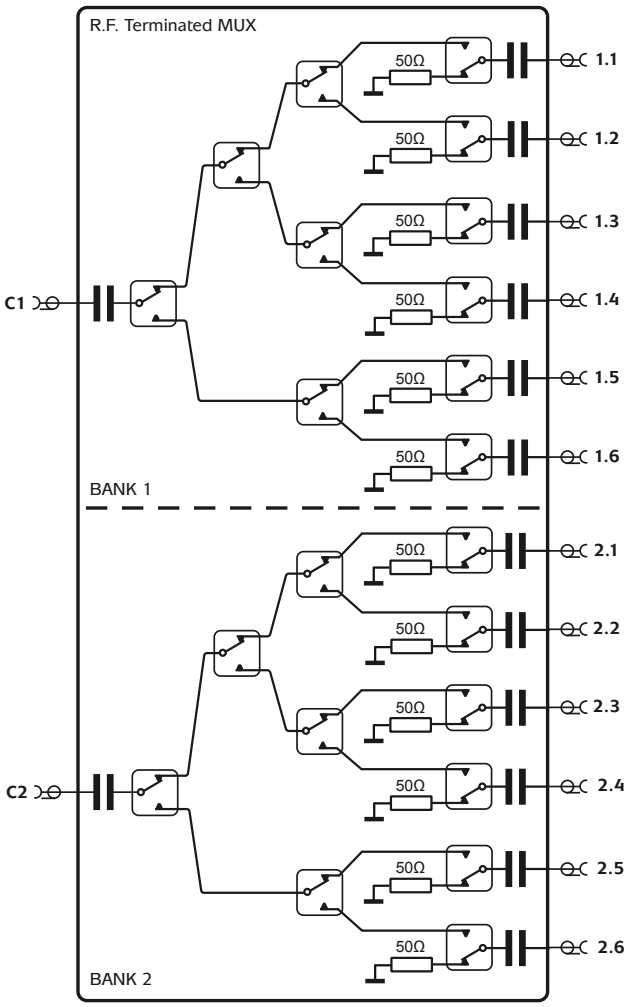
Max isolation for each channel with distant path selected for 40-881-001 up to 6GHz



Crosstalk for 40-881-001 between channel 1 and all other paths (worst case) up to 6GHz



VSWR internal termination on channel for 40-881-001 showing all paths up to 6GHz



40-881-002 Dual SP6T Terminated 6GHz MUX Switching Diagram

RF Specification

RF Frequency Range:	10MHz to 6GHz
Insertion Loss:	Typically <2.8dB @ 50MHz Typically <3.6dB to 3GHz Typically <4.7dB to 6GHz
VSWR Channel to COM:	Typically <1.45:1 to 6GHz
VSWR COM to Channel:	Typically <1.50:1 to 6GHz
VSWR Internal termination:	Typically <1.40:1 to 6GHz
Isolation:	Typically >70dB to 6GHz
Crosstalk:	Typically <-70dB to 6GHz
Maximum RF Power:	+30dBm (hot or cold switching)
Maximum DC Voltage:	16V (AC coupled)
Life Expectancy:	Indefinite when used within ratings
Operate Time:	50µs
RF Switching Time:	10µs typical rise and fall time
RF Connectors:	SMA

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
30mA	100mA	0	0

Mechanical Characteristics

Single version: 1 slot 3U PXI module (40-881-001)
Dual version: 2 slot 3U PXI module (40-881-002)
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

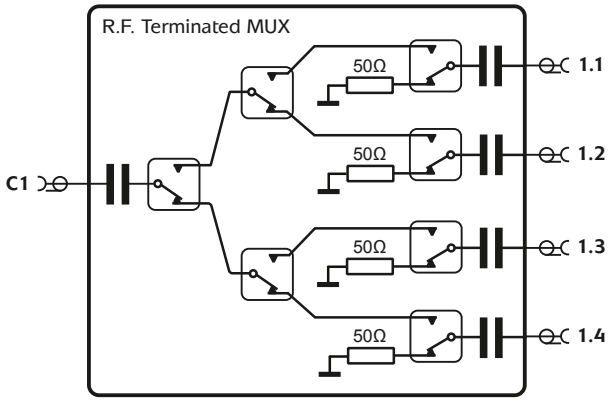
Single SP6T 6GHz MUX, SMA, terminated	**40-881-001**
Dual SP6T 6GHz MUX, SMA, terminated	**40-881-002**

Mating Connectors & Cabling

For connection accessories for the 40-881 module please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-882
50Ω SP4T Terminated 6GHz Multiplexer

- Wide Frequency Range 10MHz to 6GHz
- High Performance Solid State Switch
- 4 Channel Multiplexer
- Single, Dual, Triple and Quad Versions
- Automatic Termination of Unused MUX Channels
- SMA Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



40-882-001 Single SP4T Terminated 6GHz MUX Switching Diagram

40-882-002 Dual SP4T Terminated 6GHz MUX

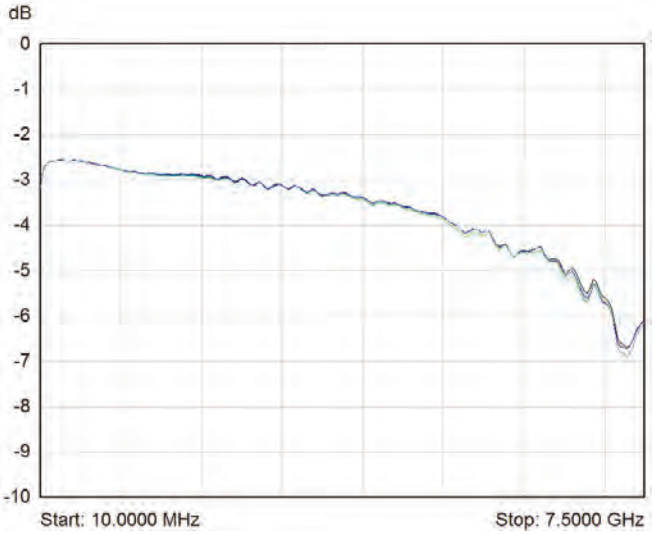
40-882-004 Quad SP4T Terminated 6GHz MUX

The 40-882 is a 50Ω SP4T 6GHz multiplexer available in single format in one PXI slot, dual format in two PXI slots, or triple and quad formats in three PXI slot modules.

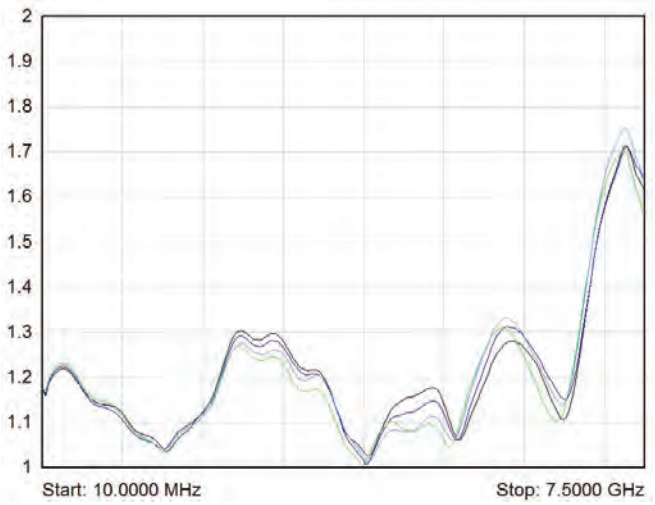
The 40-882 exhibits low VSWR characteristically over the full operating frequency range and consistent insertion loss characteristics. The use of solid state switches ensure a long service life with no wear out mechanism, making the 40-882 ideal for ATE systems requiring frequent and fast operating RF switching. The 40-882 can handle RF input powers of up to +30dBm and is able to sustain frequent hot switching without performance degradation.

The module is fitted with SMA connectors, ensuring module compatibility with commonly used cables.

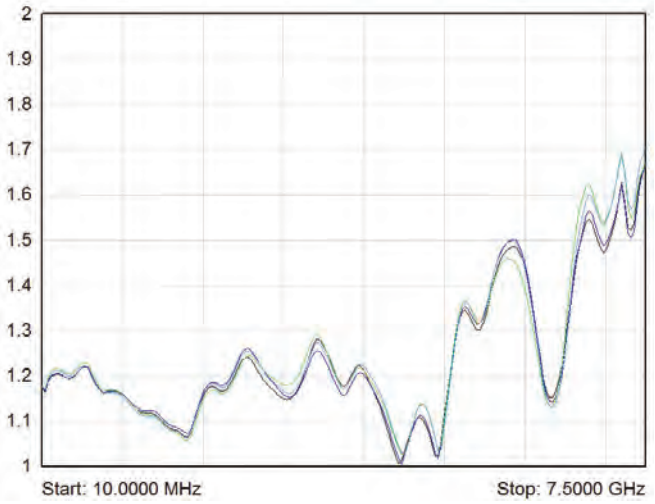
The 40-882 is supplied with drivers that allow users to support the module in all popular PXI software environments. In addition the 40-882 can be supported in Pickering Interfaces LXI/PXI Modular Switching chassis, permitting users to choose their switching platform with the same high performance characteristics and driver environment.



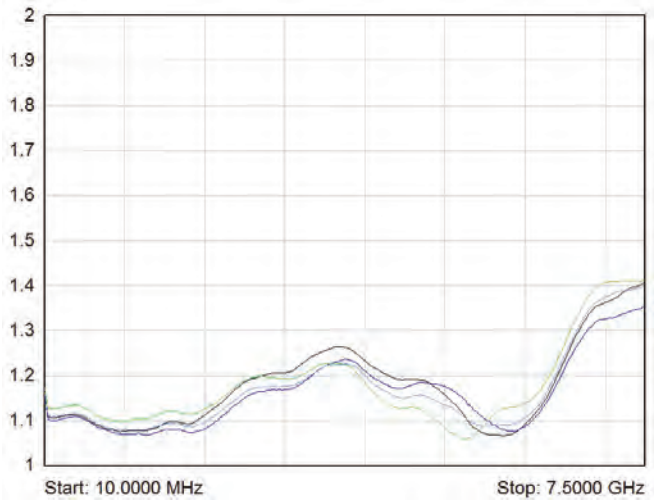
Insertion loss for 40-882-001
showing all paths up to 6GHz



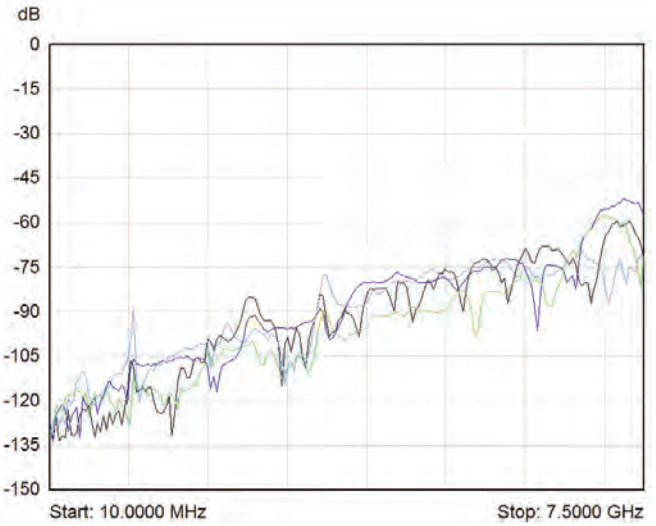
VSWR Channel to COM for 40-882-001
showing all paths up to 6GHz



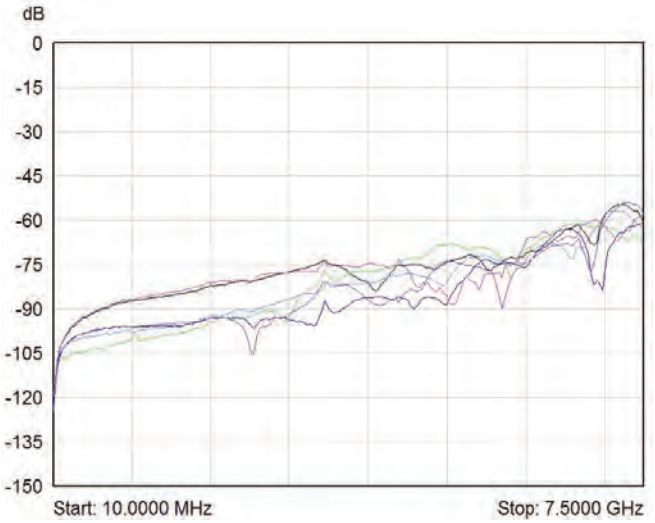
VSWR COM to Channel for 40-882-001
showing all paths up to 6GHz



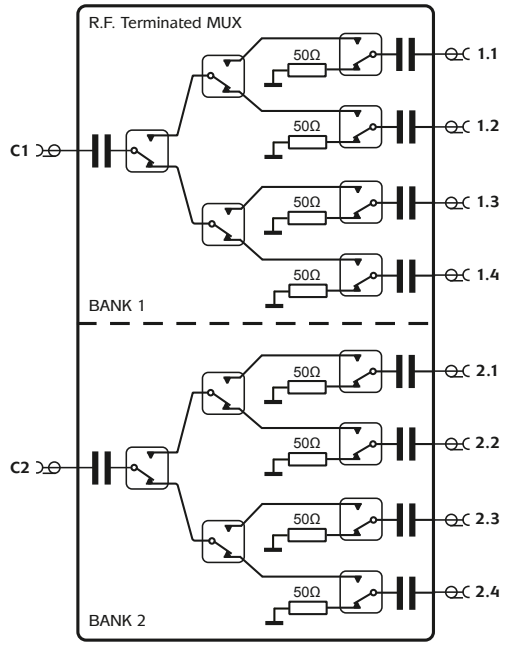
VSWR Terminated Channel for 40-882-001
showing all paths up to 6GHz



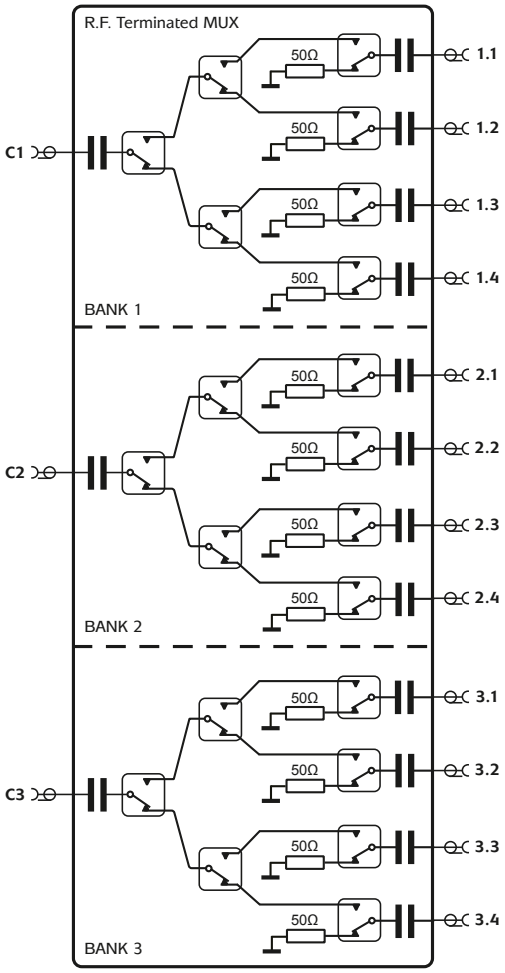
Max isolation for each channel with distant path
selected for 40-882-001 up to 6GHz



Crosstalk between adjacent channels for
40-882-001 showing all paths up to 6GHz



40-882-002 Dual SP4T Terminated 6GHz MUX Switching Diagram



40-882-003 Triple SP4T Terminated 6GHz MUX Switching Diagram

RF Specification

RF Frequency Range:	10MHz to 6GHz (useable to 7GHz)
Insertion Loss:	Typically <3.5dB @ 10MHz Typically <3.5dB to 3GHz Typically <5.0dB to 6GHz
VSWR Channel to COM:	Typically <1.40:1 to 6GHz
VSWR COM to Channel:	Typically <1.40:1 to 5GHz Typically <1.55:1 to 6GHz
VSWR Internal termination:	Typically <1.40:1 to 6GHz
Isolation:	Typically >80dB to 3GHz Typically >65dB to 6GHz
Crosstalk:	Typically <-75dB to 3GHz Typically <-60dB to 6GHz
Maximum RF Power:	+30dBm (hot or cold switching)
Maximum DC Voltage:	16V (AC coupled)
Life Expectancy:	Indefinite when used within ratings
Operate Time:	50µs
RF Switching Time:	10µs typical rise and fall time
RF Connectors:	SMA

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
30mA	100mA	0	0

Mechanical Characteristics

Single version: 1 slot 3U PXI module (40-882-001)
Dual version: 2 slot 3U PXI module (40-882-002)
Triple version: 3 slot 3U PXI module (40-882-003)
Quad version: 3 slot 3U PXI module (40-882-004)
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

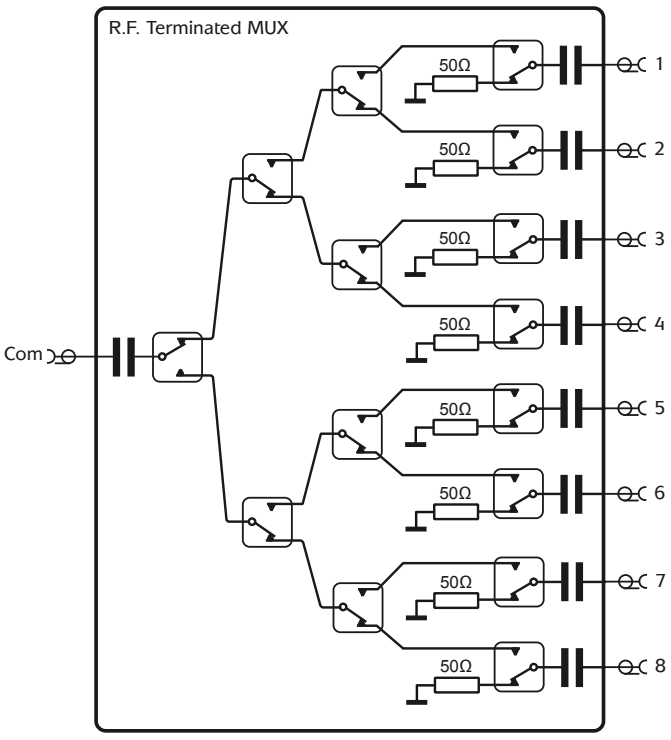
Single SP4T 6GHz MUX, SMA, terminated	**40-882-001**
Dual SP4T 6GHz MUX, SMA, terminated	**40-882-002**
Triple SP4T 6GHz MUX, SMA, terminated	**40-882-003**
Quad SP4T 6GHz MUX, SMA, terminated	**40-882-004**

Mating Connectors & Cabling

For connection accessories for the 40-882 module please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-883
50Ω Terminated 6GHz Multiplexer

- Wide Frequency Range 10MHz to 6GHz
- High Performance Solid State Switch
- 8:1 or 16:1 Multiplexer Versions
- Automatic Termination of Unused MUX Channels
- +30dBm Input Power Handling
- SMA Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



40-883-001 Single 8:1 Terminated 6GHz MUX Switching Diagram (Default Switch Positions Shown)

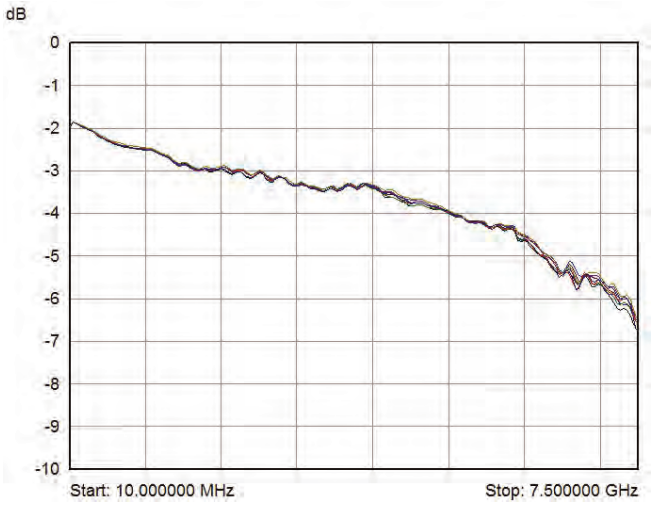
The 40-883 is a 50Ω 6GHz multiplexer available in 8:1 format in a two slot PXI module or 16:1 format in a three slot PXI module.

The 40-883 exhibits low VSWR over the full operating frequency range and consistent and flat insertion loss characteristics. The use of solid state switches ensure a long service life with no wear out mechanism, making the 40-883 ideal for ATE systems requiring frequent and fast operating RF switching. The 40-883 can handle RF input powers of up to +30dBm and is able to sustain frequent hot switching without performance degradation.

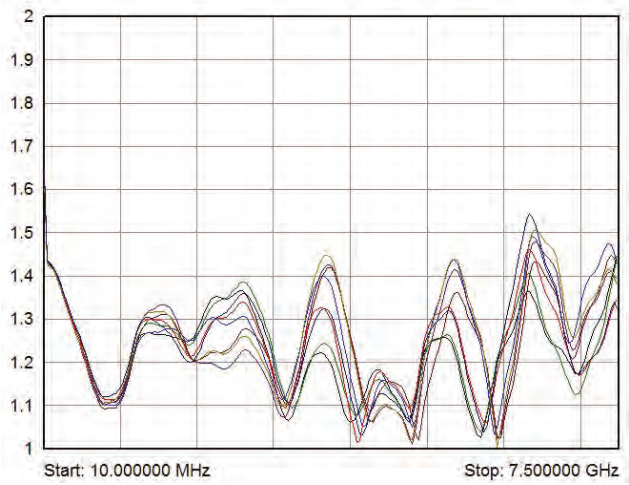
The module is fitted with SMA connectors, ensuring module compatibility with commonly used cables.

The 40-883 is supplied with drivers that allow users to support the module in all popular PXI software environments. In addition the 40-883 can be supported in Pickering Interfaces 60-100 series LXI Modular Switching chassis, permitting users to choose their switching platform with the same high performance characteristics and driver environment.

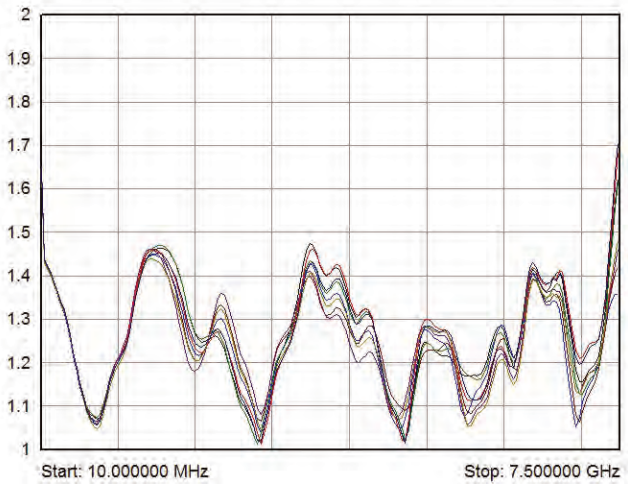
Typical RF Perfomance Plots For 8:1 Multiplexer



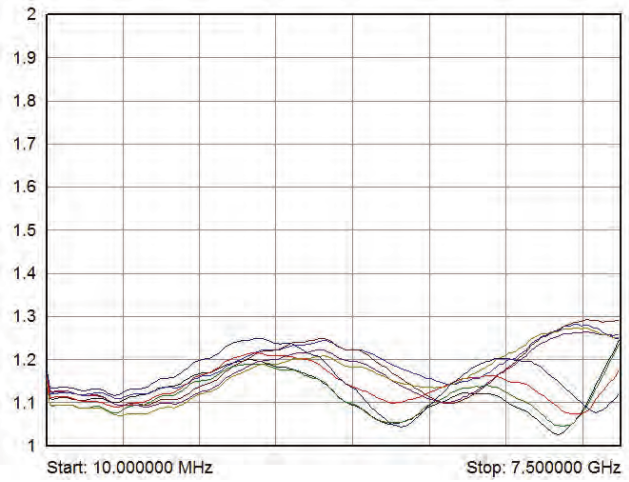
Insertion loss for 40-883-001
showing all paths up to 7.5GHz



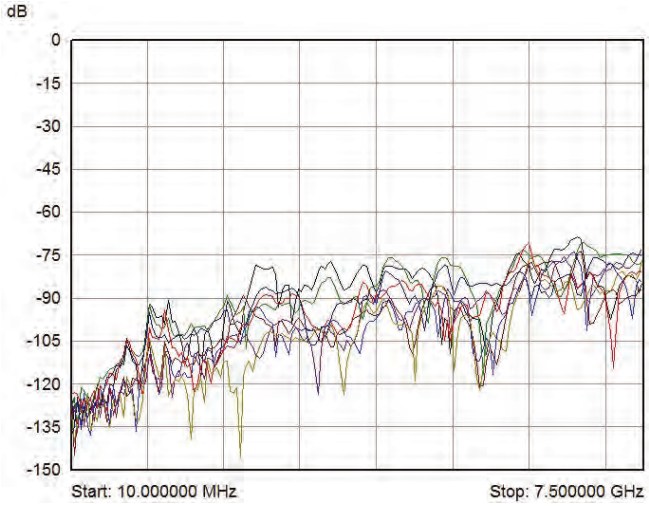
VSWR Channel to COM for 40-883-001
showing all paths up to 7.5GHz



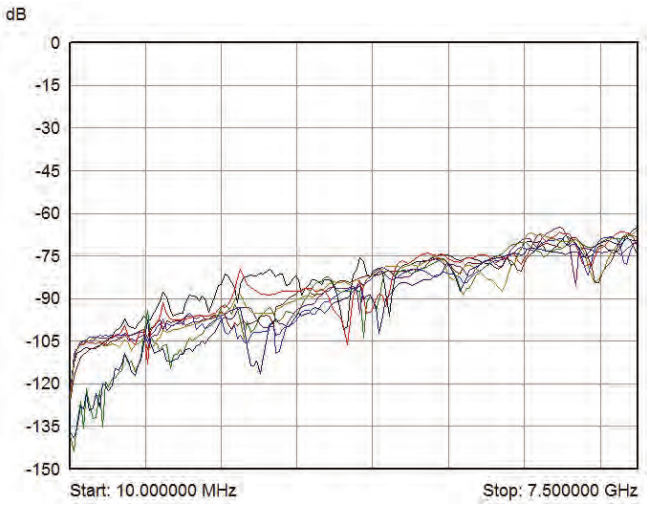
VSWR COM to Channel for 40-883-001
showing all paths up to 7.5GHz



VSWR internal termination on channel
for 40-883-001 showing all paths up to 7.5GHz

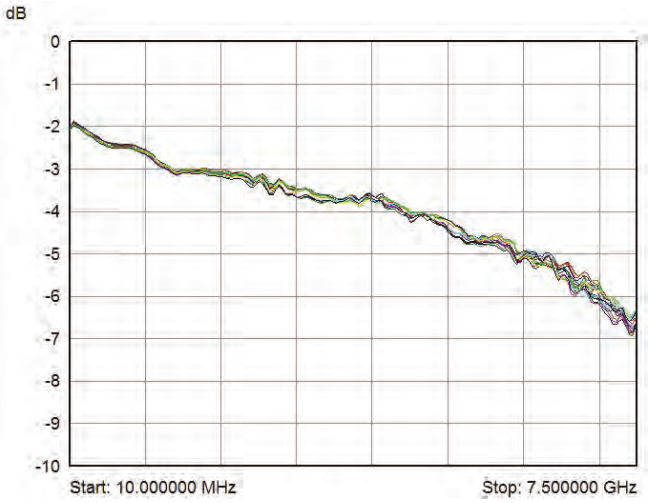


Max isolation for each channel with distant path
selected for 40-883-001 up to 7.5GHz

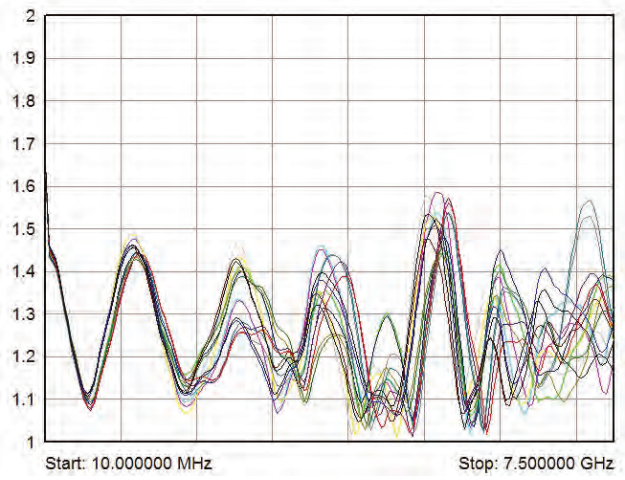


Crosstalk for 40-883-001 between adjacent channels
showing all paths up to 7.5GHz

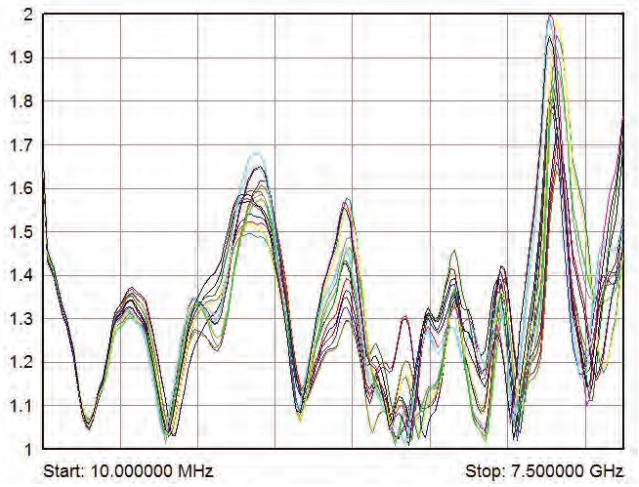
Typical RF Perfomance Plots For 16:1 Multiplexer



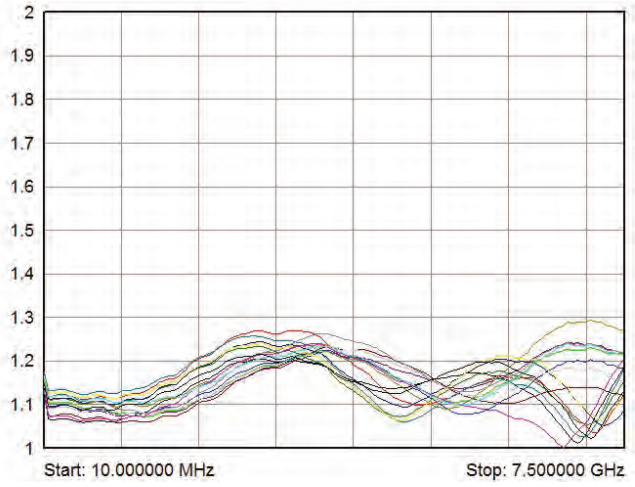
Insertion loss for 40-883-002
showing all paths up to 7.5GHz



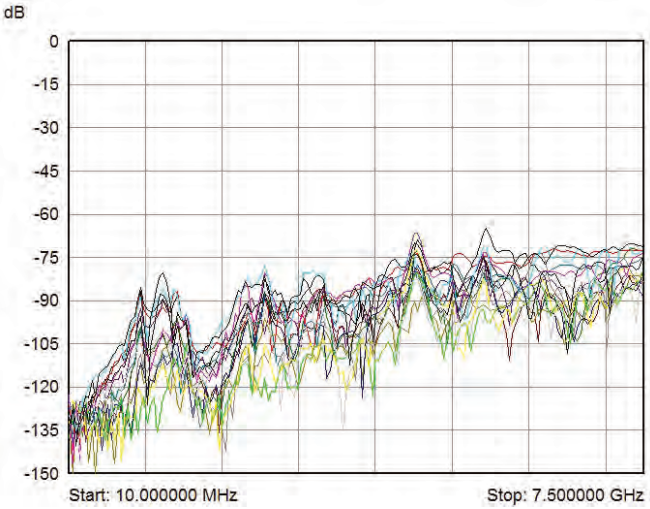
VSWR Channel to COM for 40-883-002
showing all paths up to 7.5GHz



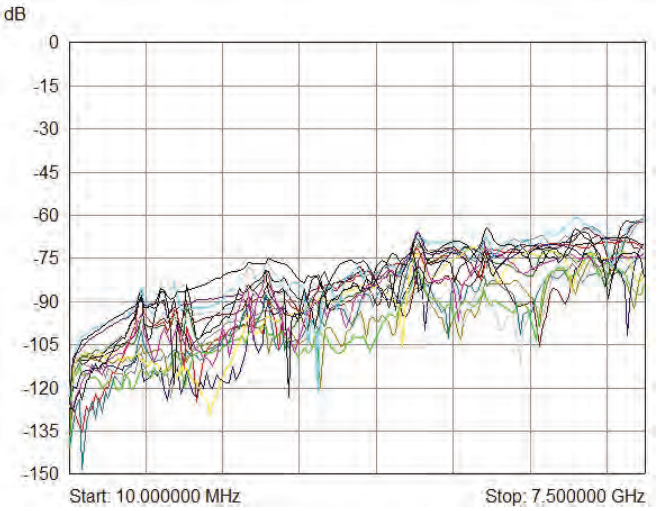
VSWR COM to Channel for 40-883-002
showing all paths up to 7.5GHz



VSWR internal termination on channel
for 40-883-002 showing all paths up to 7.5GHz



Max isolation for each channel with distant path
selected for 40-883-002 up to 7.5GHz



Crosstalk for 40-883-002 between adjacent channels
showing all paths up to 7.5GHz

General Specification

Characteristic Impedance:	50Ω
Maximum RF Power:	+30dBm (hot or cold switching)
Maximum DC Voltage:	16V (AC coupled)
Life Expectancy:	Indefinite when used within ratings
Operate Time:	50µs
RF Switching Time:	10µs typical rise and fall time
RF Connectors:	SMA

RF Specification - 8:1 MUX (40-883-001)

Bandwidth:	6GHz (useable to 7GHz)
Insertion Loss:	typically <2.1dB @ 10MHz typically <3.5dB to 3GHz typically <5dB to 6GHz
VSWR COM-CH CH-COM:	typically <1.5:1 to 6GHz
VSWR termination:	typically <1.4:1 to 6GHz
Isolation:	typically >70dB to 6GHz
Crosstalk	typically <-63dB to 6GHz

RF Specification - 16:1 MUX (40-883-002)

Bandwidth:	6GHz (useable to 7GHz)
Insertion Loss:	typically <2.2dB @ 10MHz typically <3.7dB to 3GHz typically <5.5dB to 6GHz
VSWR CH-COM:	typically <1.6:1 to 6GHz
VSWR COM-CH:	typically <1.7:1 to 6GHz
VSWR termination:	typically <1.4:1 to 6GHz
Isolation:	typically >63dB to 6GHz
Crosstalk	typically <-63dB to 6GHz

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
30mA	100mA	0	0

Mechanical Characteristics

Single 8:1 version: 2 slot 3U PXI module (40-883-001)
Single 16:1 version: 3 slot 3U PXI module (40-883-002)
3D models for all versions in a variety of popular file formats are available on request.

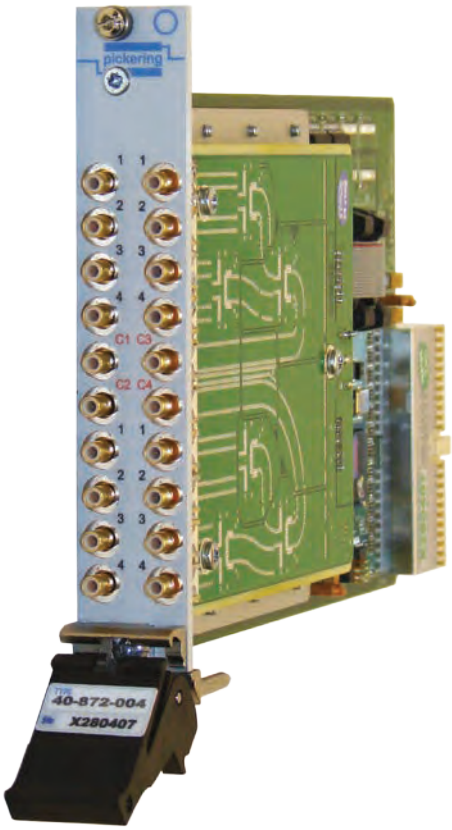
Product Order Codes

Single 8:1 6GHz MUX, SMA, terminated	**40-883-001**
Single 16:1 6GHz MUX, SMA, terminated	**40-883-002**

Mating Connectors & Cabling

For connection accessories for the 40-883 module please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-872
50Ω 4-Channel RF Multiplexer



- 3GHz RF Multiplexer
- Single, Dual and Quad Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

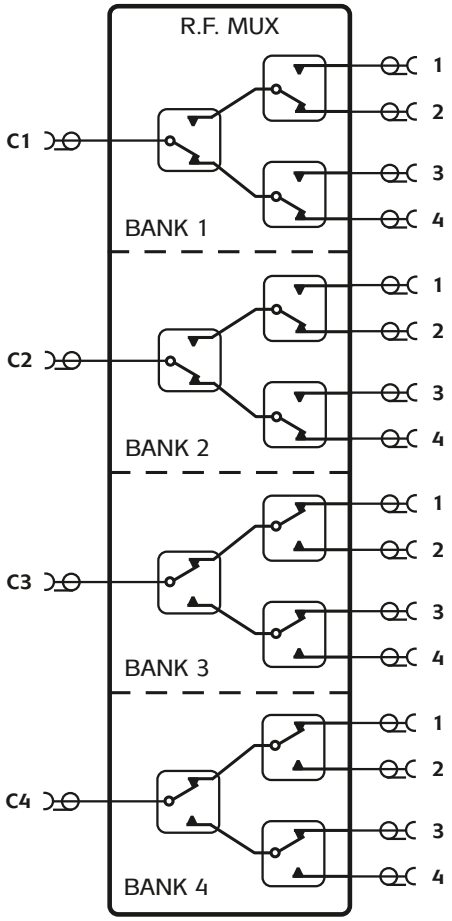
The 40-872 is a 50Ω 4 to 1 RF MUX available with 1, 2 or 4 banks in a single PXI slot.

All versions exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz with each path having a nominally equal insertion loss. The injection of noise and unwanted signals into the signal paths of the 40-872 has been minimized by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

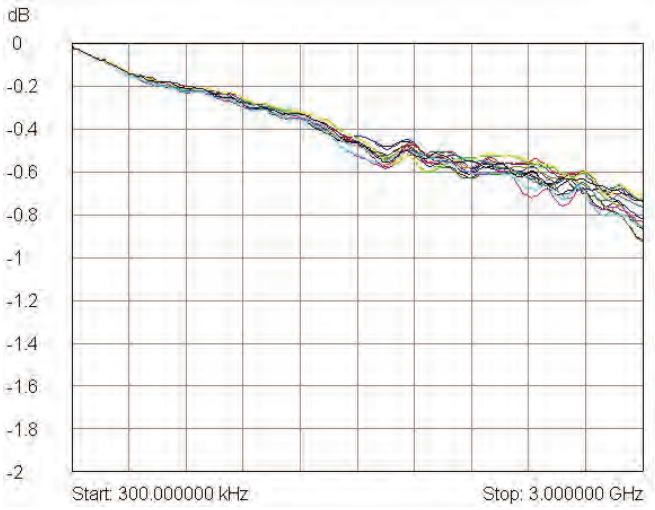
The 40-872 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-872 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 75Ω version of the 40-872 is also available, the 40-832

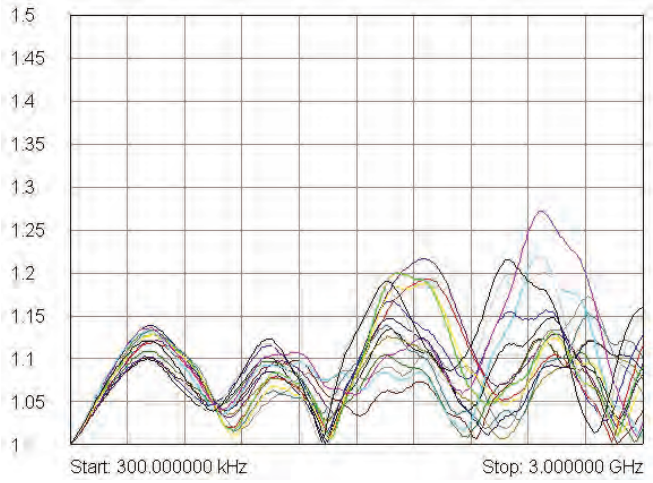


40-872 Quad 4 to 1 RF MUX Functional Diagram (Default Switch Paths Shown)

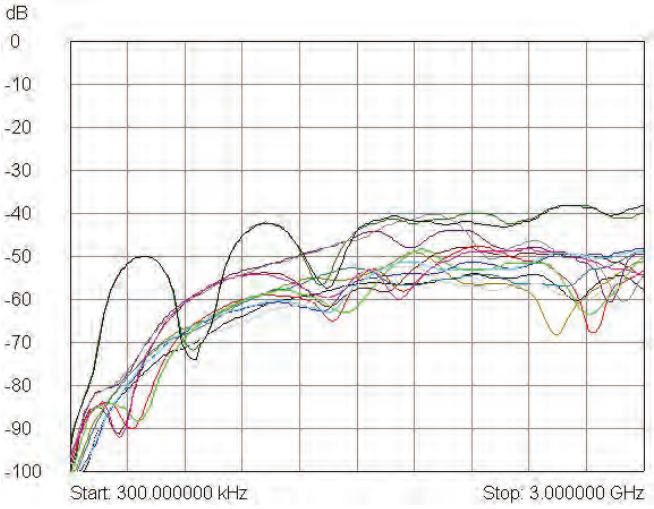
40-872 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



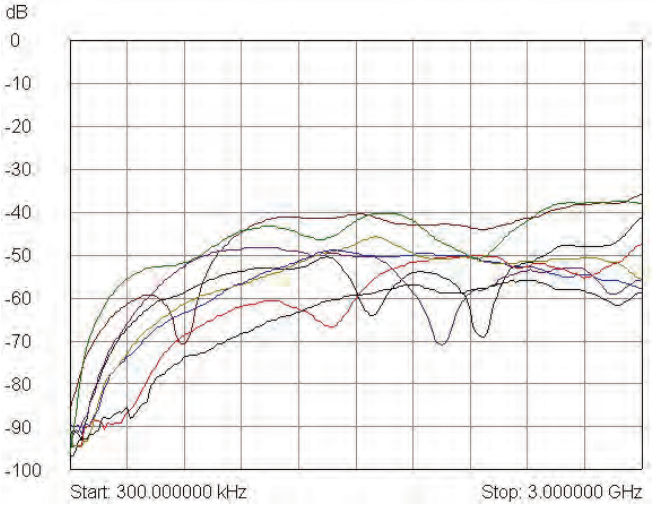
40-872 Typical Insertion Loss Plot For Each Signal Path



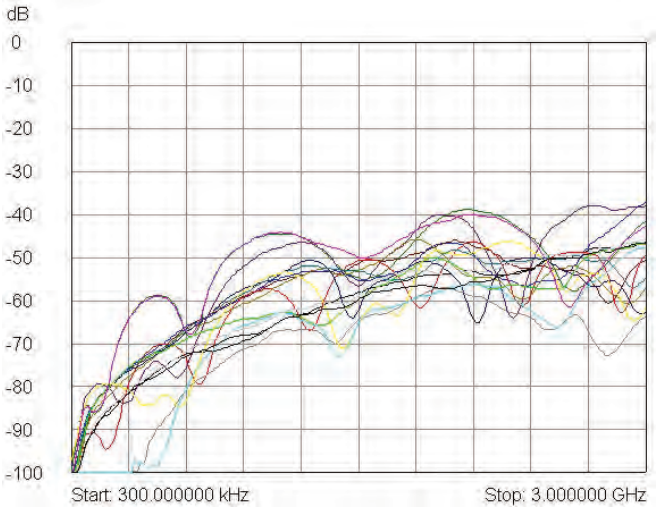
40-872 Typical VSWR Plot For Each Signal Path



40-872 Typical Crosstalk Plot Between Signal Paths



40-872 Typical Crosstalk Plot Between MUX Banks



40-872 Typical Isolation Plots for each input channel

RF Specification

RF Frequency Range:	DC to 3GHz, usable to 3.5GHz
Insertion Loss:	Typically <0.4dB to 1GHz Typically <0.7dB to 2GHz Typically <1.0dB to 3GHz
VSWR:	Typically <1.15:1 to 1GHz Typically <1.25:1 to 3GHz
Isolation:	Typically >43dB to 1GHz Typically >36dB to 3GHz
Crosstalk:	Typically <-42dB to 1GHz Typically <-35dB to 3GHz
Maximum RF Power:	10W at 3GHz

Other Switching Specifications

Maximum DC Voltage:	30V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.27A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

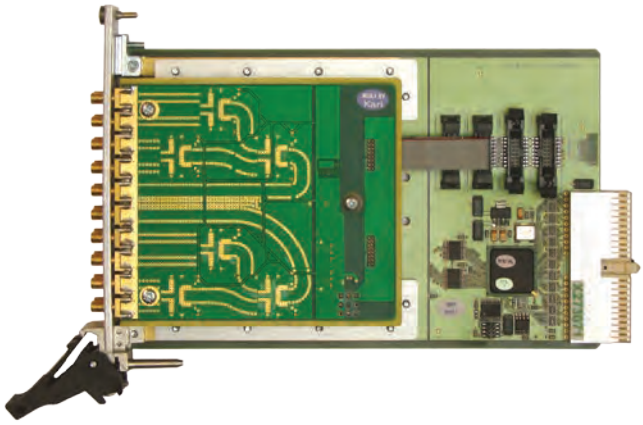
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

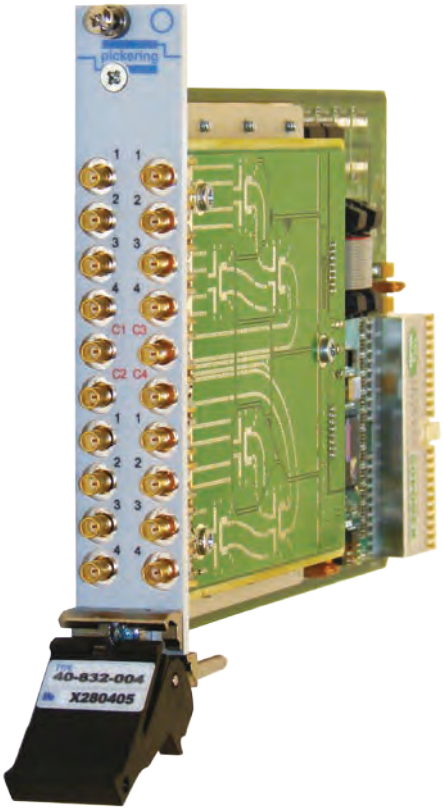
Single 4:1 RF MUX SMB	**40-872-001**
Dual 4:1 RF MUX SMB	**40-872-002**
Quad 4:1 RF MUX SMB	**40-872-004**
Single 4:1 RF MUX MCX	**40-872-101**
Dual 4:1 RF MUX MCX	**40-872-102**
Quad 4:1 RF MUX MCX	**40-872-104**

Mating Connectors & Cabling

For connection accessories for the 40-872 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-832
75Ω 4-Channel RF Multiplexer



- 3GHz RF Multiplexer
- Single, Dual and Quad Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

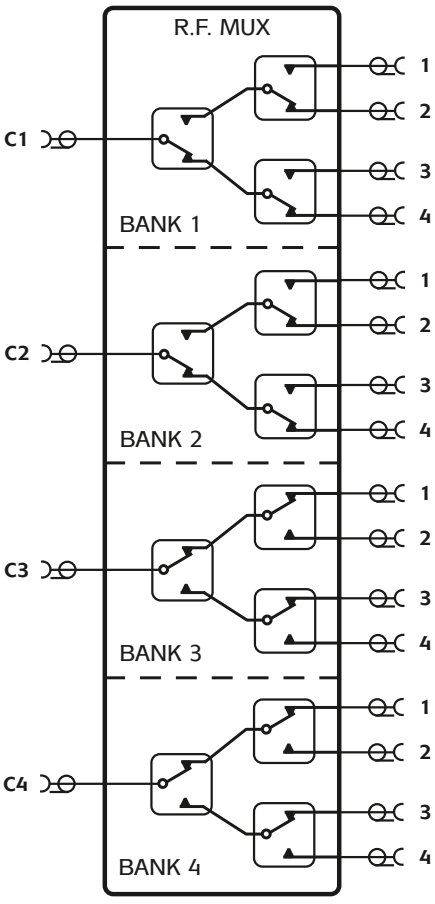
The 40-832 is a 75Ω 4 to 1 RF MUX available with 1, 2 or 4 banks in a single PXI slot.

All versions have been designed to exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz with each path having a nominally equal insertion loss. The design of the 40-832 minimizes the injection of noise and unwanted signals into the signal path by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

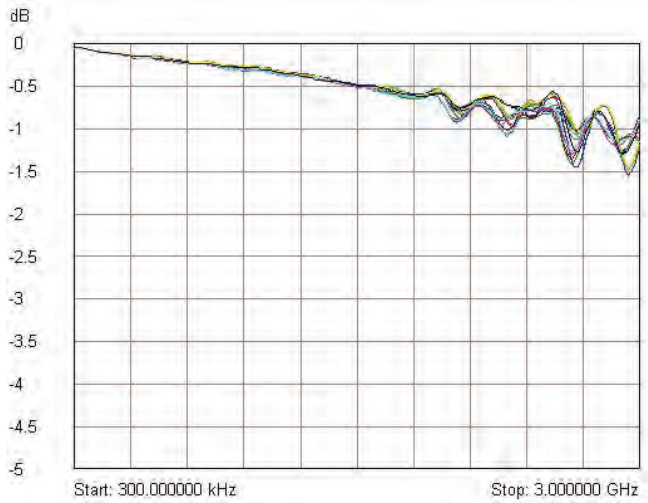
The 40-832 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-832 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 50Ω version of the 40-832 is also available, the 40-872.

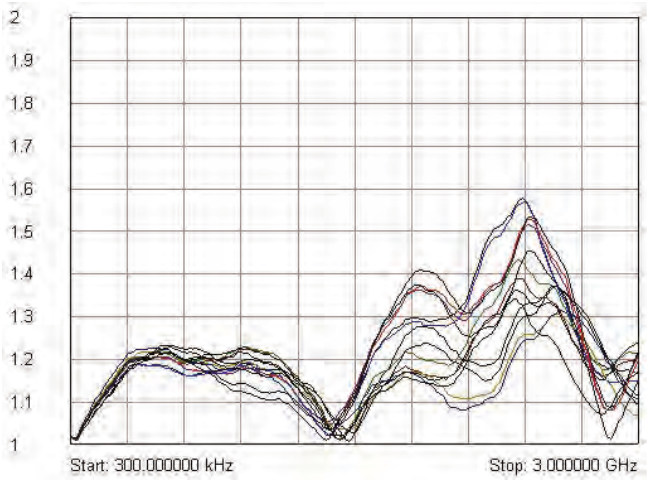


40-832 Quad 4 to 1 RF MUX Functional Diagram (Default Switch Paths Shown)

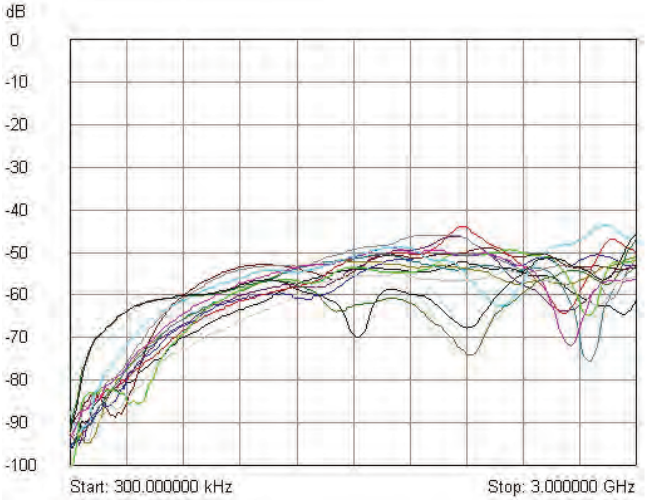
40-832 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



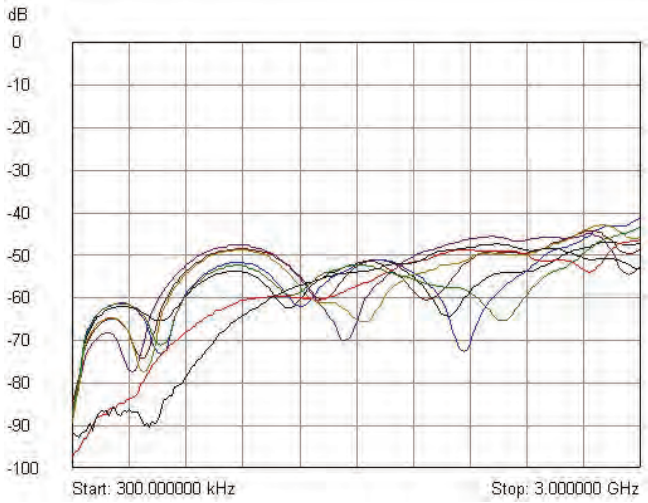
40-832 Typical Insertion Loss Plot For Each Signal Path



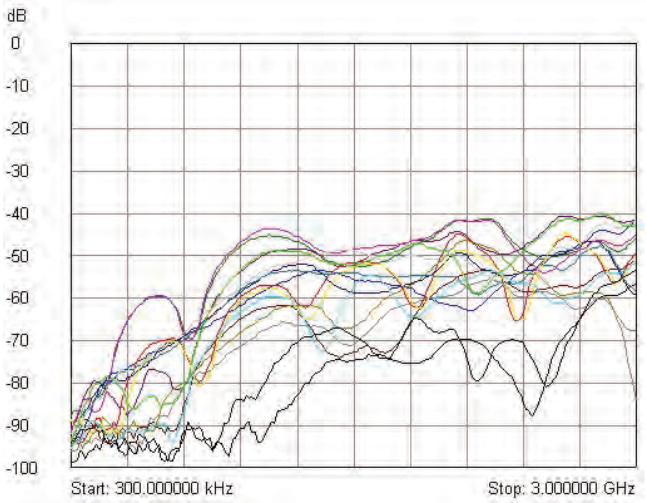
40-832 Typical VSWR Plot For Each Signal Path



40-832 Typical Crosstalk Plot Between Signal Paths



40-832 Typical Crosstalk Plot Between MUX Banks



40-832 Typical Isolation Plot Between Signal Paths

RF Specification

RF Frequency Range:	DC to 3GHz
Insertion Loss:	Typically <0.4dB to 1GHz Typically <1.0dB to 2GHz Typically <1.1dB to 2.5GHz Typically <1.6dB to 3GHz
VSWR:	Typically <1.25:1 to 1GHz Typically <1.5:1 to 2GHz Typically <1.6:1 to 3GHz

Note: VSWR measurements were carried out for each selected input with a 75Ω load fitted to the common terminal of the multiplexer.

Isolation:	Typically >43dB to 1GHz Typically >40dB to 3GHz
Crosstalk:	Typically <-52dB to 1GHz Typically <-40dB to 3GHz
Maximum RF Power:	10W at 3GHz

Other Switching Specifications

Maximum DC Voltage:	100V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.27A	0	0

Mechanical Characteristics

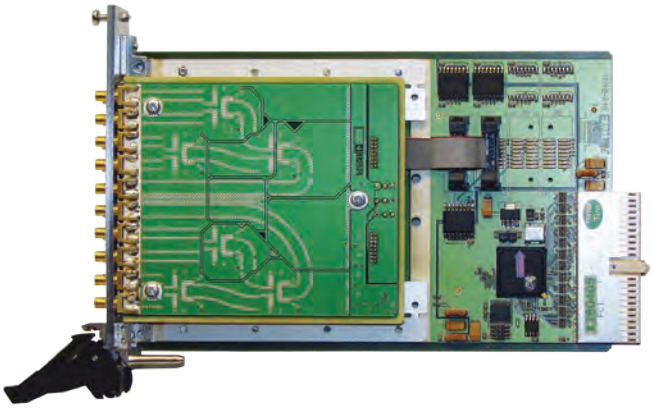
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Single 4:1 RF MUX SMB	**40-832-001**
Dual 4:1 RF MUX SMB	**40-832-002**
Quad 4:1 RF MUX SMB	**40-832-004**
Single 4:1 RF MUX MCX	**40-832-101**
Dual 4:1 RF MUX MCX	**40-832-102**
Quad 4:1 RF MUX MCX	**40-832-104**

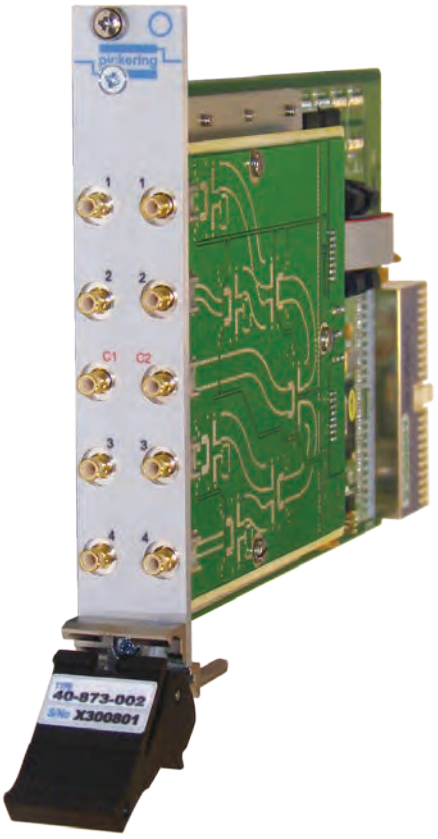
Mating Connectors & Cabling

For connection accessories for the 40-832 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-873
50Ω 4-Channel Terminated RF Multiplexer

- Terminated 3GHz RF Multiplexer
- Single and Dual Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



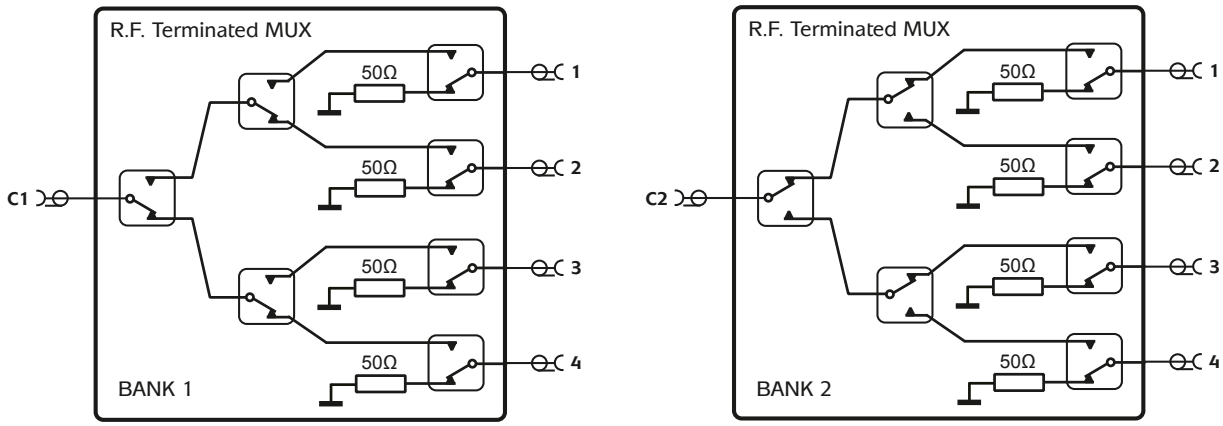
The 40-873 is a 4 to 1 RF MUX available with 1 or 2 banks in a single PXI slot. Additionally, extra switching allows unused channels to be terminated into 50Ω, maintaining signal integrity.

All versions have been designed to exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz with each path having a nominally equal insertion loss. The design of the 40-873 minimizes the injection of noise and unwanted signals into the signal path by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

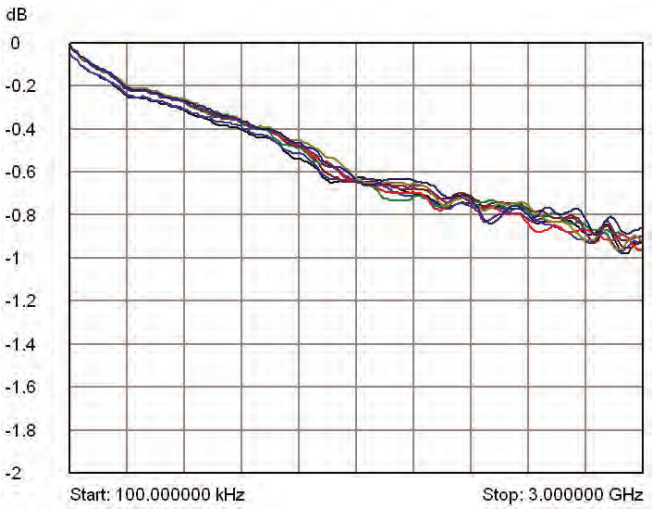
The 40-873 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-873 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 75Ω version of the 40-873 is also available, the 40-833

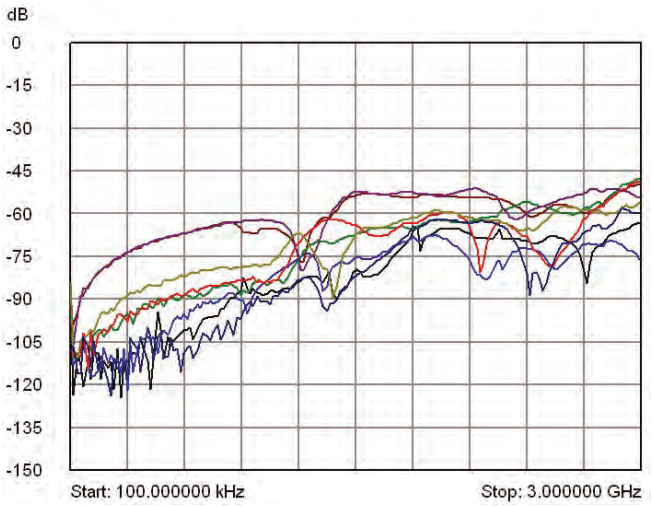


40-873 Dual 4 to 1 Terminated RF MUX Functional Diagram (Default Switch Paths Shown)

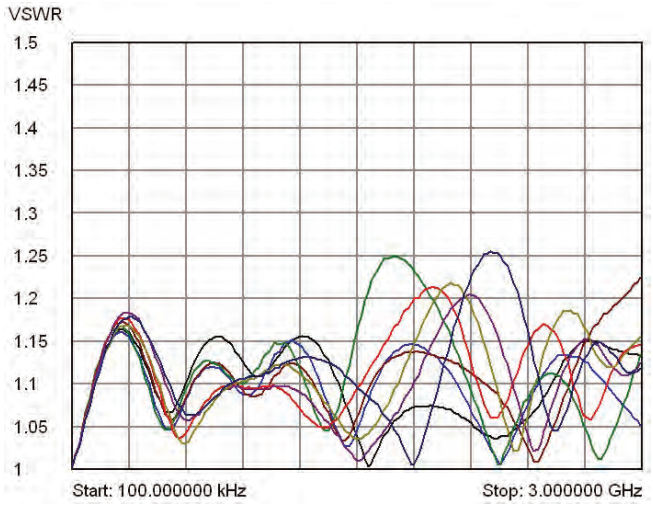
40-873 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



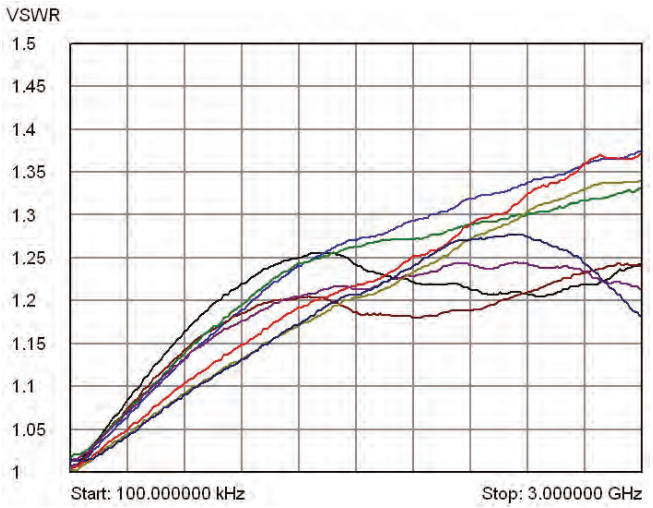
40-873 Typical Insertion Loss Plot



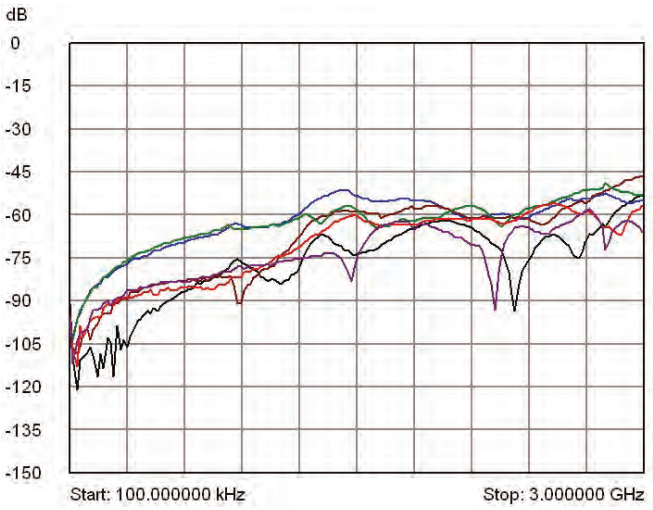
40-873 Typical Isolation Plot



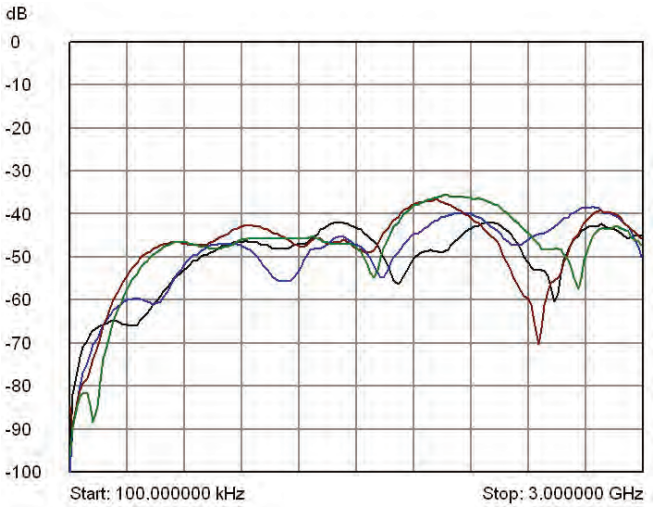
40-873 Typical VSWR Plot - Signal Paths



40-873 Typical VSWR Plot - Terminated



40-873 Typical Crosstalk Plot - Channel to Channel



40-873 Typical Crosstalk Plot - Bank to Bank

RF Specification

RF Frequency Range:	DC to 3GHz, usable to 3.5GHz
Insertion Loss:	Typically <0.5dB to 1GHz Typically <0.8dB to 2GHz Typically <1dB to 3GHz
VSWR:	Typically <1.2:1 to 1GHz Typically <1.3:1 to 3GHz
Termination VSWR:	Typically <1.25:1 to 1GHz Typically <1.4:1 to 3GHz
Isolation:	Typically >60dB to 1GHz Typically >45dB to 3GHz
Crosstalk:	Typically <-42dB to 1GHz Typically <-35dB to 3GHz
Maximum RF Power:	1W (terminated)

Other Switching Specifications

Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.21A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

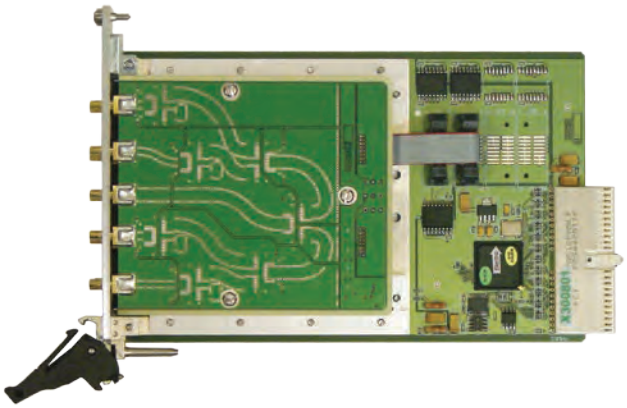
PXI bus via 32 bit P1/J1 backplane connector.
Signals via front panel SMB or MCX coaxial connectors.

Product Order Codes

Single 4:1 50Ω Terminated RF MUX SMB	**40-873-001**
Dual 4:1 50Ω Terminated RF MUX SMB	**40-873-002**
Single 4:1 50Ω Terminated RF MUX MCX	**40-873-101**
Dual 4:1 50Ω Terminated RF MUX MCX	**40-873-102**

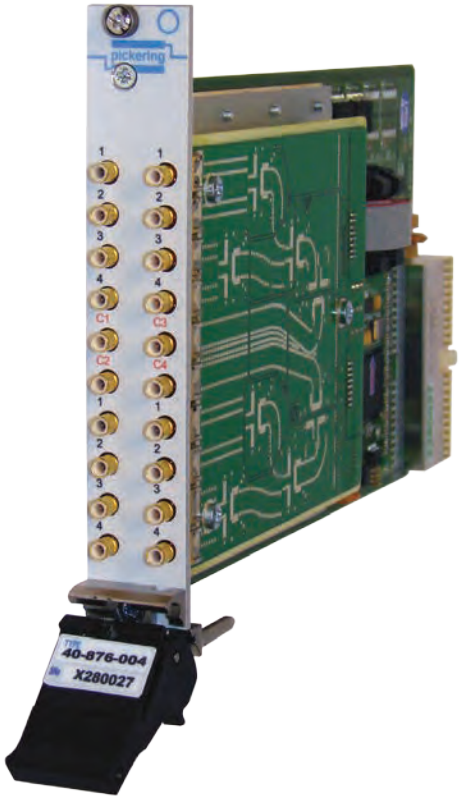
Mating Connectors & Cabling

For connection accessories for the 40-873 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-876
50Ω 4-Channel Terminated RF Multiplexer

- 3GHz RF Multiplexer
- Termination Switching For Common Connection
- Single, Dual and Quad Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

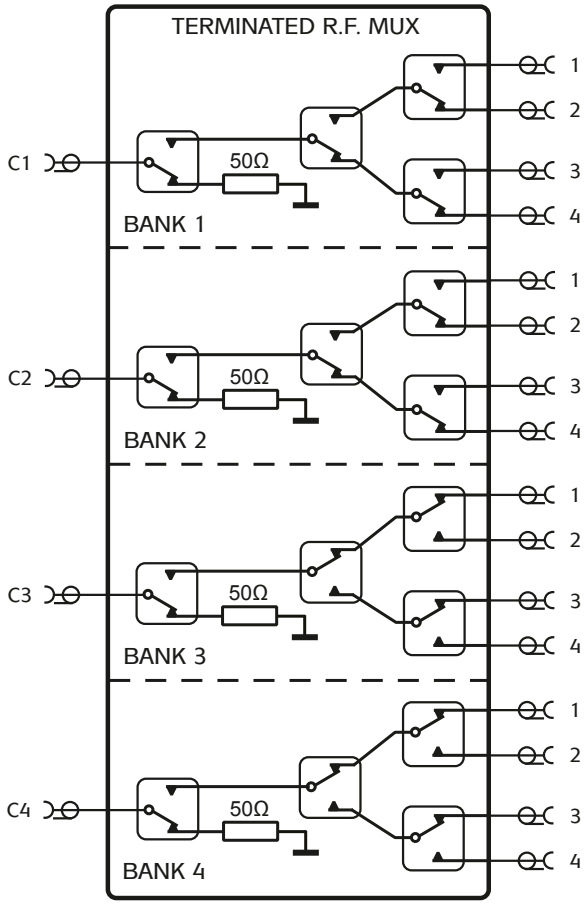


The 40-876 is a 50Ω 4 to 1 RF MUX available with 1, 2 or 4 banks in a single PXI slot. Additionally, extra switching allows the common connection to be terminated into 50Ω, maintaining signal integrity.

All versions exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz with each path having a nominally equal insertion loss. The injection of noise and unwanted signals into the signal paths of the 40-876 has been minimized by careful attention to the mechanical and electrical design.

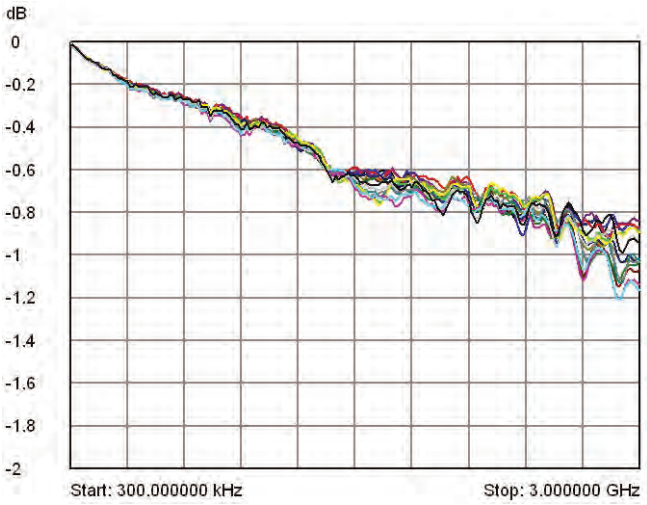
MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

The 40-876 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-872 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

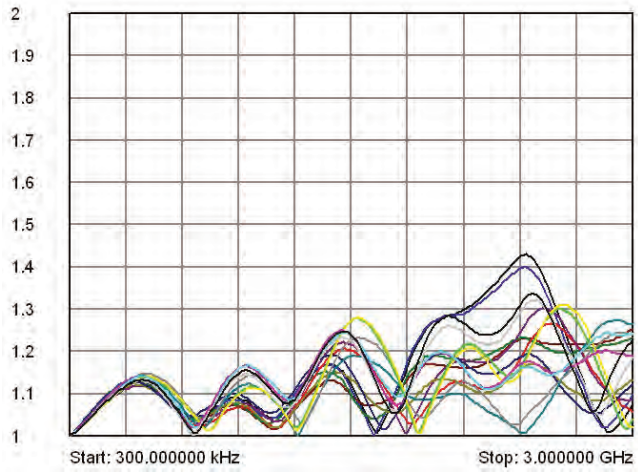


40-876 Quad 4 to 1 Terminated RF MUX Functional Diagram (Default Switch Paths Shown)

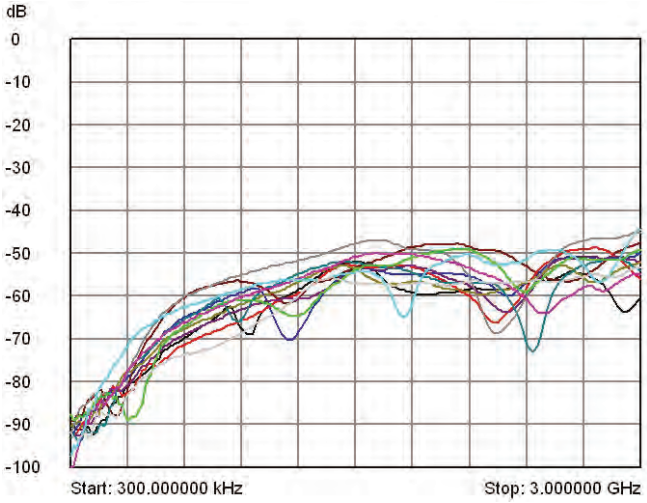
40-876 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



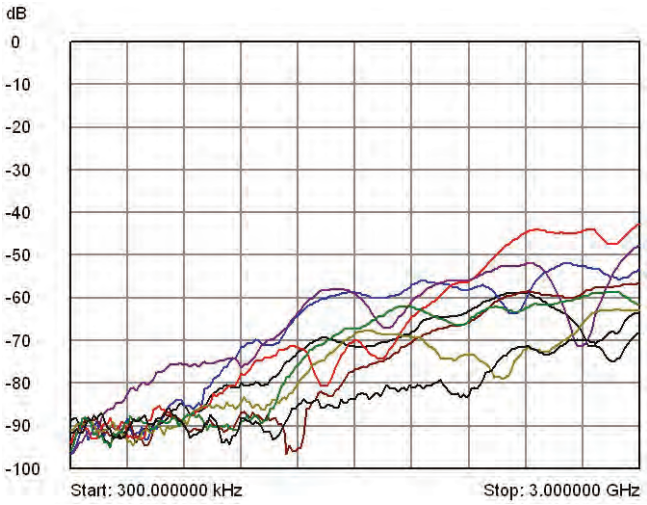
40-876 Typical Insertion Loss Plot For Each Signal Path



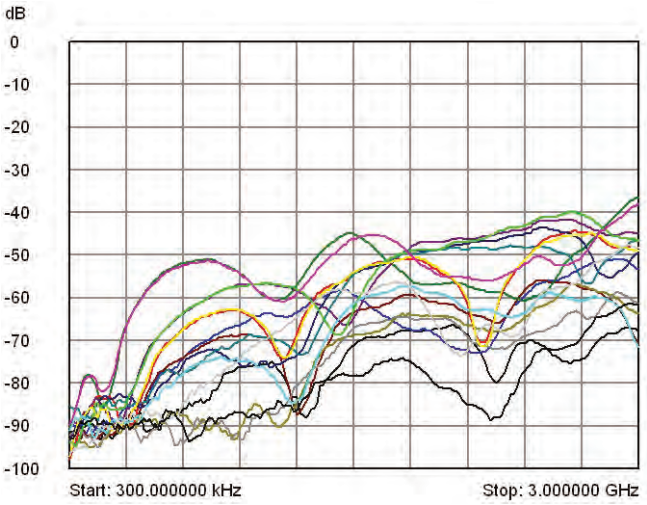
40-876 Typical VSWR Plot For Each Signal Path



40-876 Typical Crosstalk Plot Between Signal Paths



40-876 Typical Crosstalk Plot Between MUX Banks



40-876 Typical Isolation Plots for each input channel

RF Specification

RF Frequency Range:	DC to 3GHz, usable to 3.5GHz
Insertion Loss:	Typically <0.5dB to 1GHz Typically <0.9dB to 2GHz Typically <1.3dB to 3GHz
VSWR:	Typically <1.2:1 to 1GHz Typically <1.3:1 to 2GHz Typically <1.5:1 to 3GHz
Isolation:	Typically >50dB to 1GHz Typically >44dB to 2GHz Typically >35dB to 3GHz
Crosstalk:	Typically <-52dB to 1GHz Typically <-45dB to 2GHz Typically <-42dB to 3GHz
Maximum RF Power:	2W (terminated)

Other Switching Specifications

Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.4A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

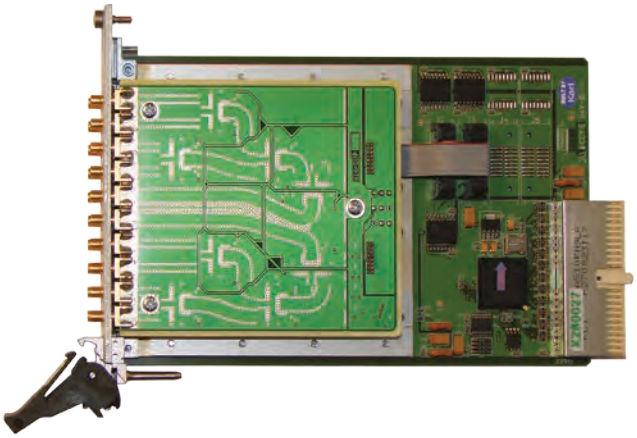
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Single 4:1 Terminated RF MUX SMB	**40-876-001**
Dual 4:1 Terminated RF MUX SMB	**40-876-002**
Quad 4:1 Terminated RF MUX SMB	**40-876-004**
Single 4:1 Terminated RF MUX MCX	**40-876-101**
Dual 4:1 Terminated RF MUX MCX	**40-876-102**
Quad 4:1 Terminated RF MUX MCX	**40-876-104**

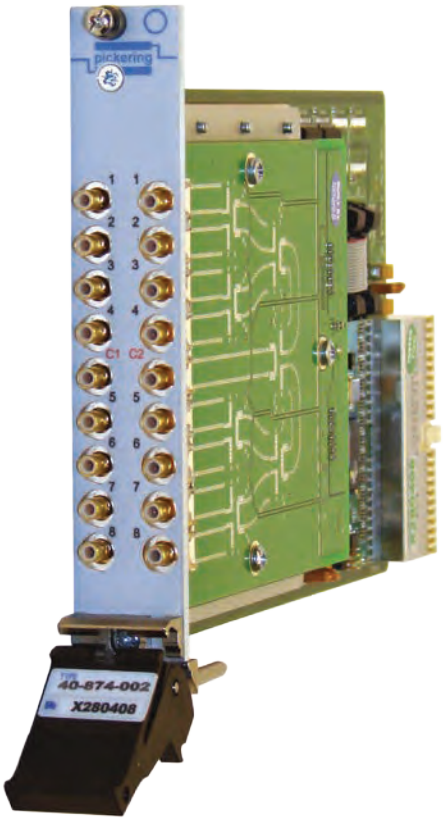
Mating Connectors & Cabling

For connection accessories for the 40-876 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-874
50Ω 8-Channel RF Multiplexer

- 3GHz RF Multiplexer
- Single and Dual Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



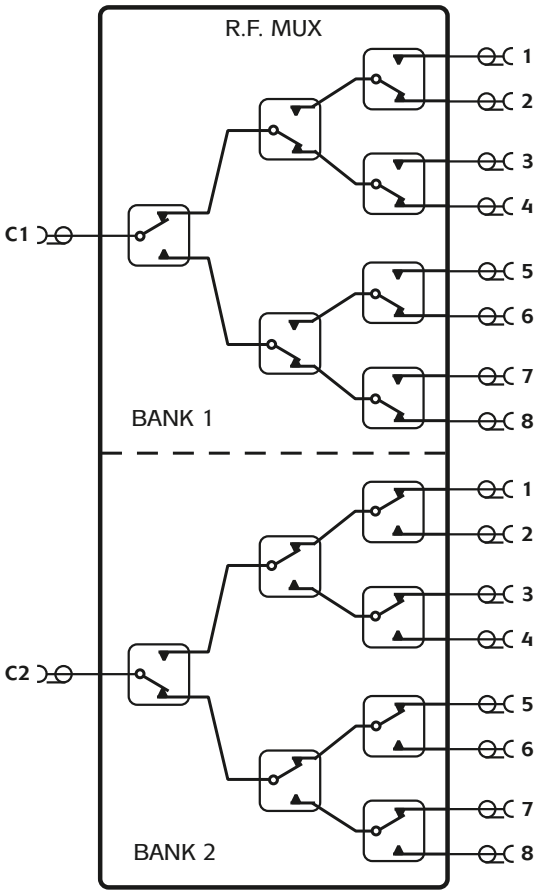
The 40-874 is a 50Ω 8 to 1 RF MUX available with 1 or 2 banks in a single PXI slot.

All versions exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz with each path having a nominally equal insertion loss. The injection of noise and unwanted signals into the signal paths of the 40-874 has been minimized by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

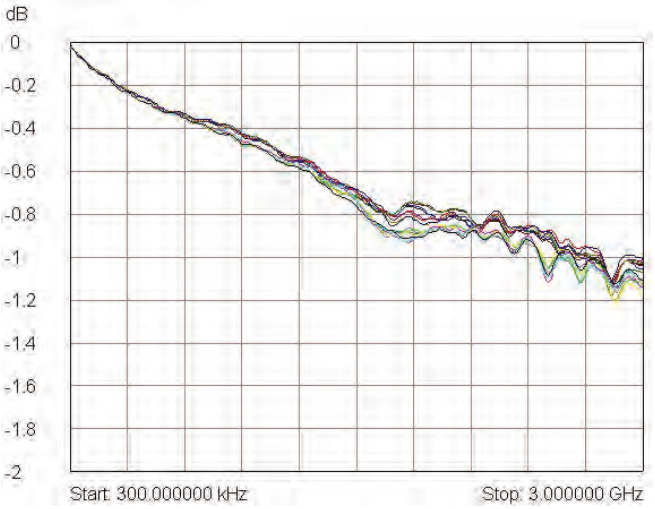
The 40-874 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-874 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 75Ω version of the 40-874 is also available, the 40-834.

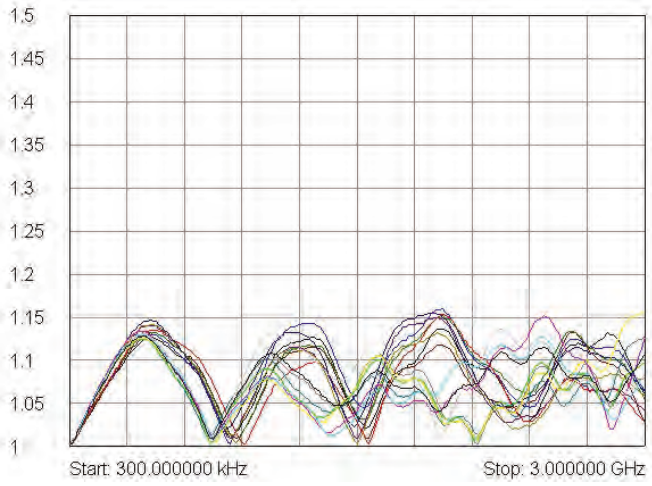


40-874 Dual 8 to 1 RF MUX Functional Diagram (Default Switch Paths Shown)

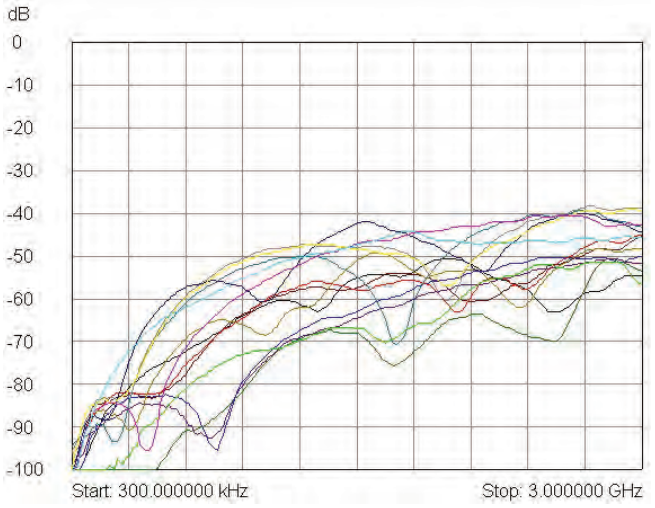
40-874 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



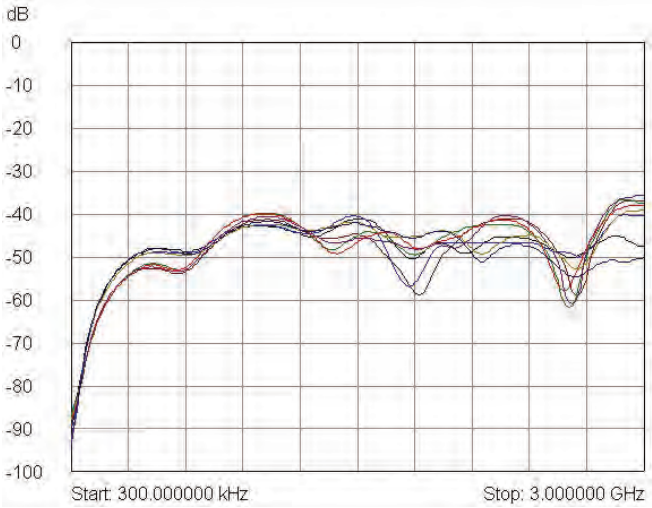
40-874 Typical insertion loss plots for each channel.



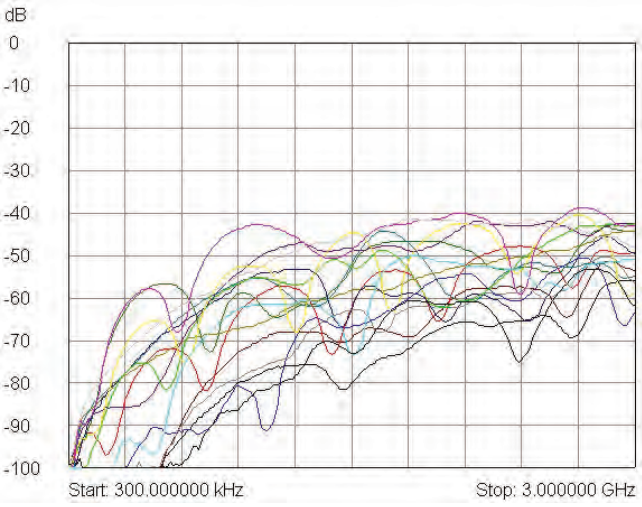
40-874 Typical VSWR plots for each channel.



40-874 Typical crosstalk between channels (these are measurements of crosstalk within each multiplexer for neighbouring channels).



40-874 Typical crosstalk between MUX banks (these are measurements of crosstalk between the same paths through neighbouring multiplexers).



40-874 Typical Isolation Plots for each input channel.

RF Specification

RF Frequency Range:	DC to 3GHz, usable to 3.5GHz
Insertion Loss:	Typically <0.6dB to 1GHz Typically <1.2dB to 3GHz
VSWR:	Typically <1.2:1 to 3GHz

Note: VSWR measurements were carried out for each selected input with the 50Ω load fitted to the common terminal of the multiplexer.

Isolation:	Typically >42dB to 1GHz Typically >38dB to 3GHz
Crosstalk:	Typically <-46dB to 1GHz Typically <-37dB to 3GHz
Maximum RF Power:	10W at 3GHz

Other Switching Specifications

Maximum DC Voltage:	30V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.21A	0	0

Mechanical Characteristics

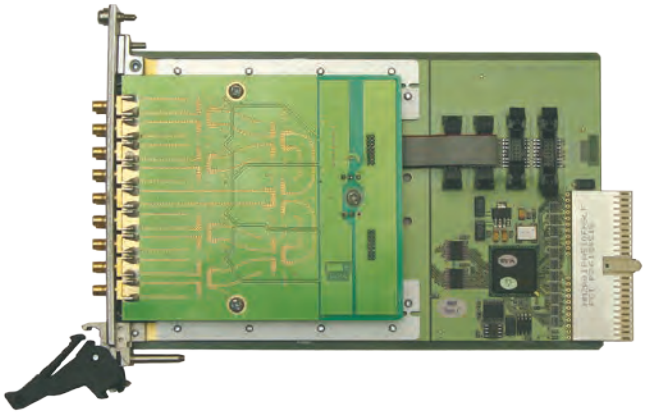
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Single 8:1 RF MUX SMB	**40-874-001**
Dual 8:1 RF MUX SMB	**40-874-002**
Single 8:1 RF MUX MCX	**40-874-101**
Dual 8:1 RF MUX MCX	**40-874-102**

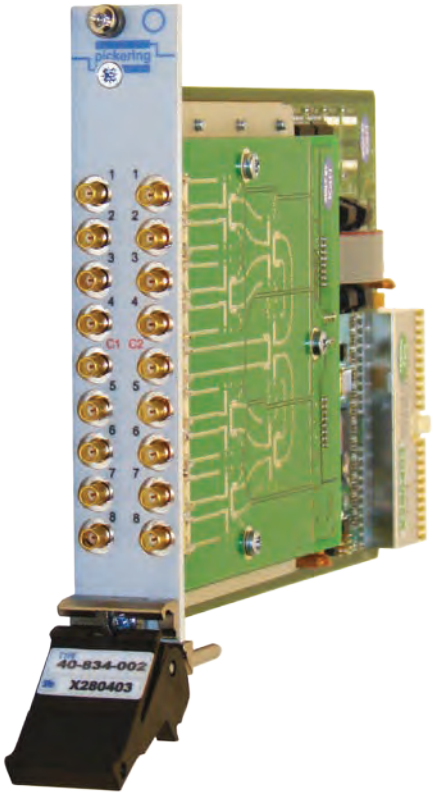
Mating Connectors & Cabling

For connection accessories for the 40-874 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-834
75Ω 8-Channel RF Multiplexer

- 3GHz RF Multiplexer
- Single and Dual Versions
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



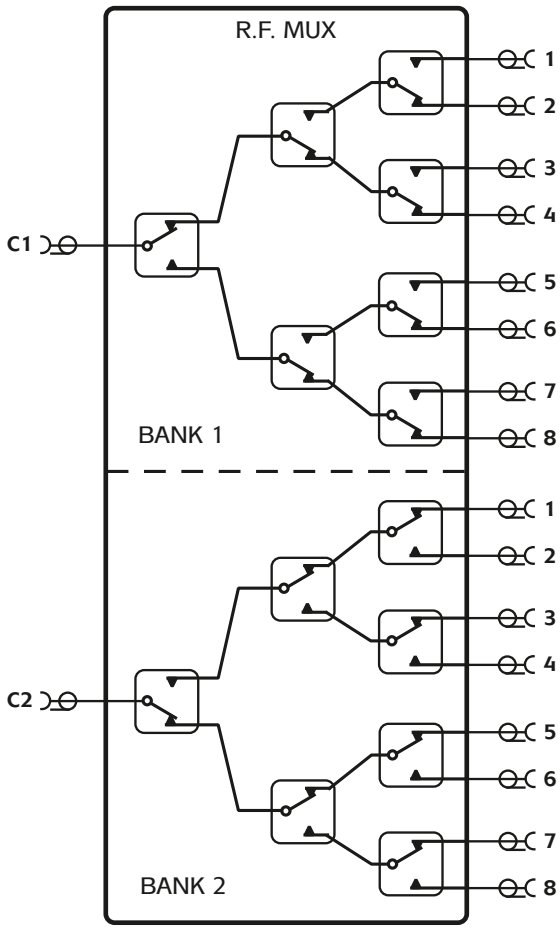
The 40-834 is a 75Ω 8 to 1 RF MUX available with 1 or 2 banks in a single PXI slot.

All versions have been designed to exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz with each path having a nominally equal insertion loss. The design of the 40-834 minimizes the injection of noise and unwanted signals into the signal path by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

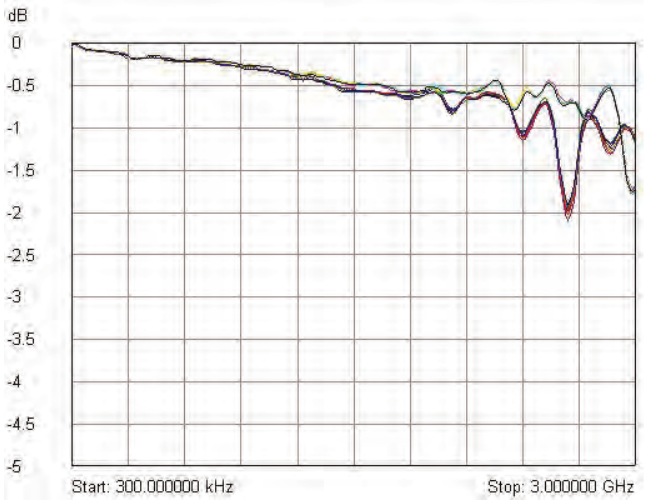
The 40-834 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-834 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 50Ω version of the 40-834 is also available, the 40-874.

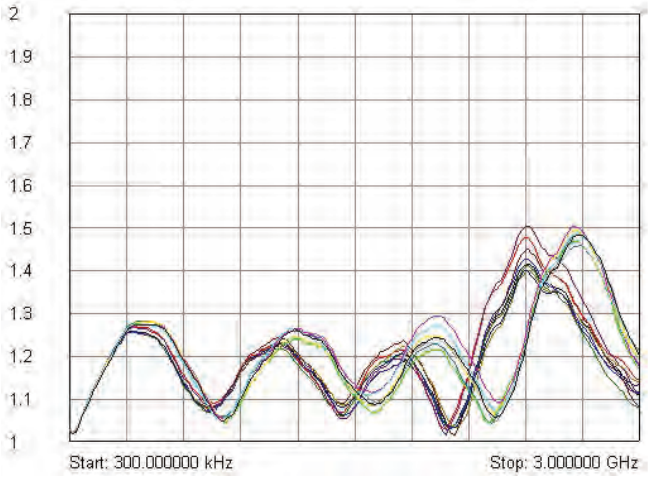


40-834 Dual 8 to 1 RF MUX Functional Diagram (default switch paths shown)

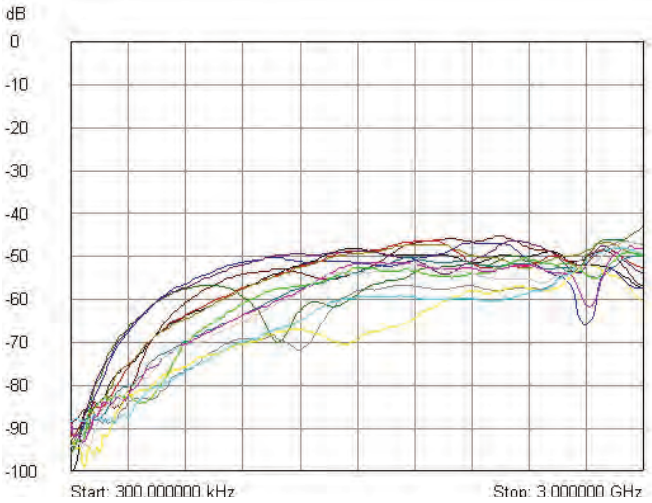
40-834 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



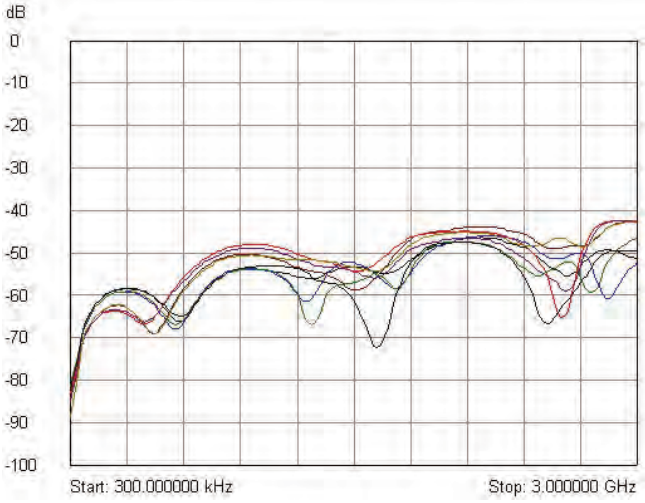
40-834 Typical insertion loss plots for each channel.



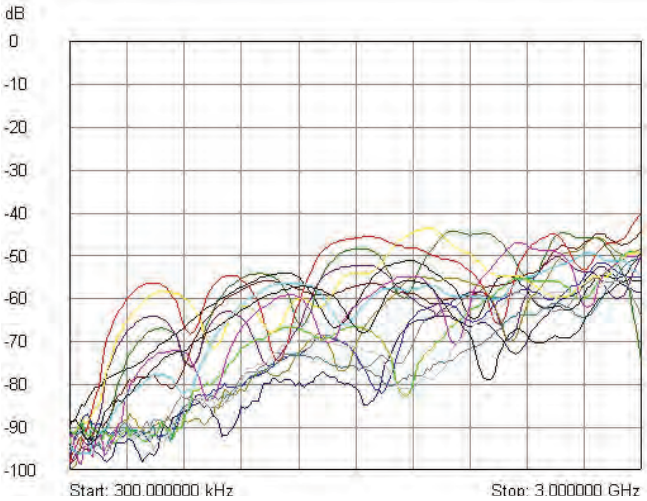
40-834 Typical VSWR plots for each channel.



40-834 Typical crosstalk between channels (these are measurements of crosstalk within each multiplexer for neighbouring channels).



40-834 Typical crosstalk between MUX banks (these are measurements of crosstalk between the same paths through neighbouring multiplexers).



40-834 Typical Isolation Plots for each input channel.

RF Specification

RF Frequency Range:	DC to 3GHz
Insertion Loss:	Typically <0.4dB to 1GHz Typically <0.9dB to 2GHz Typically <1.2dB to 2.5GHz Typically <2.1dB to 3GHz
VSWR:	Typically <1.3:1 to 2GHz Typically <1.5:1 to 3GHz

Note: VSWR measurements were carried out for each selected input with a 75Ω load fitted to the common terminal of the multiplexer.

Isolation:	Typically >52dB to 1GHz Typically >39dB to 3GHz
Crosstalk:	Typically <-49dB to 1GHz Typically <-42dB to 3GHz
Maximum RF Power:	10W at 2GHz

Other Switching Specifications

Maximum DC Voltage:	100V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.21A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

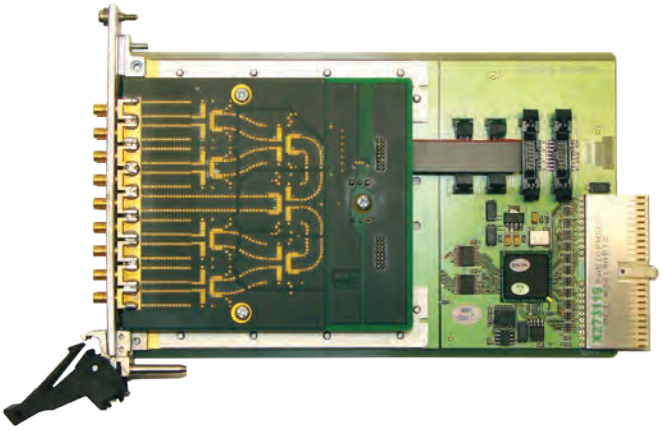
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Single 8:1 RF MUX SMB	**40-834-001**
Dual 8:1 RF MUX SMB	**40-834-002**
Single 8:1 RF MUX MCX	**40-834-101**
Dual 8:1 RF MUX MCX	**40-834-102**

Mating Connectors & Cabling

For connection accessories for the 40-834 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-875
3GHz 50Ω 16-Channel RF Multiplexer

- 3GHz RF Multiplexer
- Single 16 Channel Multiplexer
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

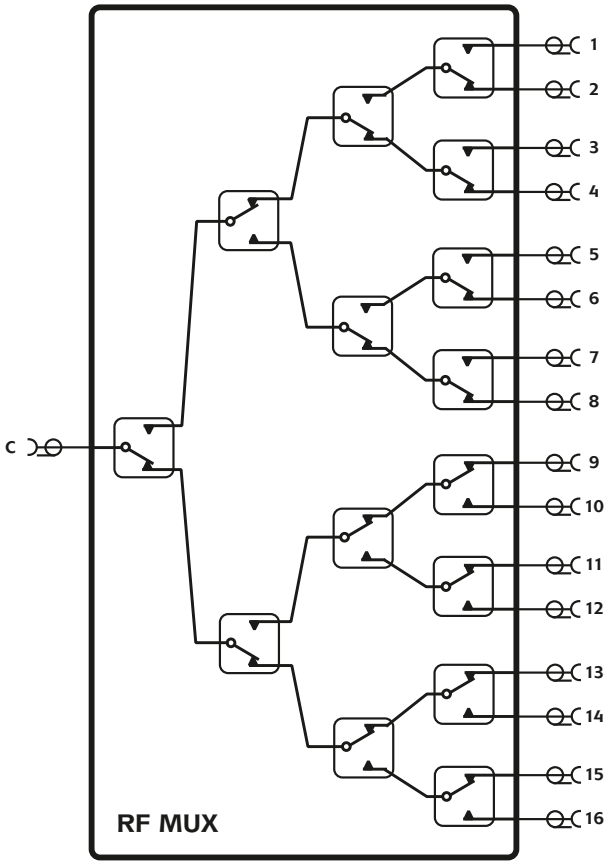
The 40-875 provides a single 50Ω 16-channel RF MUX in a single PXI slot.

The 40-875 has been designed to exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. The MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz. The design of the 40-875 minimizes the injection of noise and unwanted signals into the signal path by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

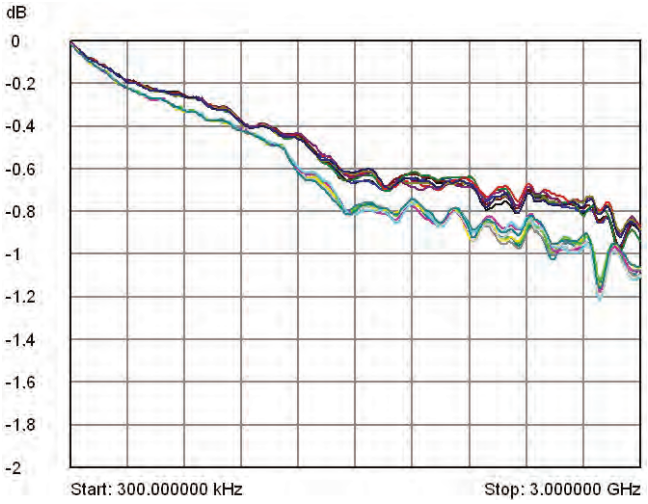
The 40-875 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-875 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 75Ω version of the 40-875 is also available, the 40-835

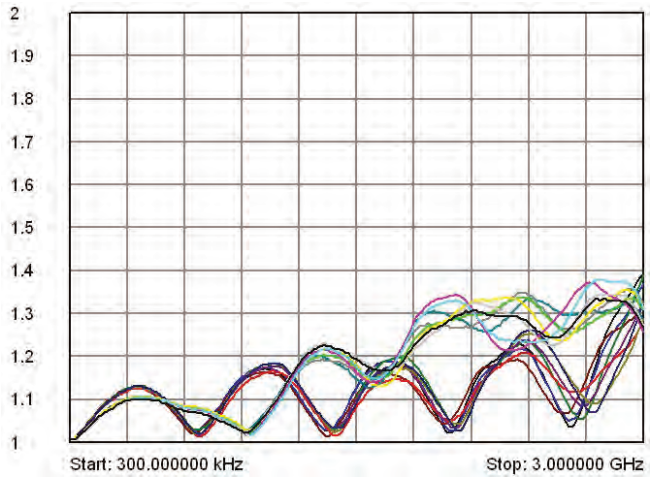


40-875 16 to 1 RF MUX Functional Diagram (Default Switch Paths Shown)

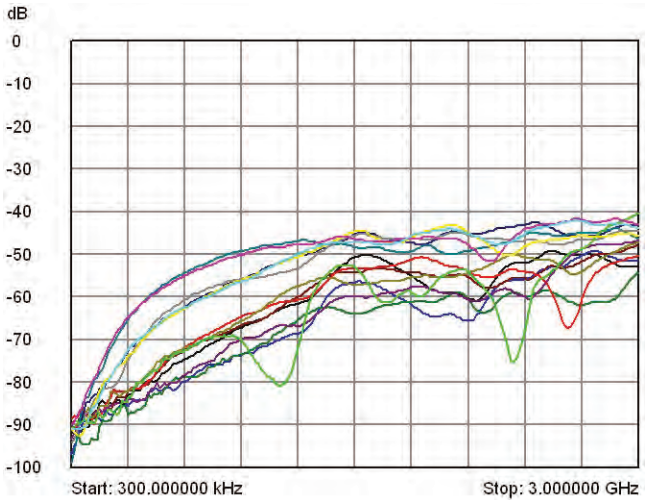
40-875 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



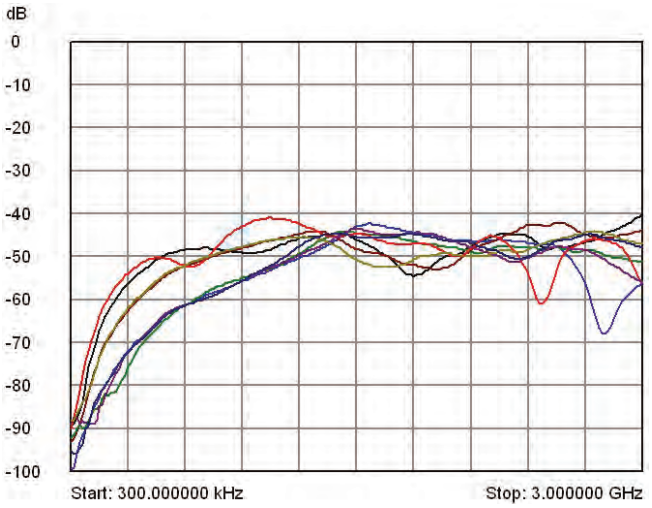
40-875 Typical insertion loss plots for each channel.



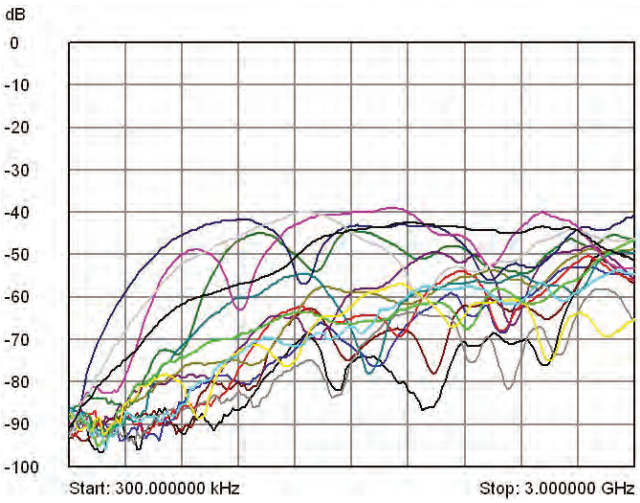
40-875 Typical VSWR plots for each channel.



40-875 Typical crosstalk between adjacent channels.



40-875 Typical crosstalk on adjacent channels between daughter cards (e.g. 1 & 9, 2 & 10 etc.)



40-875 Typical Isolation Plots for each input channel.

RF Specification

RF Frequency Range:	DC to 3GHz, usable to 3.5GHz
Insertion Loss:	Typically <0.5dB to 1GHz Typically <1.3dB to 3GHz
VSWR:	Typically <1.2 to 1GHz Typically <1.4 to 3GHz

Note: VSWR measurements were carried out for each selected input with a 50Ω load fitted to the common terminal of the multiplexer.

Isolation:	Typically >40dB to 1GHz Typically >38dB to 3GHz
Crosstalk:	Typically <-40dB to 3GHz
Maximum RF Power:	10W at 3GHz

Other Switching Specifications

Maximum DC Voltage:	30V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.18A	0	0

Mechanical Characteristics

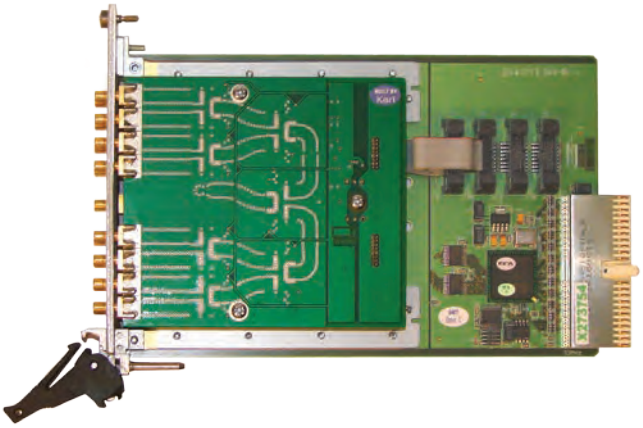
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

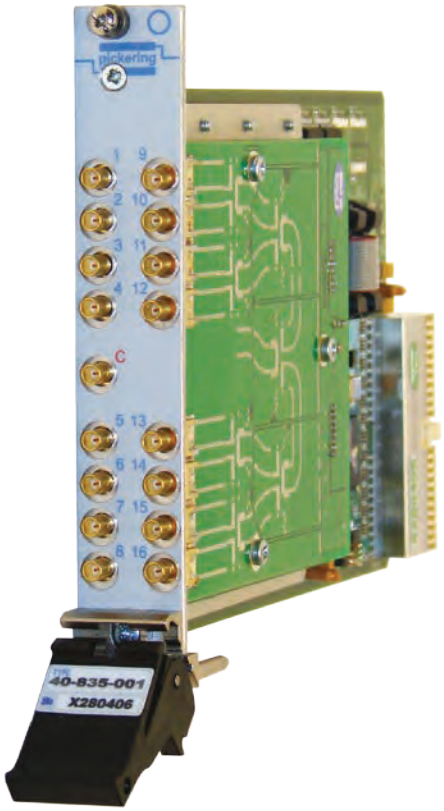
Single 16:1 RF MUX SMB	**40-875-001**
Single 16:1 RF MUX MCX	**40-875-101**

Mating Connectors & Cabling

For connection accessories for the 40-875 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-835
3GHz 75Ω 16-Channel RF Multiplexer



- 3GHz RF Multiplexer
- Single 16 Channel Multiplexer
- SMB or MCX Connector Versions
- High Performance, Low Cost
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty

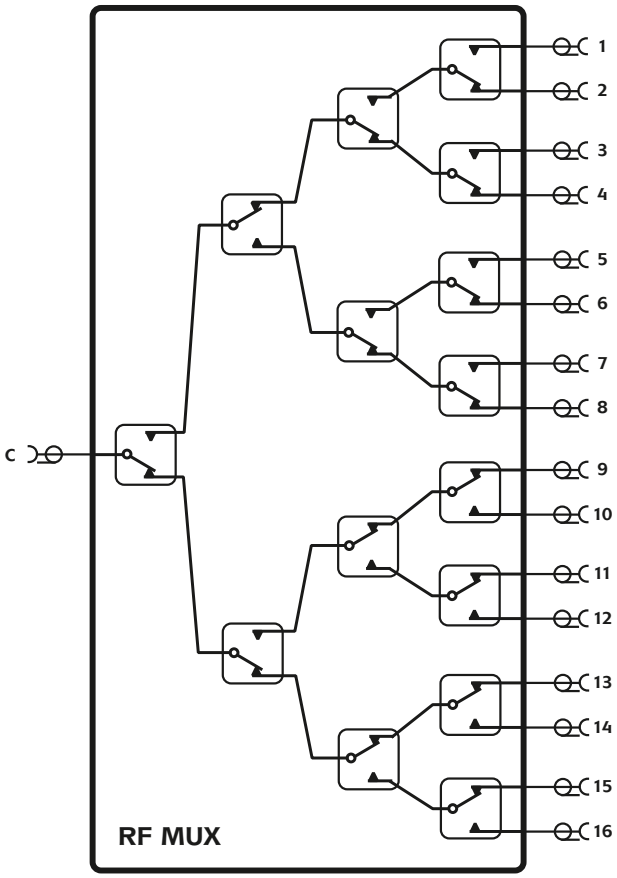
The 40-835 provides a single 75Ω 16-channel RF MUX in a single PXI slot.

The 40-835 has been designed to exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. The MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 3GHz. The design of the 40-835 minimizes the injection of noise and unwanted signals into the signal path by careful attention to the mechanical and electrical design.

MCX or SMB connectors can be chosen, allowing users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

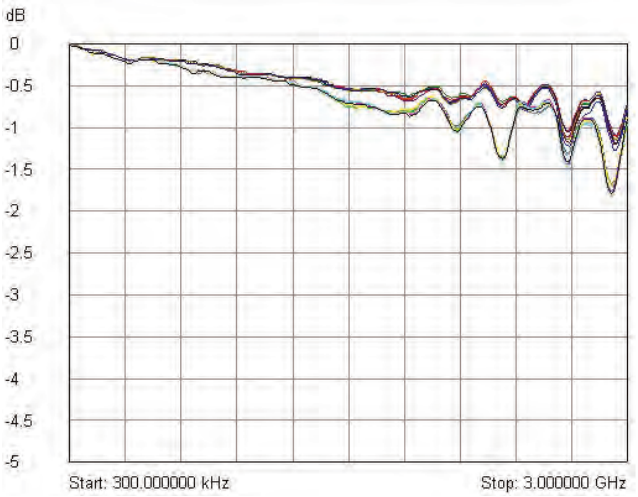
The 40-835 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-835 can be supported in the 60-102B or 60-103B LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.

A 50Ω version of the 40-835 is also available, the 40-875.

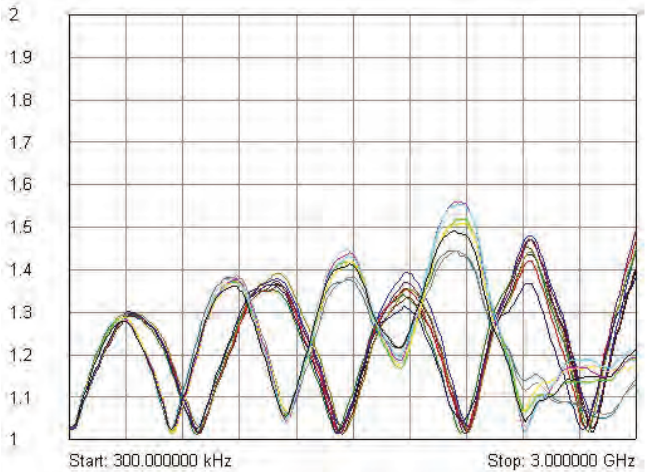


40-835 16 to 1 RF MUX Functional Diagram
(Default Switch Paths Shown)

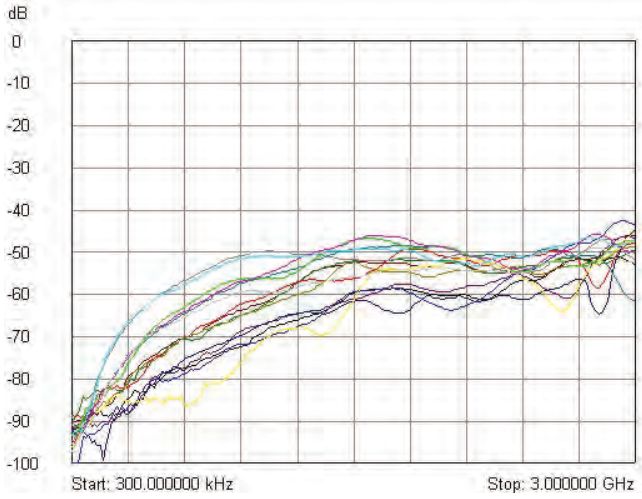
40-835 RF Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



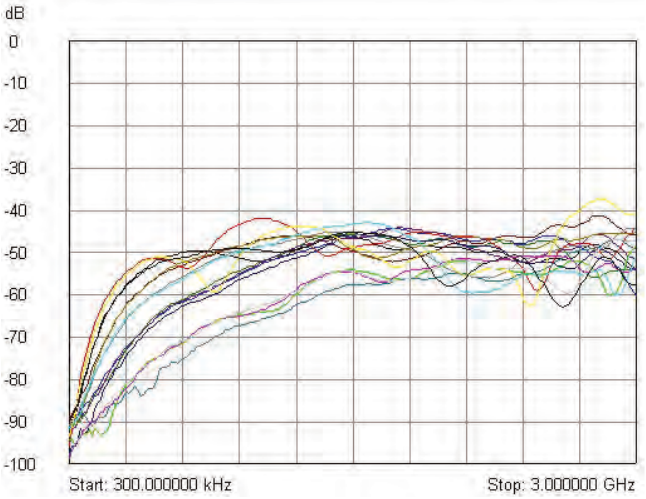
40-835 Typical insertion loss plots for each channel.



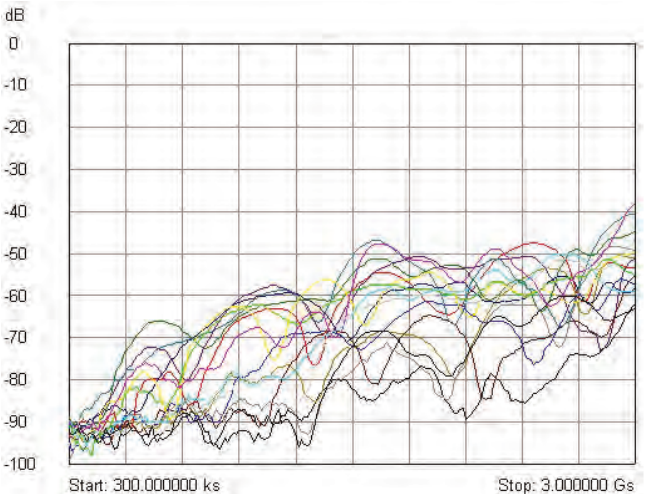
40-835 Typical VSWR plots for each channel.



40-835 Typical crosstalk between adjacent channels.



40-835 Typical crosstalk on adjacent channels between daughter cards (e.g. 1 & 9, 2 & 10 etc.)



40-835 Typical Isolation Plots for each input channel.

RF Specification

RF Frequency Range:	DC to 3GHz
Insertion Loss:	Typically <0.5dB to 1GHz Typically <0.9dB to 2GHz Typically <1.4dB to 2.5GHz Typically <1.9dB to 3GHz
VSWR:	Typically <1.4:1 to 1GHz Typically <1.6:1 to 3GHz

Note: VSWR measurements were carried out for each selected input with a 75Ω load fitted to the common terminal of the multiplexer.

Isolation:	Typically >56dB to 1GHz Typically >55dB to 2GHz Typically >38dB to 3GHz
Crosstalk:	Typically <-49dB to 1GHz Typically <-45dB to 2GHz Typically <-42dB to 3GHz
Maximum RF Power:	10W at 2.5GHz, useable to 3GHz

Other Switching Specifications

Maximum DC Voltage:	100V
Maximum DC Current:	1A
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.03A	0.18A	0	0

Mechanical Characteristics

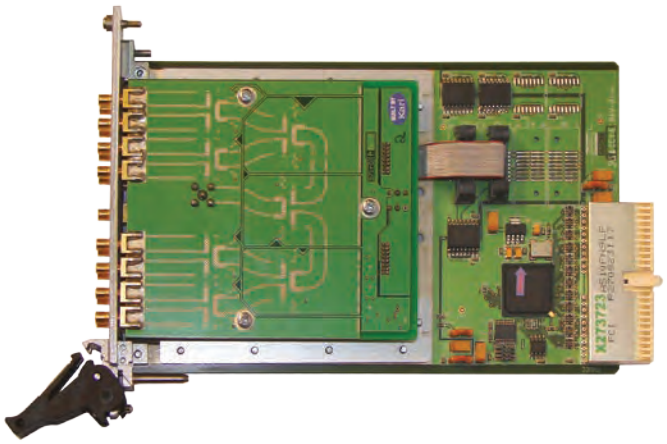
Single slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

Single 16:1 RF MUX SMB	**40-835-001**
Single 16:1 RF MUX MCX	**40-835-101**

Mating Connectors & Cabling

For connection accessories for the 40-835 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-740/745/746
RF Multiplexer Module

- R.F. Multiplexer with 2GHz Bandwidth
- 50Ω and 75Ω Versions Available
- Available as 8 to 1 or Single/Dual 4 to 1
- Single 4 to 1 Version Available With Automatic Termination of Non-Selected Channels
- Choice of Front Panel Mounted Coaxial Connectors
- 75Ω Version Suitable for Telecoms and High Quality Video Switching
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

40-746 Dual 4 Channel RF MUX

40-740, 40-745 and 40-746 RF Multiplexers are a range of Bi-Directional Multiplexers with bandwidths to beyond 2000MHz.

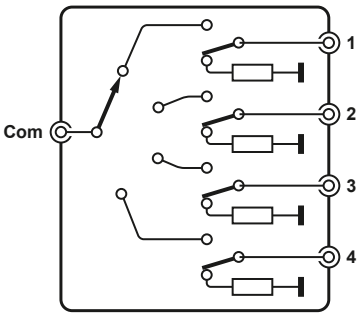
They are arranged as Single 8 to 1, Dual 4 to 1 or Single 4 to 1 configurations, all with excellent Insertion Loss, VSWR & Isolation, in 50Ω or 75Ω versions with a wide choice of connectors:

40-740 Single 4 to 1 RF Multiplexer with automatic termination of all non-selected signals.

40-745 Single 8 to 1 or 4 to 1 RF Multiplexer (no termination option).

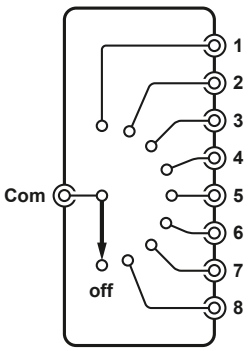
40-746 Dual 4 to 1 RF Multiplexer (no termination option).

Applications for the 40-740/75/46 include routing high frequency signals to and from oscilloscopes, analysers, signal generators and synthesizers, telecoms tributary switching (from 2MBit/s to 155MBit/S), video/audio switching and switching high frequency logic signals.

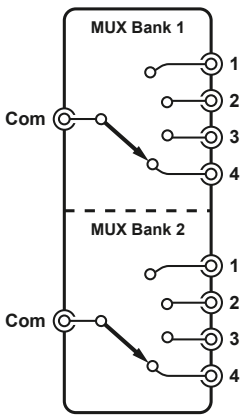


40-740 Single 4 Channel Multiplexer With Automatic Termination Of Non-Selected Channels

40-740 Single 4 Channel RF MUX, BNC Version

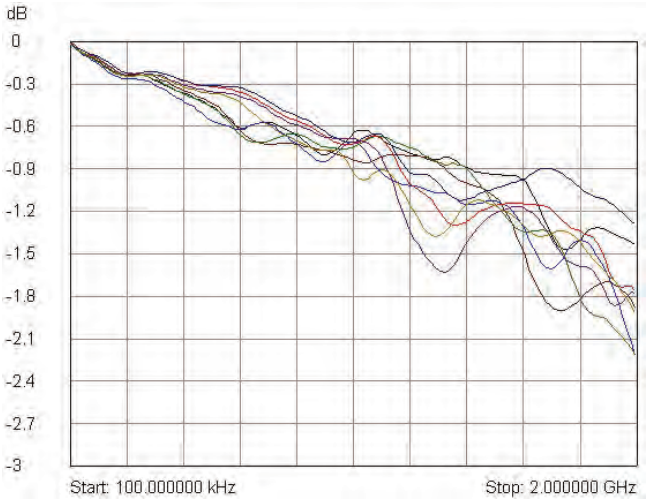


40-745 Single 8 Channel Multiplexer

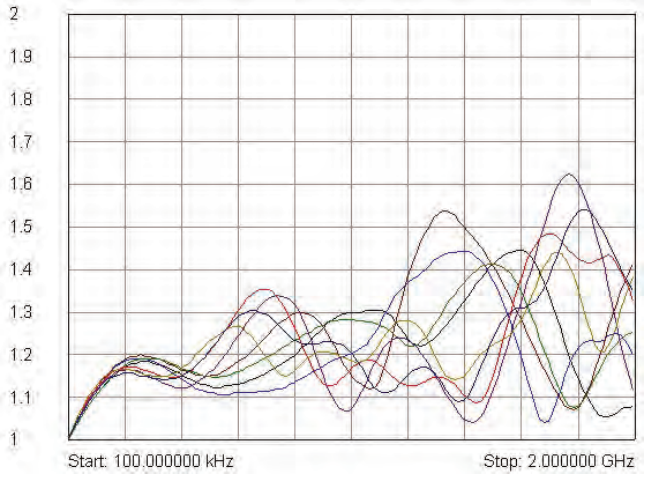


40-746 Dual 4 Channel Multiplexer (dual channel mode has no off state)

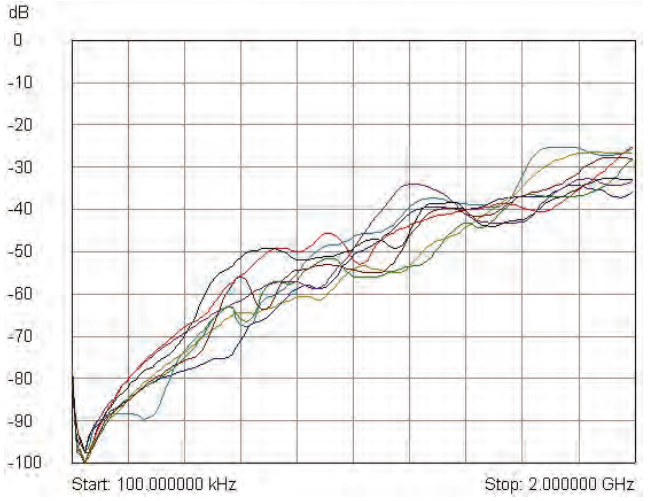
40-746-511 (50Ω SMB) Perfomance Plots (Plots taken from typical sample showing all connecting paths for parameter)



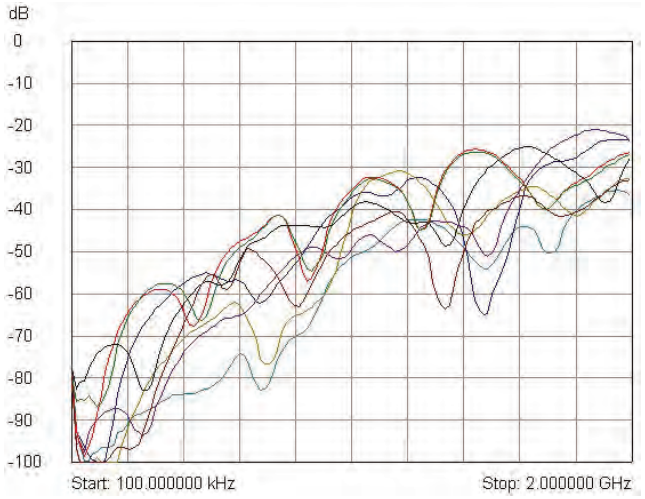
40-746-511 (50Ω SMB) typical insertion loss plots for each channel.



40-746-511 (50Ω SMB) typical VSWR plots for each channel.



40-746-511 (50Ω SMB) typical crosstalk plots between neighbouring multiplexer channels.



40-746-511 (50Ω SMB) typical isolation plots for each input channel.

General Specification (All Versions)

Maximum Voltage:	50VDC
Maximum Power:	10W
Maximum Carry Power (900MHz):	15W
Maximum Switch Current:	0.1A
Initial On Path Resistance:	<500mΩ
Off Path Resistance:	$>10^8\Omega$
Thermal Offset:	<20µV
Expected Life, Mechanical:	$>1x10^6$ operations
Expected Life, Electrical (low power):	$>3x10^5$ operations
Expected Life, Electrical (max power):	$>3x10^5$ operations
Switching Time:	5ms

Isolation and Crosstalk Specification

Isolation (0 to 2000MHz):	>40dB
Crosstalk (0 to 2000MHz):	>50dB

50Ω Specification (except BNC versions)

Maximum Frequency:	2000MHz
Rise Time:	<0.2ns
Insertion Loss:	<3dB
VSWR (0 to 2000MHz):	<1:1.9

75Ω Specification (except BNC versions)

Maximum Frequency:	2000MHz
Rise Time:	<0.3ns
Insertion Loss:	<3dB
VSWR (0 to 1000MHz):	<1:1.8

75Ω Specification (50Ω & 75Ω BNC versions)

Maximum Frequency:	1000MHz

RF Relay Type

The 40-740/745/746 is fitted with high reliabillty RF Relays, these offer long life with good low level switching performance.

Spare RF Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

Power Requirements

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 220g (40-746-731)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector. Signals via front panel mounted coaxial connectors, type dependant upon product code.

Product Order Codes

4 to 1 RF Multiplexer With Automatic Termination	
50Ω, SMB Connector, 2GHz	**40-740-511**
50Ω, SMA Connector, 2GHz	**40-740-521**
75Ω, SMZ/Type 43 Connector, 2GHz	**40-740-711**
75Ω, Siemens 1.0/2.3 Connector, 2GHz	**40-740-731**
75Ω, SMB Connector, 2GHz	**40-740-751**
4 to 1 RF Multiplexer	
50Ω, BNC Connector, 1GHz	**40-745-501**
50Ω, SMB Connector, 2GHz	**40-745-591**
75Ω, BNC Connector, 1GHz	**40-745-701**
8 to 1 RF Multiplexer	
50Ω, SMB Connector, 2GHz	**40-745-511**
50Ω, SMA Connector, 2GHz	**40-745-521**
75Ω, SMZ/Type 43 Connector, 2GHz	**40-745-711**
75Ω, Siemens 1.0/2.3 Connector, 2GHz	**40-745-731**
75Ω, SMB Connector, 2GHz	**40-745-751**
Dual 4 to 1 RF Multiplexer	
50Ω, SMB Connector, 2GHz	**40-746-511**
50Ω, SMA Connector, 2GHz	**40-746-521**
75Ω, SMZ/Type 43 Connector, 2GHz	**40-746-711**
75Ω, Siemens 1.0/2.3 Connector, 2GHz	**40-746-731**
75Ω, SMB Connector, 2GHz	**40-746-751**

–C Alternative connectors may be available, please consult factory.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

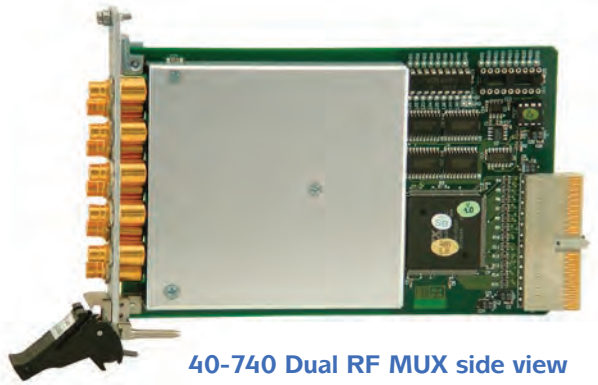
The relay kits for the 40-740 range are as follows:

91-100-096 kit for 40-740-501/521
91-100-029 kit for 40-740-711/731/751
91-100-096 kit for 40-745-501/511/521/591
91-100-029 kit for 40-745-701/711/731/751
91-100-096 kit for 40-746-511/521
91-100-029 kit for 40-746-711/731/751

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

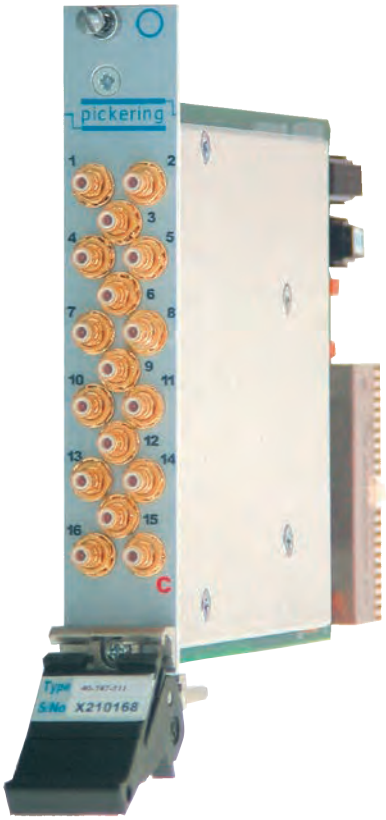
For connection accessories for the 40-740 series please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



40-740 Dual RF MUX side view

40-747
Single 16-Channel RF Multiplexer

- 1GHz Bandwidth
- Choice of Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



The 40-747 is a single 16 to 1 RF MUX available in 50Ω or 75Ω versions occupying a single PXI slot (2 slots for versions fitted with SMA connectors).

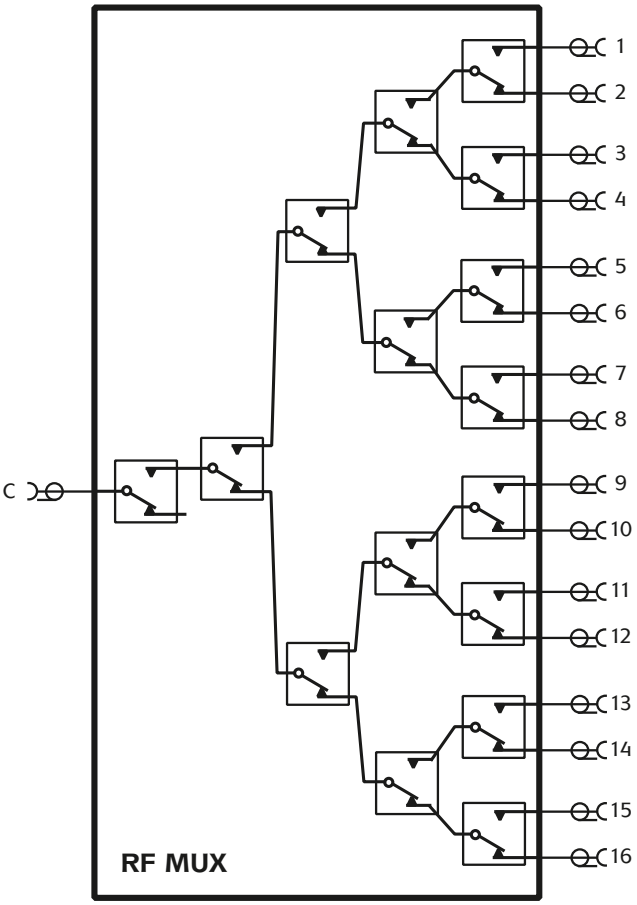
The module is available with SMB or SMA connectors for 50Ω versions or, 1.0/2.3 or SMB connectors for 75Ω versions. This allows users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

Applications for the 40-747 include routing high frequency signals to and from oscilloscopes, analysers, signal generators and synthesizers, telecoms tributary switching, video/audio switching and switching high frequency logic signals.

The 40-747 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-747 can be supported in Pickering Interfaces' **LXI/PXI Modular Chassis**, permitting users to choose an LXI or PXI switching platform while retaining the same high performance characteristics and driver environment.

For applications that require SMB or MCX connectors, Pickering offer newer designs with significantly improved performance.

The 40-875 (50Ω) and 40-835 (75Ω) are 16-channel multiplexers with bandwidths to 3GHz



40-747 Single 16 to 1 RF MUX Switching Diagram (Default Switch Paths Shown)

RF Specification - 50Ω Versions

RF Frequency Range:	DC to 1GHz
Insertion Loss:	Typically <1.0dB to 500MHz Typically <1.6dB to 1GHz
VSWR:	Typically <1.8:1 to 500MHz Typically <1.9:1 to 1GHz
Note: VSWR measurements were carried out for each selected input with the 50Ω load fitted to the common terminal of the MUX.	
Isolation:	Typically >44dB to 500MHz Typically >33dB to 1GHz
Crosstalk:	Typically <-55dB to 500MHz Typically <-37dB to 1GHz

RF Specification - 75Ω Versions

RF Frequency Range:	DC to 1GHz
Insertion Loss:	Typically <1.0dB to 500MHz Typically <2.9dB to 1GHz
VSWR:	Typically <1.42:1 to 500MHz Typically <1.92:1 to 1GHz
Note: VSWR measurements were carried out for each selected input with the 75Ω load fitted to the common terminal of the MUX.	
Isolation:	Typically >54dB to 500MHz Typically >27dB to 1GHz
Crosstalk:	Typically <-54dB to 500MHz Typically <-29dB to 1GHz

Other Switching Specifications

Maximum RF Power:	10W
Maximum DC Voltage:	30V
Maximum DC Current:	0.5A
Operating Time:	5ms typical
Expected Life, Mechanical: Expected Life, Electrical (low power): Expected Life, Electrical (max power):	$>1x10^6$ operations $>3x10^5$ operations $>3x10^5$ operations

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

SMA connector version: Dual slot 3U PXI (CompactPCI card).
All other versions: Single slot 3U PXI (CompactPCI card).

Module weight: 300g (40-747-511)
300g (40-747-751)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector. Signals via front panel mounted coaxial connectors, type dependant upon product code.

Product Order Codes

Single 16:1 RF MUX SMB 50Ω 1GHz	**40-747-511**
Single 16:1 RF MUX SMA 50Ω 1GHz	**40-747-521**
Single 16:1 RF MUX 1.0/2.3 75Ω 1GHz	**40-747-731**
Single 16:1 RF MUX SMB 75Ω 1GHz	**40-747-751**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kits for the 40-747 range are as follows:

91-100-096 kit for 40-747-511
91-100-096 kit for 40-747-521
91-100-029 kit for 40-747-731
91-100-029 kit for 40-747-751

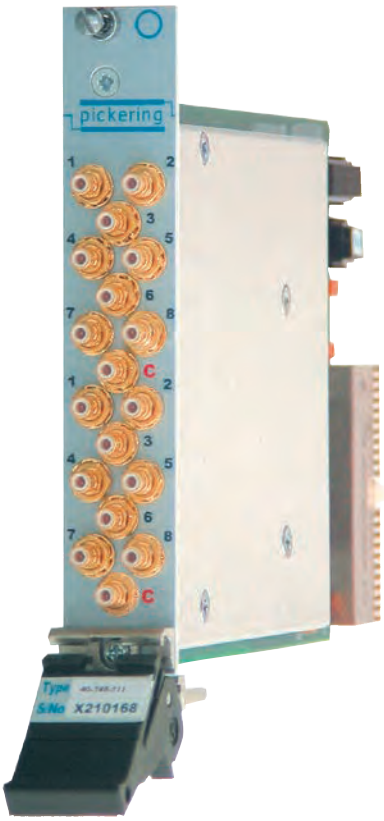
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-747 range please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-748
Dual 8-Channel RF Multiplexer

- 2GHz Bandwidth (50Ω Versions)
- 1GHz Bandwidth (75Ω Versions)
- Choice of Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



The 40-748 is a dual 8 to 1 RF MUX available in 50Ω or 75Ω versions occupying a single PXI slot (2 slots for versions fitted with SMA connectors).

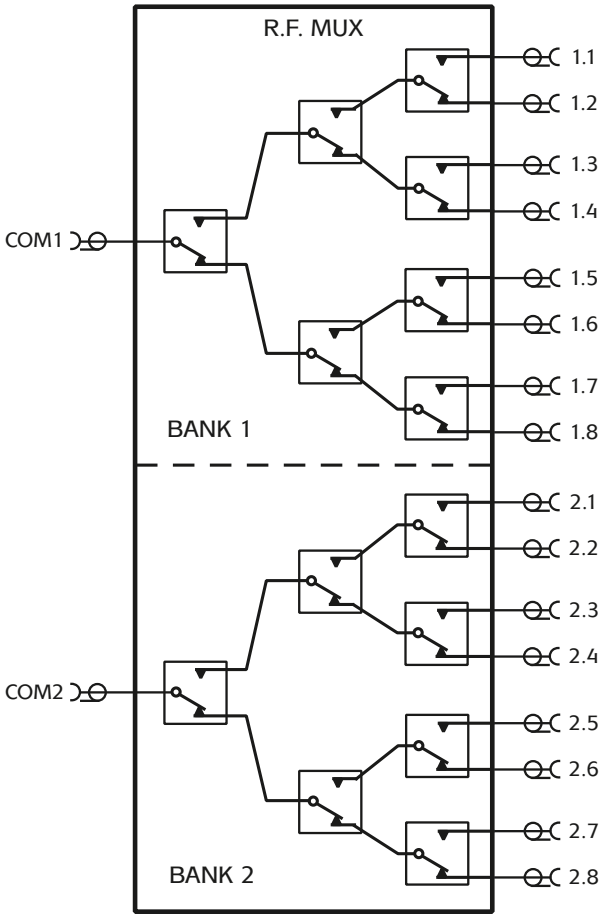
The module is available with SMB or SMA connectors for 50Ω versions or, 1.0/2.3 or SMB connectors for 75Ω versions. This allows users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

Applications for the 40-748 include routing high frequency signals to and from oscilloscopes, analysers, signal generators and synthesizers, telecoms tributary switching, video/audio switching and switching high frequency logic signals.

The 40-748 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-748 can be supported in Pickering Interfaces' **LXI/PXI Modular Chassis**, permitting users to choose an LXI or PXI switching platform while retaining the same high performance characteristics and driver environment.

For applications that require SMB or MCX connectors, Pickering offer newer designs with significantly improved performance at lower cost.

The 40-874 (50Ω) and 40-834 (75Ω) are 8-channel multiplexers with bandwidths to 3GHz



40-748 Dual 8 to 1 RF MUX Switching Diagram (Default Switch Paths Shown)

RF Specification - 50Ω Versions

RF Frequency Range:	DC to 2GHz
Insertion Loss:	Typically <1.4dB to 1GHz Typically <2.6dB to 2GHz
VSWR:	Typically <1.95:1 to 1GHz Typically <1.95:1 to 2GHz
Note: VSWR measurements were carried out for each selected input with the 50Ω load fitted to the common terminal of the MUX.	
Isolation:	Typically >32dB to 1GHz Typically >20dB to 2GHz
Crosstalk:	Typically <-42dB to 1GHz Typically <-26dB to 2GHz

RF Specification - 75Ω Versions

RF Frequency Range:	DC to 1GHz
Insertion Loss:	Typically <0.8dB to 500MHz Typically <1.9dB to 1GHz
VSWR:	Typically <1.55:1 to 500MHz Typically <1.65:1 to 1GHz
Note: VSWR measurements were carried out for each selected input with the 75Ω load fitted to the common terminal of the MUX.	
Isolation:	Typically >50dB to 500MHz Typically >26dB to 1GHz
Crosstalk:	Typically <-42dB to 500MHz Typically <-27dB to 1GHz

Other Switching Specifications

Maximum RF Power:	10W
Maximum DC Voltage:	30V
Maximum DC Current:	0.5A
Operating Time:	5ms typical
Expected Life, Mechanical: Expected Life, Electrical (low power): Expected Life, Electrical (max power):	>1x10^6 operations >3x10^5 operations >3x10^5 operations

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

SMA connector version: Dual slot 3U PXI (CompactPCI card).
All other versions: Single slot 3U PXI (CompactPCI card).

Module weight: 300g (40-748-751)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector. Signals via front panel mounted coaxial connectors, type dependant upon product code.

Product Order Codes

Dual 8:1 RF MUX SMB 50Ω 2GHz	**40-748-511**
Dual 8:1 RF MUX SMA 50Ω 2GHz	**40-748-521**
Dual 8:1 RF MUX 1.0/2.3 75Ω 1GHz	**40-748-731**
Dual 8:1 RF MUX SMB 75Ω 1GHz	**40-748-751**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kits for the 40-748 range are as follows:

91-100-096 kit for 40-748-511
91-100-096 kit for 40-748-521
91-100-029 kit for 40-748-731
91-100-029 kit for 40-748-751

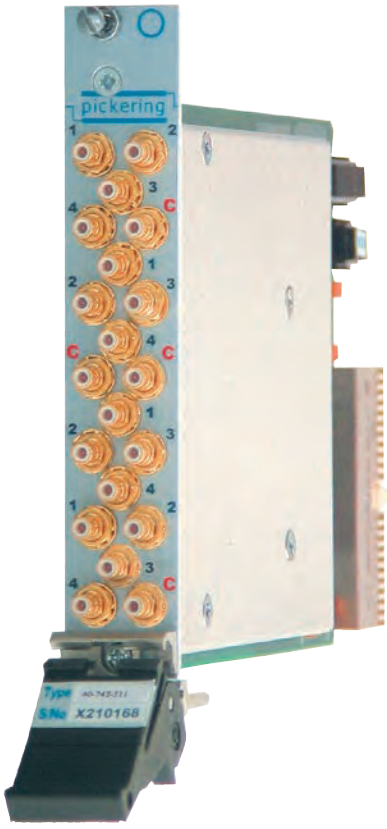
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-748 range please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-749
Quad 4-Channel RF Multiplexer

- 1.3GHz Bandwidth (50Ω Versions)
- 1GHz Bandwidth (75Ω Versions)
- Choice of Coaxial Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- 3 Year Warranty



The 40-749 is a quad 4 to 1 RF MUX available in 50Ω or 75Ω versions occupying a single PXI slot (2 slots for versions fitted with SMA connectors).

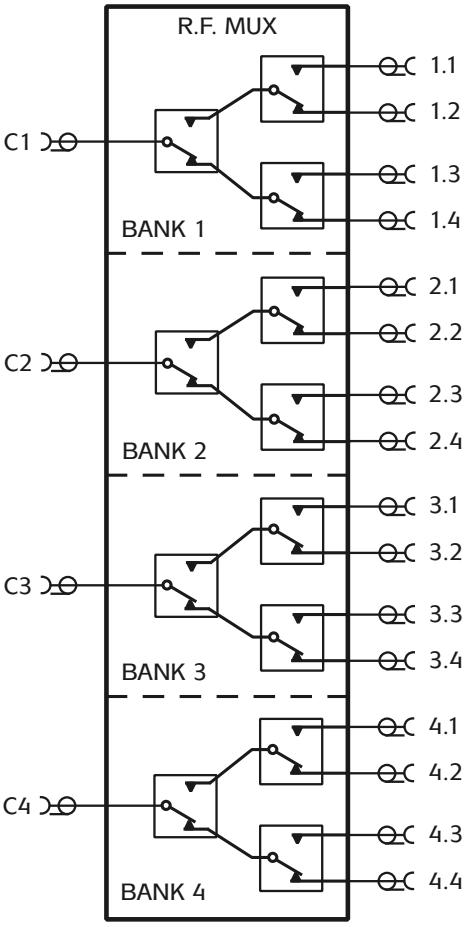
The module is available with SMB or SMA connectors for 50Ω versions or, 1.0/2.3 or SMB connectors for 75Ω versions. This allows users to simplify their cable interfacing issues in test systems by matching them to other connectors in the system.

Applications for the 40-749 include routing high frequency signals to and from oscilloscopes, analysers, signal generators and synthesizers, telecoms tributary switching, video/audio switching and switching high frequency logic signals.

The 40-749 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-749 can be supported in Pickering Interfaces' **LXI/PXI Modular Chassis**, permitting users to choose an LXI or PXI switching platform while retaining the same high performance characteristics and driver environment.

For applications that require SMB or MCX connectors, Pickering offer newer designs with significantly improved performance at lower cost.

The 40-872 (50Ω) and 40-832 (75Ω) are 4-channel multiplexers with bandwidths to 3GHz



40-749 Quad 4 to 1 RF MUX Switching Diagram (Default Switch Paths Shown)

RF Specification - 50Ω Versions

RF Frequency Range:	DC to 1.3GHz
Insertion Loss:	Typically <0.9dB to 500MHz Typically <1.5dB to 1.3GHz
VSWR:	Typically <1.70:1 to 500MHz Typically <1.85:1 to 1.3GHz
Note: VSWR measurements were carried out for each selected input with the 50Ω load fitted to the common terminal of the MUX.	
Isolation:	Typically >45dB to 500MHz Typically >27dB to 1.3GHz
Channel Crosstalk:	Typically <-52dB to 500MHz Typically <-32dB to 1.3GHz
Bank Crosstalk:	Typically <-55dB to 500MHz Typically <-38dB to 1.3GHz

RF Specification - 75Ω Versions

RF Frequency Range:	DC to 1GHz
Insertion Loss:	Typically <1.0dB to 500MHz Typically <1.25dB to 1GHz
VSWR:	Typically <1.8:1 to 500MHz Typically <2.0:1 to 1GHz
Note: VSWR measurements were carried out for each selected input with the 75Ω load fitted to the common terminal of the MUX.	
Isolation:	Typically >50dB to 500MHz Typically >30dB to 1GHz
Channel Crosstalk:	Typically <-50dB to 500MHz Typically <-30dB to 1GHz
Bank Crosstalk:	Typically <-55dB to 500MHz Typically <-35dB to 1GHz

Other Switching Specifications

Maximum RF Power:	10W
Maximum DC Voltage:	30V
Maximum DC Current:	0.5A
Operating Time:	5ms typical
Expected Life, Mechanical: Expected Life, Electrical (low power): Expected Life, Electrical (max power):	>$1x10^6$ operations >$3x10^5$ operations >$3x10^5$ operations

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0	320mA (typ 240mA)	0	0

Mechanical Characteristics

SMA connector version: Dual slot 3U PXI (CompactPCI card).
All other versions: Single slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector. Signals via front panel mounted coaxial connectors, type dependant upon product code.

Product Order Codes

Quad 4:1 RF MUX SMB 50Ω 1.3GHz	**40-749-511**
Quad 4:1 RF MUX SMA 50Ω 1.3GHz	**40-749-521**
Quad 4:1 RF MUX 1.0/2.3 75Ω 1GHz	**40-749-731**
Quad 4:1 RF MUX SMB 75Ω 1GHz	**40-749-751**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kits for the 40-749 range are as follows:

91-100-096 kit for 40-749-511
91-100-096 kit for 40-749-521
91-100-029 kit for 40-749-731
91-100-029 kit for 40-749-751

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-749 range please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-755
50Ω RF Multiplexer SP4T 1.8GHz

- Up To 10off SP4T in a Single Module
- 1.8GHz Switching (SMB Version)
- SMB and Multiway Connector Versions
- Low Cost, High Performance
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported in PXI or LXI Chassis
- Selected Builds Supported by eBIRST
- 3 Year Warranty

The 40-755 is a 50Ω high density RF multiplexer (SP4T) array available with up to 10 MUXs in a single PXI module. The 40-755 is available with two connector options, an SMB connector that provides a frequency range of 1.8GHz and is available in single or dual PXI slots, or a Multiway connector which limits the bandwidth to 500MHz but offers a high density solution occupying just one PXI slot. The RF switch design is identical in each case.

Each design offers low insertion loss and low VSWR through its usable frequency range and each multiplexer has been designed to have a nominally path independent loss.

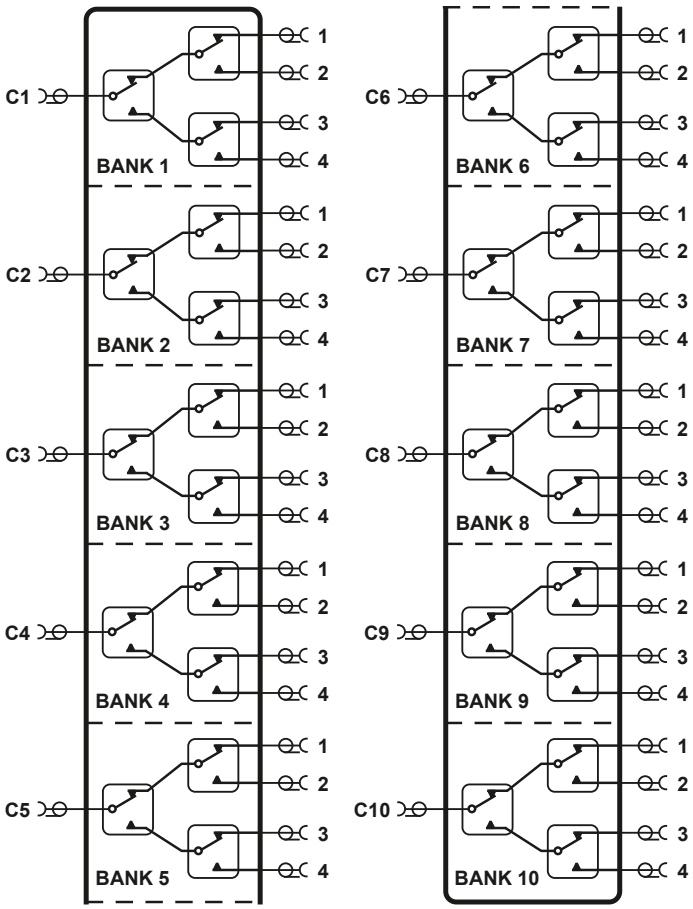
The array of SP4T switches can be configured into alternative configurations through the use of external cabling.

The RF connectors used are fully supported by the range of Pickering Interfaces connection solutions.

The 40-755 is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition the 40-755 can be supported in the 60-102 or 60-103 LXI Modular Chassis, permitting users to freely chose to use PXI or LAN controlled switching solutions with the same high levels of performance.

Supported by eBIRST

SMB builds of this product are supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see 93-000D.pdf



40-755-010 10off SP4T RF MUX
Switching Diagram (Default Switch Paths Shown)

40-755 Specification with multiway connectors

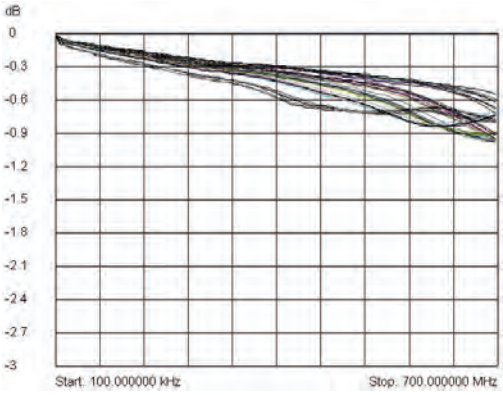
RF Specification - Multiway Connector Versions

Impedance:	50Ω
RF Frequency Range:	DC to 500MHz
Insertion Loss:	<1dB to 500MHz (typically 0.7dB)
VSWR:	<1.8:1 to 500MHz (typically 1.5:1 max)
Isolation:	>55dB to 500MHz
Crosstalk:	<-55dB to 500MHz
Maximum RF Power:	10W at 500MHz

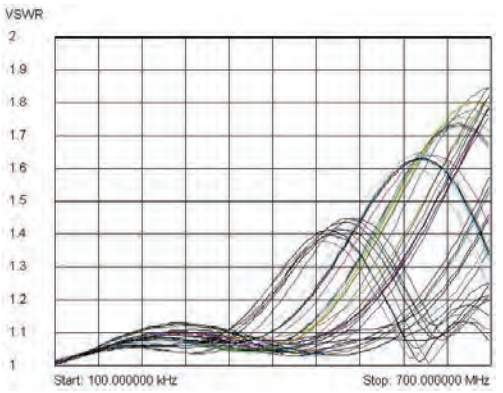
Other Switching Specifications

Maximum Hot Switch Voltage:	200VDC or AC peak
Maximum Hot Switch Current:	1A
Maximum Cold Switch Current:	1A
Maximum Hot Switch Power:	10W
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

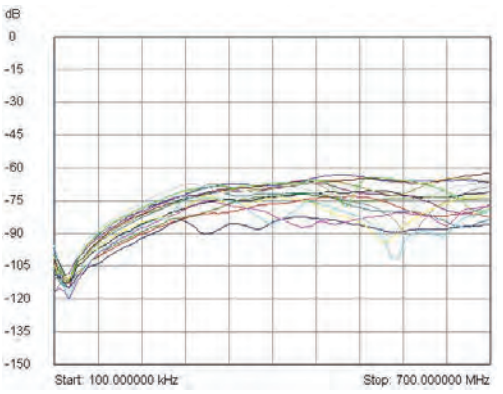
40-755-010 10off SP4T RF MUX with MS-M RF multiway connectors



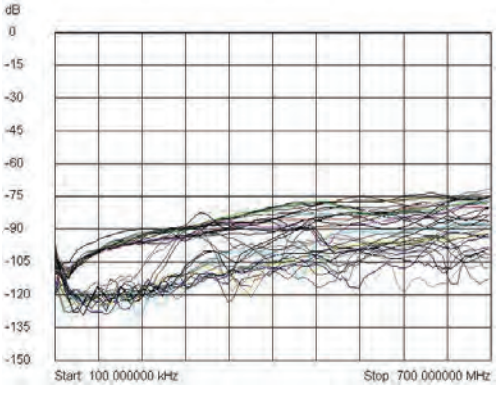
40-755 typical insertion loss plot.



40-755 typical VSWR plot.



40-755 typical bank to bank crosstalk plot



40-755 typical channel to common isolation plot

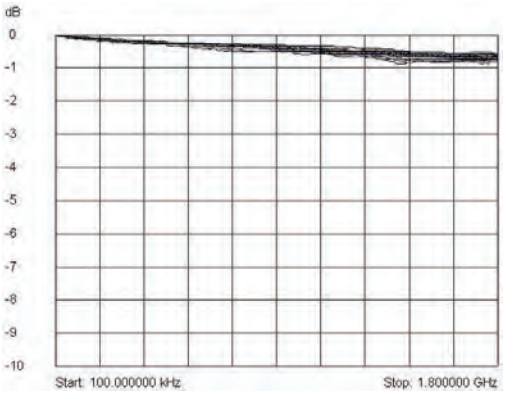
RF Specification - SMB Connector Version

Impedance:	50Ω
RF Frequency Range:	DC to 1.8GHz
Insertion Loss:	<1.3dB to 1.8GHz (typically 0.8dB)
VSWR:	<1.6:1 to 1.8GHz
Isolation:	>40dB to 1.8GHz
Crosstalk:	<-40dB to 1.8GHz
Maximum RF Power:	10W at 1.8GHz

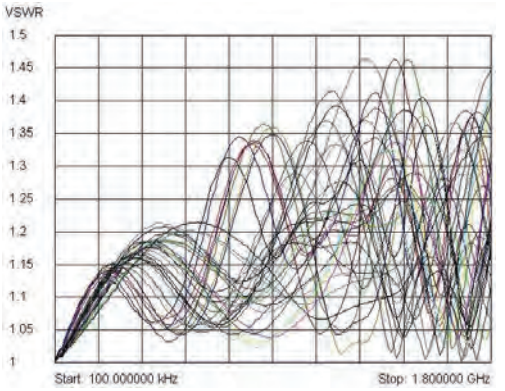
Other Switching Specifications

Maximum Hot Switch Voltage:	200VDC or AC peak
Maximum Hot Switch Current:	1A
Maximum Cold Switch Current:	1A
Maximum Hot Switch Power:	10W
Operating Time:	3ms typical
Life Expectancy:	10 million operations at <100mW

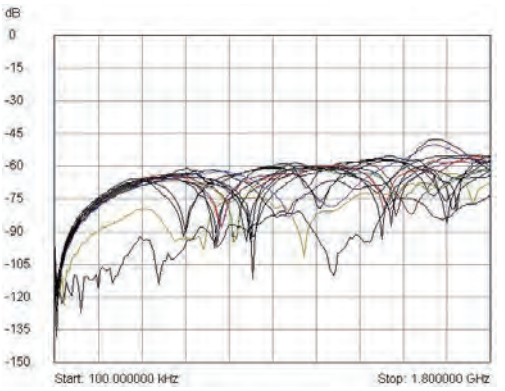
40-755-110 10off SP4T RF MUX with SMB coaxial connectors



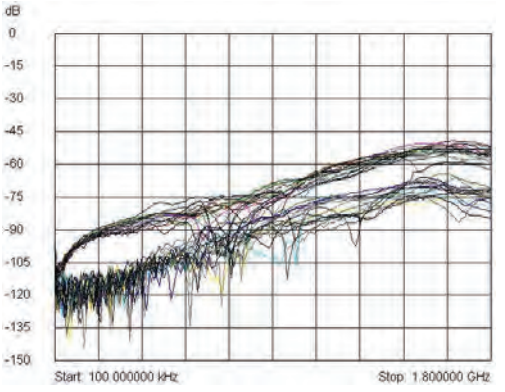
40-755 typical insertion loss plot.



40-755 typical VSWR plot.



40-755 typical bank to bank crosstalk plot



40-755 typical channel to common isolation plot

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
1A	0.65A	0	0

Mechanical Characteristics (40-755-0xx)

Width & Dimensions:	Single slot 3U PXI (CompactPCI card). 3D models in a variety of popular file formats are available on request.
PXI bus:Connector	32-bit P1/J1 backplane connector
User RF Connections:	2off 26-way (-010) or 1off 26-way (-005) high density MS-M RF multiway coaxial connectors.

Mechanical Characteristics (40-755-1xx)

Width & Dimensions:	2 slot (-110) or 1 slot (-104) 3U PXI (CompactPCI card). 3D models in a variety of popular file formats are available on request.
PXI bus:Connector	32-bit P1/J1 backplane connector
User RF Connections:	50off SMB (-110) or 20off SMB (-104) coaxial connectors.

Product Order Codes

10off SP4T RF MUX, 500MHz Multiway	**40-755-010**
5off SP4T RF MUX, 500MHz Multiway	**40-755-005**
10off SP4T RF MUX, 1.8GHz SMB	**40-755-110**
4off SP4T RF MUX, 1.8GHz SMB	**40-755-104**

Support Products

eBIRST Switching System Test Tool

SMB builds of this product are supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adaptor
40-755-110/104	**93-005-001**	**93-005-202**
40-755-010/005	**Unsupported**	

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

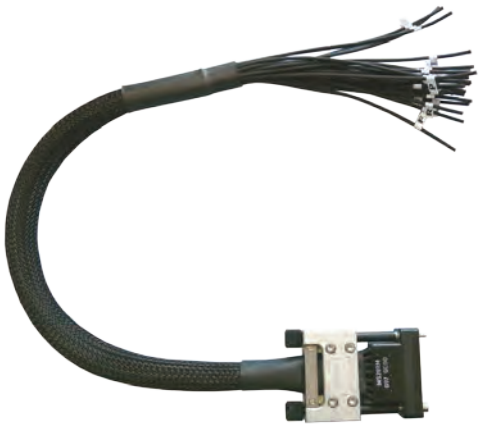
Product	Relay Kit
All Types	**91-100-014**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the SMB version of the 40-755 please refer to the **90-011D** RF Cable Assemblies data sheet, or for the multiway MS-M RF connector version please refer to the **90-017D** Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

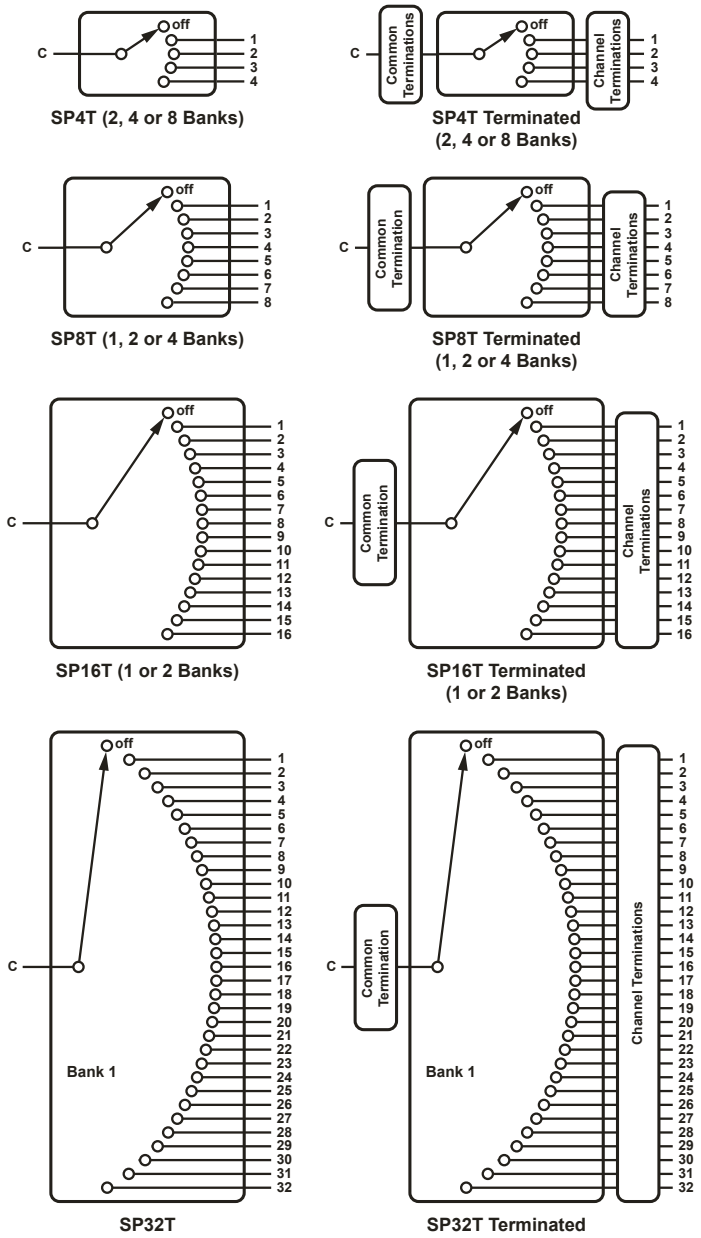
40-755-104 4off SP4T RF MUX with SMB coaxial connectors



Pickering can supply cable assemblies for all its modules. The 40-979-526 shown (MS-M RF to unterminated coax) is suitable for multiway connector versions of the 40-755.

40-760/761/762/763/764/765/766/767
50Ω 600MHz RF Multiplexer

- Range of 600MHz RF Multiplexers
- Available as Dual, Quad & Octal SP4T, Single, Dual & Quad SP8T, Single & Dual SP16T or Single SP32T
- All Versions Available With Automatic Termination of Unused MUX Channels
- SMB Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported in PXI or LXI Chassis
- 3 Year Warranty

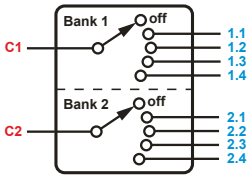


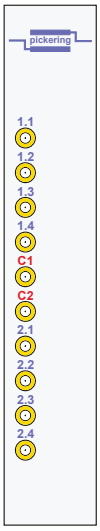
40-760 RF Multiplexer Range Overview

The 40-760 series is a range of 50Ω RF multiplexers available in SP4T, SP8T, SP16T and SP32T formats. All multiplexers have the option of automatic terminations which offer advantages at system level by reducing the presence of standing waves in the system which can cause degradation in isolation and crosstalk.

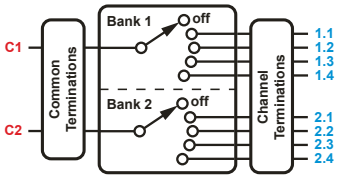
All versions exhibit low insertion loss and VSWR through the use of modern RF relay technology at an affordable cost. Each MUX has been carefully designed to ensure excellent and repeatable RF characteristics to frequencies of 600MHz with each path having a nominally equal insertion loss. The injection of noise and unwanted signals into the signal paths of the 40-760 range has been minimized by careful attention to the mechanical and electrical design.

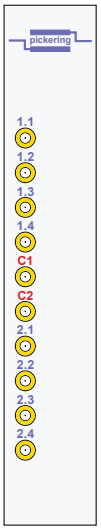
The 40-760 range is supplied with drivers that allow users to support the module in all the popular PXI software environments. In addition, the 40-760 range can be supported in all Pickering's LXI Modular Switching chassis, permitting users to freely choose their switching platform with the same high performance switching module and driver environment.



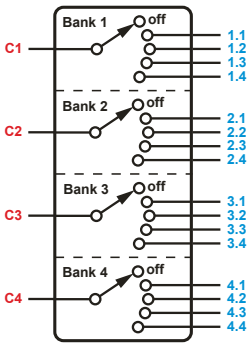


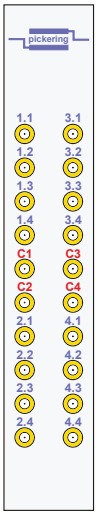
40-760-002 Dual SP4T RF Multiplexer



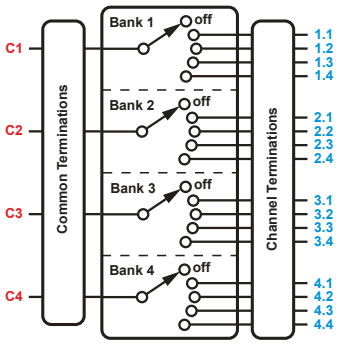


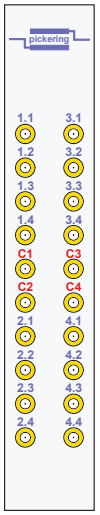
40-761-002 Dual SP4T Terminated RF Multiplexer



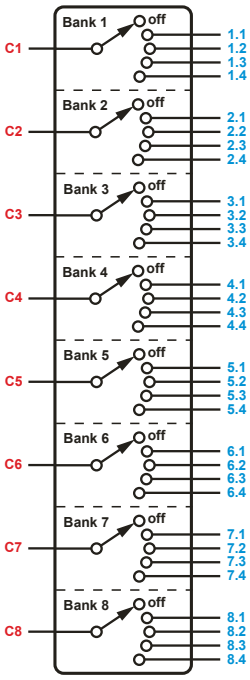


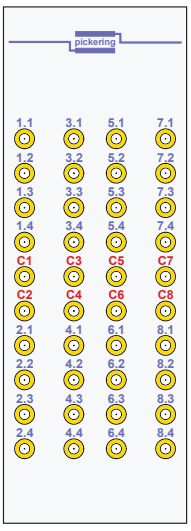
40-760-004 Quad SP4T RF Multiplexer



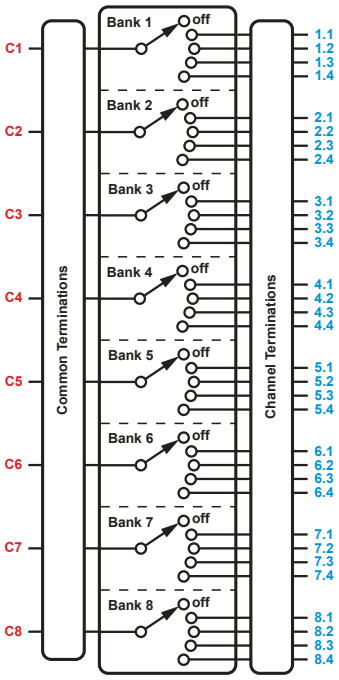


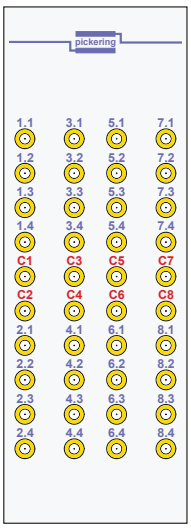
40-761-004 Quad SP4T Terminated RF Multiplexer





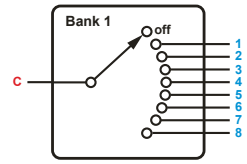
40-760-008 Octal SP4T RF Multiplexer

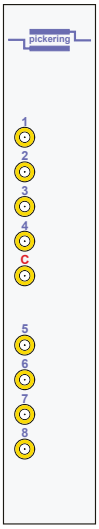




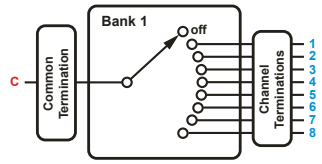
40-761-008 Octal SP4T Terminated RF Multiplexer

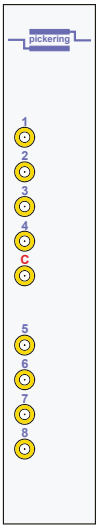
NOTE: The default state of all multiplexers is the "off" position. Additionally, the default state of terminated versions is with all common and channel signals terminated into 50Ω.



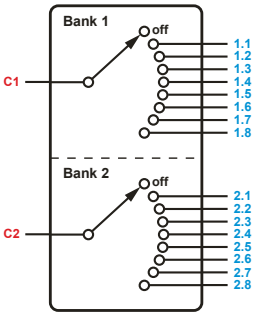


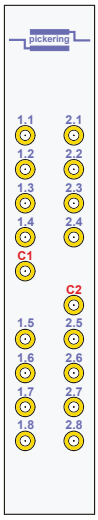
40-762-001 Single SP8T RF Multiplexer



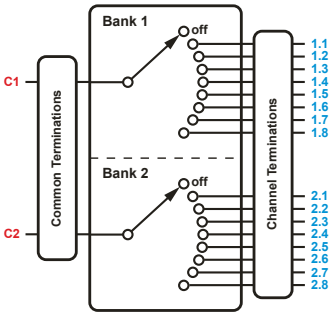


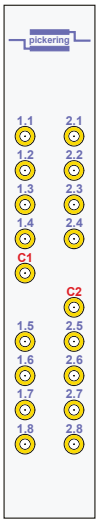
40-763-001 Single SP8T Terminated RF Multiplexer



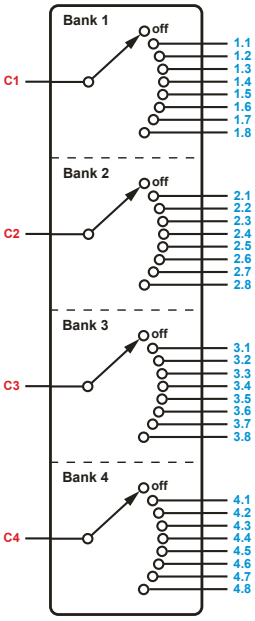


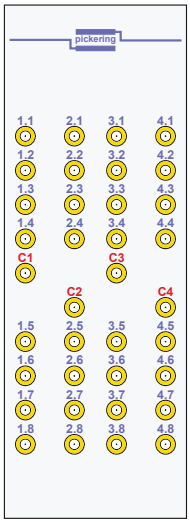
40-762-002 Dual SP8T RF Multiplexer



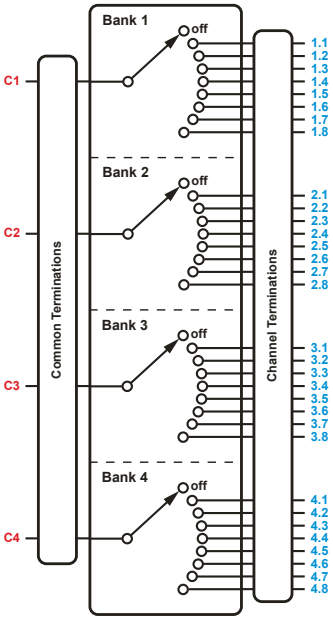


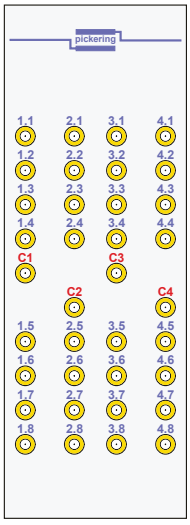
40-763-002 Dual SP8T Terminated RF Multiplexer





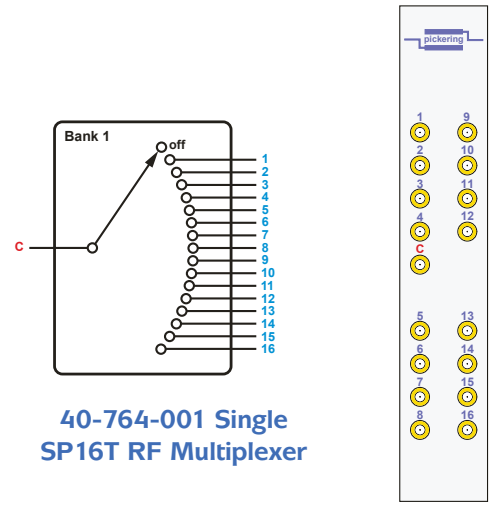
40-762-004 Quad SP8T RF Multiplexer



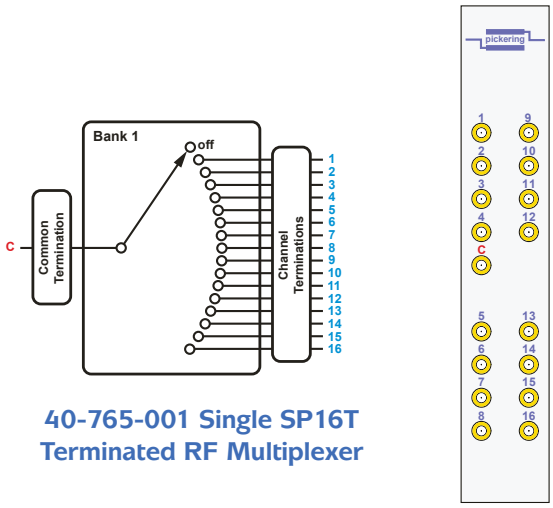


40-763-004 Quad SP8T Terminated RF Multiplexer

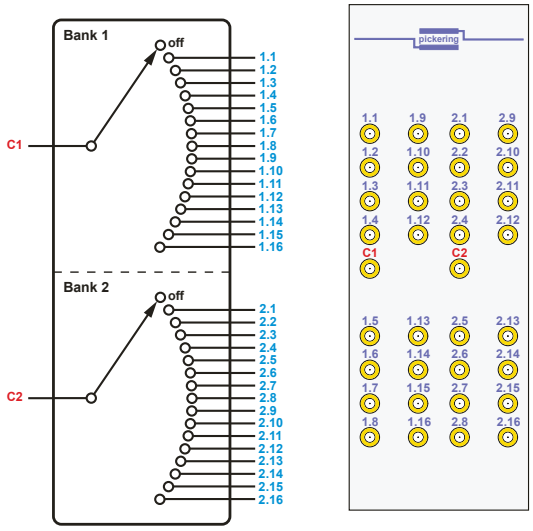
NOTE: The default state of all multiplexers is the "off" position. Additionally, the default state of terminated versions is with all common and channel signals terminated into 50Ω



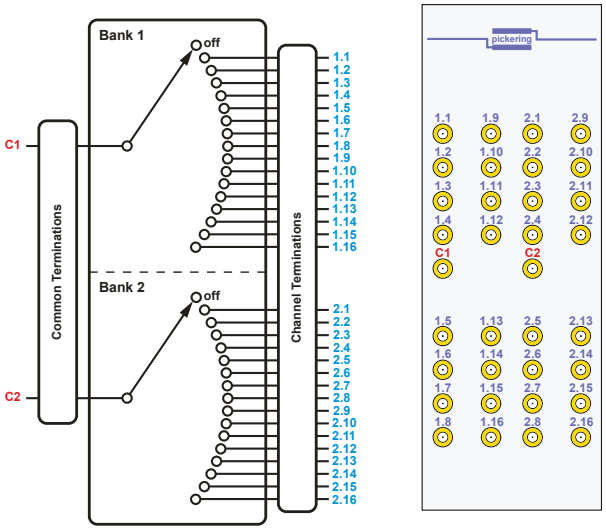
40-764-001 Single SP16T RF Multiplexer



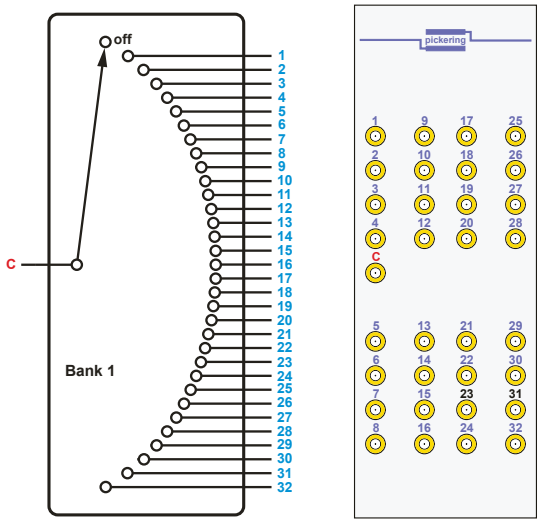
40-765-001 Single SP16T Terminated RF Multiplexer



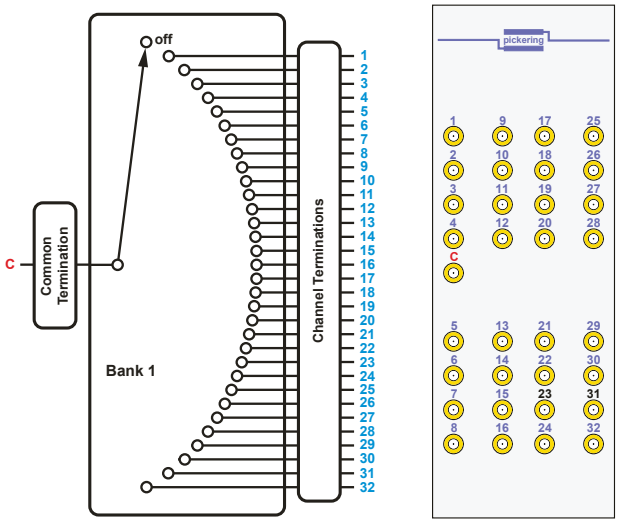
40-764-002 Dual SP16T RF Multiplexer



40-765-002 Dual SP16T Terminated RF Multiplexer



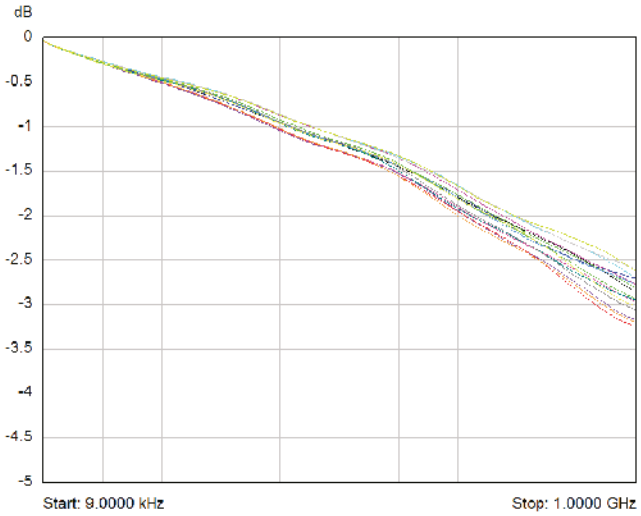
40-766-001 Single SP32T RF Multiplexer



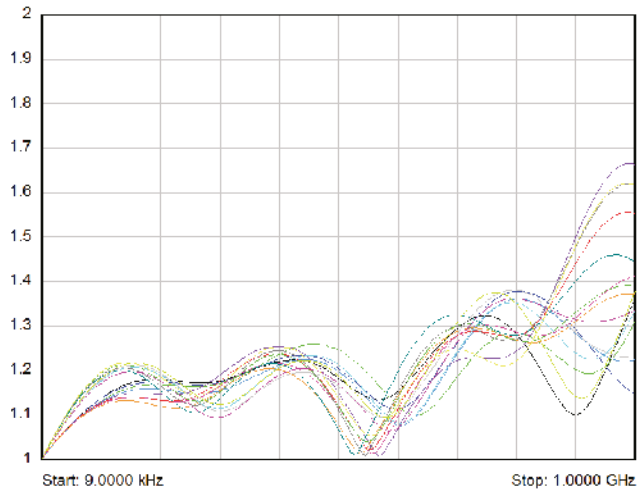
40-767-001 Single SP32T Terminated RF Multiplexer

NOTE: The default state of all multiplexers is the "off" position. Additionally, the default state of terminated versions is with all common and channel signals terminated into 50Ω.

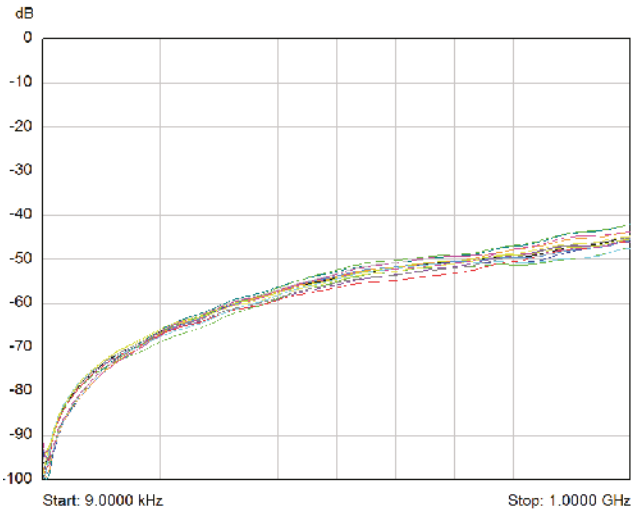
Example RF Performance plots for 40-762-002 Dual SP8T RF MUX



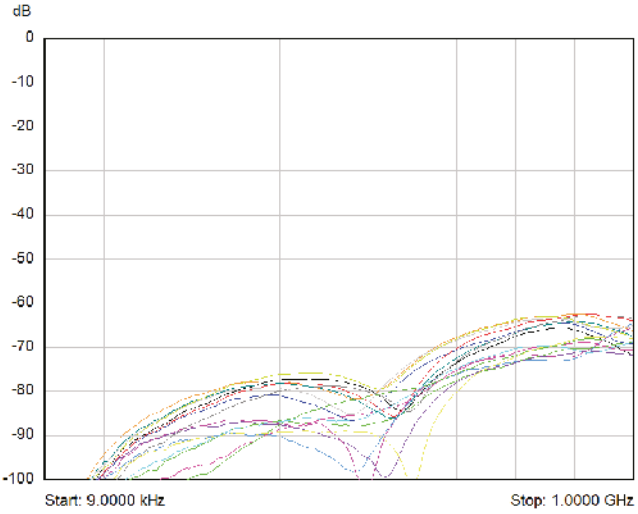
Typical insertion loss plot for all channels of 40-762-002 (Dual SP8T RF MUX)



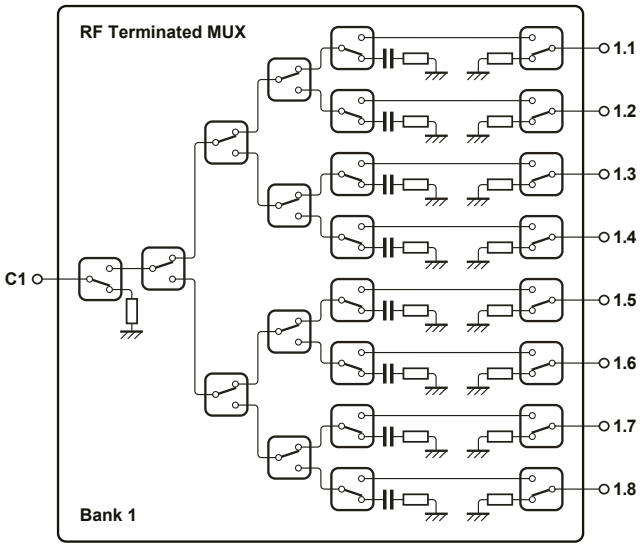
Typical VSWR plot for all channels of 40-762-002 (Dual SP8T RF MUX)

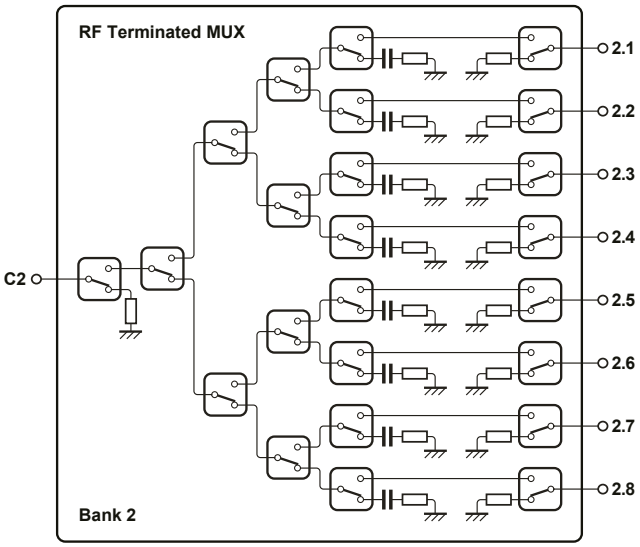


Typical crosstalk plot between channels for 40-762-002 (Dual SP8T RF MUX)



Typical crosstalk plot between banks for 40-762-002 (Dual SP8T RF MUX)





Example Relay Configuration for 40-763-002 Dual Terminated SP8T RF MUX (Default Switch Paths Shown)

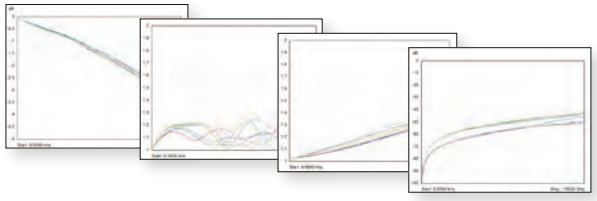
RF Specification

RF Frequency Range:	DC to 600MHz
Insertion Loss:	Typically <0.5dB to 100MHz Typically <3dB to 600MHz
VSWR:	Typically <1.3:1 to 100MHz Typically <1.6:1 to 600MHz
Isolation (all channels off):	Terminated versions: Typically >80dB to 100MHz Typically >70dB to 600MHz Unterminated versions: Typically >75dB to 100MHz Typically >50dB to 600MHz
Crosstalk:	Typically <-60dB to 100MHz Typically <-45dB to 600MHz
Maximum RF Power:	0.25W (terminated versions) 1W (unterminated versions)

RF Performance Plots

RF plots up to 1GHz for all versions in the 40-760 range are shown in the User Manual for:

- Insertion Loss
- VSWR
- Crosstalk



Switching Specification (excluding terminations)

Switch Type:	Electro-mechanical
Contact Type:	Palladium-ruthenium, Gold Covered Bifurcated contact
Maximum Switching Voltage:	30VDC
Maximum Current:	1A
Operate Time:	10ms typical
Expected Life (operations)	
Very low power load:	$>1x10^8$
Low power load:	$>1.5x10^7$ (0.1A, 20VDC)
Full power load:	$>5x10^6$ (1A, 30VDC)

Power Requirements from PXI Power Supply

+3.3V	+5V	+12V	-12V
0.18A	1.15A	0	0

Mechanical Characteristics

Single or dual slot 3U PXI (CompactPCI card), see product order code list.

3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

SP4T 600MHz RF Multiplexer

Single PXI Slot Versions:	
Dual SP4T, SMB Connectors	**40-760-002**
Quad SP4T, SMB Connectors	**40-760-004**
Dual PXI Slot Version:	
Octal SP4T, SMB Connectors	**40-760-008**

SP4T Terminated 600MHz RF Multiplexer

Single PXI Slot Versions:	
Dual SP4T Terminated, SMB Connectors	**40-761-002**
Quad SP4T Terminated, SMB Connectors	**40-761-004**
Dual PXI Slot Version:	
Octal SP4T Terminated, SMB Connectors	**40-761-008**

SP8T 600MHz RF Multiplexer

Single PXI Slot Versions:	
Single SP8T, SMB Connectors	**40-762-001**
Dual SP8T, SMB Connectors	**40-762-002**
Dual PXI Slot Version:	
Quad SP8T, SMB Connectors	**40-762-004**

SP8T Terminated 600MHz RF Multiplexer

Single PXI Slot Versions:	
Single SP8T Terminated, SMB Connectors	**40-763-001**
Dual SP8T Terminated, SMB Connectors	**40-763-002**
Dual PXI Slot Version:	
Quad SP8T Terminated, SMB Connectors	**40-763-004**

SP16T 600MHz RF Multiplexer

Single PXI Slot Version:	
Single SP16T, SMB Connectors	**40-764-001**
Dual PXI Slot Version:	
Dual SP16T, SMB Connectors	**40-764-002**

SP16T Terminated 600MHz RF Multiplexer

Single PXI Slot Version:	
Single SP16T Terminated, SMB Connectors	**40-765-001**
Dual PXI Slot Version:	
Dual SP16T Terminated, SMB Connectors	**40-765-002**

SP32T 600MHz RF Multiplexer

Dual PXI Slot Version:	
Single SP32T, SMB Connectors	**40-766-001**

SP32T Terminated 600MHz RF Multiplexer

Dual PXI Slot Version:	
Single SP32T Terminated, SMB Connectors	**40-767-001**

Mating Connectors & Cabling

For connection accessories for the 40-760 range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Microwave Switch Modules

- Comprehensive Range of Microwave Switch Modules Including Relays, Matrices and Multiplexers
- 50Ω and 75Ω Versions Available
- Bandwidths Up To 65GHz
- Range of Signal Connectors
- Power Handling Up To 700 Watts
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

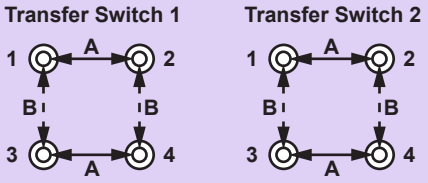
The Pickering Interfaces range of microwave modules provides high performance switching that features low insertion loss and very high isolation. The range varies from simple multiplexer and switch configurations to integrated matrices and large multiplexers.

Most products are characterized for 50Ω operation but some 75Ω versions are supplied either as standard products or as custom units. The 40-785A is also available in 20GHz terminated versions, and in remotely controlled versions. Remote versions occupy a single PXI slot with the microwave switches mounted separately from the host chassis, connection to the module is via a supplied control cable.

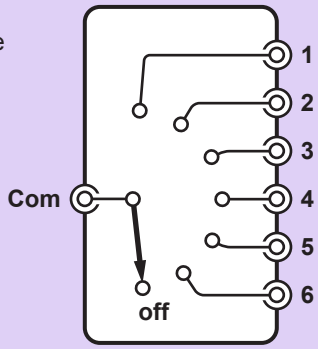
The modules use high quality RF connectors that are supported by a comprehensive range of cable and connector accessories.

40-784A Triple & Dual 6-Channel Microwave Multiplexer Modules

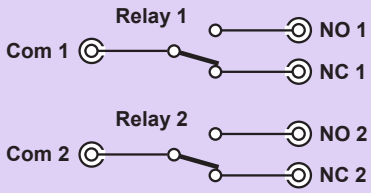
40-780A Quad SPDT Microwave Switch Module



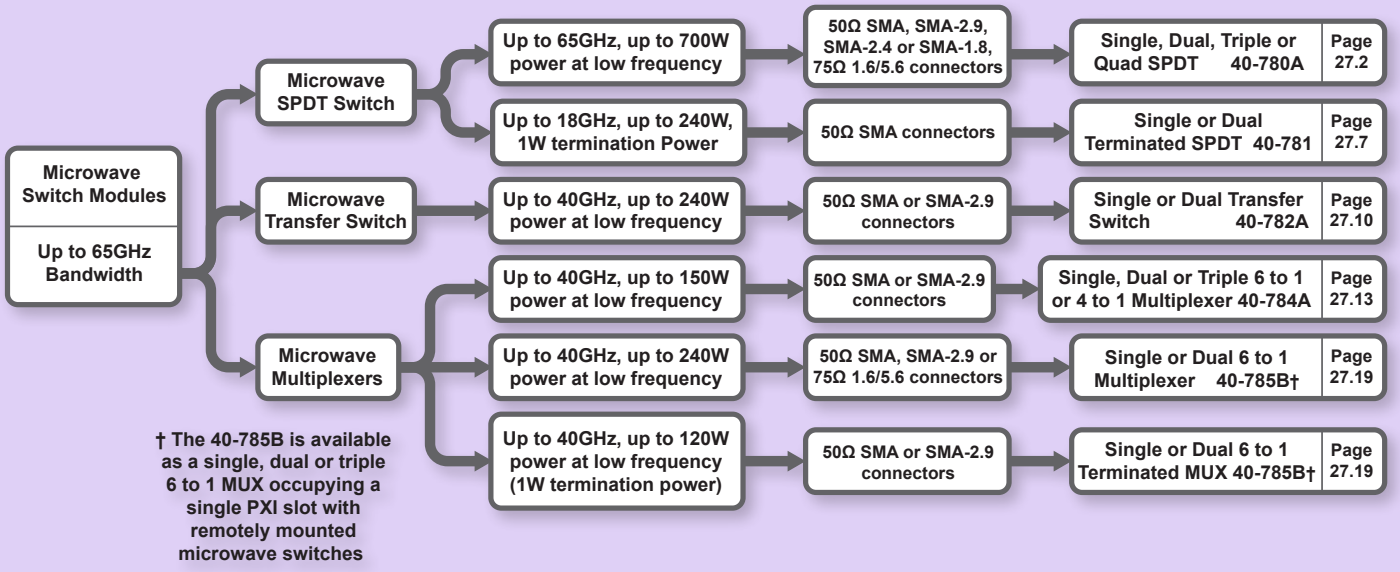
Schematic Diagram for the 40-782A 2 x Microwave Transfer Switch



Schematic Diagram for the 40-785B Single 6 to 1 Microwave MUX



Schematic Diagram for the 40-780A 2 x SPDT Microwave Switch



† The 40-785B is available as a single, dual or triple 6 to 1 MUX occupying a single PXI slot with remotely mounted microwave switches

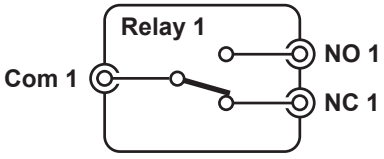
40-780A
Microwave SPDT Relay

- 1, 2, 3 or 4 SPDT Relays Per Module
- 12.4GHz, 18GHz, 26.5GHz, 40GHz, 50GHz & 65GHz Bandwidth in 50Ω
- 2.5GHz Bandwidth in 75Ω
- High Power N-Type Options
- Tree Networks may be Constructed by Inter-Linking Individual Modules
- LED Indication
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

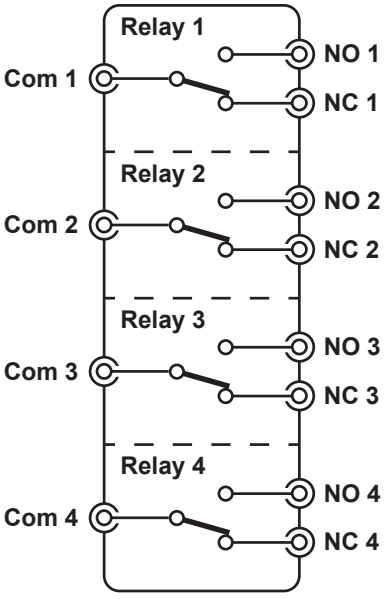
The 40-780A Microwave switching module consists of one, two, three or four SPDT switches capable of switching frequencies to 65GHz in 50Ω or 2.5GHz in 75Ω.

Connections are made via front panel mounted high quality RF coaxial connectors, SMA/N-Type for 50Ω and 1.6/5.6 in 75Ω versions.

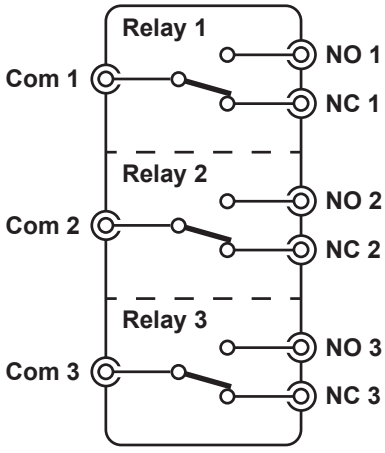
The 40-780A range gives you the highest RF & Microwave switching performance available within a Pickering Switching System. Applications are mainly in the Microwave region, however there are many uses in the RF spectrum where extremely low insertion loss and ultra high isolation are critical, they may also be used for lower frequency RF applications where power handling to 240W is required (700W for N-Type options).



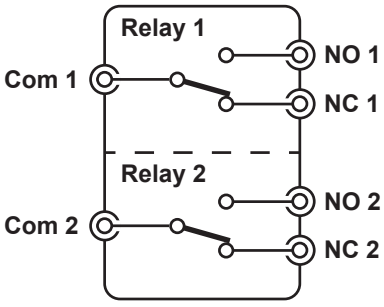
40-780A Single SPDT
Microwave Relay Module



40-780A Quad SPDT
Microwave Relay Module



40-780A Triple SPDT
Microwave Relay Module



40-780A Dual SPDT
Microwave Relay Module

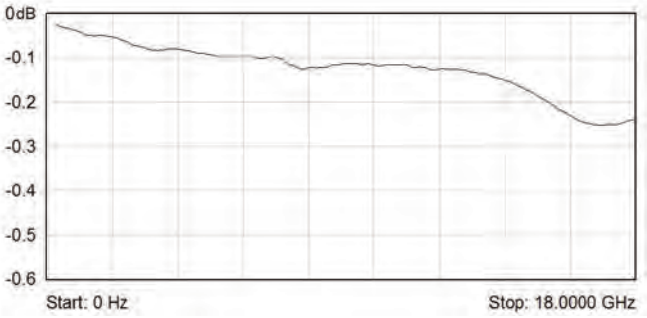
Specification

General Specification - 50Ω Versions

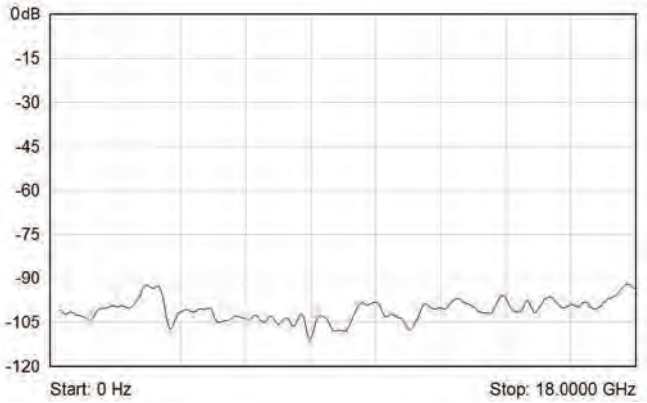
Configuration:	SPDT Microwave Switch, 1 to 4 independent banks.
LED Indicators:	Blue LEDs to indicate activated relays.
Operate Time:	10ms
Expected Life:	>10 million operations

RF Specification - 18GHz Versions and 26.5GHz Versions

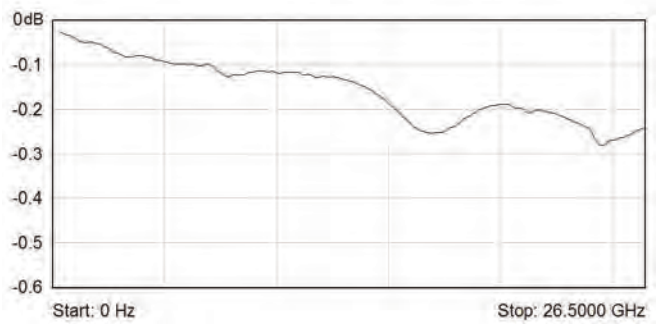
Connectors:	SMA
Insertion Loss:	<0.2dB to 3GHz <0.3dB to 8GHz <0.4dB to 12.4GHz <0.5dB to 18GHz <0.7dB to 26.5GHz (26.5GHz versions only)
Isolation:	>80dB to 3GHz >70dB to 8GHz >60dB to 18GHz >55dB to 26.5GHz (26.5GHz versions only)
VSWR:	<1.2:1 0 to 3GHz <1.3:1 to 8GHz <1.4:1 to 12.4GHz <1.5:1 to 18GHz <1.7:1 to 26.5GHz (26.5GHz versions only)
RF Average Carry Power at 25°C:	240W to 3GHz 150W to 8GHz 120W to 12.4GHz 100W to 18GHz 40W to 26.5GHz (26.5GHz versions only)



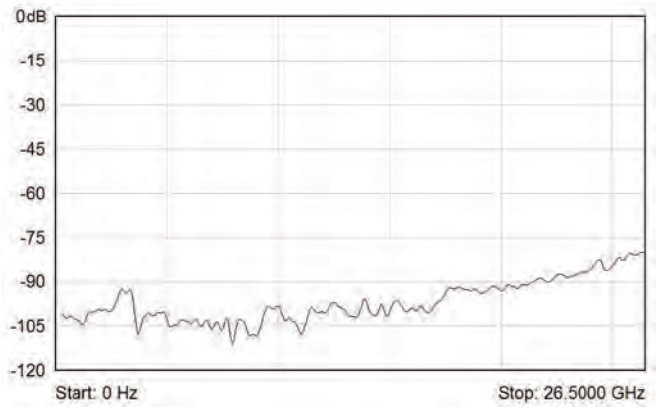
Insertion Loss Plot for 18GHz Versions



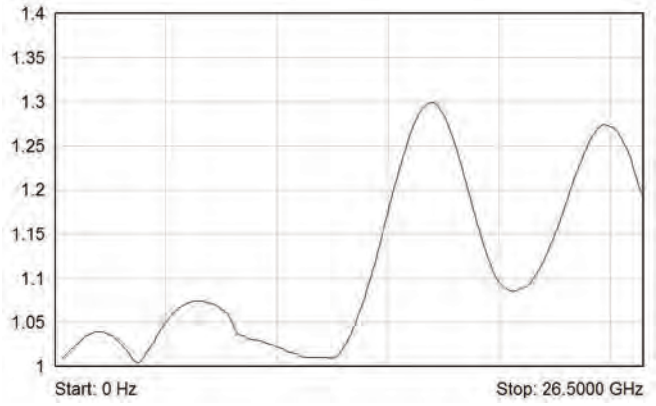
Isolation Plot for 18GHz Versions



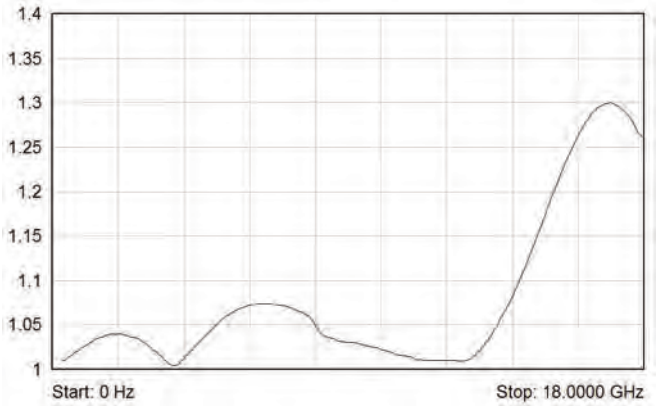
Insertion Loss Plot for 26.5GHz Versions



Isolation Plot for 26.5GHz Versions



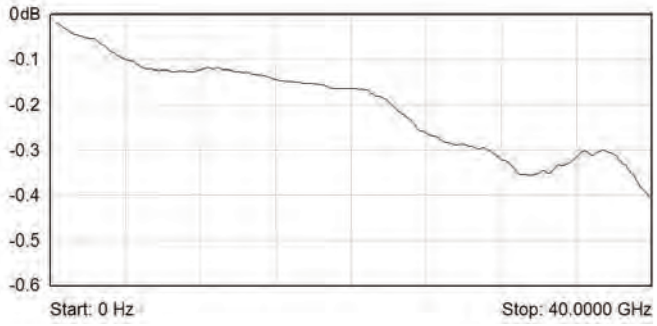
VSWR Plot for 26.5GHz Versions



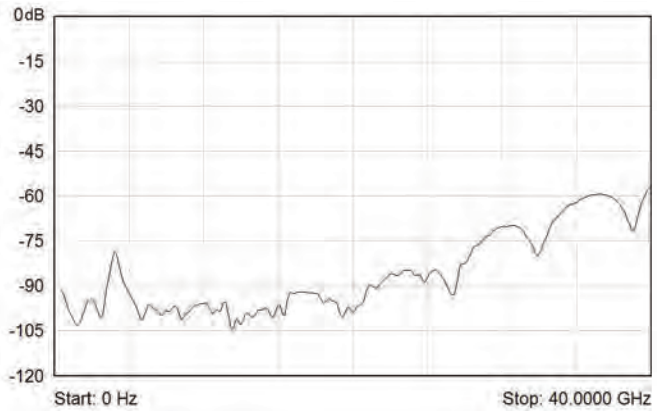
VSWR Plot for 18GHz Versions

Additional Specification - 40GHz and 50GHz Versions

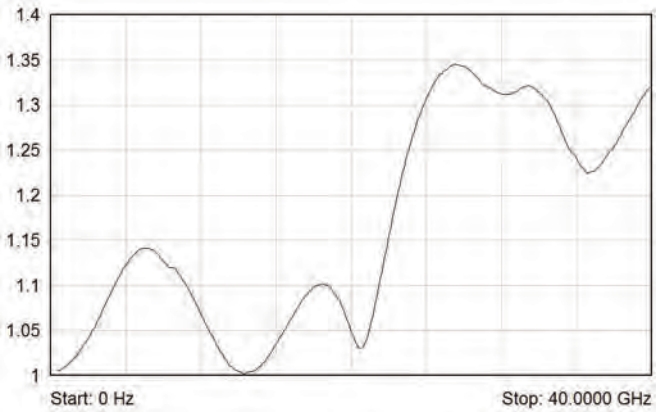
Connectors:	SMA-2.9 (40GHz) SMA-2.4 (50GHz)
Insertion Loss:	<0.8dB to 40GHz <1.1dB to 50GHz
Isolation:	>50dB to 50GHz
VSWR:	<1.9:1 to 50GHz
RF Average Carry Power at 25°C:	80W to 6GHz 60W to 12.4GHz 50W to 18GHz 20W to 25.5GHz 10W to 40GHz 5W to 50GHz



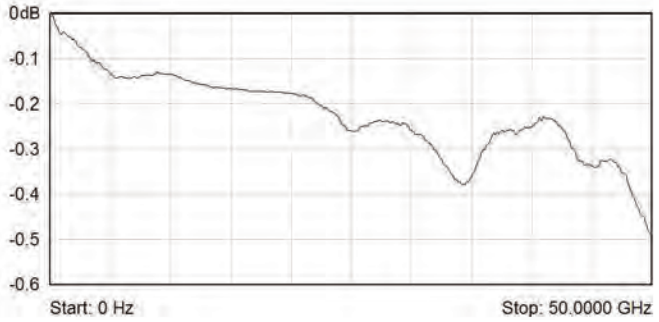
Insertion Loss Plot for 40GHz Versions



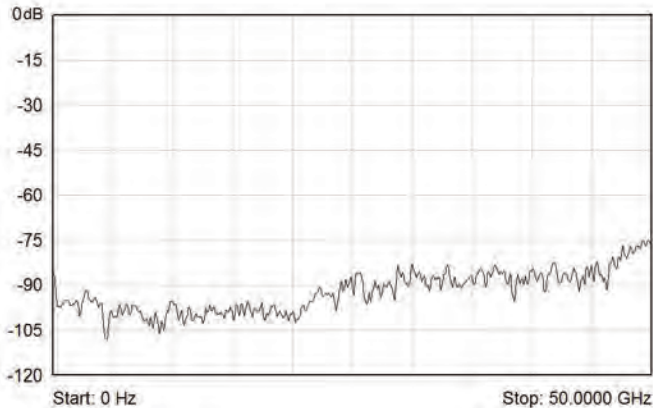
Isolation Plot for 40GHz Versions



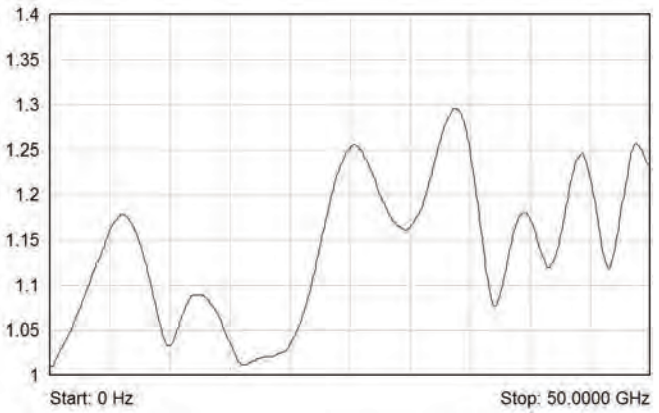
VSWR Plot for 40GHz Versions



Insertion Loss Plot for 50GHz Versions



Isolation Plot for 50GHz Versions



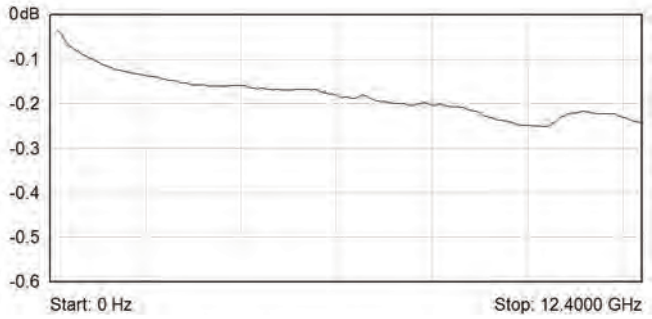
VSWR Plot for 50GHz Versions

Additional Specification - 65GHz Versions

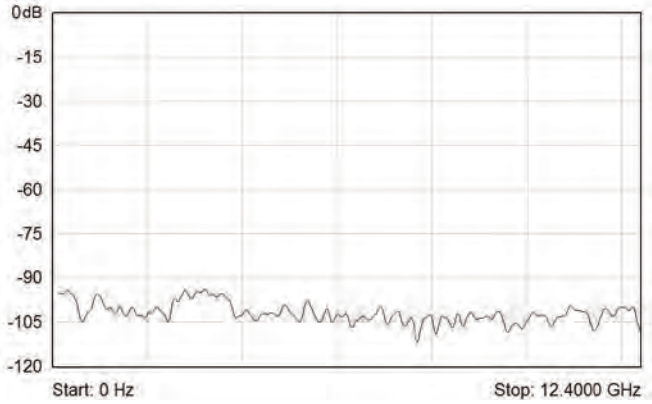
Connectors:	SMA-1.8
Insertion Loss:	<0.41dB to 4GHz <0.56dB to 12.4GHz <0.68dB to 20GHz <0.80dB to 26.5GHz <0.91dB to 40GHz <0.99dB to 50GHz <1.12dB to 65GHz
Isolation:	>95dB to 4GHz >85dB to 12.4GHz >77dB to 20GHz >70dB to 65GHz
VSWR:	<1.15:1 to 4GHz <1.25:1 to 12.4GHz <1.30:1 to 20GHz <1.70:1 to 26.5GHz <1.90:1 to 65GHz

Additional Specification - 12.4GHz N-type Versions

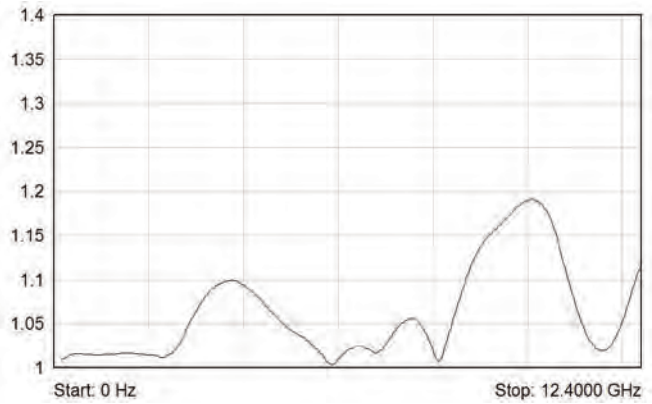
Connectors:	N-type
Insertion Loss:	<1.15dB to 1GHz <0.20dB to 2GHz <0.25dB to 3GHz <0.35dB to 8GHz <0.50dB to 12.4GHz
Isolation:	>85dB to 1GHz >80dB to 2GHz >75dB to 3GHz >70dB to 8GHz >60dB to 12.4GHz
VSWR:	<1.15:1 to 1GHz <1.20:1 to 2GHz <1.25:1 to 3GHz <1.35:1 to 8GHz <1.50:1 to 12.4GHz
RF Average Carry Power at 25°C:	700W to 1GHz 500W to 2GHz 400W to 3GHz 250W to 8GHz 200W to 12.4GHz



Insertion Loss Plot for 12.4GHz N-Type Versions



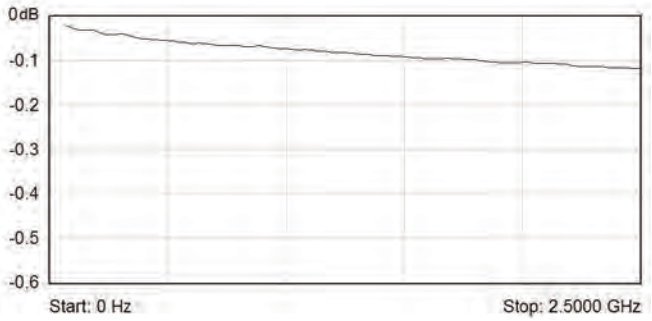
Isolation Plot for 12.4GHz N-Type Versions



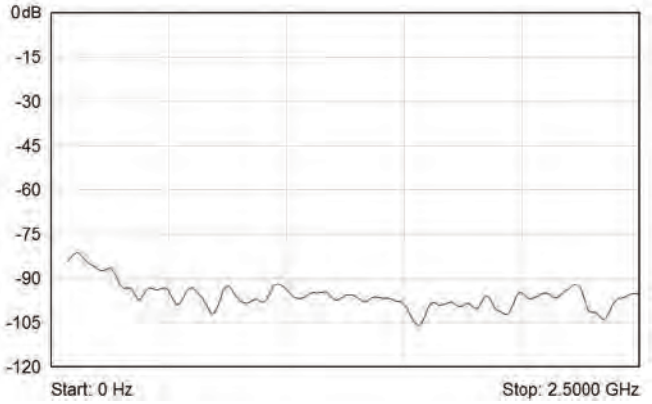
VSWR Plot for 12.4GHz N-Type Versions

Additional Specification - 2.5GHz 75Ω Versions

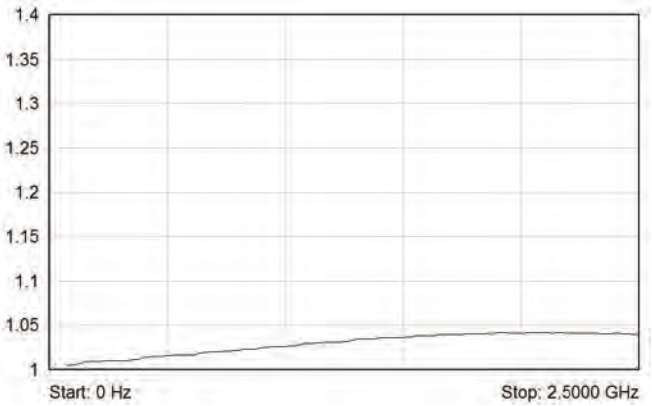
Connectors:	1.6/5.6 Female
Insertion Loss:	<0.20dB to 1GHz <0.30dB to 2.5GHz
Isolation:	>80dB to 1GHz >70dB to 2.5GHz
VSWR:	<1.20:1 to 1GHz <1.30:1 to 2.5GHz
RF Average Carry Power at 25°C:	400W to 1GHz 240W to 2.5GHz



Insertion Loss Plot for 2.5GHz 75Ω Versions



Isolation Plot for 2.5GHz 75Ω Versions



VSWR Plot for 2.5GHz 75Ω Versions

Power Requirements

Power consumption from the backplane supply is as follows:

+3.3V	+5V	+12V	-12V
0.1A	0.2A (1.3A for 65GHz versions)	1.0A	0

Mechanical Characteristics

40-780A single & dual (except 40-780A-511 & 40-780A-512): Single slot 3U PXI (CompactPCI card).
40-780A-511: Double slot 3U PXI (CompactPCI card).
40-780A-512: Triple slot 3U PXI (CompactPCI card).
40-780A triple & quad: Double slot 3U PXI (CompactPCI card).
Module weight: 200g (40-780-522)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel mounted coaxial connectors.

Product Order Codes

12.4GHz Microwave Relays, 50Ω N-Type	
1 x Changeover (SPDT)	**40-780A-511**
2 x Changeover (SPDT)	**40-780A-512**
18GHz Microwave Relays, 50Ω SMA	
1 x Changeover (SPDT)	**40-780A-521**
2 x Changeover (SPDT)	**40-780A-522**
3 x Changeover (SPDT)	**40-780A-523**
4 x Changeover (SPDT)	**40-780A-524**
26.5GHz Microwave Relays, 50Ω SMA	
1 x Changeover (SPDT)	**40-780A-531**
2 x Changeover (SPDT)	**40-780A-532**
3 x Changeover (SPDT)	**40-780A-533**
4 x Changeover (SPDT)	**40-780A-534**
40GHz Microwave Relays, 50Ω SMA-2.9	
1 x Changeover (SPDT)	**40-780A-541**
2 x Changeover (SPDT)	**40-780A-542**
3 x Changeover (SPDT)	**40-780A-543**
4 x Changeover (SPDT)	**40-780A-544**
50GHz Microwave Relays, 50Ω SMA-2.4	
1 x Changeover (SPDT)	**40-780A-551**
2 x Changeover (SPDT)	**40-780A-552**
3 x Changeover (SPDT)	**40-780A-553**
4 x Changeover (SPDT)	**40-780A-554**
65GHz Microwave Relays, 50Ω SMA-1.8	
1 x Changeover (SPDT)	**40-780A-561**
2 x Changeover (SPDT)	**40-780A-562**
3 x Changeover (SPDT)	**40-780A-563**
4 x Changeover (SPDT)	**40-780A-564**
2.5GHz Microwave Relays, 75Ω 1.6/5.6	
1 x Changeover (SPDT)	**40-780A-751**
2 x Changeover (SPDT)	**40-780A-752**
3 x Changeover (SPDT)	**40-780A-753**
4 x Changeover (SPDT)	**40-780A-754**

Warranty

This module carries a 3 year warranty. The warranty specifically applies to only the cold switching operations of the relay within the stated lifetime.

Mating Connectors & Cabling

For connection accessories for the 40-780A series please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

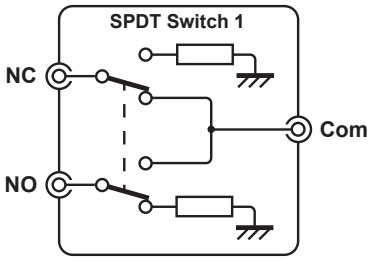
40-781
Terminated SPDT Microwave Relay

- 1 or 2 Changeover Relays Per Module
- Internal or External Termination
- 50Ω Characteristic Impedance
- 18GHz Bandwidth
- LED Indication
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

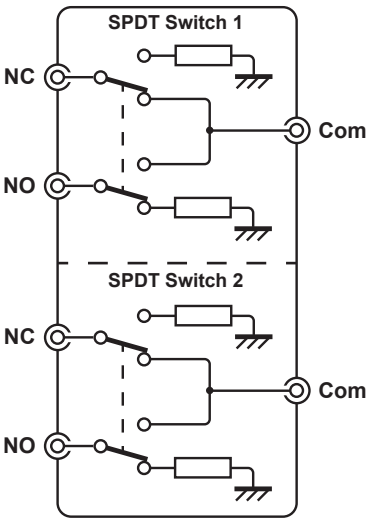
The 40-781 Microwave switching module consists of one, or two changeover switches capable of switching frequencies to 18GHz in 50Ω. Versions are available with either internal or external terminations and connections are made via front panel mounted high quality SMA RF coaxial connectors.

The externally terminated versions have the advantage that the terminations can be removed and replaced with RF loads capable of handling higher power. Also, this allows alternative configurations such as terminated 4-port bypass (1 termination removed) and 5-port DP3T (both terminations removed). See overleaf for diagrams of the alternative configurations.

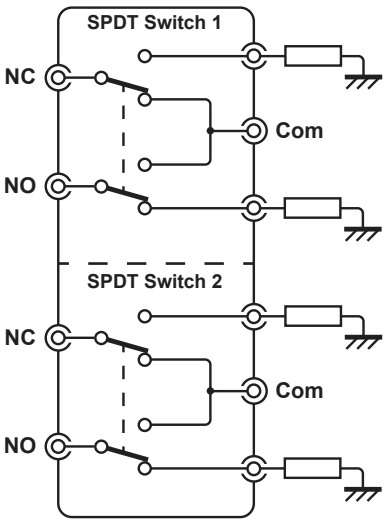
The 40-781 range gives you the highest RF & Microwave switching performance available within a Pickering Switching System. Applications are mainly in the Microwave region, however there are many uses in the RF spectrum where extremely low insertion loss and ultra high isolation are critical, they may also be used for lower frequency RF applications where power handling to 240W (without termination) is required.



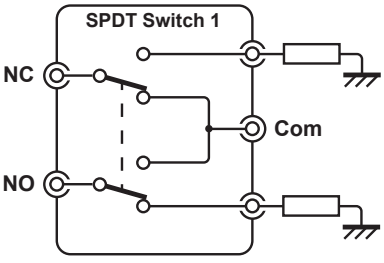
40-781 Single Changeover Microwave Relay, Internal Terminations



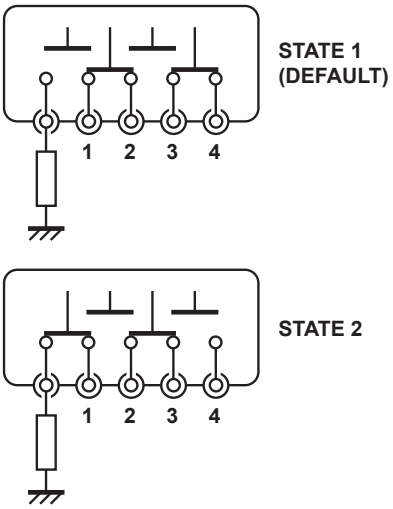
40-781 Dual Changeover Microwave Relay, Internal Terminations



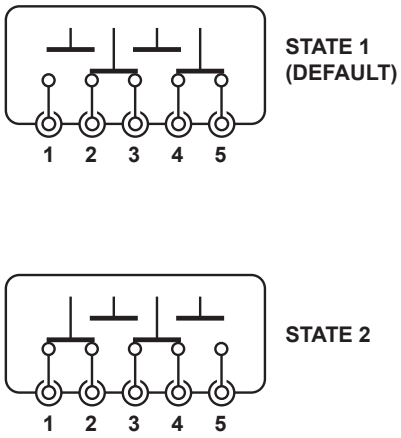
40-781 Dual Changeover Microwave Relay, External Terminations



40-781 Single Changeover Microwave Relay, External Terminations



40-781-12x Configured as a Terminated 4-Port Bypass Switch (With One External Termination Removed)



40-781-12x Configured as a 5-Port DP3T Switch (With Both External Terminations Removed)

Specification

General Specification

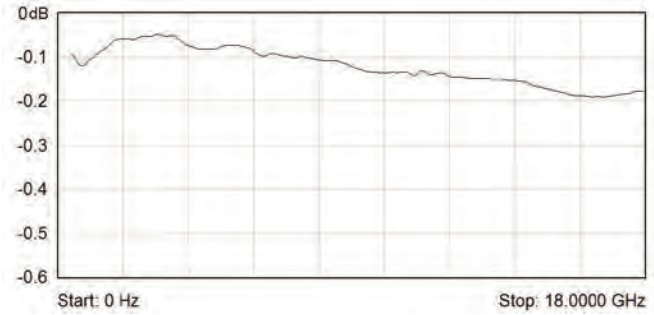
Configuration:	SPDT Microwave Switch with automatic termination on the NO and NC paths, 1 or 2 independent banks.
LED Indicators:	Blue LEDs to indicate activated relays.
Operate Time:	10ms
Characteristic Impedance:	50Ω
Connectors:	SMA
Maximum Frequency:	18GHz
Expected Life:	>10 million operations

RF Specification

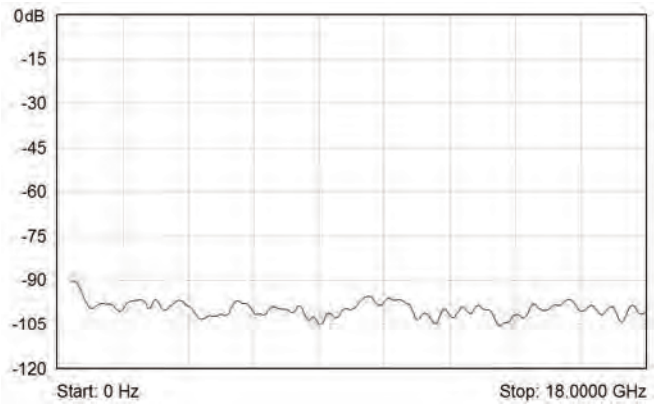
Insertion Loss:	<0.2dB to 3GHz <0.3dB to 8GHz <0.4dB to 12.4GHz <0.5dB to 18GHz
Isolation:	>80dB to 3GHz >70dB to 8GHz >60dB to 18GHz
VSWR:	<1.2:1 0 to 3GHz <1.3:1 to 8GHz <1.4:1 to 12.4GHz <1.5:1 to 18GHz
Power Handling - Externally Terminated Versions:	1W limited by terminations.

NOTE: External terminations can be removed and replaced with higher power loads.

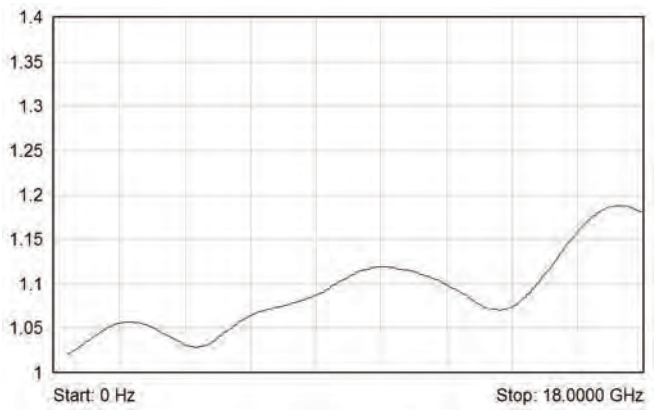
Power Handling - Internally Terminated Versions:	1W limited by terminations.
RF Average Carry Power at 25°C:	240W to 3GHz 150W to 8GHz 120W to 12.4GHz 100W to 18GHz



40-781 Microwave Switch Insertion Loss



40-781 Microwave Switch Isolation



40-781 Microwave Switch VSWR

Power Requirements

Power consumption from the backplane supply is as follows:

+3.3V	+5V	+12V	-12V
0	0.2A	0.5A max	0

Mechanical Characteristics

40-781 single SPDT: Single slot 3U PXI (CompactPCI card).
40-781 dual SPDT: Double slot 3U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.
Signals via front panel mounted coaxial connectors.

Mating Connectors & Cabling

For connection accessories for the 40-781 series please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Product Order Codes

18GHz Microwave Relays, 50Ω SMA	
1 x Changeover (SPDT), Internal Termination	**40-781-021**
2 x Changeover (SPDT), Internal Termination	**40-781-022**
18GHz Microwave Relays, 50Ω SMA	
1 x Changeover (SPDT), External Termination	**40-781-121**
2 x Changeover (SPDT), External Termination	**40-781-122**

Warranty

This module carries a 3 year warranty. The warranty specifically applies to only the cold switching operations of the relay within the stated lifetime.

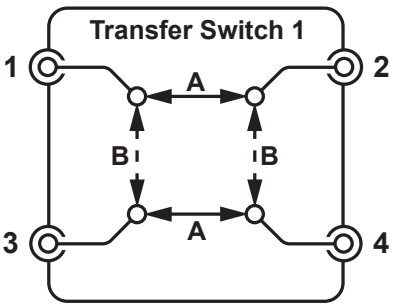
40-782A
Microwave Transfer Switch

- 1 or 2 Transfer Switches Per Module
- 50Ω Characteristic Impedance
- 18GHz, 26.5GHz & 40GHz Options
- LED Indication
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

The 40-782A module consists of one or two microwave transfer switches. It has a characteristic impedance of 50Ω and is available in versions with maximum operating frequencies of 18GHz, 26.5GHz or 40GHz. Connections are made via front panel mounted high quality RF coaxial connectors, SMA or SMA 2.9, depending upon the frequency range.

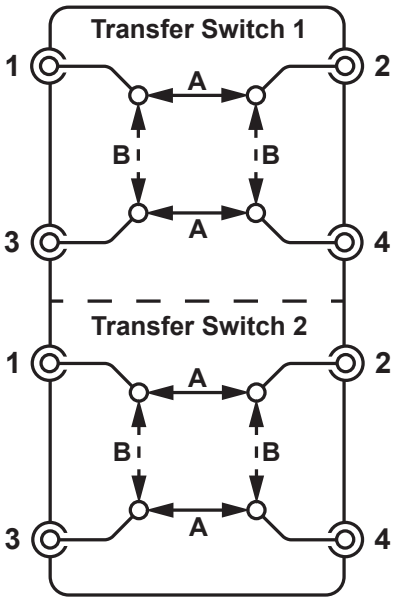
Transfer switches have four ports with two possible switch states. In the default (de-energized) state, ports 1 to 2 and 3 to 4 have signal paths between them. In the energized state the signal paths are between ports 1 to 3 and 2 to 4 (see diagrams).

The 40-782A range gives you the highest RF & Microwave switching performance available within a Pickering Switching System. Applications are mainly in the Microwave region, however there are many uses in the RF spectrum where extremely low insertion loss and ultra high isolation are critical, they may also be used for lower frequency RF applications where power handling to 240W is required.



Position A: 1 to 2, 3 to 4
Position B: 1 to 3, 2 to 4

Schematic of 40-782A
Single Microwave Transfer Switch



Position A: 1 to 2, 3 to 4
Position B: 1 to 3, 2 to 4

Schematic of 40-782A
Dual Microwave Transfer Switch

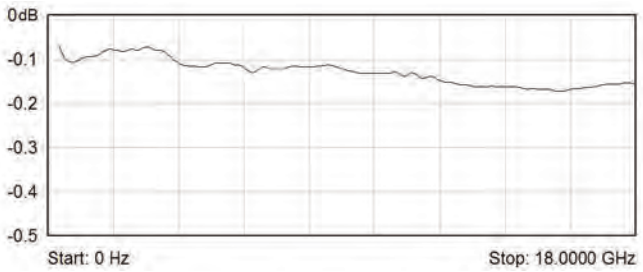
Specification

General Specification

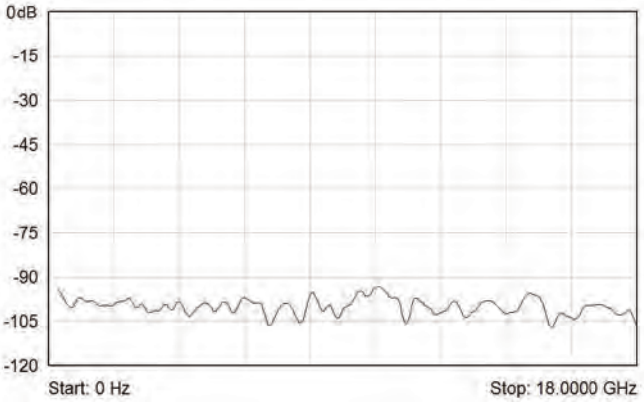
Configuration:	Microwave Transfer Switch, 1 or 2 independent banks.
LED Indicators:	Blue LEDs to indicate activated relays.
Operate Time:	15ms
Characteristic Impedance:	50Ω
Expected Life:	>2.5 million operations

RF Specification - 18GHz Versions and 26.5GHz Versions

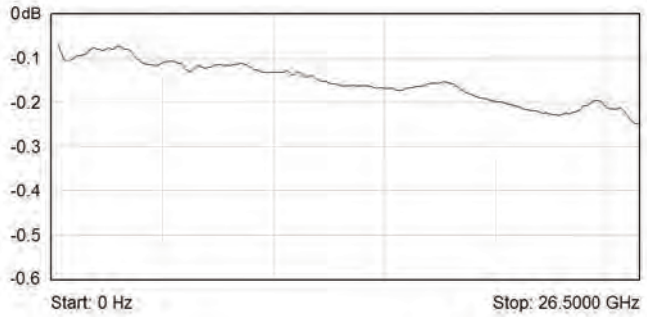
Connectors:	SMA
Insertion Loss:	<0.2dB to 3GHz <0.3dB to 8GHz <0.4dB to 12.4GHz <0.5dB to 18GHz <0.7dB to 26.5GHz (26.5GHz versions only)
Isolation:	>80dB to 3GHz >70dB to 8GHz >65dB to 12.4GHz >60dB to 18GHz >50dB to 26.5GHz (26.5GHz versions only)
VSWR:	<1.2:1 to 3GHz <1.3:1 to 8GHz <1.4:1 to 12.4GHz <1.5:1 to 18GHz <1.7:1 to 26.5GHz (26.5GHz versions only)
RF Average Carry Power at 25°C:	240W to 3GHz 150W to 8GHz 120W to 12.4GHz 100W to 18GHz 40W to 26.5GHz (26.5GHz versions only)



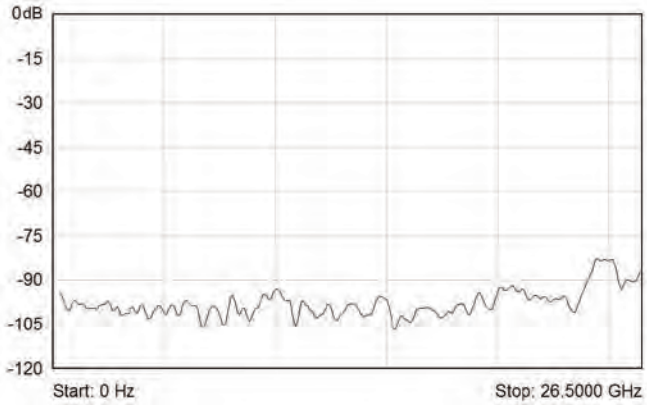
Insertion Loss Plot for 18GHz Versions



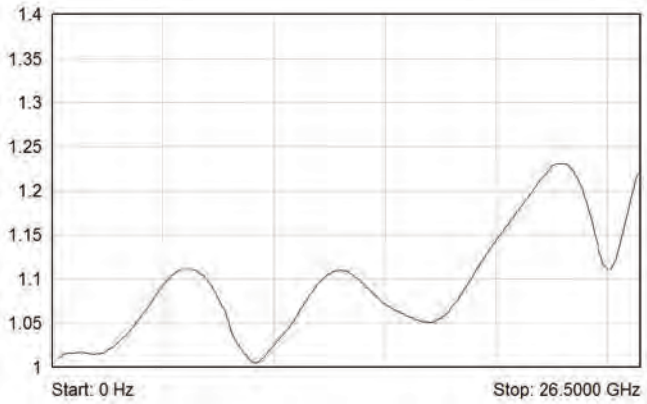
Isolation Plot for 18GHz Versions



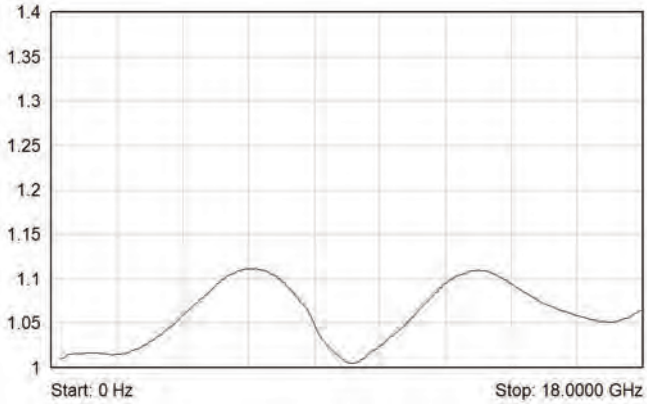
Insertion Loss Plot for 26.5GHz Versions



Isolation Plot for 26.5GHz Versions



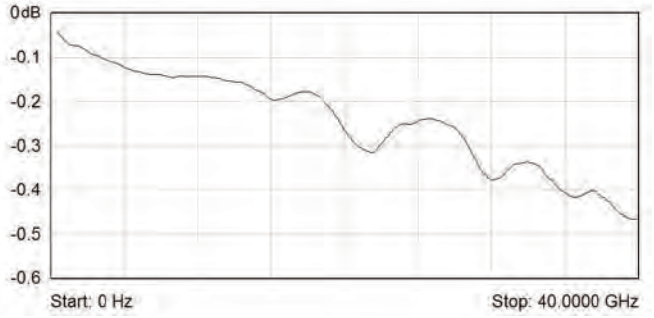
VSWR Plot for 26.5GHz Versions



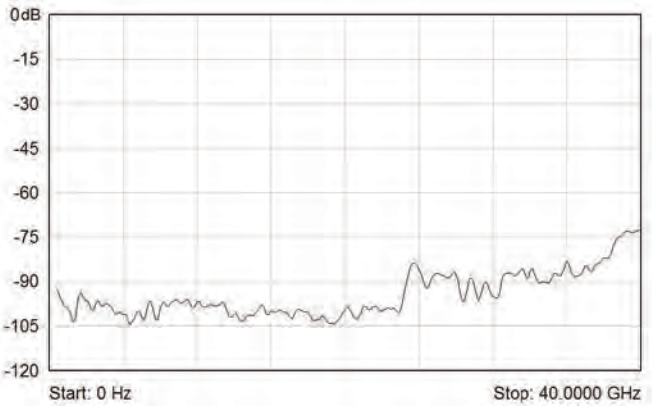
VSWR Plot for 18GHz Versions

Additional Specification 40GHz Versions

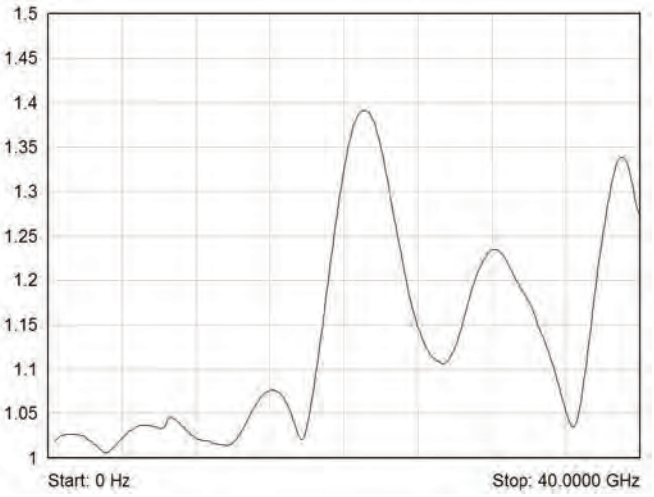
Connectors:	SMA-2.9
Insertion Loss:	<0.8dB to 40GHz
Isolation:	>50dB to 40GHz
VSWR:	<1.9:1 to 40GHz
RF Average Carry Power at 25°C:	80W to 6GHz 60W to 12.4GHz 50W to 18GHz 20W to 26.5GHz 10W to 40GHz



Insertion Loss Plot for 40GHz Versions



Isolation Plot for 40GHz Versions



VSWR Plot for 40GHz Versions

Power Requirements

Power consumption from the backplane supply is as follows:

+3.3V	+5V	+12V	-12V
0.1A	0.2A	0.7A	0

Mechanical Characteristics

40-782A single & dual: Double slot 3U PXI (CompactPCI card).

Module weight: 200g (40-782A-522)

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Signals via front panel mounted coaxial connectors.

Product Order Codes

18GHz Microwave Transfer Switch, 50Ω SMA	
1 x Transfer Switch	**40-782A-521**
2 x Transfer Switch	**40-782A-522**
26.5GHz Microwave Transfer Switch, 50Ω SMA	
1 x Transfer Switch	**40-782A-531**
2 x Transfer Switch	**40-782A-532**
40GHz Microwave Transfer Switch, 50Ω SMA-2.9	
1 x Transfer Switch	**40-782A-541**
2 x Transfer Switch	**40-782A-542**

Warranty

This module carries a 3 year warranty. The warranty specifically applies to only the cold switching operations of the relay within the stated lifetime.

Mating Connectors & Cabling

For connection accessories for the 40-782A series please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

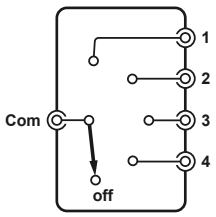
40-784A
Microwave Multiplexer Module

- Single, Dual or Triple Subminiature SP6T & SP4T Multiplexers
- 6GHz, 18GHz, 26.5GHz and 40GHz Bandwidths
- Custom Versions Available
- Excellent RF & Repeatability Characteristics
- Extended Life For 6GHz/18GHz/26.5GHz Models – 10M Operations Guaranteed & Typically >25M!
- Faster Operate Time than Conventional Microwave Relay Solutions (Typically <10.5ms)
- LED Indication
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI, PXIe Hybrid and Pickering LXI Modular Chassis
- 3 Year Warranty

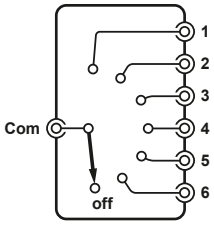
Pickering Interfaces' 40-784A PXI Microwave Multiplexer Modules have a characteristic impedance of 50Ω and are capable of switching signals up to 40GHz. Available in single, dual or triple, SP6T or SP4T formats, they are suitable for constructing complex microwave switching networks and provide a range of switching configurations to suit most applications. Connection is by high performance front panel mounted SMA or SMA-2.9 connectors.

These modules provide a high performance solution for RF and microwave switching, the performance at low frequencies providing superior isolation, insertion loss and VSWR to EMR or solid state designs.

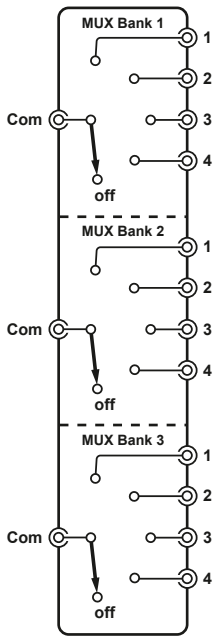
For applications where PXI slot space is even more critical, users should consider the remote relay versions of the 40-785A which support up to 3 remotely mounted multiplexers from a single PXI slot.



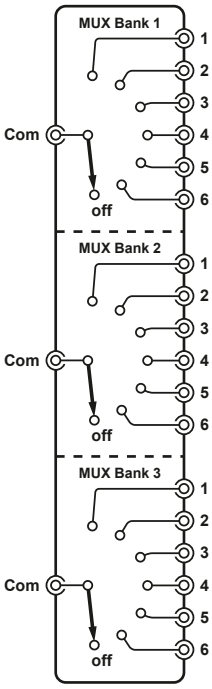
40-784A Single SP4T MUX



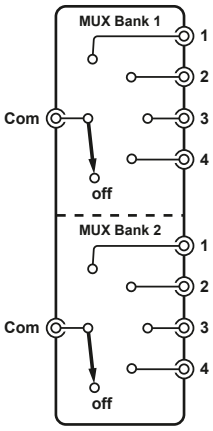
40-784A Single SP6T MUX



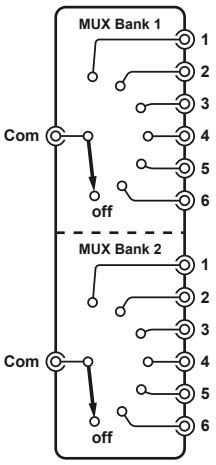
40-784A Triple SP4T MUX



40-784A Triple SP6T MUX



40-784A Dual SP4T MUX



40-784A Dual SP6T MUX

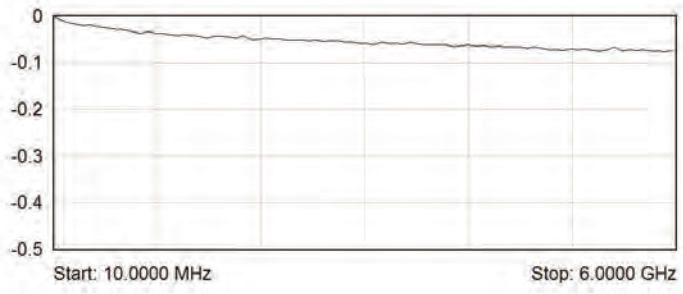
Specification

General Multiplexer Information

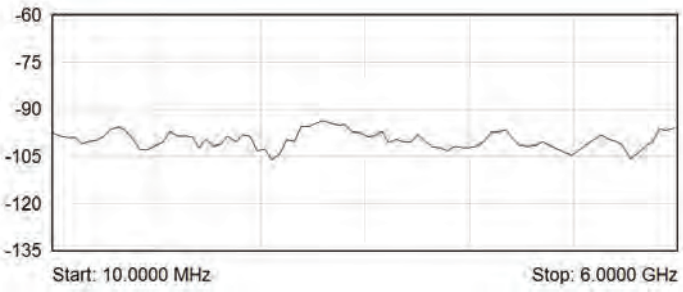
Relay Manufacturer:	Radiall
Configuration:	SP6T or SP4T Microwave Multiplexer with 1, 2 or 3 independent banks.
LED Indicators:	Multiplexers have blue LEDs to indicate a closed RF path.
Operate Time:	Typically <10.5ms
Maximum Cold Switch Voltage:	100V
Maximum Carry Current:	1A

Multiplexer Specification - 6GHz Versions

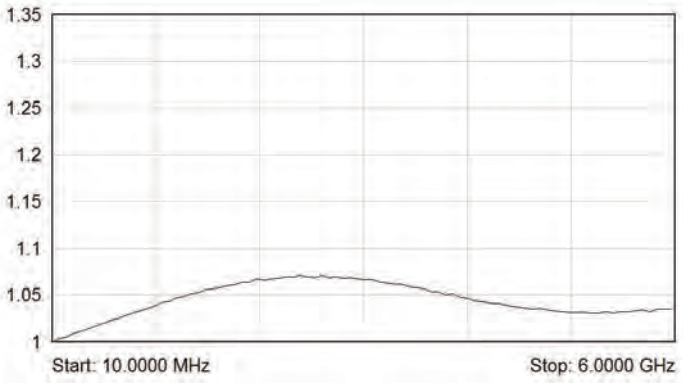
Characteristic Impedance:	50Ω
Connectors:	SMA
Bandwidth	DC to 6GHz
Maximum RF Carry Power:	220W (0-3GHz) 150W (3-6GHz)
Isolation:	>80dB (0-3GHz) >70dB (3-6GHz)
Insertion Loss:	<0.2dB (0-3GHz) <0.3dB (3-6GHz)
VSWR:	<1:1.2 (0-3GHz) <1:1.3 (3-6GHz)
Expected Life (low power):	>10 million operations per position guaranteed (typically >25 million)
Insertion Loss Repeatability:	Within 0.01dB



Typical Insertion Loss (dB) Plot for 6GHz Versions



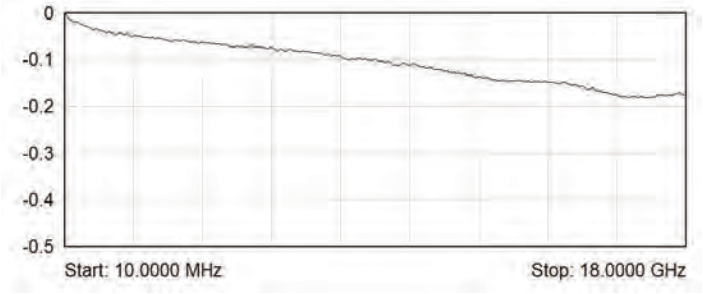
Typical Isolation (dB) Plot for 6GHz Versions



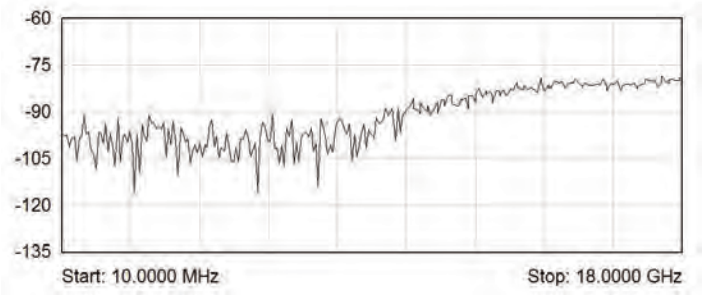
Typical VSWR Plot for 6GHz Versions

Multiplexer Specification - 18GHz Versions

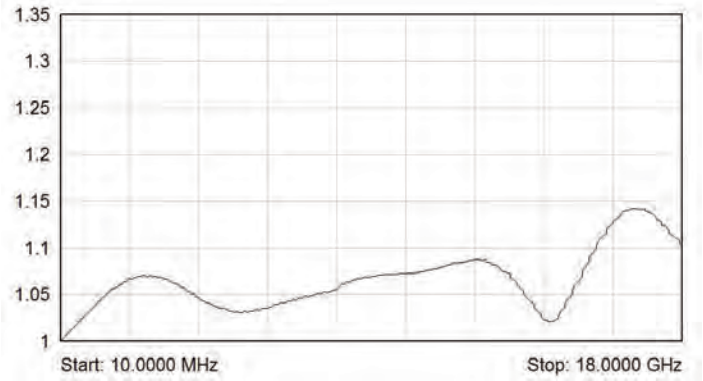
Characteristic Impedance:	50Ω
Connectors:	SMA
Bandwidth	DC to 18GHz
Maximum RF Carry Power:	220W (0-3GHz) 150W (3-8GHz) 120W (8-12.4GHz) 100W (12.4-18GHz)
Isolation:	>80dB (0-3GHz) >70dB (3-8GHz) >60dB (8-12.4GHz) >60dB (12.4-18GHz)
Insertion Loss:	<0.2dB (0-3GHz) <0.3dB (3-8GHz) <0.4dB (8-12.4GHz) <0.5dB (12.4-18GHz)
VSWR:	<1:1.2 (0-3GHz) <1:1.3 (3-8GHz) <1:1.4 (8-12.4GHz) <1:1.5 (12.4-18GHz)
Expected Life (low power):	>10 million operations per position guaranteed (typically >25 million)
Insertion Loss Repeatability:	Within 0.025dB
Propagation Delay Variation (between channels):	<1ps



Typical Insertion Loss (dB) Plot for 18GHz Versions



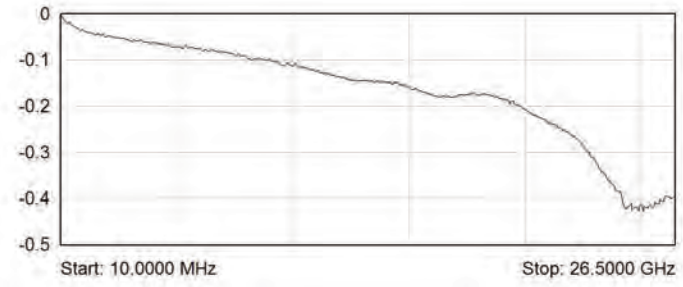
Typical Isolation (dB) Plot for 18GHz Versions



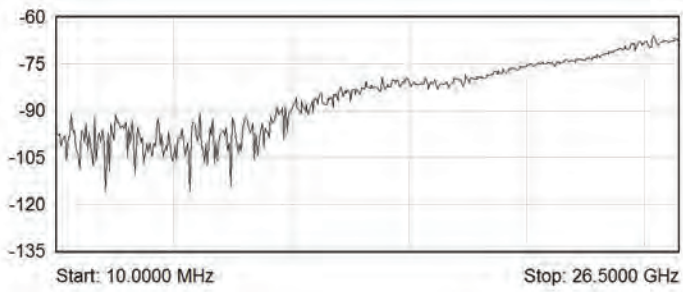
Typical VSWR Plot for 18GHz Versions

Multiplexer Specification - 26.5GHz Versions

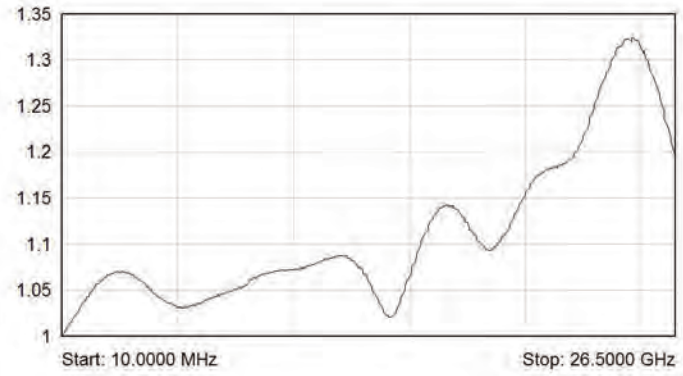
Characteristic Impedance:	50Ω
Connectors:	SMA
Bandwidth	DC to 26.5GHz
Maximum RF Carry Power:	220W (0-3GHz) 150W (3-8GHz) 120W (8-12.4GHz) 100W (12.4-18GHz) 40W (18-26.5GHz)
Isolation:	>80dB (0-3GHz) >70dB (3-8GHz) >60dB (8-12.4GHz) >60dB (12.4-18GHz) >55dB (18-26.5GHz)
Insertion Loss:	<0.2dB (0-3GHz) <0.3dB (3-8GHz) <0.4dB (8-12.4GHz) <0.5dB (12.4-18GHz) <0.6dB (18-26.5GHz)
VSWR:	<1:1.2 (0-3GHz) <1:1.3 (3-8GHz) <1:1.4 (8-12.4GHz) <1:1.5 (12.4-18GHz) <1:1.6 (18-26.5GHz)
Expected Life (low power):	>10 million operations per position guaranteed (typically >25 million)
Insertion Loss Repeatability:	Within 0.035dB



Typical Insertion Loss (dB) Plot for 26.5GHz Versions



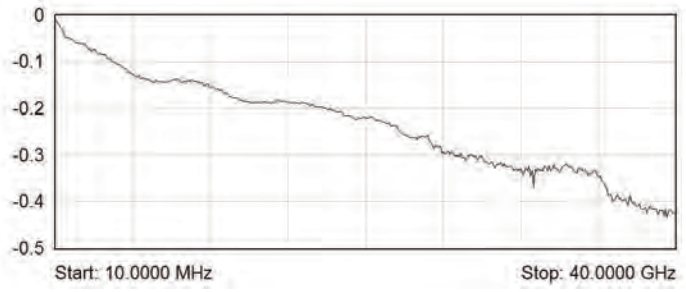
Typical Isolation (dB) Plot for 26.5GHz Versions



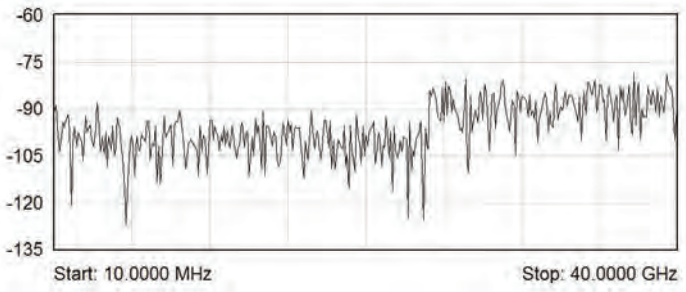
Typical VSWR Plot for 26.5GHz Versions

Multiplexer Specification - 40GHz Versions

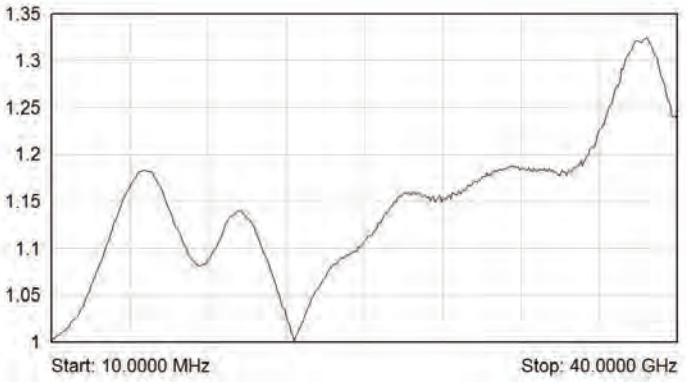
Characteristic Impedance:	50Ω
Connectors:	SMA-2.9
Bandwidth	DC to 40GHz
Maximum RF Carry Power:	60W (0-3GHz) 35W (3-8GHz) 30W (8-12.4GHz) 25W (12.4-18GHz) 15W (18-26.5GHz) 5W (26.5-40GHz)
Isolation:	>80dB (0-3GHz) >70dB (3-8GHz) >60dB (8-12.4GHz) >60dB (12.4-18GHz) >55dB (18-26.5GHz) >45dB (26.5-40GHz)
Insertion Loss:	<0.2dB (0-3GHz) <0.3dB (3-8GHz) <0.4dB (8-12.4GHz) <0.5dB (12.4-18GHz) <0.7dB (18-26.5GHz) <1.1dB (26.5-40GHz)
VSWR:	<1:1.2 (0-3GHz) <1:1.3 (3-8GHz) <1:1.4 (8-12.4GHz) <1:1.5 (12.4-18GHz) <1:1.7 (18-26.5GHz) <1:2.2 (26.5-40GHz)
Expected Life (low power):	>2 million operations per position guaranteed (typically >5 million)
Insertion Loss Repeatability:	Within 0.05dB



Typical Insertion Loss (dB) Plot for 40GHz Versions



Typical Isolation (dB) Plot for 40GHz Versions



Typical VSWR Plot for 40GHz Versions

Power Requirements

Power consumption from the backplane supply is as follows:

+3.3V	+5V	+12V	-12V
0	0.2A	0.75A	0

Mechanical Characteristics

2-slot 3U PXI (CompactPCI card).

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Front panel signal connections:

6GHz, 18GHz & 26.5GHz versions: 50Ω SMA connectors.
40GHz versions: 50Ω SMA-2.9 connectors.

Mating Connectors & Cabling

For connection accessories for the 40-784A range please refer to the **90-011D** RF Cable Assemblies data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-784A Single SP6T Microwave Multiplexer

40-784A Dual SP4T Microwave Multiplexer

Product Order Codes

		6GHz	18GHz	26.5GHz	40GHz
Single	SP4T Microwave MUX	**40-784A-101**	**40-784A-121**	**40-784A-131**	**40-784A-141**
	SP6T Microwave MUX	**40-784A-001**	**40-784A-021**	**40-784A-031**	**40-784A-041**
Dual	SP4T Microwave MUX	**40-784A-102**	**40-784A-122**	**40-784A-132**	**40-784A-142**
	SP6T Microwave MUX	**40-784A-002**	**40-784A-022**	**40-784A-032**	**40-784A-042**
Triple	SP4T Microwave MUX	**40-784A-103**	**40-784A-123**	**40-784A-133**	**40-784A-143**
	SP6T Microwave MUX	**40-784A-003**	**40-784A-023**	**40-784A-033**	**40-784A-043**

Custom Configurations

Pickering can also offer mixed configurations of SP4T and SP6T multiplexers with a mix of bandwidths as outlined in the table below. Please contact the sales office with your requirements.

	Frequency	Configuration
MUX Position 1	6GHz, 18GHz, 26.5GHz or 40GHz	SP4T or SP6T
MUX Position 2	6GHz, 18GHz, 26.5GHz or 40GHz	SP4T or SP6T
MUX Position 3	6GHz, 18GHz, 26.5GHz or 40GHz	SP4T or SP6T

40-785B
Microwave Multiplexer Module

- Single or Dual 6 Channel Panel Mounted Multiplexer
- Up To 3 Remote Multiplexers From Single Slot Version
- 18GHz, 26.5GHz and 40GHz Versions
- 50 Ohm Terminated and Unterminated Versions
- 75Ω Version With 2.5GHz Bandwidth
- LED Indication
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

Pickering Interfaces PXI Microwave multiplexer modules are suitable for switching 50Ω signals up to 40GHz. The 40-785B is available as a single or dual 6 channel multiplexer, with relays mounted on the front panel. The single slot version can support up to three supplied remotely mounted multiplexers.

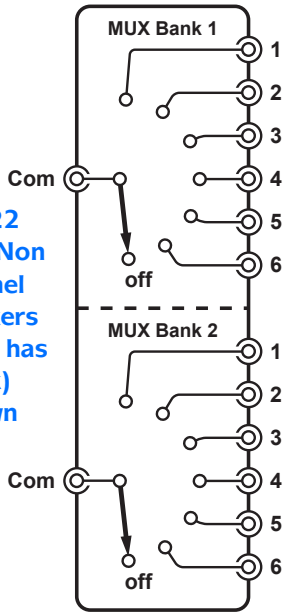
The single slot remote multiplexer versions occupy less PXI panel space and allow the microwave relays to be placed closer to the UUT and other RF test equipment. In some applications it can shorten the length of RF cable runs and improve system performance. The remote multiplexers are supplied complete with a 1.5m interface cable.

A 50Ω terminated version with panel mounted multiplexers is also available that occupies 4 or 6 (for the dual version) slots.

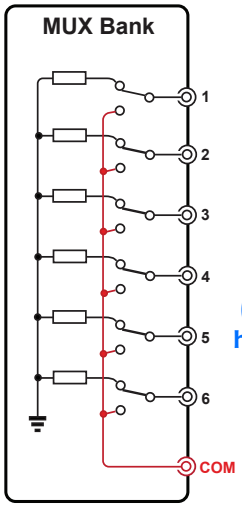
A 75Ω version is now available with a bandwidth of 2.5GHz, using the Siemens 1.6/5.6 style 75Ω connector.

The 40-785B is suitable for constructing complex microwave switching networks and provides a range of switching configurations to suit most applications. connection is by high performance SMA and SMA-2.9 connectors for 50 Ohm versions

Single slot version controls 1, 2 or 3 remotely mounted microwave multiplexers via interface cables



Model 40-785B-522 Features 2 Separate Non Terminated 6 Channel Microwave Multiplexers (model 40-785A-521 has 1 multiplexer bank) Default State Shown



Model 40-785B-521-T Features a single Terminated 6 Channel Microwave Multiplexer (model 40-785A-522-T has 2 multiplexer banks) Default State Shown

These modules offer high RF & Microwave performance with applications mainly in the Microwave region, however there are many uses in the RF spectrum where extremely low insertion loss and ultra-high isolation are critical.

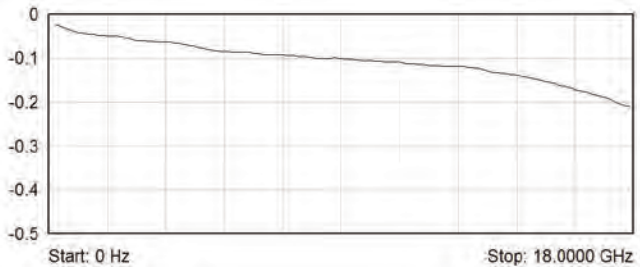
Specification

General Multiplexer Information

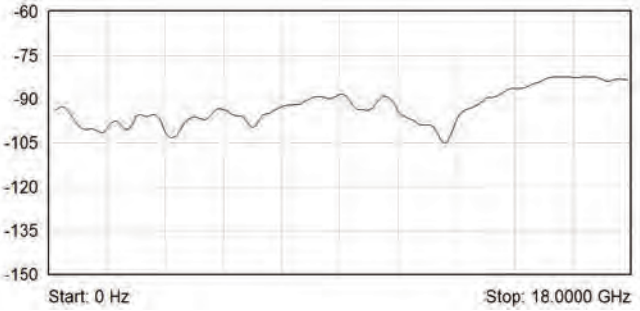
Relay Manufacturer:	Radiall
Configuration:	SP6T Microwave Multiplexer with 1, 2 or 3 independent banks.
LED Indicators:	Multiplexers have blue LEDs to indicate a closed RF path.
Operate Time:	Typically 15ms
Maximum Cold Switch Voltage:	100V
Maximum Carry Current:	1A

Multiplexer Specification - 18GHz Versions

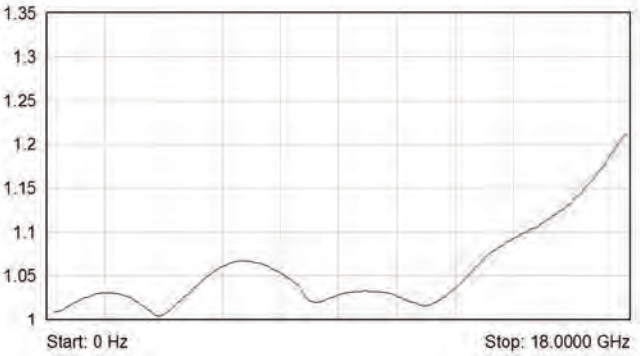
Characteristic Impedance:	50Ω
Connectors:	SMA
Bandwidth	DC to 18GHz
Rise Time:	<3ps
Isolation:	80dB (0-3GHz) 70dB (3-8GHz) 60dB (8-12.4GHz) 60dB (12.4-18GHz)
Insertion Loss:	0.2dB (0-3GHz) 0.3dB (3-8GHz) 0.4dB (8-12.4GHz) 0.5dB (12.4-18GHz)
VSWR:	1.2:1 (0-3GHz) 1.3:1 (3-8GHz) 1.4:1 (8-12.4GHz) 1.5:1 (12.4-18GHz)
Maximum RF Carry Power:	240W (0-3GHz) 150W (3-8GHz) 120W (8-12.4GHz) 100W (12.4-18GHz)
Termination Power Rating:	1W per termination, 3W total per 6 channel multiplexer.
Expected Life (Low Power)	18GHz option >5 million operations 18GHz terminated option >2 million operations



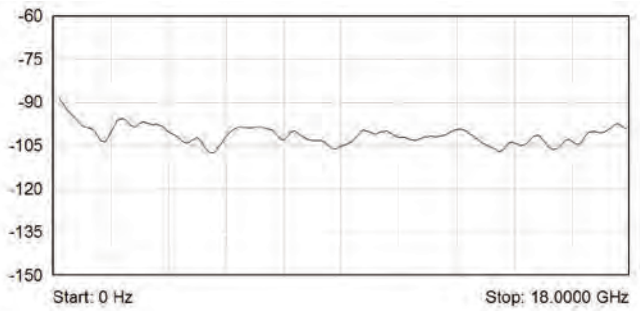
Typical Insertion Loss (dB) Plot for 18GHz Versions



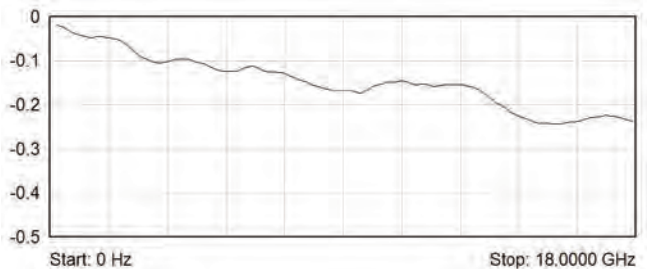
Typical Isolation (dB) Plot for 18GHz Versions



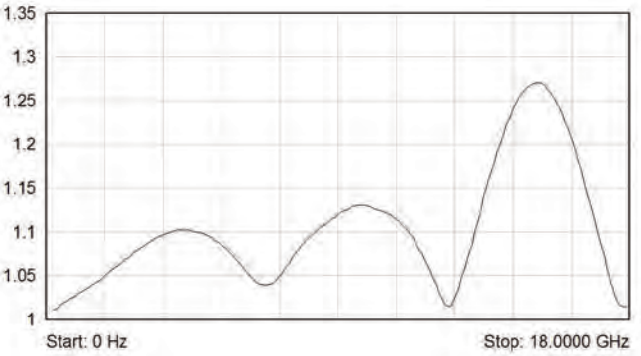
Typical VSWR Plot for 18GHz Versions



Typical Isolation (dB) Plot for Terminated 18GHz Versions



Typical Insertion Loss (dB) Plot for Terminated 18GHz Versions



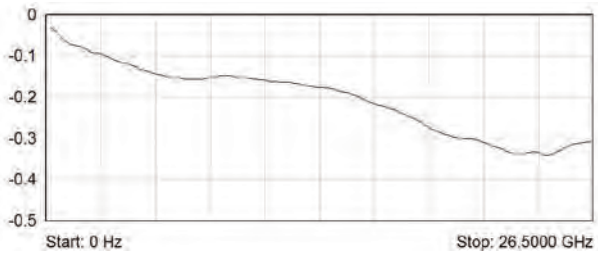
Typical VSWR Plot for Terminated 18GHz Versions

Multiplexer Specification - 26.5GHz Terminated Versions

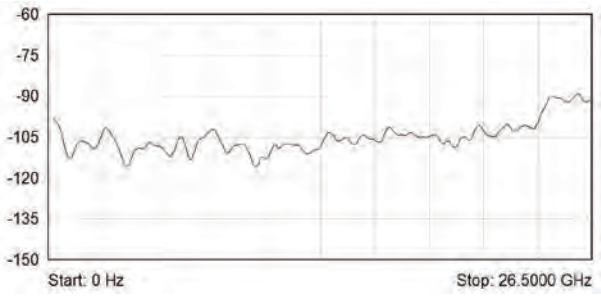
Characteristic Impedance:	50Ω
Connectors:	SMA
Bandwidth	DC to 26.5GHz
Rise Time:	<3ps
Isolation:	80dB (0-3GHz) 70dB (3-8GHz) 60dB (8-12.4GHz) 60dB (12.4-18GHz) 55dB (18-26.5GHz)
Insertion Loss:	0.2dB (0-3GHz) 0.3dB (3-8GHz) 0.4dB (8-12.4GHz) 0.5dB (12.4-18GHz) 0.7dB (18-26.5GHz
VSWR:	1.2:1 (0-3GHz) 1.3:1 (3-8GHz) 1.4:1 (8-12.4GHz) 1.5:1 (12.4-18GHz) 1.7:1(18-26.5GHz)
Maximum RF Carry Power:	240W (0-3GHz) 150W (3-8GHz) 120W (8-12.4GHz) 100W (12.4-18GHz) 40W (18-26.5GHz)
Termination power rating:	1W per termination, 3W total per 6 channel multiplexer
Expected Life (low power):	>2 million ops per position

Multiplexer Specification - 26.5GHz Unterminated Versions

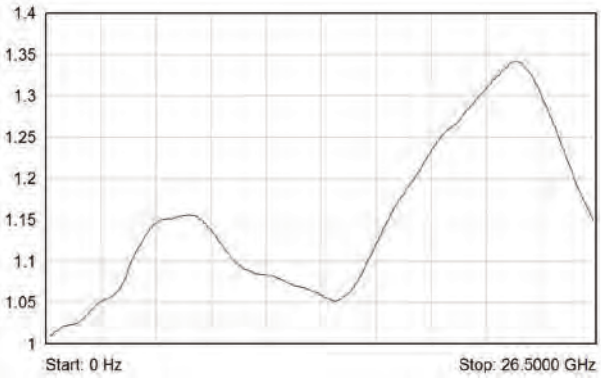
Characteristic Impedance:	50Ω
Connectors:	SMA-2.9
Bandwidth	DC to 26.5GHz
Rise Time:	<3ps
Isolation:	70dB (0-6GHz) 60dB (6-12.4GHz) 60dB (12.4-18GHz) 55dB (18-26.5GHz)
Insertion Loss:	0.2dB (0-6GHz) 0.4dB (6-12.4GHz) 0.5dB (12.4-18GHz) 0.7dB (18-26.5GHz
VSWR:	1.2:1 (0-6GHz) 1.4:1 (6-12.4GHz) 1.5:1 (12.4-18GHz) 1.7:1(18-26.5GHz)
Maximum RF Carry Power:	40W (0-6GHz) 30W (6-12.4GHz) 25W (12.4-18GHz) 15W (18-26.5GHz)
Expected Life (low power):	>2 million ops per position



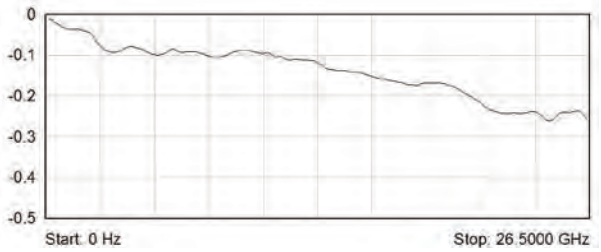
Typical Insertion Loss (dB) Plot for 26.5GHz Versions



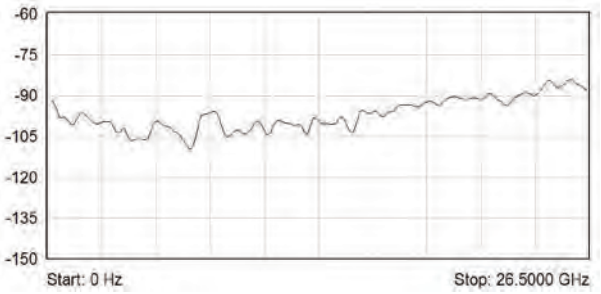
Typical Isolation (dB) Plot for 26.5GHz Versions



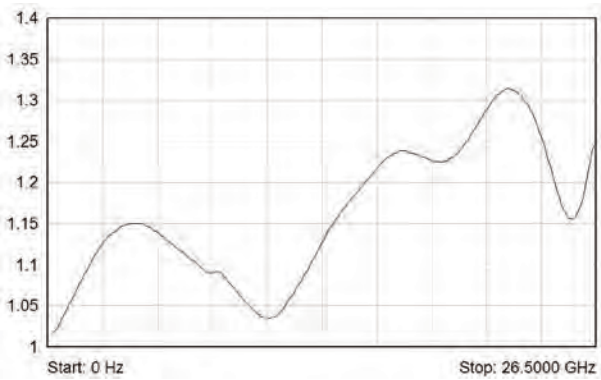
Typical VSWR Plot for 26.5GHz Versions



Typical Insertion (dB) Loss Plot for 26.5GHz Terminated Versions



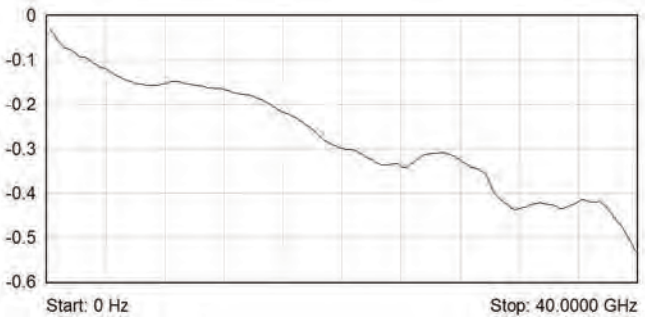
Typical Isolation (dB) Plot for 26.5GHz Terminated Versions



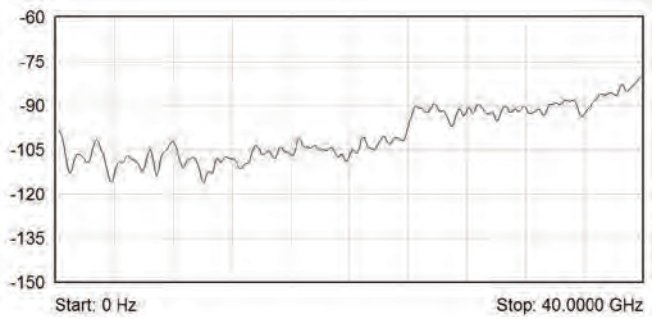
Typical VSWR Plot for 26.5GHz Terminated Versions

Multiplexer Specification - 40GHz Versions

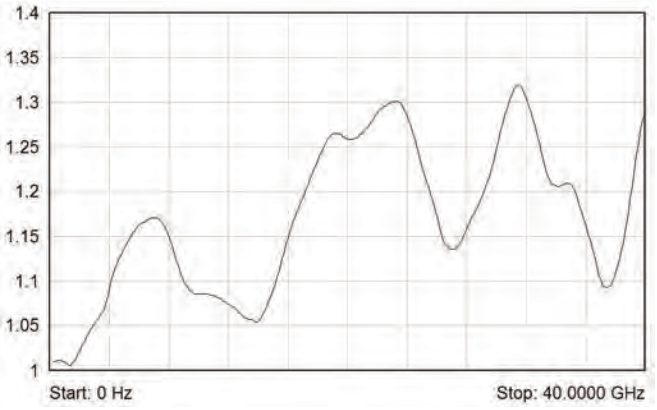
Characteristic Impedance:	50Ω
Connectors:	SMA-2.9
Bandwidth	DC to 40GHz
Rise Time:	<3ps
Isolation:	70dB (0-6GHz) 60dB (6-12.4GHz) 60dB (12.4-18GHz) 55dB (18-26.5GHz) 50dB (26.5-40GHz)
Insertion Loss:	0.2dB (0-6GHz) 0.4dB (6-12.4GHz) 0.5dB (12.4-18GHz) 0.7dB (18-26.5GHz) 1.1dB (26.5-40GHz)
VSWR:	1.3:1 (0-6GHz) 1.4:1 (6-12.4GHz) 1.5:1 (12.4-18GHz) 1.7:1(18-26.5GHz) 2.2:1 (26.5-40GHz
Maximum RF Carry Power:	40W (0-6GHz) 30W (6-12.4GHz) 25W (12.4-18GHz) 15W (18-26.5GHz) 5W (26.5-40GHz)
Termination power rating:	1W per termination, 3W total per 6 channel multiplexer
Expected Life (Low Power):	>2 million operations per position



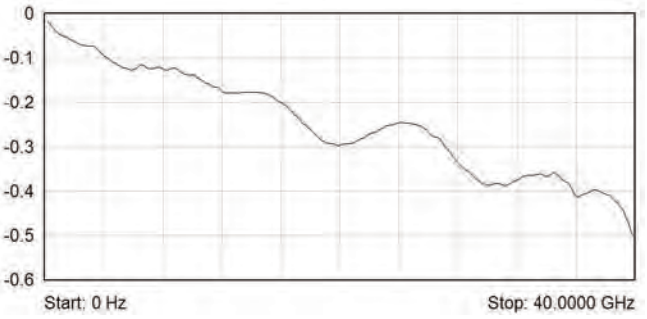
Typical Insertion Loss (dB) Plot for 40GHz Versions



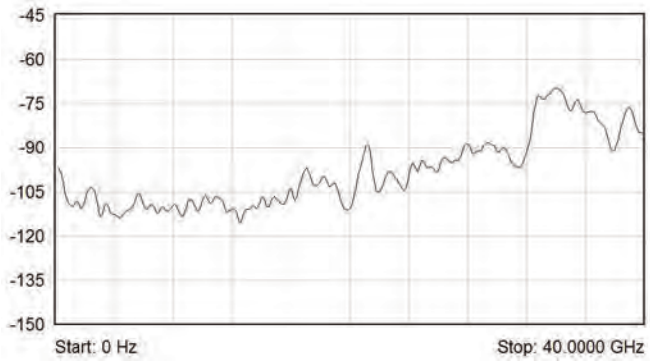
Typical Isolation (dB) Plot for 40GHz Versions



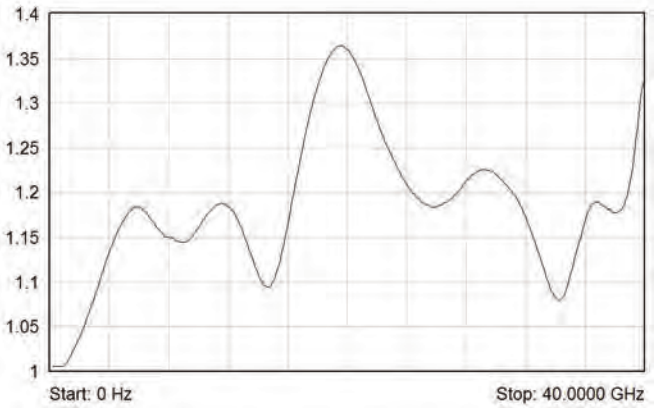
Typical VSWR Plot for 40GHz Versions



Typical Insertion (dB) Loss Plot for 40GHz Terminated Versions



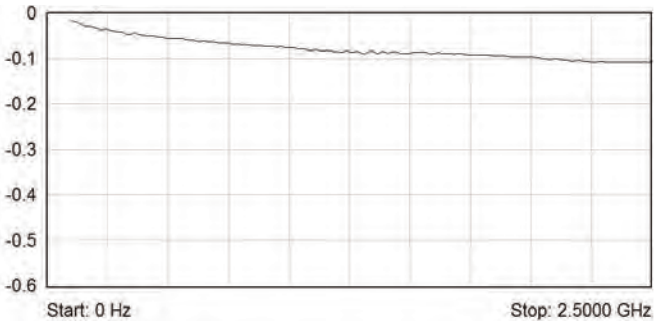
Typical Isolation (dB) Plot for 40GHz Terminated Versions



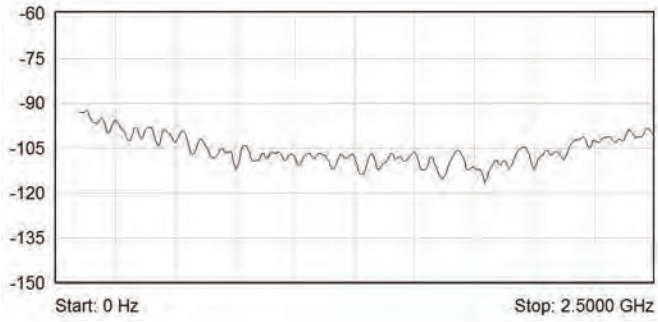
Typical VSWR Plot for 40GHz Terminated Versions

Mux Specification - 2.5GHz 75 Ohms unterminated version

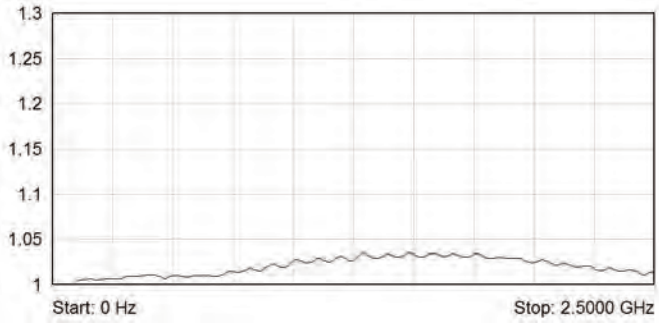
Characteristic Impedance:	75Ω
Connectors:	1.6/5.6
Bandwidth	DC to 2.5GHz
Rise Time:	<3ps
Isolation:	80dB (0-1GHz) 70dB (1-2.5GHz)
Insertion Loss:	0.2dB (0-1GHz) 0.3dB (1-2.5GHz)
VSWR:	1.2:1 (0-1GHz) 1.3:1 (1-2.5GHz)
Maximum RF Carry Power:	400W (0-1GHz) 240W (1-2.5GHz)
Expected Life (Low Power):	>2 million operations per position



Typical Insertion Loss (dB) Plot for 2.5GHz 75Ω Versions

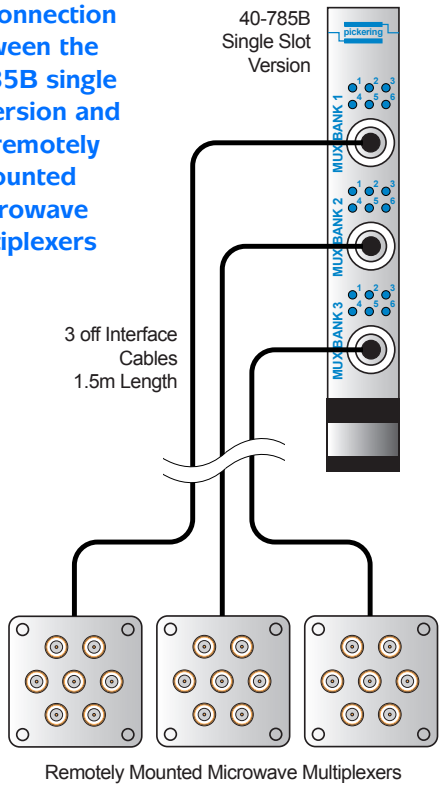


Typical Isolation (dB) Plot for 2.5GHz 75Ω Versions



Typical VSWR Plot for 2.5GHz 75Ω Versions

Interconnection between the 40-785B single slot version and the remotely mounted microwave multiplexers



Remotely Mounted Microwave Multiplexers

Remote Mount Microwave Multiplexer 40-785B-541-E

Power Requirements

Power consumption from the backplane supply is as follows:

+3.3V	+5V	+12V	-12V
0	0.2A	0.75A	0

Mechanical Characteristics

Front panel mounted versions occupy 3 slots, terminated front panel mounted versions occupy 4 (single) or 6 (dual versions) slots.

Remote multiplexer versions occupy one slot and are supplied with a 1.5m interface cable for each of the supplied microwave relays.

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Connectors on microwave switches are coaxial as follows:
18GHz versions - SMA
26.5GHz versions - SMA or SMA-2.9
40GHz versions - SMA-2.9
75Ω versions - Siemens 1.6/5.6 75Ω connectors

Product Order Codes

18GHz Multiplexer Versions - 50Ω	
† Single 6 Chan, Panel mount, 50Ω SMA	**40-785B-521**
† Dual 6 Chan, Panel mount, 50Ω SMA	**40-785B-522**
Single 6 Chan, Panel mt, 50Ω SMA, Term.	**40-785B-521-T**
Dual 6 Chan, Panel mt, 50Ω SMA, Term	**40-785B-522-T**
Single 6 Chan, Remote mount, 50Ω SMA	**40-785B-521-E**
Dual 6 Chan, Remote mount, 50Ω SMA	**40-785B-522-E**
Triple 6 Chan, Remote mount, 50Ω SMA	**40-785B-523-E**
Single 6 Chan, Remote, 50Ω SMA, Term.	**40-785B-521-TE**
Dual 6 Chan, Remote, 50Ω SMA, Term	**40-785B-522-TE**
Triple 6 Chan, Remote, 50Ω SMA, Term	**40-785B-523-TE**
26.5GHz Multiplexer Versions - 50Ω	
‡ Single 6 Chan, Panel mount, 50Ω SMA-2.9	**40-785B-531**
‡ Dual 6 Chan, Panel mount, 50Ω SMA-2.9	**40-785B-532**
Single 6 Chan, Panel mt, 50Ω SMA, Term.	**40-785B-531-T**
Dual 6 Chan, Panel mt, 50Ω SMA, Term	**40-785B-532-T**
Single 6 Chan, Remote mount, 50Ω SMA-2.9	**40-785B-531-E**
Dual 6 Chan, Remote mount, 50Ω SMA-2.9	**40-785B-532-E**
Triple 6 Chan, Remote mount, 50Ω SMA-2.9	**40-785B-533-E**
Single 6 Chan, Remote, 50Ω SMA, Term.	**40-785B-531-TE**
Dual 6 Chan, Remote, 50Ω SMA, Term	**40-785B-532-TE**
Triple 6 Chan, Remote, 50Ω SMA, Term	**40-785B-533-TE**
40GHz Multiplexer Versions - 50Ω	
‡ Single 6 Chan, Panel mount, 50Ω SMA-2.9	**40-785B-541**
‡ Dual 6 Chan, Panel mount, 50Ω SMA-2.9	**40-785B-542**
Single 6 Chan, Panel mt, 50Ω SMA-2.9, Term	**40-785B-541-T**
Dual 6 Chan, Panel mt, 50Ω SMA-2.9, Term	**40-785B-542-T**
Single 6 Chan, Remote mount, 50Ω SMA-2.9	**40-785B-541-E**
Dual 6 Chan, Remote mount, 50Ω SMA-2.9	**40-785B-542-E**
Triple 6 Chan, Remote mount, 50Ω SMA-2.9	**40-785B-543-E**
Single 6 Chan, Remote, 50Ω SMA-2.9, Term	**40-785B-541-TE**
Dual 6 Chan, Remote, 50Ω SMA-2.9, Term	**40-785B-542-TE**
Triple 6 Chan, Remote, 50Ω SMA-2.9, Term	**40-785B-543-TE**
2.5GHz Multiplexer Versions - 75Ω	
Single 6 Chan, Panel mount, 75Ω 1.6/5.6	**40-785B-751**
Dual 6 Chan, Panel mount, 75Ω 1.6/5.6	**40-785B-752**
Single 6 Chan, Remote mount, 75Ω 1.6/5.6	**40-785B-751-E**
Dual 6 Chan, Remote mount, 75Ω 1.6/5.6	**40-785B-752-E**
Triple 6 Chan, Remote mount, 75Ω 1.6/5.6	**40-785B-753-E**

Accessories:

Microwave relay bracket for remote mounting
- Contact Pickering Interfaces for information.

† These models have equivalents in the 40-784A range that occupy only two PXI slots.

‡ These models have been superceded with more competitive options from model 40-784A, however remain available for legacy requirements.

Mating Connectors & Cabling

For connection accessories for the 40-785B range please refer to the **90-011D** RF Cable Assemblies data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

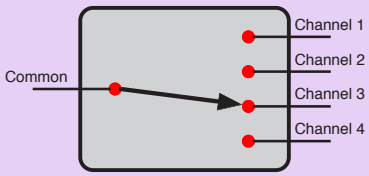
Optical Switch Modules

- Comprehensive Range of Optical Multiplexers and Insert/Bypass Switches
- MEMS Switching Technology Offers High Reliability and Fast Operating Speed
- Single and Multi Mode Versions
- FC/APC, FC/PC, SC/PC, MU (mini SC) or LC Connectors (Single Mode Versions)
- SC or ST Connectors (Multi Mode Versions)
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

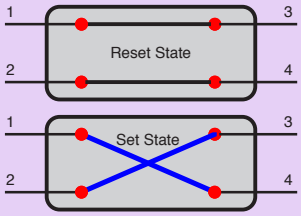
40-852 8-Channel Fiber Optic Multiplexer Module

40-855 Single Fiber Optic Switch Module

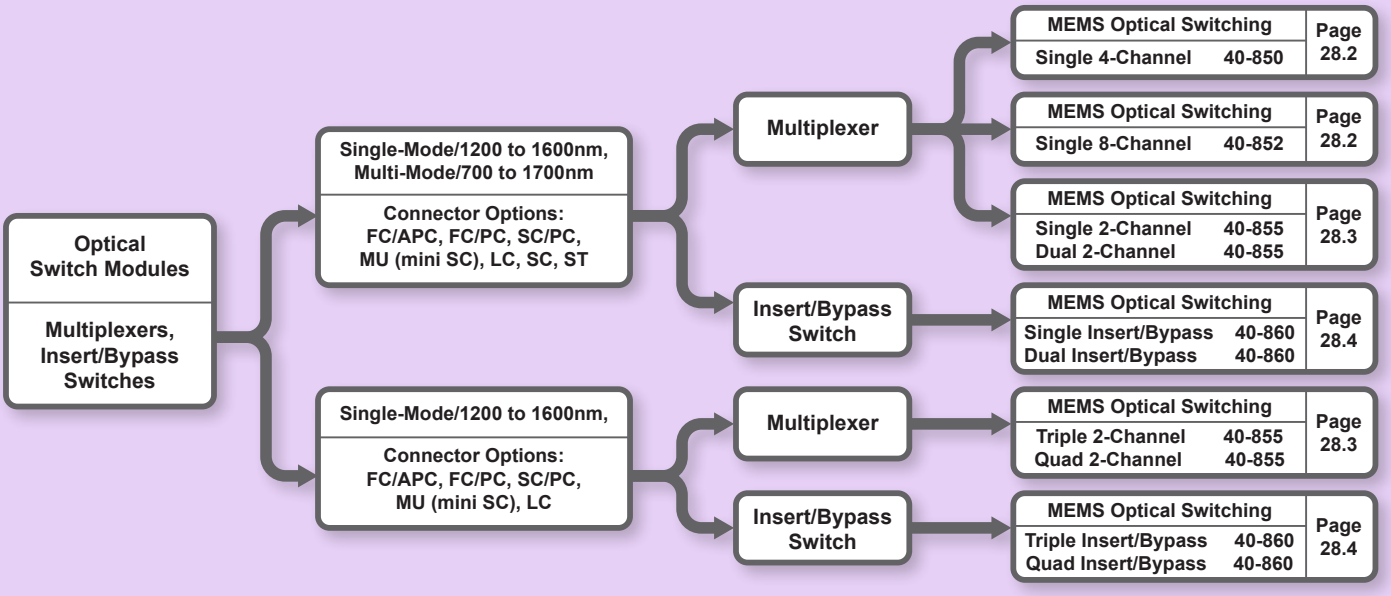
Schematic Diagram for Single 4 to 1 Multiplexer



Schematic Diagram for Insert/Bypass Switch

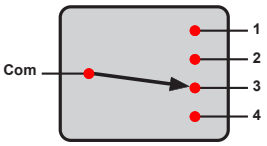


The Pickering Interfaces range of optical switching modules include high performance multiplexers and insert/bypass switches. MEMS (Micro Electro-Mechanical Systems) switch technology offers higher performance and longer operational life compared to conventional prism based optical switching.

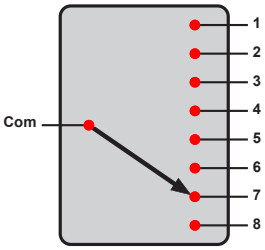


40-850/852
MEMS Fiber Optic Multiplexer

- Single 8 to 1 or Single 4 to 1 Fiber Optic MUX
- High Density 1 or 2 Slot Width Modules
- FC/APC, FC/PC or SC/PC Connectors
- Small Form Factor Connectors LC or MU (mini SC)
- 1240 to 1640nm Single Mode
- 700 to 1700nm Multi-Mode
- Return Loss >55dB
- Long Operating Life >10^9 Operations with High Repeatability ± 0.01dB and Good Temperature Stability
- Crosstalk -60dB Typical
- 1ms Typical Switching Time
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



4 Channel Fiber Optic Multiplexer



8 Channel Fiber Optic Multiplexer

General Specification (All Versions)

Fiber Switch Type: **Internal Fiber Type:**	**MEMS** **SM 9/125**
Wavelength: Insertion loss (4 channel versions): Insertion loss (8 channel versions): Return loss (APC version): Return loss (other versions): Polarization dependent loss (PDL): Repeatability: Crosstalk: Optical Input Power:	1240 to 1640nm 1dB Typ 1.5dB Typ 60dB Min 55dB Min 0.05dB Max ±0.01dB Max -60dB Max 300mW Max
Thermal Stability: (-10 to 75°C insertion loss variation)	0.2dB Max
Expected Life:	>>10^9 operations
Maximum Switching Time: Cycle Rate:	1ms 500/sec
Module Weight:	<0.8Kg typ.

Additional Specification (MM Versions)

Fiber Switch Type: **Internal Fiber Type:**	**MEMS** **MM 62.5/125**
Wavelength: Insertion loss (4 channel versions): Insertion loss (8 channel versions): Return loss (other versions): Polarization dependent loss (PDL):	700 to 1700nm 1dB Typ 1.5dB Typ 55dB Min 0.05dB Max

Power Requirements

+3.3V	+5V	+12V	-12V
0	300mA (typ 220mA)	0	0

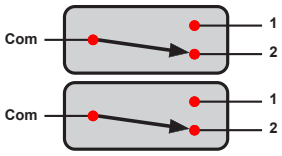
Product Order Codes

8 Channel Multiplexer Versions	
FC/APC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-018**
FC/PC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-118**
SC/PC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-218**
MU (mini SC), 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 1 slot	**40-852-318**
LC, 1240 to 1640nm, Single-Mode Single 8 Channel Fiber MUX, 1 slot	**40-852-418**
SC, 700 to 1700nm, Multi-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-218-M**
ST, 700 to 1700nm, Multi-Mode Single 8 Channel Fiber MUX, 2 slot	**40-852-518-M**
4 Channel Multiplexer Versions	
FC/APC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-014**
FC/PC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-114**
SC/PC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 2 slot	**40-850-214**
MU (mini SC), 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-314**
LC, 1240 to 1640nm, Single-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-414**
SC, 700 to 1700nm, Multi-Mode Single 4 Channel Fiber MUX, 2 slot	**40-850-214-M**
ST, 700 to 1700nm, Multi-Mode Single 4 Channel Fiber MUX, 1 slot	**40-850-514-M**

40-855
MEMS Fiber Optic Switch

- Single, Dual, Triple or Quad 2 to 1 Fiber Optic MUX
- High Density 1, 2 or 3 Slot Width Modules
- FC/APC, FC/PC or SC/PC Connectors
- Small Form Factor Connectors LC or MU (mini SC)
- 1240 to 1640nm Single Mode
- 700 to 1700nm Multi-Mode
- Return Loss >55dB
- Long Operating Life >10^9 Operations with High Repeatability ± 0.01dB and Good Temperature Stability
- Crosstalk -60dB Typical
- 1ms Typical Switching Time
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty

Single 2 Channel Fiber Optic Multiplexer



Single 2 Channel Fiber Optic Multiplexer

General Specification (All Versions)

Fiber Switch Type: **Internal Fiber Type:**	**MEMS** **SM 9/125**
Wavelength: Insertion loss (4 channel versions): Return loss (APC version): Return loss (other versions): Polarization dependent loss (PDL): Repeatability: Crosstalk: Optical Input Power:	1240 to 1640nm 0.8dB Typ 60dB Min 55dB Min 0.05dB Max ±0.01dB Max -60dB Max 300mW Max
Thermal Stability: (-10 to 75°C insertion loss variation)	0.2dB Max
Expected Life:	>>10^9 operations
Maximum Switching Time: Cycle Rate:	1ms 500/sec
Module Weight:	<0.8Kg typ.

Additional Specification (MM Versions)

Fiber Switch Type: **Internal Fiber Type:**	**MEMS** **MM 62.5/125**
Wavelength: Insertion loss (4 channel versions): Return loss (other versions): Polarization dependent loss (PDL):	700 to 1700nm 0.8dB Typ 55dB Min 0.05dB Max

Power Requirements

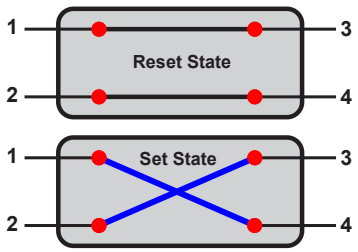
+3.3V	+5V	+12V	-12V
0	300mA (typ 220mA)	0	0

Product Order Codes

2 Channel Multiplexer Versions	
FC/APC, 1240 to 1640nm, Single-Mode	
Single 2 Channel Fiber MUX, 1 slot	**40-855-012**
Dual 2 Channel Fiber MUX, 2 slot	**40-855-022**
FC/PC, 1240 to 1640nm, Single-Mode	
Single 2 Channel Fiber MUX, 1 slot	**40-855-112**
Dual 2 Channel Fiber MUX, 2 slot	**40-855-122**
SC/PC, 1240 to 1640nm, Single-Mode	
Single 2 Channel Fiber MUX, 1 slot	**40-855-212**
Dual 2 Channel Fiber MUX, 2 slot	**40-855-222**
MU (mini SC), 1240 to 1640nm, Single-Mode	
Single 2 Channel Fiber MUX, 1 slot	**40-855-312**
Dual 2 Channel Fiber MUX, 1 slot	**40-855-322**
Triple 2 Channel Fiber MUX, 1 slot	**40-855-332**
Quad 2 Channel Fiber MUX, 1 slot	**40-855-342**
LC, 1240 to 1640nm, Single-Mode	
Single 2 Channel Fiber MUX, 1 slot	**40-855-412**
Dual 2 Channel Fiber MUX, 1 slot	**40-855-422**
Triple 2 Channel Fiber MUX, 1 slot	**40-855-432**
Quad 2 Channel Fiber MUX, 1 slot	**40-855-442**
SC, 700 to 1700nm, Multi-Mode	
Single 2 Channel Fiber MUX, 1 slot	**40-855-212-M**
Dual 2 Channel Fiber MUX, 2 slot	**40-855-222-M**
ST, 700 to 1700nm, Multi-Mode	
Single 2 Channel Fiber MUX, 1 slot	**40-855-512-M**
Dual 2 Channel Fiber MUX, 2 slot	**40-855-522-M**

40-860
MEMS Optical Insert/Bypass Switch

- Single, Dual, Triple or Quad 2x2 Insert/Bypass Fiber Optic Switch
- High Density 1 or 2 Slot Width Modules
- FC/APC, FC/PC or SC/PC Connectors
- Small Form Factor Connectors LC or MU (mini SC)
- 1240 to 1640nm Single Mode
- 700 to 1700nm Multi-Mode
- Return Loss >55dB
- Long Operating Life >10^9 Operations with High Repeatability ± 0.01dB and Good Temperature Stability
- Crosstalk -60dB Typical
- 1ms Typical Switching Time
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



Block Diagram of 2x2 Insert/Bypass Fiber Optic Switch (both Set and Reset states are shown)

General Specification (SM Versions)

Fiber Switch Type: **Internal Fiber Type:**	**MEMS** **SM 9/125**
Wavelength: Insertion loss (2x2): Return loss (APC version): Return loss (other versions): Polarization dependent loss (PDL): Repeatability: Crosstalk: Optical Input Power:	1240 to 1640nm 0.8dB Typ 60dB Min 55dB Min 0.05dB Max ±0.01dB Max -60dB Max 300mW Max
Thermal Stability: (-10 to 75°C insertion loss variation)	0.2dB Max
Expected Life:	>>10^9 operations
Maximum Switching Time: Cycle Rate:	1ms 500/sec
Module Weight:	<0.8Kg typ.

Additional Specification (MM Versions)

Fiber Switch Type: **Internal Fiber Type:**	**MEMS** **MM 62.5/125**
Wavelength: Insertion loss (2x2): Return loss (other versions): Polarization dependent loss (PDL):	700 to 1700nm 0.8dB Typ 55dB Min 0.05dB Max

Power Requirements

+3.3V	+5V	+12V	-12V
0	300mA (typ 220mA)	0	0

Product Order Codes

2 x 2 Insert/Bypass Switch Versions	
FC/APC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-012**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-022**
FC/PC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-112**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-122**
SC/PC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 2 slot	**40-860-212**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-222**
MU (mini SC), 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-312**
Dual 2x2 Insert/Bypass Switch, 1 slot	**40-860-322**
Triple 2x2 Insert/Bypass Switch, 2 slot	**40-860-332**
Quad 2x2 Insert/Bypass Switch, 2 slot	**40-860-342**
LC, 1240 to 1640nm, Single-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-412**
Dual 2x2 Insert/Bypass Switch, 1 slot	**40-860-422**
Triple 2x2 Insert/Bypass Switch, 2 slot	**40-860-432**
Quad 2x2 Insert/Bypass Switch, 2 slot	**40-860-442**
SC, 700 to 1700nm, Multi-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-212-M**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-222-M**
ST, 700 to 1700nm, Multi-Mode	
Single 2x2 Insert/Bypass Switch, 1 slot	**40-860-512-M**
Dual 2x2 Insert/Bypass Switch, 2 slot	**40-860-522-M**

Telecoms/Differential Switches

- A Range of Switching Modules Designed For Switching Signals Carried on Differential Pairs
- Daisy Chain Switching Modules Suitable For Testing SONET/SDH Transmission Multiplexers
- Daisy Chain Switching Modules Available in Unbalanced 75Ω and Balanced 120Ω Versions With 8 or 16 Channels
- Differential MUX For Switching Serial Data Communication Signals Such as USB and Ethernet
- USB 2.0 Hub With Connect/Disconnect on all Channels
- Kernel, VISA and IVI Support For PXI Environments
- Kernel and IVI Support For LXI Environments

40-795 Daisy Chain Switching Module

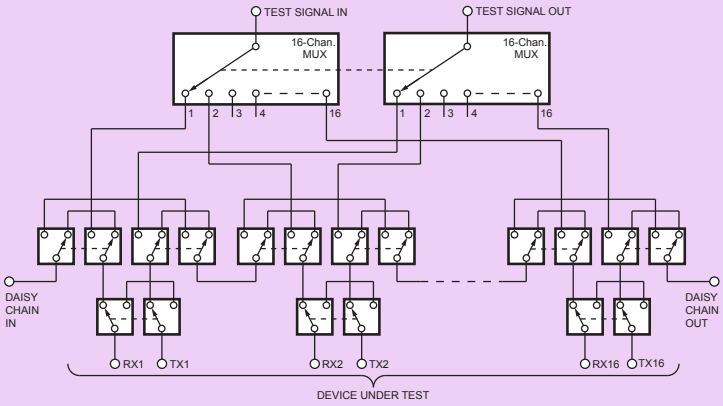
40-736 Datacoms MUX

This range of modules is ideal for switching signals carried as differential signals where a controlled differential impedance is required. Applications include Telecoms signals and the switching of serial bus systems that use differential signalling.

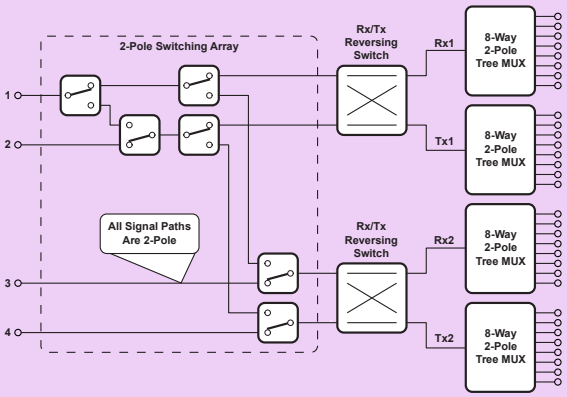
The daisy chain switching modules 40-792/3/5/6, are specifically designed for production or verification testing of SONET/SDH transmission multiplexers switching 2MBit/s or 1.5MBIt/s data. Versions are available for 75Ω or 120Ω balanced systems with either 8 or 16 tributary channels. The modules incorporate switches that allow data to be fed sequentially through selected tributaries, and multiplexers enable test equipment to break into selected channels.

The 40-735 and 40-736 multiplexers are designed to switch signals carried by serial interfaces such as RS232 and USB. They can be configured to different multiplexer formats, each channel having two poles. The 40-736 has sufficient bandwidth to allow the switching of Gigabit Ethernet.

All the connectors used by these modules are supported by a comprehensive range of cable and connector accessories.



16 Channel Daisy Chain Switching Module 40-793



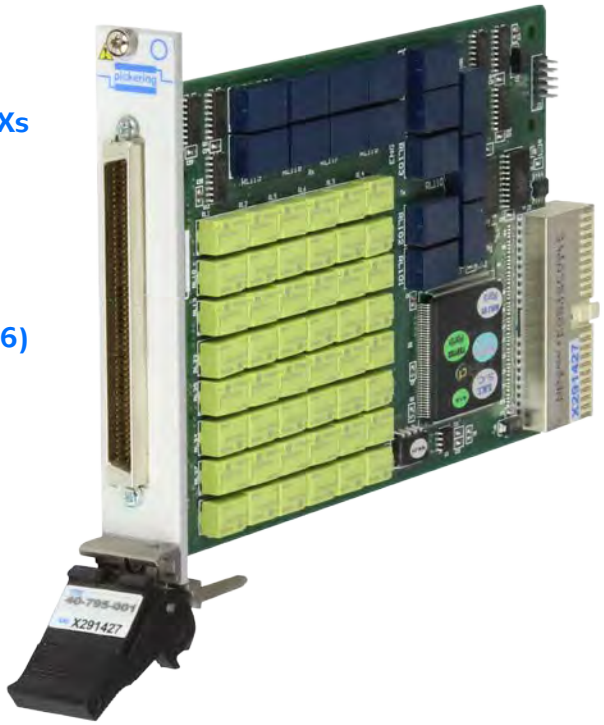
Configurable 2-Pole Datacoms MUX 40-736

Telecoms/Differential Switch Modules

- **Daisy-Chain Tributary Switch**
  - 100VDC/100VAC 1A max current
    - Daisy-Chain Tributary Switch: 1-Pole, 75Ω, 100MHz bandwidth
      - Electro-mechanical: 8-Channel 40-792-701; 16-Channel 40-793-701 — Page 29.2
    - Daisy-Chain Tributary Switch: 2-Pole, 100/120Ω, 100MHz bandwidth
      - Electro-mechanical: 8-Channel 40-795-001; 16-Channel 40-796-001 — Page 29.2
- **Data Comms Multiplexer**
  - 150VDC/100VAC 0.5A max current
    - MUX suitable for USB1 or RS232: 2-Pole, 90Ω, >200MHz bandwidth
      - Reed & Electro-mechanical: Single 36-Channel or Dual 18-Channel 40-735-912; Single 18-Channel 40-735-902 — Page 29.4
  - 100V max voltage 0.3A max current
    - MUX suitable for USB, RS232 or Ethernet: 2-Pole, 100Ω, 450MHz bandwidth
      - Electro-mechanical: Configurable as Single 32-Channel, Dual 16-Channel or Quad 8-Channel 40-736-001 — Page 29.6
  - 100V max voltage 0.5A max current
    - MUX suitable for USB1 and USB2: 4-Pole, 100Ω, 450MHz bandwidth
      - Electro-mechanical: Single 8-Channel 40-737-901 — Page 29.9
- **USB 2.0 Hub**
  - 8-Port USB Hub with programmable connect and disconnect on power and data signals
    - Solid State: USB 2.0 Hub 40-738-001 — Page 29.12

40-792/793/795/796
2MBit/s Daisy-Chain Tributary Switching Modules

- Suitable For Testing SONET/SDH Transmission MUXs
- 8 or 16 Tributaries Per 1-Slot Module
- Up To 272 Tributaries Per 18-Slot PXI Chassis
- Expandable To Any Size: 8, 16, 24,....
- 75Ω Impedance (40-792/793)
- Suitable For 100/120Ω Balanced Lines (40-795/796)
- All Tributaries Can Be Daisy-Chained to One Signal
- Pickering Interfaces Can Construct and Test Custom Switching Networks
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



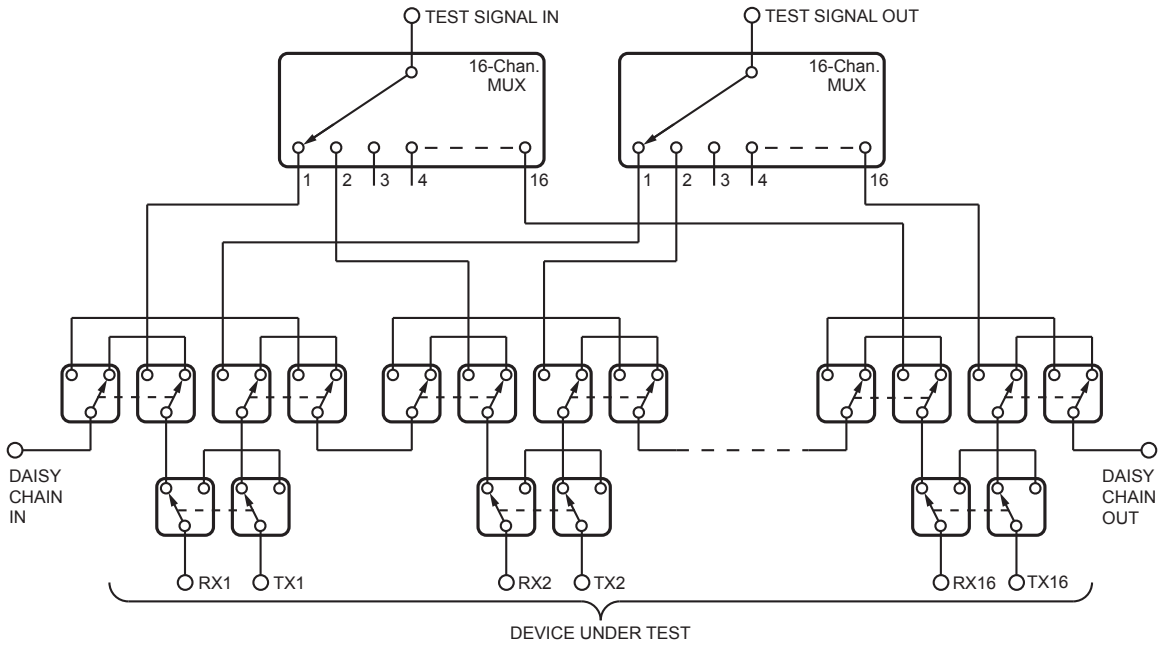
The Daisy Chain Tributary Switching Module is designed for telecom test applications. It allows production or verification testing of SONET/SDH transmission multiplexers switching 2MBit/s (E1) or 1.5MBIt/s (T1) data with a characteristic impedance of 75Ω. (40-792/793), or 100Ω/120Ω balanced lines (40-795/796).

Multiple modules can be cascaded together to form very large systems, for example a 7 slot PXI chassis can contain a 112 tributary switching system and an 18 slot PXI chassis can contain up to 272 Tributaries.

Traffic is sequentially Daisy-Chained through all tributaries (or any selection of tributaries), modules can be cascaded to test any number of tributaries. Two additional multiplexers have been built in to allow Transmit or Receive instrumentation to connect to any individual tributary this allows specific testing of that port, for example to measure pulse shape distortion or return loss.

SDH/SONET Tributary Testing is a very specialised area, please contact Pickering Interfaces for additional application information and to discuss your exact requirements.

Pickering Interfaces also have SDH/SONET switching solutions in our System 30 (VXI) and system 20 (IEEE-488) switching systems.



Simplified Block Diagram for the 16 Tributary Daisy Chain Switch Balanced Module (40-796)

General Specification (40-792/793)

Maximum Voltage:	100VDC/100VAC
Maximum Power:	30W
Maximum Switch Current:	1.0A
On Path Resistance:	<500mΩ
Off Path Resistance:	>1x10^{8}Ω
Expected Life (Low Power):	>1x10^8 operations
Expected Life (Max Power):	>2x10^5 operations
Total Switching Time:	10ms
Relay Mechanical Setting Time:	<3ms

R.F. Specification (40-792/793)

Characteristic Impedance:	75Ω
Maximum Frequency:	100MHz
Rise Time:	<1ns
Insertion Loss (<10MHz):	<0.3dB
Return Loss (<10MHz):	>21dB
VSWR (<10MHz):	<1:1.15
Isolation (<10MHz):	>50dB

General Specification (40-795/796)

Maximum Voltage:	100VDC/100VAC
Maximum Power:	30W
Maximum Switch Current:	1A
On Path Resistance:	<1.5Ω for all connections (except for Daisy Chain In – Daisy Chain Out, which is <5Ω)
Off Path Resistance:	>1x10^{8}Ω
Expected Life (Low Power):	>1x10^8 operations
Expected Life (Max Power):	>2x10^5 operations
Total Switching Time:	10ms
Relay Mechanical Setting Time:	<3ms

R.F. Specification (40-795/796)

Characteristic Impedance:	100/120Ω
Insertion Loss	
Test Signal to Rx/Tx:	<0.25dB to 10MHz
Daisy Chain:	<0.5dB (40-795) and <1dB (40-796) to 10MHz
VSWR	
Test Signal to Rx/Tx:	<1.3 to 10MHz
Daisy Chain:	<1.5 to 10MHz (40-795) and to 5MHz (40-796)

Power Requirements

+3.3V	+5V	+12V	-12V
0	500mA	0	0

Using The Tributary Daisy Chain Switch

The Tributary Switching Module comprises 2 sections (see graphic on previous page).

1. Daisy-Chain switches. These are used to feed 2M signals into and out of the DUT (device under test), any selection of tributaries may be routed (e.g. all even, all odd, etc).

2. Breakout multiplexer. This is used to test a specific tributary.

The module is programmed as a 4x16 matrix:-

1st row is used to route the Daisy-Chain switches. The default setting is for all tributaries to be selected.

2nd row is used to switch polarity.

3rd row is used to select the receive multiplexer to a specific tributary.

4th row is used to select the transmit multiplexer to a specific tributary.

Width and Dimensions

Single width 3U PXI/CompactPCI instrument module consisting of mother and daughter cards or mother card only.

3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus:	32-bit P1/J1 backplane connector
Front panel connector:	96-way male SCSI style micro-D

Product Order Codes

8 Trib Daisy Chain Switch, 75Ω	**40-792-701**
16 Trib Daisy Chain Switch, 75Ω	**40-793-701**
8-Tributary Daisy Chain Switch Balanced Module, 100Ω/120Ω	**40-795-001**
16-Tributary Daisy Chain Switch Balanced Module, 100Ω/120Ω	**40-796-001**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kits for the Tributary Switch range are as follows:

91-100-040 & 91-100-023 kits for 40-792-701
91-100-040 & 91-100-023 kits for 40-793-701
91-100-040 & 91-100-023 kits for 40-795-001
91-100-040 & 91-100-023 kits for 40-796-001

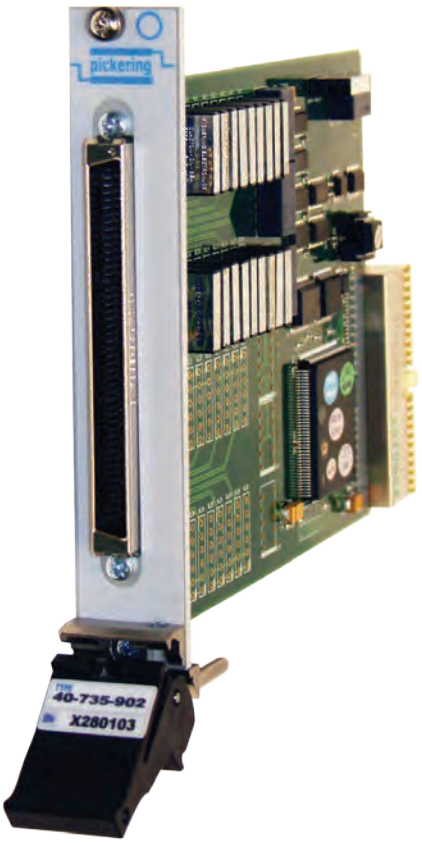
For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-792/793/795/796 modules please refer to the **90-016D** 96-way SCSI style micro-D connector data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-735
Data Communications RF MUX

- Suitable For Switching USB or RS-232 Data Lines
- Configurable To Dual 18-Channel or Single 36-Channel
- Maintains USB Data Line Impedance
- Can be Used As General Purpose Two Pole MUX
- VISA, IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-735 MUX is designed for switching the data lines of serial interfaces (RS232, USB). Careful attention to the design of the module ensures that the switching system minimises its impact on the transmission distance of USB1.1 interfaces.

The MUX is available in 36:1 or 18:1 formats and enables a single source of serial data to be switched to one of 36 or 18 devices under test. This allows the data source to load information to, or receive information from, the device under test. The 36:1 version of the 40-735 can be software configured into two independent 18 way MUXs enabling two separate sources of serial data to be connected to separate banks of 18 devices.

The module is ideal for performing bulk testing of any device that relies on a serial data communications port to load software or control the device operation.

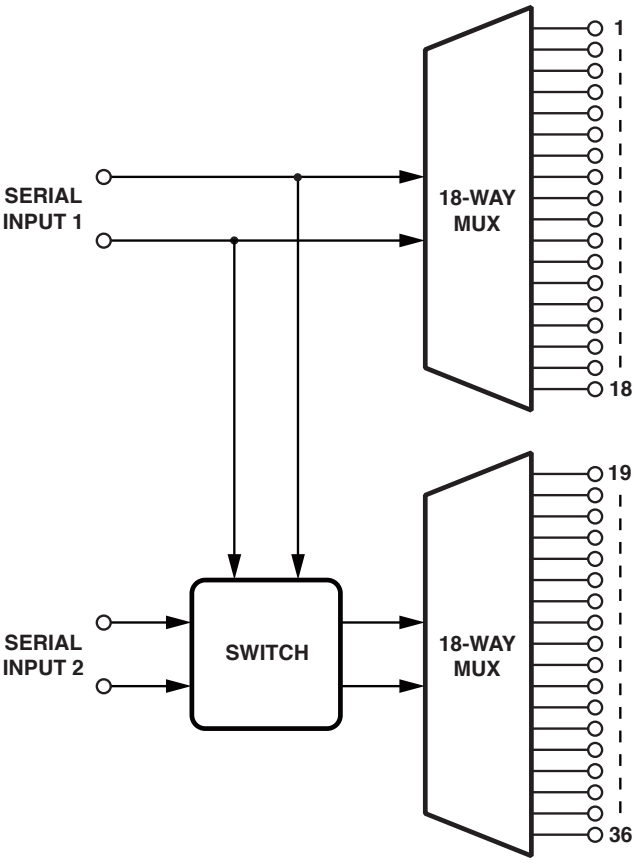
The 40-735 can be used for a variety of other applications where ever a 2-pole low power MUX is required.

Relay Type

The 40-735 is fitted with a mix of Reed Relays (Ruthenium sputtered type) and electro-mechanical relays. Spare Reed Relays are built onto the circuit board to facilitate easy maintenance with minimum downtime.

All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

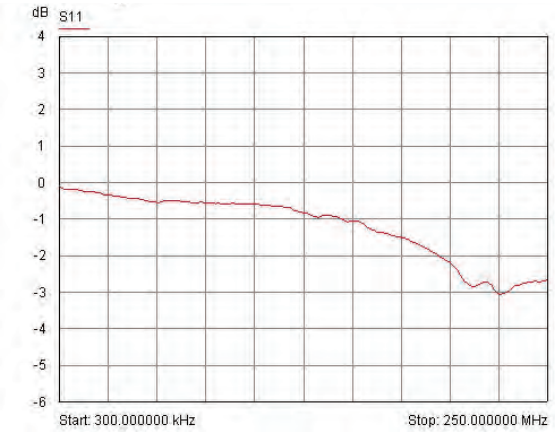
Pickering's Range of Data Comms Multiplexers		
Model No.	**Configuration**	**Application**
40-735	Single 36 channel or Dual 18 channel, differential pair	USB, RS232
40-736	Single 32, Dual 16, Quad 8 channel, differential pair	1Gb Ethernet, AFDX, LVDS, USB, RS232
40-737	Single 8:1 or 16:1 differential pair and power	USB1, USB2



Functional diagram of the 40-735 Data Communications RF Multiplxer

Switching Specification

Max Switching Voltage:	150VDC/100VAC
Max Power: Max Switch Current:	10W 0.5A
Initial On Path Resistance Off Path Resistance Thermal Offset:	<1200mΩ >1x10^{9}Ω <10µV
Bandwidth:	>200MHz (differential, 90Ω)
Operate Time: Release Time:	<4ms <4ms
Expected Life Low power load: Full power load:	 >1x10^8 operations >2x10^5 operations



Typical Insertion Loss
(Measured in a 90Ω Differential Transmission Line)

Power Requirements

+3.3V	+5V	+12V	-12V
0	150mA	0	0

Connectors

PXI bus via 32-bit P1/J1 Backplane connector.

Signals via front panel 96-way male SCSI style micro-D connector, for pin outs please refer to the operating manual.

Special builds are available with the following connectors:
Dual 18 Channel MUX with 96-pin SCSI connector (1 slot)
Single 10 Channel MUX with XLR connectors (6 slot)
Single 18 Channel MUX with BNC connectors (2 slot)
Single 36 Channel MUX with SMB connectors (2 Slot)

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card). For the slot occupancy of special build modules, see the Connectors section.

3D models for all versions in a variety of popular file formats are available on request.

Product Order Codes

36 Channel Data Comms MUX, 96-pin SCSI	**40-735-912**
18 Channel Data Comms MUX, 96-pin SCSI	**40-735-902**
Special Builds:	
Dual 18 Channel MUX, 96-pin SCSI conn.	**40-735-912-S1**
Single 10 Channel MUX, XLR connectors	**40-735-902-S2**
Single 18 Channel MUX, BNC connectors	**40-735-902-S3**
Single 36 Channel MUX, SMB connectors	**40-735-912-S4**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.

The relay kits for the 40-735 range are as follows:

91-100-005 & 91-100-040 kits for 40-735-912/902

For further assistance, please contact your local Pickering sales office.

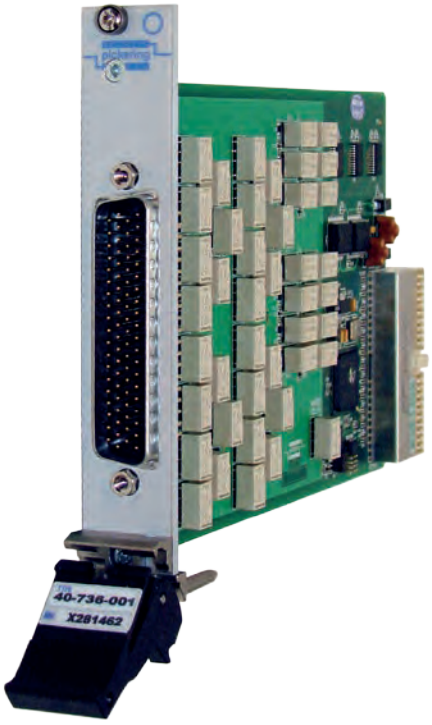
Mating Connectors & Cabling

For connection accessories for the 40-735-912/902 modules please refer to the **90-016D** 96-way SCSI style micro-D connector data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Note: 96 way micro-D connector blocks can be used for prototype verification, however can significantly restrict bandwidth performance when used in RF applications in comparison with standard connection solutions.

40-736
Data Communications MUX

- Multiplexer Designed For Differential Signals
- Configurable To Single, Dual and Quad Multiplexer
- Wide Differential Bandwidth
- Controlled Differential Impedance of 100Ω
- Suitable For Telephony, Ethernet, LVDS, RS232 and USB Switching Applications
- Compatible With 1Gb Ethernet
- Designed to Work With AFDX and Future Implementations of ARINC's ADN
- Differential Pair Reversing Switch to Simulate Crossover Cables
- Available With Interface System to Ethernet/AFDX Connectors
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Supported by eBIRST
- 3 Year Warranty



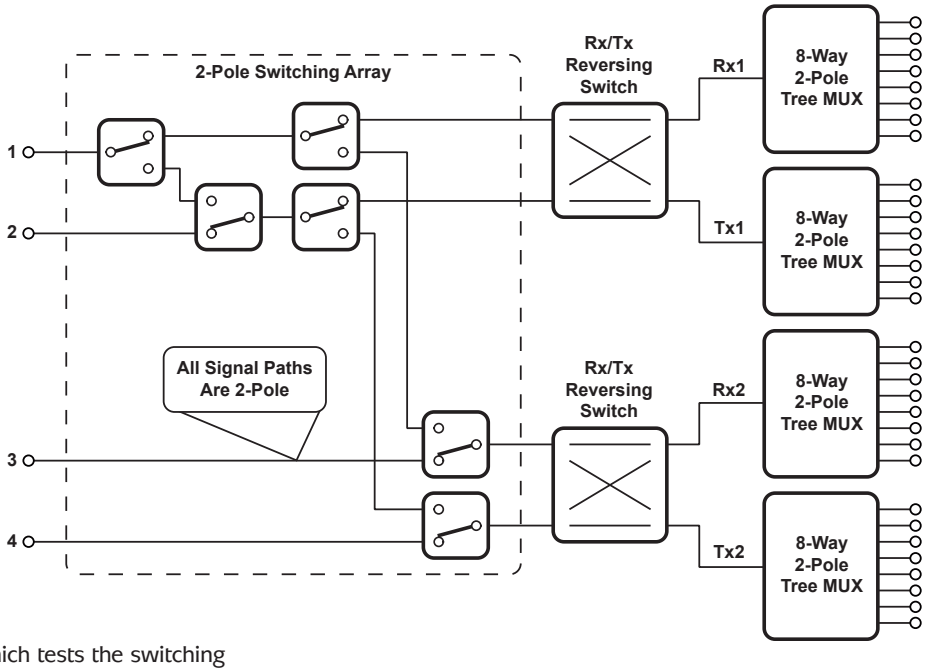
The 40-736 is designed specifically for multiplexing or de-multiplexing up to 32 differential signal pairs having controlled 100Ω differential impedance. The multiplexer can be configured under software control to provide switching for 32 differential pairs, 16 dual differential pairs and 8 quad differential pairs. The dual and quad versions are particularly well suited for providing switching of AFDX and Ethernet links. The 40-736 is capable of switching 1Gb Ethernet cables. To support Ethernet applications the design includes a switching network that simplifies the swapping of Tx and Rx pairs to simulate the effect of Ethernet crossover cables.

Pickering's Range of Data Comms Multiplexers		
Model No.	**Configuration**	**Application**
40-735	Single 36 channel or Dual 18 channel, differential pair	USB, RS232
40-736	Single 32, Dual 16, Quad 8 channel, differential pair	1Gb Ethernet, AFDX, LVDS, USB, RS232
40-737	Single 8:1 or 16:1 differential pair and power	USB1, USB2

The module is ideal for the testing of multiple devices that use serial interfaces, allowing the test system to select one target device from many. The design is bi-directional to permit use as a multiplexer or de-multiplexer with no impact on performance. The module is compatible with Power Over Ethernet.

Other applications include the switching of telephone wire cabling or the routing of serial interface signals such as LVDS, RS232 and USB.

The design uses long lifetime electromechanical relays characterised for use in telephony systems.

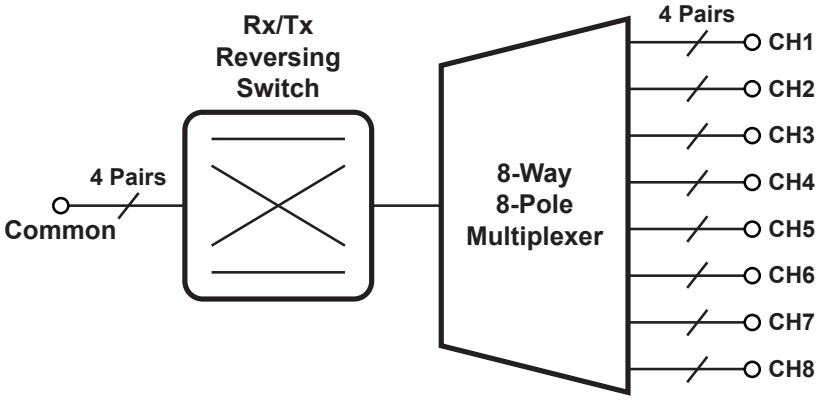


Functional diagram of the 40-736 Data Communications Multiplxer

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**

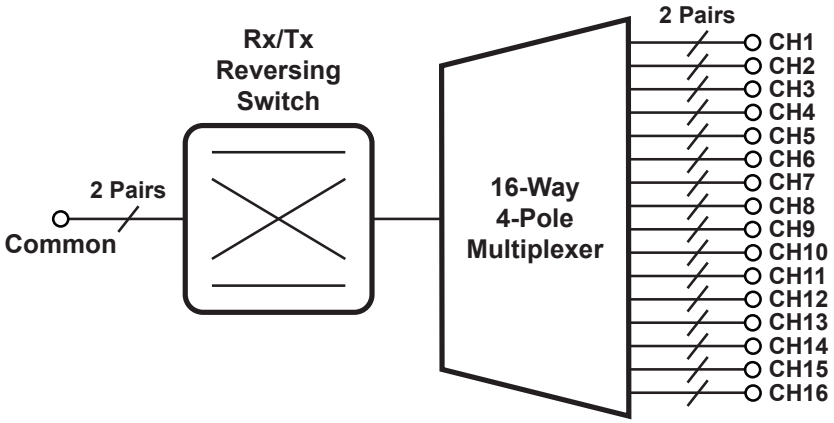
40-736 DATA COMMUNICATIONS MULTIPLEXER: EXAMPLE CONFIGURATIONS



8-Way Multiplexer Switching 4 Pairs of Signals

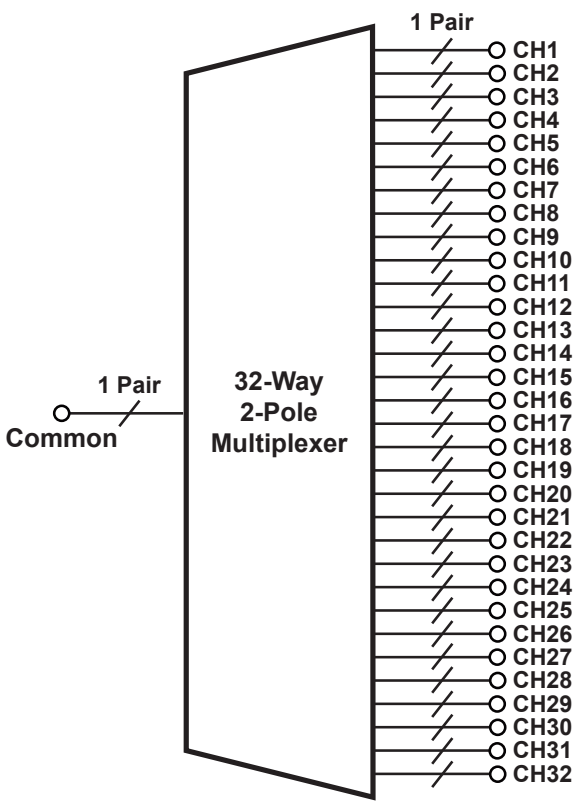
Suitable for 1Gb Ethernet switching.

The Low Cost option 40-965-901 and Compact option 40-965-907 converter boards allow the easy connection of RJ45 leads to the 40-736 and at the same time maintaining signal integrity.



16-Way Multiplexer Switching 2 Pairs of Signals

Suitable for 100 BaseT Ethernet, POTs, USB 4-wire switching (with power).



32-Way Multiplexer Switching 1 Pair of Signals

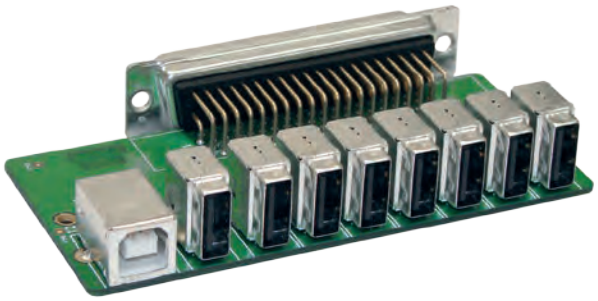
Suitable for differential signalling and USB data line multiplexing.

Specification

Switching Configuration:	Configure as single differential pair 32-way MUX, dual 16 way MUX or quad 8-way MUX. All configurations are 2-pole.
Differential Transmission Line Impedance:	100Ω
Voltage Rating:	100V between wires in same pair, 100V pair to pair
Current Rating:	0.3A
Maximum Power:	60W
Minimum Switching Voltage:	100µV
Contact Type:	Palladium Ruthenium, gold covered
Operate Time:	3ms
Expected Life	
Mechanical Endurance:	$>10^8$ operations
Full Power Load:	$>10^5$ operations
Path Resistance:	Typically <2Ω
Typical Bandwidth:	450MHz differential
Output Connector:	78-pin male D-type.
Mechanical Characteristics:	Single slot 3U PXI (CompactPCI card). 3D models for all versions in a variety of popular file formats are available on request

Power Requirements

+3.3V	+5V	+12V	-12V
0.05A	0.5A	0	0



The 40-965-903 converter board enables standard USB leads to be connected to the 78-way plug of the 40-736 for 8:1 USB switching applications.

NOTE: This breakout card can be used with the 40-736 for USB1 switching and also for USB2 but with a maximum of 2 meters of external cabling.

Product Order Codes

Data Communications Multiplexer:	**40-736-001**
Accessories:	
Interface Board 8:1 Ethernet RJ45 converter low cost option	**40-965-901**
Interface Board 8:1 Ethernet RJ45 converter compact option	**40-965-907**
Interface Board 8:1 USB converter	**40-965-903**

The 40-965-901 low cost board enables 9 RJ45 leads to be connected to the 78-way plug of the 40-736 for 8:1 Ethernet switching applications

The 40-965-907 compact board enables 9 RJ45 leads to be connected to the 78-way plug of the 40-736 for 8:1 Ethernet switching applications

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
40-736-001	**93-006-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

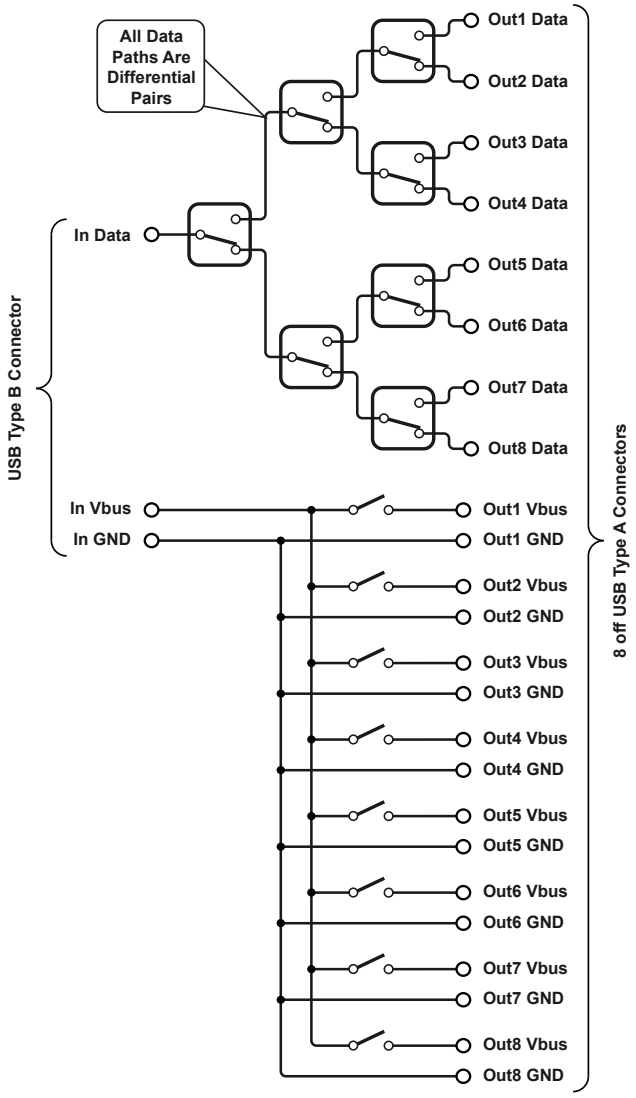
Mating Connectors & Cabling

For general purpose (non-differential) connection accessories for the 40-736 module please refer to the **90-006D** 78-way D-type connector data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Note: To use the 40-736 up to its full operating frequency, cables with twisted pairs must be used, and for Gigabit Ethernet applications the 40-965-901 converter board is recommended with RJ45 cables of at least CAT5e specification.

40-737
USB Data Communications MUX

- Multiplexer Designed For Switching USB Signals
- Configured As An 8:1 or a 16:1 Multiplexer
- Wide Differential Bandwidth
- Controlled Differential Impedance
- Suitable For USB1 and USB2 Switching Applications
- 8:1 Version Uses Standard USB Type A and B Signal Connectors
- Interface Board Available For 16:1 Version Allowing Use of Standard USB Cables
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Selected Builds Supported by eBIRST
- 3 Year Warranty



Switching diagram for the 40-737-901 8:1 USB Multiplxer, relays are shown in their default position.

Pickering's Range of Data Comms Multiplexers		
Model No.	**Configuration**	**Application**
40-735	Single 36 channel or Dual 18 channel, differential pair	USB, RS232
40-736	Single 32, Dual 16, Quad 8 channel, differential pair	1Gb Ethernet, AFDX, LVDS, USB, RS232
40-737	Single 8:1 or 16:1 differential pair and power	USB1, USB2

The 40-737 is an 8:1 or a 16:1 multiplexer for switching datacomms signals and has been specifically designed for routing USB. The data signal paths are 2-pole arranged as differential pairs as defined by the USB standard. The signal pair has a controlled differential impedance and the multiplexer has been designed for minimum insertion loss. The USB power paths are arranged as a common negative and a switched positive. The power paths are designed to ensure minimum loss of the USB power.

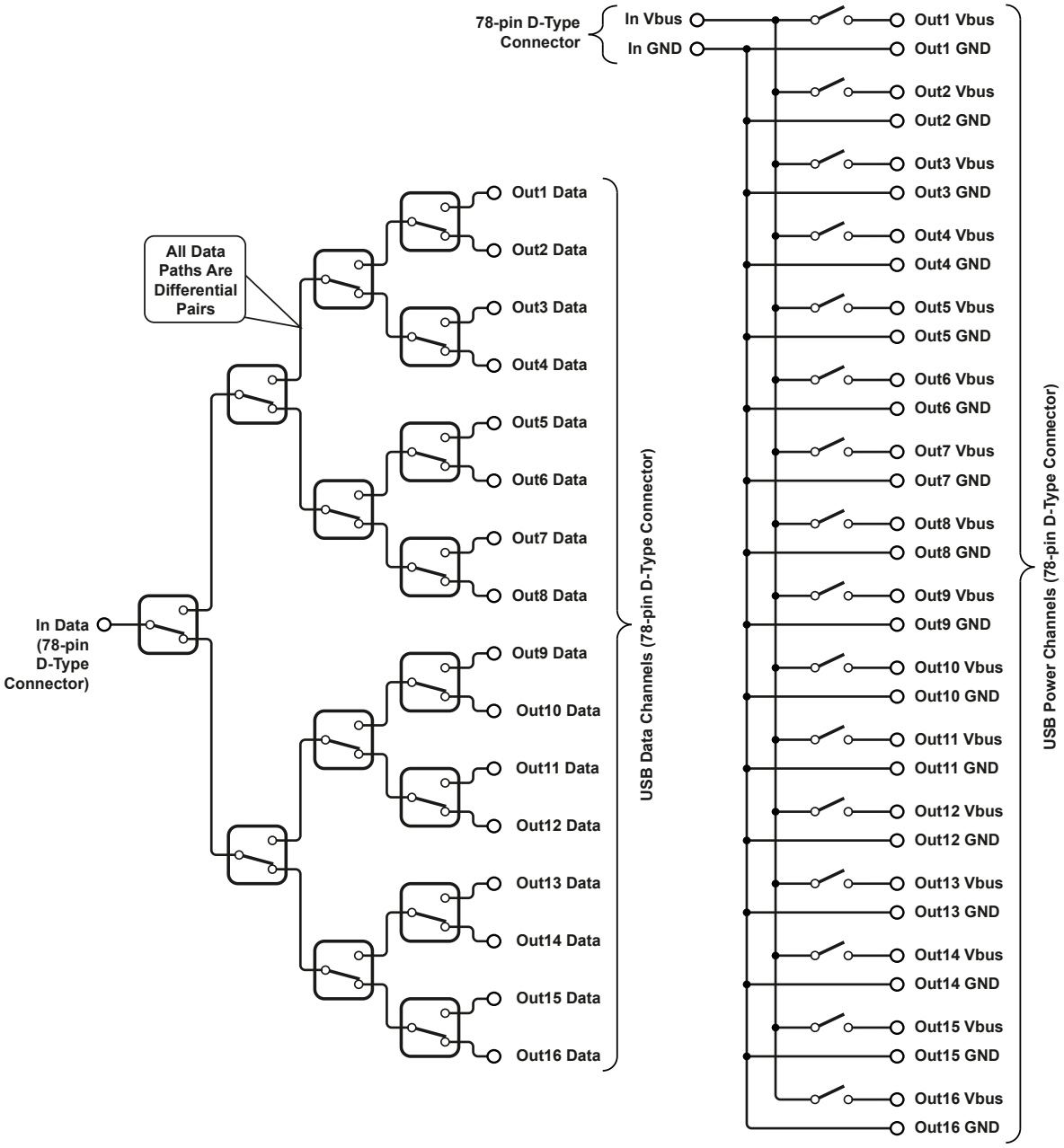
The common of the 8:1 version of the multiplexer is connected via a front panel mounted USB type B socket, and the eight channel connectors are USB type A sockets. The 16:1 version uses a male 78-pin D-type connector for all signals. An interface board is available (40-965-909) allowing standard USB cables to be connected to the 16:1 version. Both versions of the multiplexer are capable of switching USB1 or USB2 signals.

The module is ideal for the testing of multiple devices that use USB interfaces, allowing the test system to select one target device from many. The design is bi-directional to permit use as a multiplexer or de-multiplexer with no impact on performance.

The design uses long lifetime electromechanical relays characterised for use in telephony systems.

Supported by eBIRST

The 16:1 MUX (using the 78-pin D-type connector) is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



Switching diagram for the 40-737-001 16:1 USB Multiplxer, relays are shown in their default position.

Specification

Switching Configuration (40-737-901):	8-way, 2-pole tree MUX for USB differential data pairs. 8 way single pole conventional MUX for USB power with common ground connection.
Switching Configuration (40-737-001):	16-way, 2-pole tree MUX for USB differential data pairs. 16 way single pole conventional MUX for USB power with common ground connection.
Differential Transmission Line Impedance:	90Ω ±10Ω (data pairs)
Voltage Rating:	100V between wires in same pair, 100V pair to pair
Current Rating:	0.5A (data paths) 2A (power paths)
Maximum Power:	60W
Minimum Switching Voltage:	100µV
Contact Type:	Palladium Ruthenium, gold covered
Operate Time:	3ms
Expected Life Mechanical Endurance: Full Power Load:	 $>10^8$ operations $>10^5$ operations
Path Resistance:	<0.6Ω (data path) <0.2Ω (power path)
Typical Bandwidth:	450MHz differential
Signal Connectors (40-737-901):	MUX common is USB type B 8 channels are USB type A
Signal Connectors (40-737-001):	Connections are via a male 78-pin D-type connector.
Mechanical Characteristics:	Single slot 3U PXI (CompactPCI card). 3D models for all versions in a variety of popular file formats are available on request.

Power Requirements

+3.3V	+5V	+12V	-12V
0.05A	0.5A	0	0

The 40-965-909 interface board for 16:1 USB switching applications.

Product Order Codes

8:1 USB Data Comms Multiplexer	**40-737-901**
16:1 USB Data Comms Multiplexer (78-pin D-type connector)	**40-737-001**
Accessories:	
16:1 Interface Board 78-pin D-type to USB connectors for 40-737-001	**40-965-909**

40-965-909 allows conversion of a 16:1 USB MUX from a 78-pin D-type to 16 off USB A and 1 off USB B

Support Products

eBIRST Switching System Test Tool

78-pin D-type builds of this product are supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information see **eBIRST**.

Product	Test Tool	Adapter
40-737-001	**93-006-001**	**Not Required**
40-737-901	**Not Supported**	

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-737 module please refer to the **90-006D** 78-pin D-type connector data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Note: Maintenance of the USB capability requires cabling solutions specifically designed to support USB signalling. Pickering Interfaces is able to offer suitable custom cabling solutions, contact your local sales representative with your requirement.

40-738
USB 2.0 Hub with Programmable Connect/Disconnect

- Adds USB 2.0 Instruments and DUT Directly to PXI Chassis
- 8 Port USB 2.0 Hub
- Data Stream Directly From Controller PCI Bus
- USB Power On All Outputs
- Programmatic Disconnect of USB Power and Data thru Pickering Interfaces Switch Driver
- USB Data Connection Via Vendor USB Driver
- 3 Year Warranty

The 40-738 is a USB hub that allows data to be streamed to and from the USB devices by the system controller PCI system via the PXI backplane

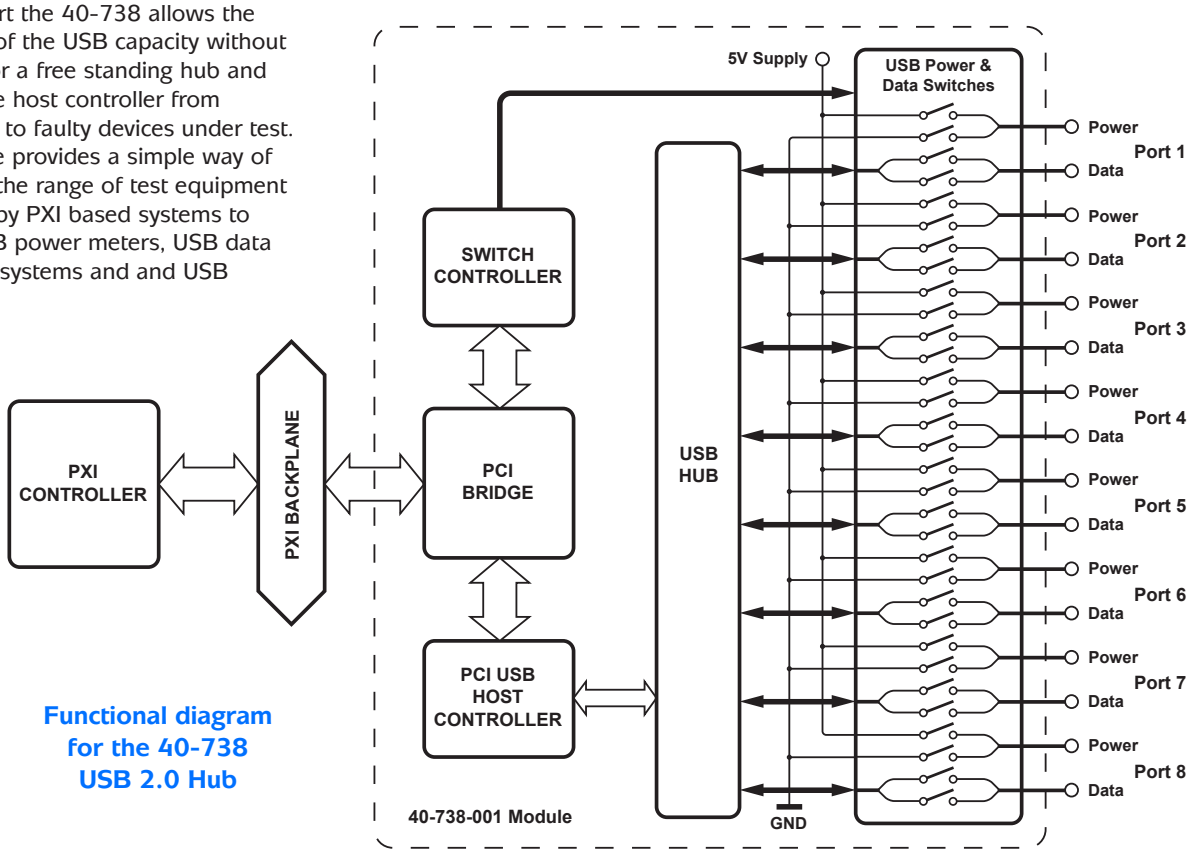
The output ports can be connected or disconnected programmatically to simulate the mechanical connection of a USB device to the module. Additionally, each port has the ability to connect and disconnect the power and data paths separately, enabling the simulation of various connection faults.

Using Pickering Interfaces standard switch drivers, a simple method is provided of attaching or detaching USB connections or restarting the USB connection. Each USB output port supports up to 0.5A at 5V in accordance with the USB specification through a USB protected power switch.

The 40-738 can be used to attach USB based devices under test or USB test equipment to the test system without reliance on the PXI controller USB ports. By providing USB power on each port the 40-738 allows the expansion of the USB capacity without the need for a free standing hub and protects the host controller from attachment to faulty devices under test. The module provides a simple way of expanding the range of test equipment supported by PXI based systems to include USB power meters, USB data acquisition systems and and USB scopes.

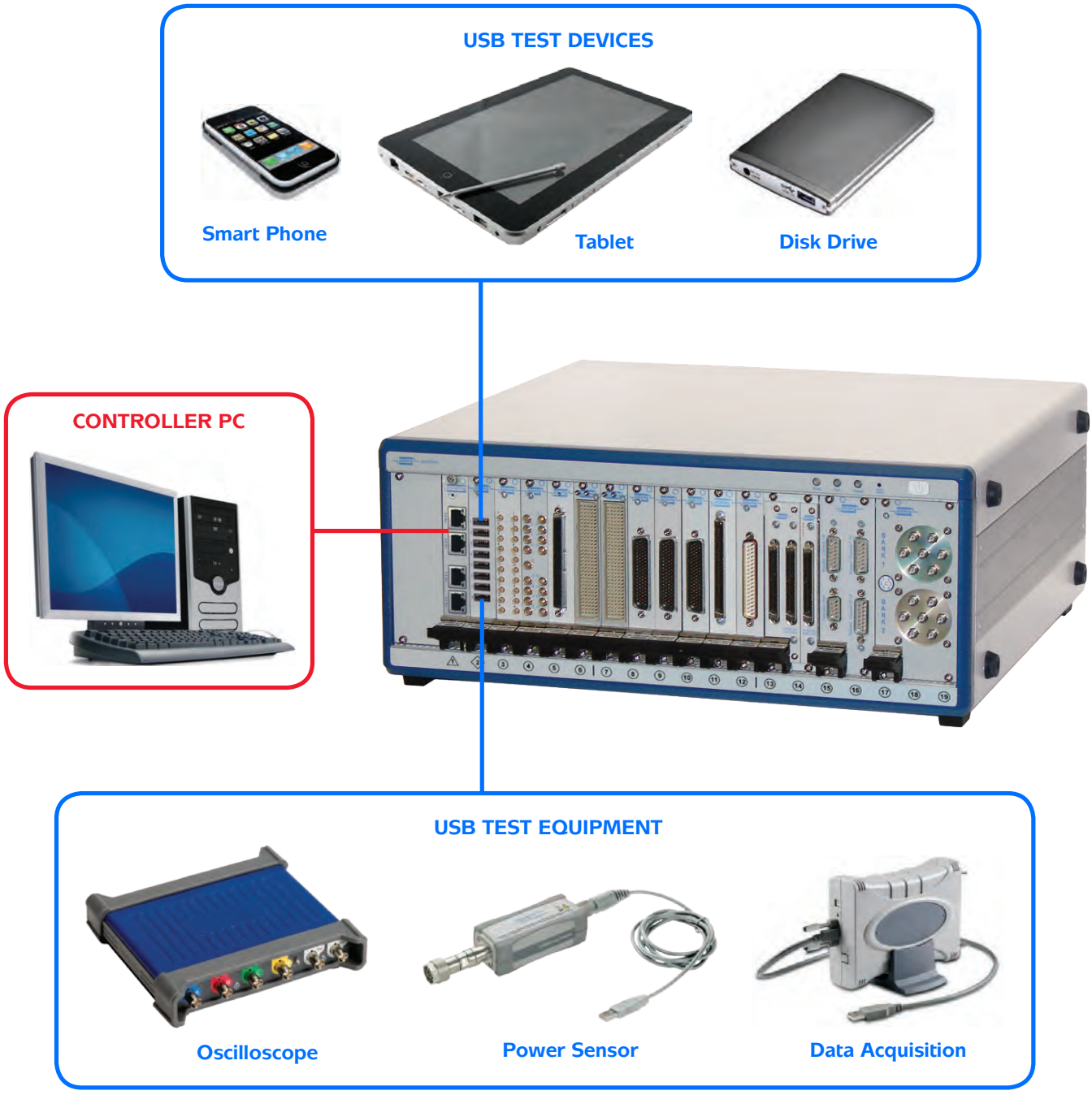
PXI Chassis Compatibility

Compatible with all chassis conforming to the PXI and cPCI specification. Compatible with Legacy and Hybrid peripheral slots in a 3U PXI Express chassis.
Not compatible with Pickering Interfaces LXI Modular Chassis.



Functional diagram for the 40-738 USB 2.0 Hub

EXPANDING YOUR PXI TEST SYSTEM WITH LOW COST USB TEST INSTRUMENTS AND USB TEST DEVICES



Specification

USB Hub:	8 port USB hub, data and power to USB 2.0
USB Common:	Direct connection from PXI controller to PCI interface via PXI backplane
USB Data:	USB device appears on the PXI controller PCI bus to enable use of standard Windows drivers for data flow.
USB Ports:	USB Type A connectors on front panel
USB Power	Up to 0.5A at 5V, includes USB power protection switch
Connection Function:	Allows any USB port to be connected or disconnected from the USB hub, independent control of power (switches V+ and V-) and data (switches D+ and D-) for each port. Connections controlled by Pickering Interfaces PXI drivers.
Mechanical Characteristics:	Single slot 3U PXI (CompactPCI card) Compatible with PXIe chassis hybrid slot

Power Requirements

+3.3V	+5V	+12V	-12V
1A	Up to 4.1A (0.5A on every Channel)	0	0

Programming

The switching functions of the 40-738 module can be controlled using standard Pickering PXI switch drivers.

Pickering provide kernel, IVI and VISA (NI and Agilent) drivers which are compatible with 32/64-bit versions of Windows including XP, Vista, 7 and 8 operating systems. The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering.

These drivers may be used with a variety of programming environments and applications including:

- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Agilent** VEE
- **Mathworks** Matlab
- **Geotest** ATE Easy
- **MTQ Testsolutions** Tecap

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.

Product Order Codes

USB 2.0 HUB With Programmable Connect/Disconnect	**40-738-001**

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.
Uses 33MHz 32-bit backplane interface.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

ARINC 608A Switch Modules

40-569 2Amp BRIC™
Resource Distributor & Bus Matrix Inputs Module

- Designed to Support the Requirements of the ARINC 608A Specification
- Integrated PXI 2A Matrix Module With Built In High Performance Screened Analog Bus
- Hot Switching 100VDC/70VAC, 2A, 60W
- Separate Bus Matrix Inputs and Resource Distributor Daughter Cards
- Load Just The Number Of Daughter Switch Cards You Need For Your Application, Expansion Cards Can Be Added Later
- Partially Populated Versions Available
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

8-Slot BRIC8 shown populated with 2 Bus Matrix cards and 2 Resource Distributor cards

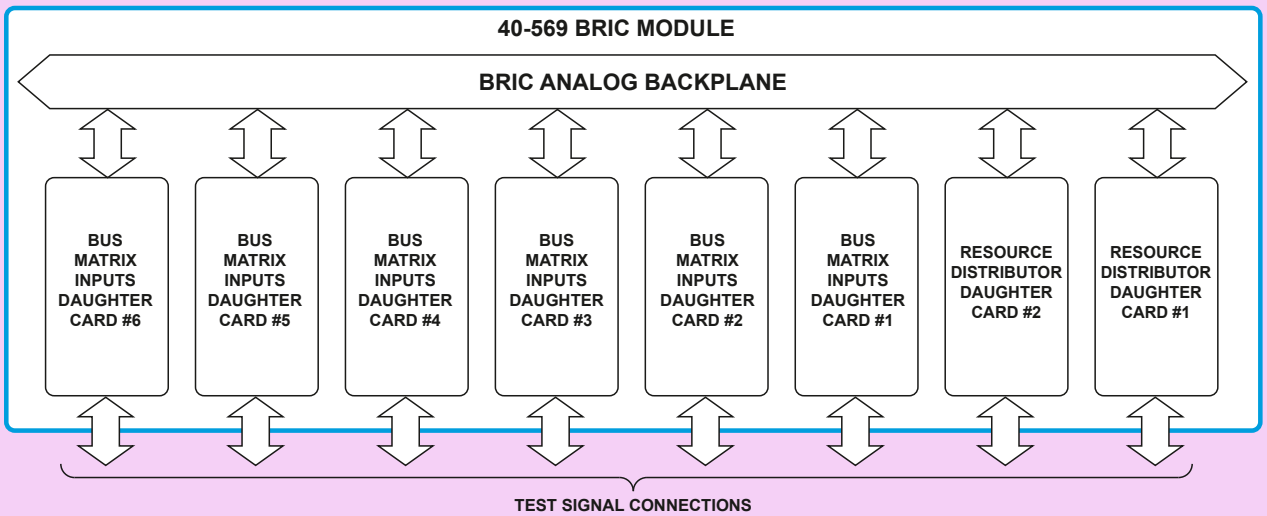
BRIC™ 2nd Generation PXI 2A Switch Matrix

The 40-569 PXI Matrix BRIC provides a range of high density bus matrix inputs and resource distributor bussed configurations capable of hot switching up to 2A and up to 100VDC/70VAC. The 40-569 BRIC modules are available in 4 or 8 slot PXI sizes and are constructed using high quality electro-mechanical relays.

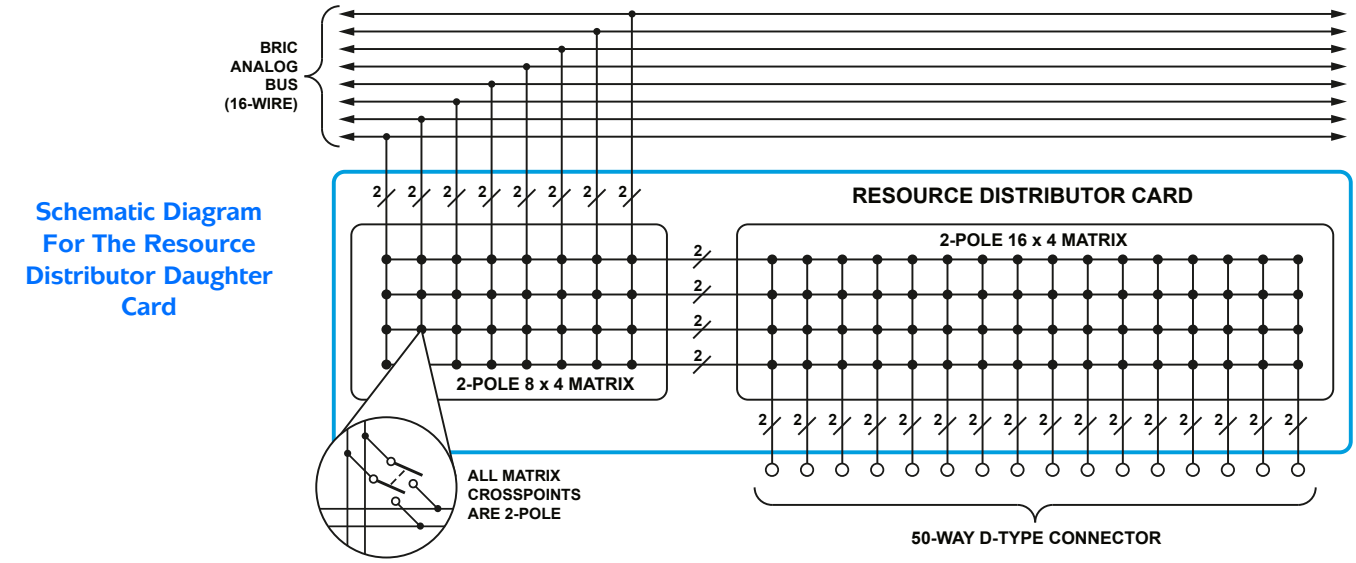
Typical applications include signal routing for avionics test systems that conform to the ARINC 608A specification. The flexibility of the 40-569 BRIC module allows a custom combination of Bus Matrix Inputs and Resource Distributor cards to meet the user's requirements.

High Reliability and Ease of Use

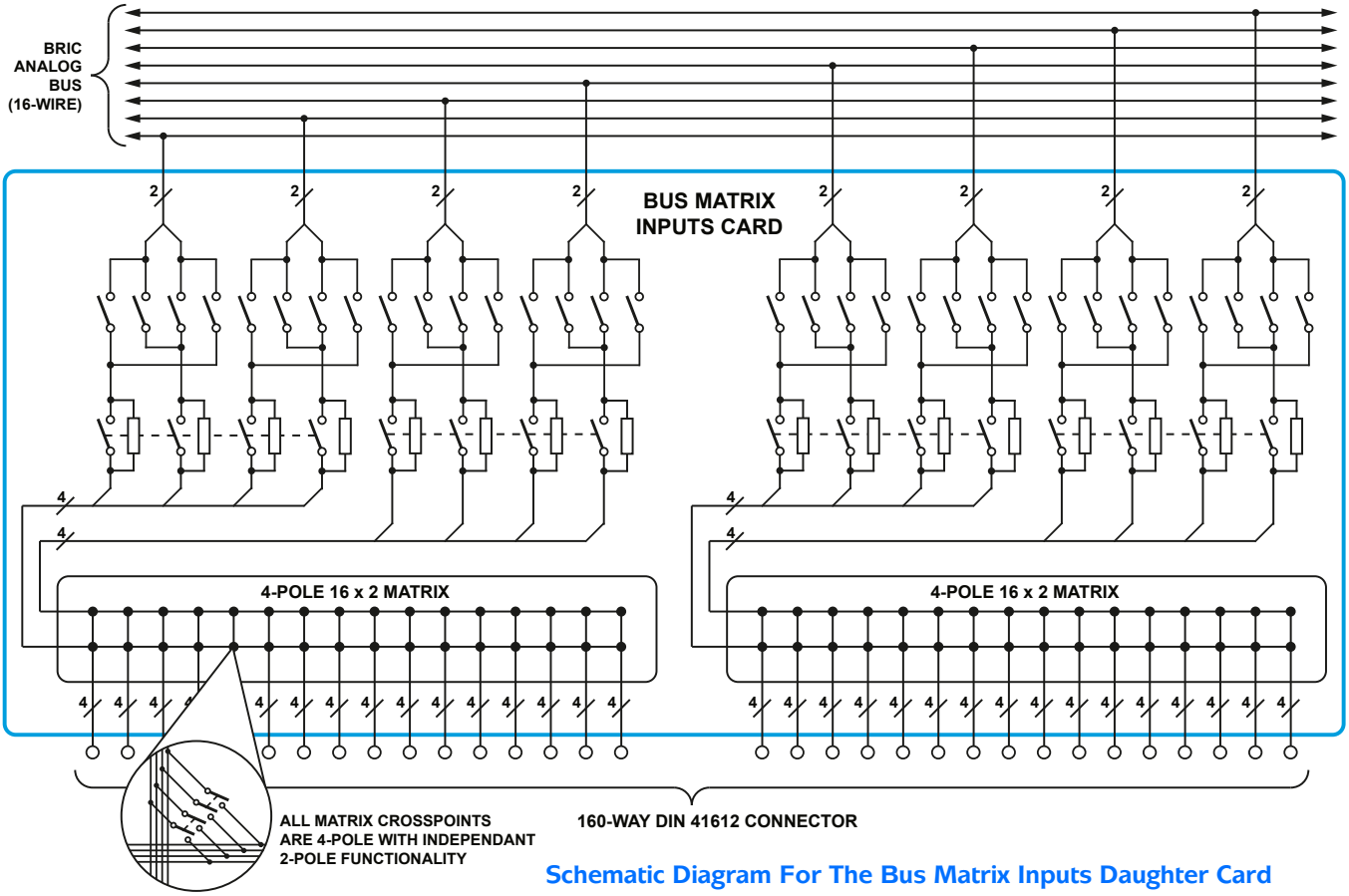
The 40-569 PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing is housed within the module using a high performance screened analog bus backplane. Pickering can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.



Schematic diagram for a fully loaded 40-569 BRIC8 with 6 Bus Matrix Inputs Cards and 2 Resource Distributor Cards



Schematic Diagram For The Resource Distributor Daughter Card



Schematic Diagram For The Bus Matrix Inputs Daughter Card

Pickering PXI Modules are compatible with Mass Interconnect solutions from both VPC and MAC Panel. Shown is the 40-569 with the MAC Panel Scout

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Interconnect Solutions & Services
Since 1958

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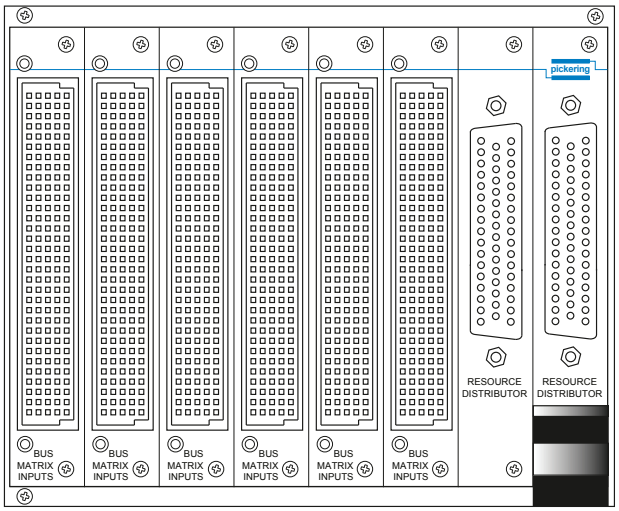
40-569 BRIC Key Advantages

- ✔ Complete PXI Switching Solution in one PXI Module.
- ✔ Simplified cabling, easy to connect to the DUT thus minimizing costs.
- ✔ Internal Shielded Analog Bus giving maximum signal integrity with easy expansion at minimal cost with maximum bandwidth and isolation.
- ✔ Targeted at high performance matrix switching with minimized cost.
- ✔ Build just the matrix configuration you need. Modular architecture allows users to buy just as much matrix capacity as they require, expansion cards can be added later.
- ✔ BRICs allow use of much lower cost 8 or 14 slot PXI chassis (such as 40-908 or 40-914).
- ✔ Simpler and faster programming with Direct I/O, VISA and IVI Drivers + LabView Soft Front Panels.
- ✔ Custom versions built to order.

The 40-569 Matrix module is based on the proven features of Pickering's large range of BRIC Integrated Matrix modules.

Available Versions of the 40-569

The 40-569 can be supplied in BRIC4 or BRIC8 format with a minimum configuration of a single Bus Matrix card and a single Resource Distributor card. The maximum configuration is a BRIC8 populated with 6 Bus Matrix cards and 2 Resource Distributor cards as shown below. For a list of all the possible configurations, please refer to the product codes overleaf.

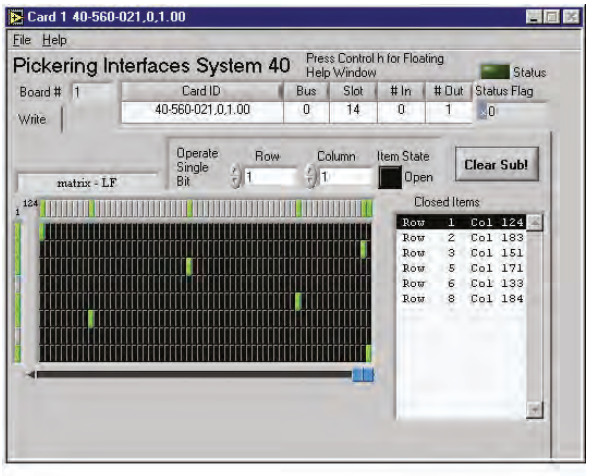


PXI BRIC Software Drivers

The PXI BRIC uses the standard software drivers used by all Pickering Interfaces PXI switch modules, these are supplied with Windows XP/Vista/7 drivers - freely available from our web site www.pickeringtest.com, also available are code examples in LabWindows/CVI, Visual Basic, Visual C++ and Borland C++.

All modules also have comprehensive IVI, VISA and DLL (Direct I/O) support together with Soft Front Panels, source code for LabView VIs, Diagnostic utilities and HTML Help, all of which may also be downloaded direct from our web site.

Pickering PXI modules are compatible with NI's Measurement & Automation Explorer.



Mating Connectors & Cabling

For connection accessories for the 40-569 module please refer to the **90-001D** 160-pin DIN 41612 and the **90-005D** 50-pin D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Maximum Crosspoint Count

The 40-569 has a suggested maximum number of simultaneously operated crosspoints of 104, please refer to manual for detailed breakdown. Higher closure counts are possible, please contact sales office for further information.

Specifications

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Hot Switch Voltage: Max Cold Switch Voltage:	100VDC/70VAC 200VDC/140VAC (maximum voltage slew rate 3V/µs)
Max Power:	60W/62.5VA
Max Switch Current:	2A †
Max Continuous Carry Current:	2A †
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance (Bus Matrix Inputs to Resource Distributor)	
On:	<1000mΩ
Off:	$>10^9$Ω
Minimum Voltage:	100µV
Differential Thermal Offset:	<10µV
Operate Time:	<3ms typical, single operation
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)
Bus Matrix Inputs isolation path resistors:	100kΩ, 0.5W, 1%

† Please be aware of switch path current restriction with Bus Matrix Inputs isolation path resistors in circuit

Typical Bandwidth and Crosstalk

Bandwidth (-3dB):	>8MHz	
Crosstalk (typical):	10kHz:	-60dB
	100kHz:	-50dB
	1MHz:	-30dB
	10MHz:	-12dB
Isolation:	10kHz:	>90dB
	100kHz:	>80dB
	1MHz:	>56dB
	10MHz:	>36dB

Power Requirements

For module with full compliment of daughter cards:

+3.3V	+5V	+12V	-12V
0	<4A (typ 1A)	0	0

Weight

BRIC4 empty module	0.9Kg
BRIC4 fully loaded	2.1Kg
BRIC8 empty module	1.6Kg
BRIC8 fully loaded	4.0Kg
BRIC daughter card	0.2Kg

Mechanical Characteristics

Four or eight slot 3U PXI (CompactPCI module).
3D models for all versions in a variety of popular file formats are available on request.

Connectors

PXI bus via 32-bit P1/J1 backplane connector.

Connections are made to the Bus Matrix Inputs card via a front panel 160-pin male DIN 41612 connector (includes a strain relief fixing for use with Pickering's cableforms).

Connections are made to the Resource Distributor card via a front panel 50-pin male D-Type connector.

Note: We recommend that Pickering mating connectors are used with this module. These are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

40-569 BRIC Matrix Product Order Codes

BRIC4 - 4-Slot High Density 2A Resource Distributor & Bus Matrix Inputs Module	**40-569-0XX**
BRIC8 - 8-Slot High Density 2A Resource Distributor & Bus Matrix Inputs Module	**40-569-1XX**

When ordering a 40-569 module the number of daughter cards is specified by XX shown in the part number, see the configuration table below for the specific code.

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

Number of Resource Distributor Cards	Number of Bus Matrix Inputs Cards	BRIC4	BRIC8
1	1	**40-569-011**	**40-569-111**
2	1	**40-569-021**	**40-569-121**
1	2	**40-569-012**	**40-569-112**
2	2	**40-569-022**	**40-569-122**
1	3	**40-569-013**	**40-569-113**
2	3		**40-569-123**
1	4		**40-569-114**
2	4		**40-569-124**
1	5		**40-569-115**
2	5		**40-569-125**
1	6		**40-569-116**
2	6		**40-569-126**

Upgrading With Daughtercards

BRIC modules can be upgraded to a larger size using daughtercards, please consult your local sales office for further information.

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time. The relay kit for the 40-569 range is as follows:

91-100-001 kit for 40-569-xxx

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40-569 module please refer to the **90-001D** 160-way DIN 41612 and **90-005D** 50-way D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

40-618
Source Switching Module

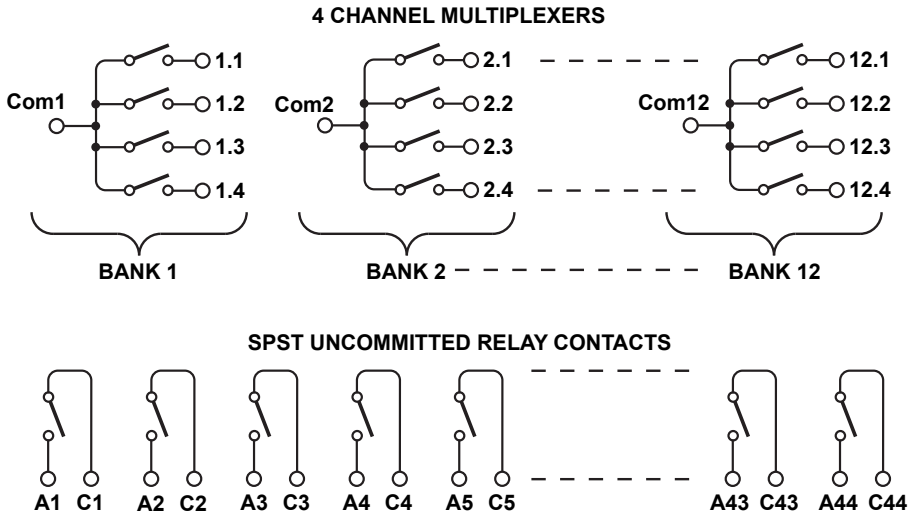
- Designed to Support the Requirements of the ARINC 608A Specification
- 44 x SPST Relay Contacts and 12 Banks of 4 Channel Multiplexer in a Single PXI Module
- Uses High Quality Electro-mechanical Relays
- Maximum Current 2A Hot or Cold Switching
- Switch up to 300VDC/250VAC and up to 60W Max Power
- Breakdown Voltage >500V
- VISA & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Supported by PXI or LXI Chassis
- 3 Year Warranty

Pickerings 40-618 Source Switching Module consists of 12 separate 4-channel multiplexers and 44 uncommitted SPST relay contacts in a single width PXI module.

Typical applications include signal routing for avionics test systems that conform to the ARINC 608A specification.

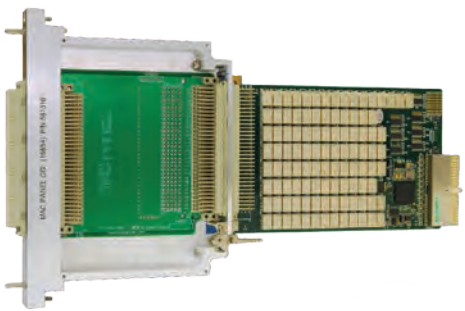
Switching is performed using high quality electro-mechanical signal relays with 2 Amp switch/carry current and voltage handling of 300VDC/250VAC. The signal breakdown voltage is greater than 500V.

Other configurations for this module can be supplied, please contact Pickering Interfaces with your requirements



Switching Diagram For The 40-618-001 Source Switching Module

Pickering PXI Modules are compatible with Mass Interconnect solutions from both VPC and MAC Panel. Shown is the 40-618 module with the terminal block for the MAC Panel Scout.



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SCOUT

Specification

Switch Type	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Hot Switch Voltage: Breakdown Voltage:	300VDC/250VAC >500V
Max Power:	62.5VA, 60W from 30V to 220VDC, 30W to 300VDC (resistive load)
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance On (Single Module): Off (Single Module): Minimum Voltage: Thermal Offset: Minimum Breakdown Voltage:	 <300mΩ >10^9Ω 100µV <5µV >500V
Estimated Bandwidth SPST Switch: 4-Channel MUX:	 30MHz 30MHz (dependent upon application)
Operate Time:	<3ms
Expected Life (operations) Very low power signal load: Low power load (2W): Medium power load (30W): Full power load (60W):	 >$1x10^8$ >$1.5x10^7$ (0.1A 20VDC) >$5x10^6$ (1A 30VDC) >$1x10^5$ (2A 30VDC) >$1x10^5$ (0.1A 300VDC)

Power Requirements

+3.3V	+5V	+12V	-12V
0	<2A	0	0

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
3D models in a variety of popular file formats are available on request.

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel Connector: 160-way male DIN 41612 (includes a strain relief fixing for use with Pickering's cableforms).

We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Product Order Codes

PXI Source Switching Module	**40-618-001**

Support Products

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching modules, simplifying servicing and reducing down-time.
The relay kit for the 40-618 module is as follows:

91-100-003 kit for 40-618-001

For further assistance, please contact your local Pickering sales office.

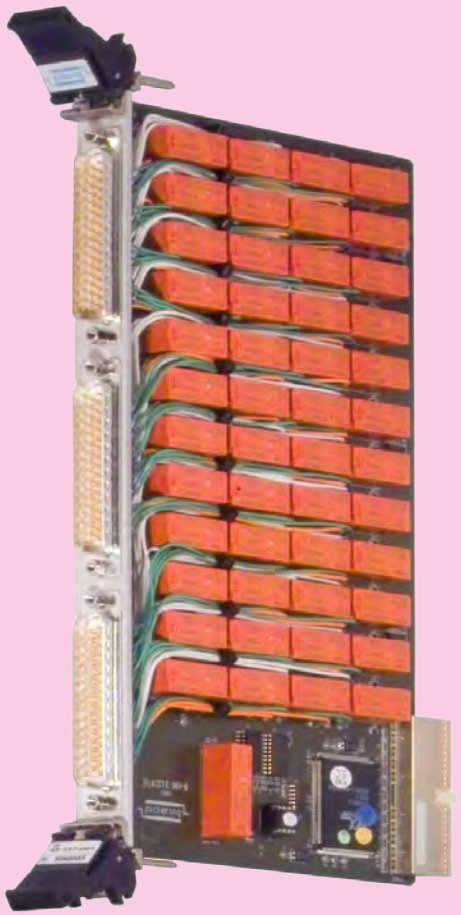
Mating Connectors & Cabling

For connection accessories for the 40-618 module please refer to the **90-001D** 160-way DIN 41612 Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

The 40-618 module is based on a simple combination of the proven features of Pickering's 40-613 Multiplexer and the 40-139 General Purpose Relay module.

45-157
48 x SPDT Power Relay Module

- 48 Changeover Contacts in One 6U PXI Module
- Current Handling of 7.5A Per Contact
- Hot Switch to 300VDC/240VAC, Cold Switch to 400VDC/240VAC
- Suitable for Switching Resistive and Inductive Loads
- Uses Electro-mechanical Relays With Gold Plated Silver Alloy Contacts
- VISA and Kernel Drivers Supplied for Windows XP/Vista/7/8
- 3 Year Warranty



The 45-157 SPDT Power Relay Module consists of 48 single pole changeover relays controlled by a PXI/CompactPCI interface. It is suitable for applications were conventional reed-relay based switching modules do not have sufficient voltage rating or current carrying capacity. All 48 contacts are electrically isolated from each other and are capable of switching resistive and inductive loads up to 1800VA at 240VAC.

The module is built on a single width 6U PXI module and the interface is via a standard PXI/CompactPCI backplane. Connection to the switching contacts is via three 50-way D-type male connectors mounted on the front panel. Theses are machined contact types with 7.5A current carrying capacity.

Applications for the 45-157 include routing power to the device under test or for selecting high power loads. It can also be used for switching large external devices such as lamps and solenoids or slave switching larger relays and contactors.

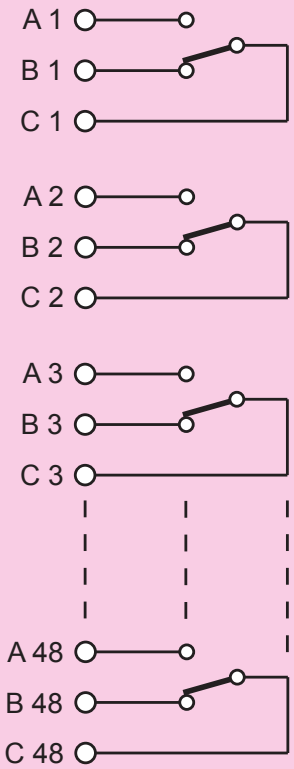
Programming

Pickering provide kernel, IVI and VISA (NI and Agilent) drivers which are compatible with 32/64-bit versions of Windows including XP, Vista, 7 and 8 operating systems. The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering.

These drivers may be used with a variety of programming environments and applications including:

- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Agilent** VEE
- **Mathworks** Matlab
- **Marvin** ATE Easy
- **MTQ Testsolutions** Tecap

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.



Switching Diagram for the 45-157 48 x SPDT Power Relay Module

Specification

Contact Type:	Gold plated silver alloy
Cold Switching Capacity Maximum Current: Maximum Voltage:	 7.5A 400VDC/240VAC
Hot Switching Capacity Maximum Current: Maximum Voltage: Maximum Power:* Minimum Switching Capacity:	 7.5A 300VDC/240VAC 240W/1800VA 10mA, 5VDC
Initial On Path Resistance: Off Path Resistance:	<50mΩ typical, 100mΩ maximum $>10^9\Omega$
Bandwidth:	>20MHz
Operate Time:	10ms typical
Expected Life (operations) Mechanical Life: At Max Hot Switch Capacity:	 $>30x10^6$ $>1x10^5$

* For variation of maximum hot switching capacity of voltage with current refer to plot.

Power Requirements

+3.3V	+5V	+12V	-12V
0	160mA	1A	0

Width and Dimensions

Size: Single width 6U PXI/CompactPCI module

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel connectors: 3x50-way male D-Type (machined contact for 7.5A current handling)

PXI & CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.

Uses 33MHz 32-bit backplane interface.

Compatible with PXI Express Hybrid Slot.

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

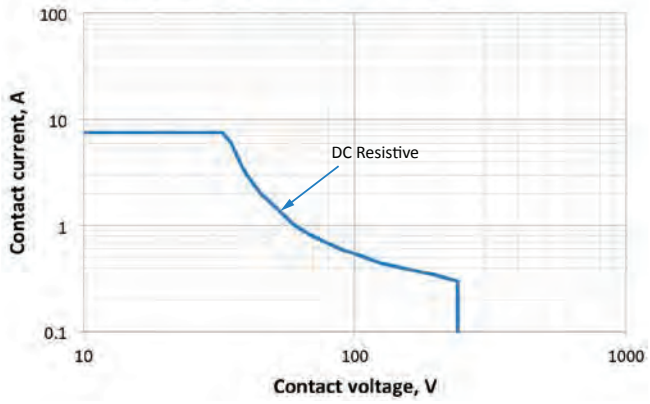
Operating/Storage Conditions

Operating Conditions

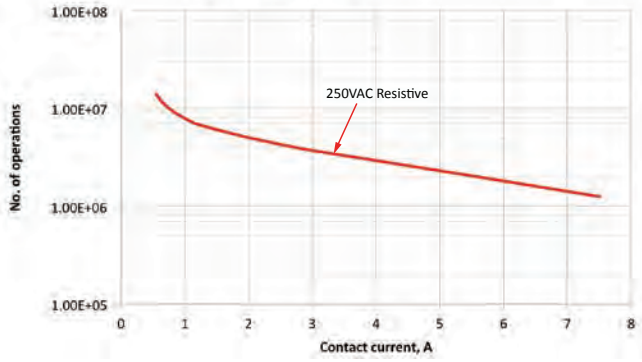
Operating Temperature:	0°C to 55°C
Humidity:	Up to 95% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 95% non-condensing
Altitude:	15000m



45-157 Current/Voltage Curve



45-157 Current/Operating Life Curve

Product Order Codes

48 x SPDT Power Relay Module	**45-157-001**

Mating Connectors & Cabling

For connection accessories for the 45-541 module please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download. Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

45-541
Ultra High Density Matrix Module

- 132x8 High Density Matrix in 6U PXI Format
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Switch up to 100VDC/70VAC RMS, 0.5A with 10W Max Power
- Fast Operating Speed (typically 0.5ms)
- VISA/IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Ease of Maintenance & Repair Through the Use of Leaded Relays
- Built-In Diagnostics - BIRST™
- Supported by eBIRST
- 3 Year Warranty

The 6U PXI Reed Relay Matrix Module 45-541 is an ultra high density reed relay matrix available in 132x8 format with 1 pole switching.

Typical applications include signal routing in Functional ATE and data acquisition systems. The matrix is constructed using high reliability Sputtered Ruthenium Reed Relays, offering >10^9 operations to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. However, for applications that require a very large matrix, Pickering's BRIC™ modules are best suited

Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for further assistance.

Relay Type

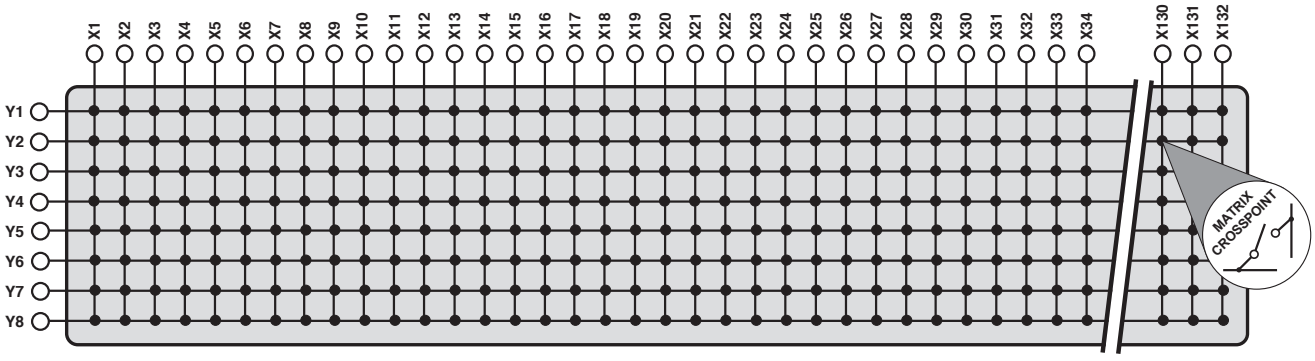
The 45-541 module is fitted with Reed Relays (Ruthenium sputtered type), these offer very long life with good low level switching performance and excellent contact resistance stability. **Spare Reed Relays** are built onto the circuit board to facilitate easy maintenance with minimum downtime. All reed relays are manufactured by our sister company Pickering Electronics, www.pickeringrelay.com.

Built-In-Relay-Self-Test BIRST™

The BIRST facility provides a quick and simple way of finding relay failures within the module. No supporting test equipment is required to run a BIRST test, simply disconnect the UUT from the module's user connector, launch the supplied BIRST application software and the tool will run a diagnostic test that will find all relays with contacts welded closed or with high (open) contact resistance. It makes it simple for systems integrators to diagnose the cause of switching failures in a system. For general information see **BIRST**.

Supported by eBIRST

As an alternative to BIRST this product is also supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



45-541 132x8 Matrix Switching Diagram

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	100VDC/70VAC RMS†
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
Initial Path Resistance On (Single Module): Off (Single Module):	 <750mΩ $>10^9$Ω
Operate Time:	0.5ms typical
Maximum number of simultaneously operated relays:	100
Expected Life, low power load: Expected Life, full power load:	$>10^9$ operations $>5x10^6$ operations (20V, 500mA, 10W)

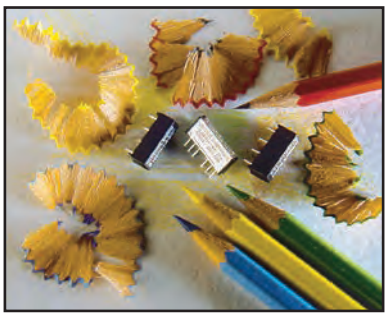
† in phase signals only

RF Specification - In a 50Ω System

Bandwidth (-3dB insertion loss, 50Ω):	10MHz
Crosstalk:	Typically <-30dB to 10MHz
Isolation:	Typically >47dB to 10MHz

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using very high density Reed Relays manufactured by our sister company Pickering Electronics.



Sputtered Ruthenium Reed Relays offer maximum performance, they are hermetically sealed and offer a very stable, long life relay contact (typically 10^9 operations) with very fast operate time. Alternative types such as electro-mechanical armature relays or non-instrumentation grade reed relays are lower cost but do not offer the consistent contact resistance, long life, fast switching speed and low level switching capability of a reed relay.

All of the reed relays used in our matrix switching modules are manufactured by Pickering Electronics, these offer maximum switching performance. Please visit the Reed Relay web site at www.pickeringrelay.com for further information.

Power Requirements

+3.3V	+5V	+12V	-12V
400mA	1.1A	50mA	0

Mechanical Characteristics

Single slot 6U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

PXI & CompactPCI Chassis

Pickering 6U PXI modules will operate in any 6U PXI chassis, in addition they will also operate (with 100% compatibillity) in any 6U CompactPCI chassis.

Connectors

PXI Bus: 32-bit P1/J1 backplane connector.

Front Panel Signal Connectors: 3 off 50-way male D-type

Product Order Codes

Ultra High Density 6U PXI Matrix Module	
Single 132x8 Matrix, 1 Pole	**45-541-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST.**

Product	Test Tool	Adapter
All Types	**93-005-001**	**Not Required**

Mating Connectors & Cabling

For connection accessories for the 45-541 module please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

Operating/Storage Conditions

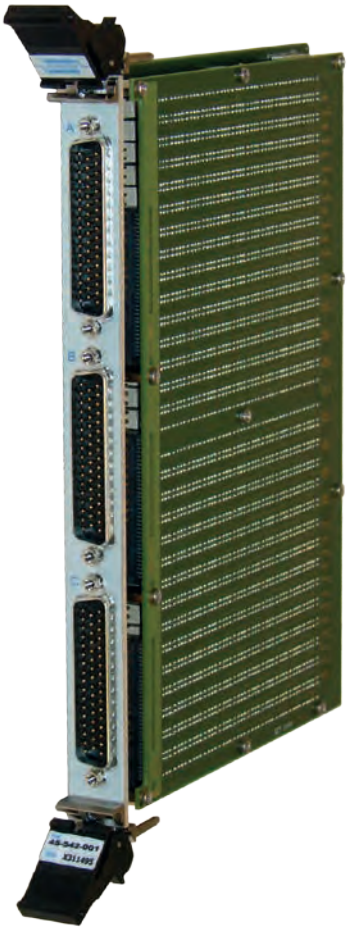
Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

45-542
Very High Density Matrix Module



- 132x8 High Density Matrix in 6U PXI Format
- Uses Gold-Plated Contact Electro-mechanical Relays
- Switch 1A & up to 170VDC/120VAC With 60W Maximum Power
- VISA/IVI & Kernel Drivers Supplied for Windows XP/Vista/7/8
- Ease of Maintenance & Repair Through the Use of Leaded Relays
- Pin Compatible With 45-541 Matrix
- Supported by eBIRST
- 3 Year Warranty

The 6U PXI Matrix Module 45-542 is a very high density electro-mechanical relay matrix available in 132x8 format with 1 pole switching.

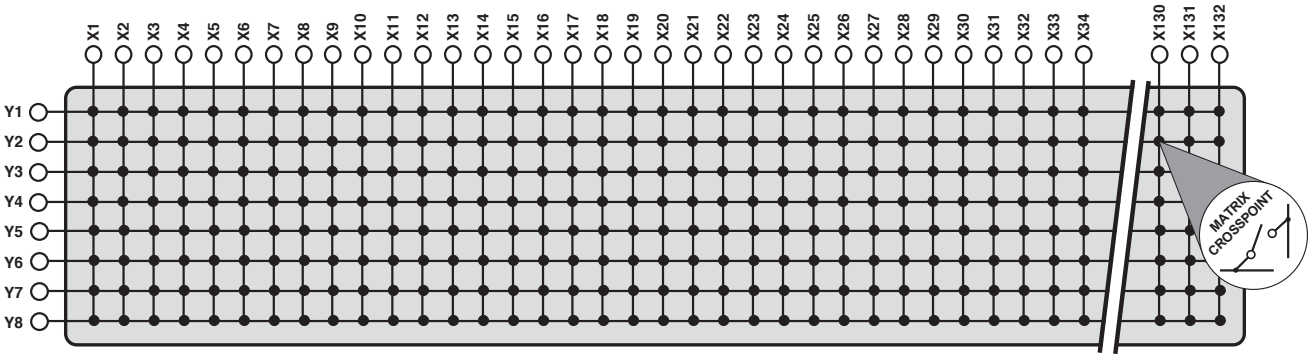
Typical applications include signal routing in Functional ATE and data acquisition systems. The matrix is constructed using high reliability 2A electro-mechanical relays, offering >10^8 operations (under low power loads) to give maximum switching confidence with long life and stable contact resistance.

Larger matrices may be constructed by Daisy Chaining the common signals from multiple PXI modules. For larger matrices the 3U 40-565A or the range of 60-550 LXI solutions can be considered.

Pickering Interfaces can supply cable assemblies for all its modules, please refer to the Connection Solutions catalog or contact sales office for further assistance.

Supported by eBIRST

This product is supported by eBIRST which tests the switching system using an external tool. eBIRST provides a graphical output of its tests which includes an image showing the location of any defective relay. For more information on eBIRST see **93-000D.pdf**



45-542 132x8 Matrix Switching Diagram

The 45-542 supports 8 concurrent switch paths for X to X and Y to X connections, however connections between different Y axis lines (e.g. Y1 to any of Y2 to Y8) are not permitted by the driver.

Switching Specification

Relay Type:	2 Amp Electro-mechanical Relay
Contact Type:	Palladium-Ruthenium, Gold plated, bifurcated
Max Switch Voltage:	170VDC/120VAC
Max Power:	60W/62.5VA
Max Switch Current:	1A
Max Continuous Carry Current:	1A
Initial On Path Resistance:	<1Ω
Off Path Resistance:	$>10^9\Omega$
Thermal Offset:	15µV (X to X connection)
Max Number of Simultaneously Closed Crosspoints:	132
Switch Operate Time:	6.5ms
Expected Life (Operations)	
Very low power load:	$>1x10^8$
Low power load:	$>1.5x10^7$ (0.1A 20VDC)
Medium power load:	$>5x10^6$ (1A 30VDC)
Full power load:	$>1x10^5$ (1A 60VDC)

Matrix Functionality

Permits 8 concurrent X to X paths or 8 concurrent Y to X paths. Any number of X connections can be connected to to a Y axis (e.g. X1, X2, X3 .....X132 connected to Y1). The driver prevents the connection of Y axis connections together (e.g. Y1 to Y2).

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to +55°C
Humidity:	Up to 90% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 90% non-condensing
Altitude:	15000m

Power Requirements

+3.3V	+5V	+12V	-12V
400mA	2.64A	0	0

Mechanical Characteristics

Single slot 6U PXI (CompactPCI card).
3D models for all versions in a variety of popular file formats are available on request.

PXI & CompactPCI Chassis

Pickering 6U PXI modules will operate in any 6U PXI chassis, in addition they will also operate (with 100% compatibillity) in any 6U CompactPCI chassis.

Connectors

PXI Bus: 32-bit P1/J1 backplane connector.

Front Panel Signal Connectors: 3-off 50-way male D-type

Product Order Codes

Very High Density 6U PXI Matrix Module

Single 132x8 Matrix, 1 Pole	**45-542-001**

Support Products

eBIRST Switching System Test Tool

This product is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information see **eBIRST**.

Product	Test Tool	Adapter
All Types	**93-005-001**	**Not Required**

Spare Relay Kits

Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

Product	Relay Kit
All Types	**91-100-001**

For further assistance, please contact your local Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 45-542 module please refer to the **90-005D** 50-way D-type Connector Accessories data sheet where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.

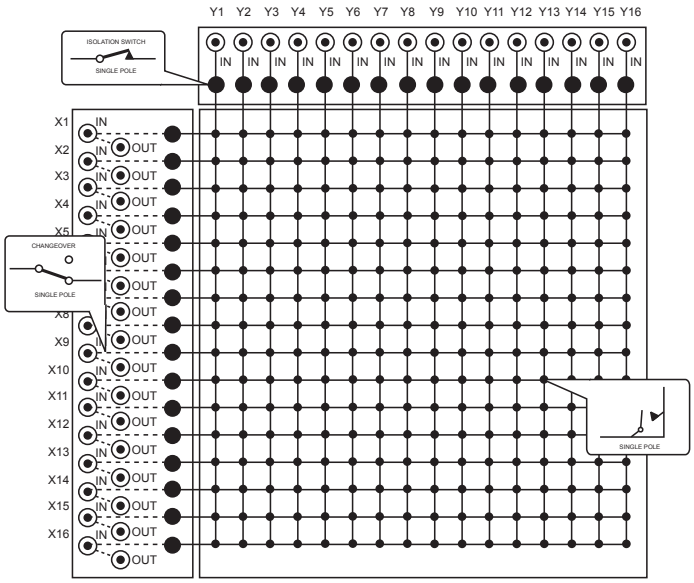
45-720A
Expandable 250MHz RF 16X16 Matrix

- 16x16 Coaxial Matrix
- 250MHz Bandwidth
- High Quality Ruthenium Reed Relays
- Choice of Front Panel Mounted Coaxial Connectors
- Available in 50Ω and 75Ω Versions
- Uses High Reliability Reed Relays
- VISA/IVI Drivers Supplied for Windows XP/Vista/7/8
- 3 Year Warranty

The 45-720A module is a 6U 16x16 RF Matrix suitable for switching frequencies to beyond 250MHz. The 45-720A module is available in 50Ω and 75Ω versions with a choice of coaxial connectors. It is intended for the easy construction of high performance bi-directional matrix switching systems.

Automatic Isolation Switches are located on all coaxial connectors (refer to drawing), these disconnect the matrix from the external test fixture. This maximises isolation and RF performance.

Typical applications are switching signals to high speed digitizers. These PXI matrix modules are constructed using high reliability Ruthenium Electro-Plated Reed Relays, offering >10^8 operations to give maximum switching confidence with long life and stable contact resistance.



Switching Diagram for the 45-720A 16x16 Matrix Module

Matrix Operation

The 45-720A is a true 16x16 high density matrix, any combination of cross-points may be selected. Only the signal is switched, all grounds are common. Special Versions With Loop-Through are available.

Easy Expansion with Automatic "Loop-Through"

Each Y input channel has a loop-through, all unused input channels will automatically be switched to the corresponding output channel, this allows for simple expansion (with little performance loss) and permits the user to place matched terminations on all output channels if required.

Programming

Pickering provide kernel, IVI and VISA (NI and Agilent) drivers which are compatible with 32/64-bit versions of Windows including XP, Vista, 7 and 8 operating systems. The VISA driver is also compatible with Real-Time Operating Systems such as LabVIEW RT. For other RTOS support contact Pickering.

These drivers may be used with a variety of programming environments and applications including:

- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Agilent** VEE
- **Mathworks** Matlab
- **Marvin** ATE Easy
- **MTQ Testsolutions** Tecap

Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries.

Larger matrices may be constructed by daisy-chaining the common signals from multiple PXI modules, for example, six modules form a 96x16 matrix (1536 cross-points) as shown below. Expansion is achieved via externally cabling between front panel coaxial connectors, i.e. Y_{out} to Y_{in}.

Please note that the operating bandwidth will reduce slightly as the number of modules is increased.

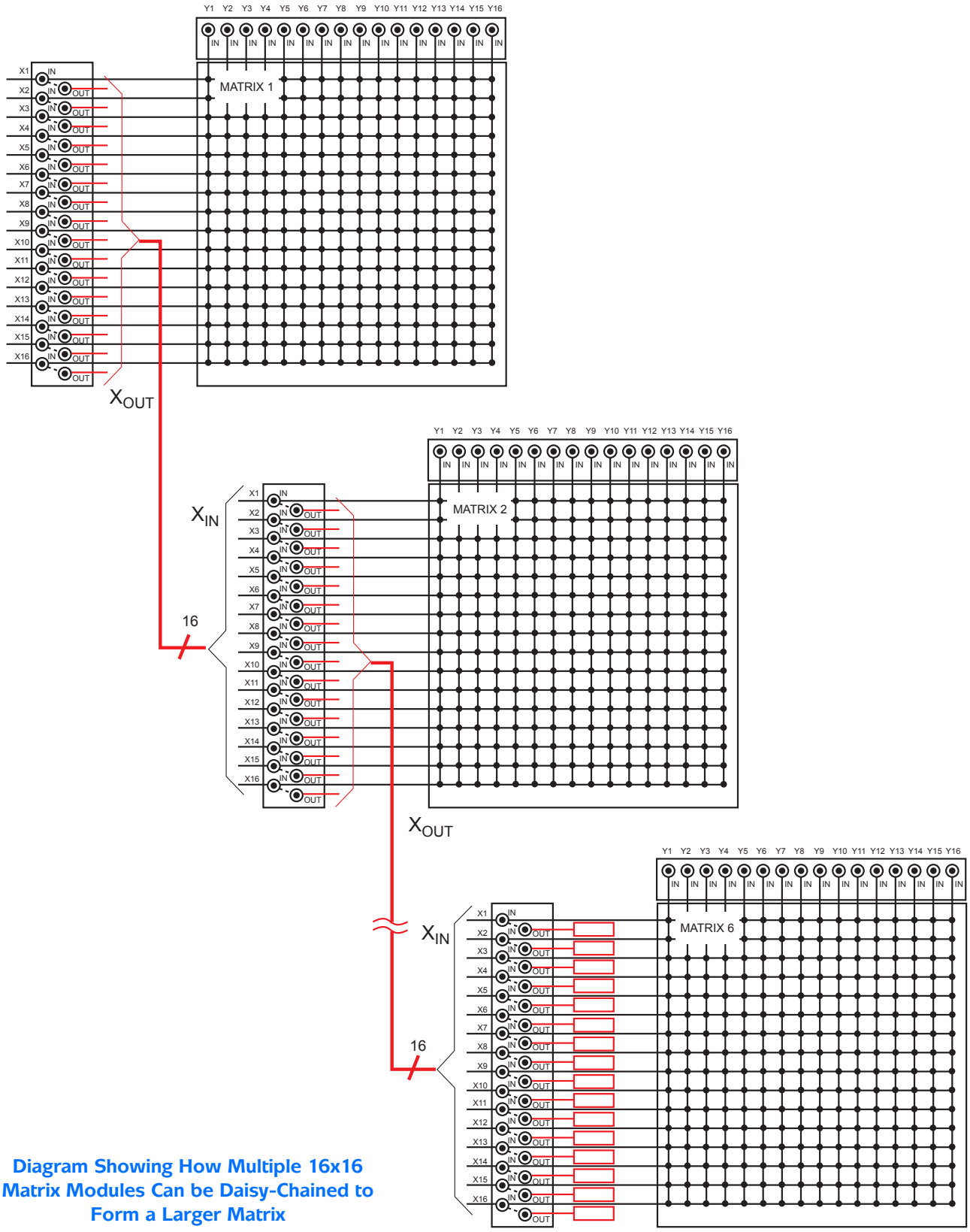
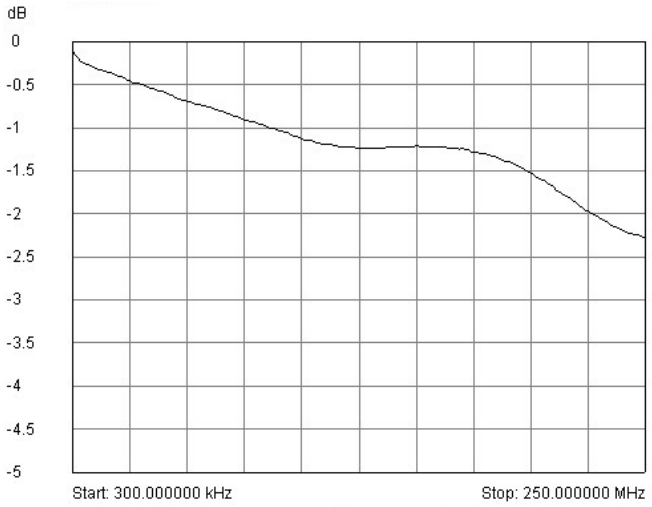
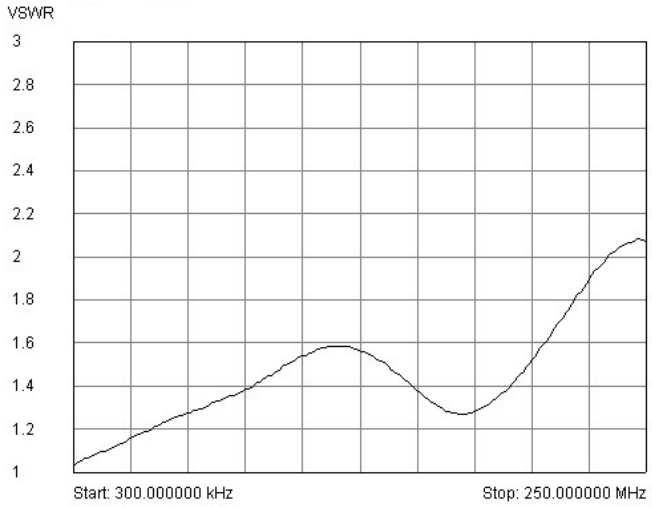


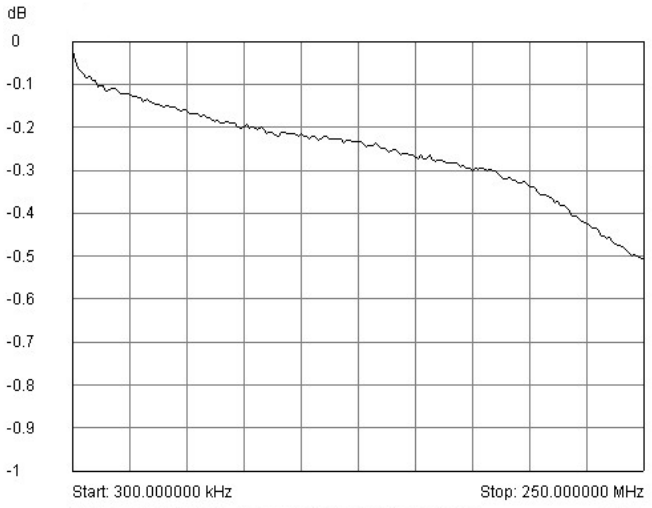
Diagram Showing How Multiple 16x16 Matrix Modules Can be Daisy-Chained to Form a Larger Matrix



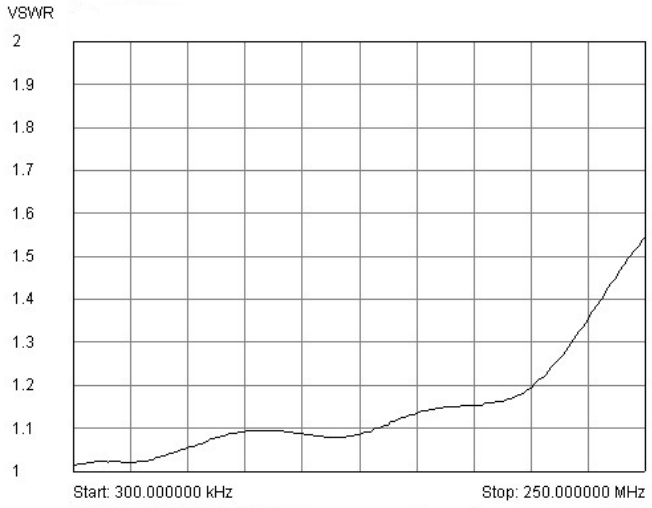
Typical Insertion Loss For One Module



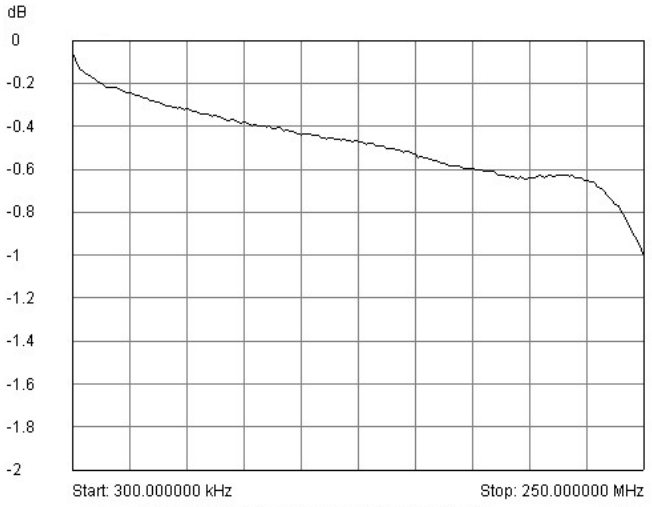
Typical VSWR For One Module



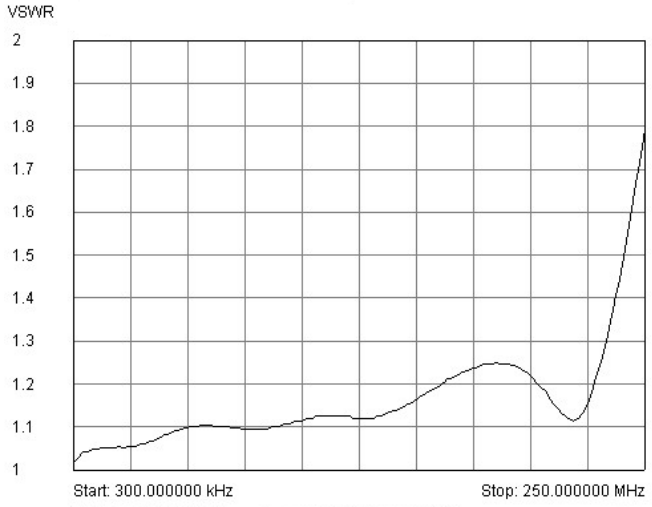
Typical Insertion Loss with Loop-Through For One Module



Typical VSWR with Loop-Through For One Module



Typical Insertion Loss for 2 Daisy-Chained Modules



Typical VSWR for 2 Daisy-Chained Modules

General Switching Specification

Switch Type:	Ruthenium Reed
Maximum Voltage:	100Vdc
Max Power: Max Switch Current: Max Carry Current:	10W 0.5A 0.5A
On Path Resistance: Off Path Resistance: Differential Thermal Offset:	<750mΩ $>10^8$Ω <30µV
Charateristic Impedance:	50Ω or 75Ω
Operate Time: Release Time:	<3.0ms <3.0ms
Expected Life Low power load: Full power load:	 $1x10^8$ operations $>5x10^6$ operations

RF Specification (50Ω)

Maximum Frequency:	250MHz
Typical Rise Time:	800ps †
Insertion Loss (<250MHz):	<3.5dB †
VSWR (<250MHz):	<1:1.9 †
Isolation (<250MHz):	>70dB
Crosstalk (<250MHz):	>60dB

Loop Through RF Specification (1 Pole)

Insertion Loss (<250MHz):	<0.5dB
VSWR (<100MHz):	<1:1.05

RF Specification (6 modules daisy-chained)

Maximum Frequency:	250MHz
Typical Rise Time:	800ps †
Insertion Loss (<250MHz):	<3.5dB †
VSWR (<250MHz):	<1:1.9 †
Isolation (<250MHz):	>70dB
Crosstalk (<250MHz):	>60dB

† Matrix RF Performance is entirely dependant upon the combination of cross-points currently selected, these figures are for one selected cross-point on any X or Y channel only, refer to graphs.

Power Requirements

+3.3V	+5V	+12V	-12V
0	1A (0.6A typ.)	0	0

Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives: Low-voltage safety EN61010-1:2001, EMC Immunity EN61000-6-1:2001, Emissions EN55011:1998.

Operating/Storage Conditions

Operating Conditions

Operating Temperature:	0°C to 55°C
Humidity:	Up to 95% non-condensing
Altitude:	5000m

Storage and Transport Conditions

Storage Temperature:	-20°C to +75°C
Humidity:	Up to 95% non-condensing
Altitude:	15000m

Width and Dimensions

Size: Single or Dual Slot 6U PXI/ CompactPCI module - dependant upon connector choice

Connectors

PXI bus: 32-bit P1/J1 backplane connector

Front panel: 50Ω SMB
or 50Ω Lemo 00 (2 slot module)
or 75Ω BT Type 43/SMZ (2 slot module)
or 75Ω 1.0/2.3
or 75Ω Mini SMB

PXI and CompactPCI Compliance

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus and Star Trigger are not implemented.
Uses 33MHz 32-bit backplane interface.

PXI & CompactPCI Chassis

Pickering 6U PXI modules will operate in any 6U PXI chassis, in addition they will also operate (with 100% compatibility) in any CompactPCI chassis.

Product Order Codes

Expandable 16x16 RF Matrix SMB, 50Ω	**45-720A-511**
Expandable 16x16 RF Matrix Lemo 00, 50Ω (2 slot module)	**45-720A-541**
Expandable 16x16 RF Matrix 75Ω BT Type 43/SMZ (2 slot module)	**45-720A-711**
Expandable 16x16 RF Matrix 75Ω 1.0/2.3	**45-720A-741**
Expandable 16x16 RF Matrix 75Ω Mini SMB	**45-720A-751**

Mating Connectors & Cabling

Examples of connectors and cabling for the 45-720A are:

40-977-511-1M Cable, 50Ω SMB, Plug to Plug, 1 Meter Length.

40-977-711-1M Cable, 75Ω SMZ/Type 43, Plug to Plug, 1 Meter Length.

40-977-751-1M Cable, 75Ω Mini SMB, Plug to Plug, 1 Meter Length.

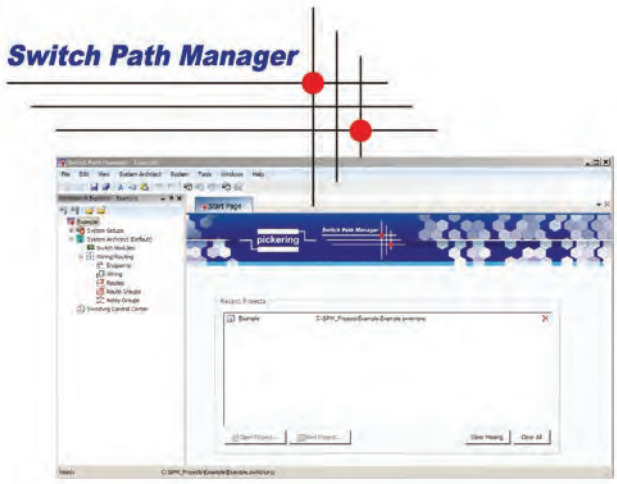
Please refer to the Pickering Interfaces "**Connection Solutions**" catalog for the full list of connector/cabling options, including drawings, photos and specifications. This is available in either print or as a download. Alternatively our web site has dynamically linked connector/cabling options, including pricing, for all Pickering PXI modules.

Latest Details

Please refer to our Web Site for Latest Product Details.
www.pickeringtest.com

90-900
Switch Path Manager™ – Signal Routing Software

- Manages Complex Switching Systems
- Reduces Switching Software Development Effort
- Provides Automated or Pre-defined Signal Routing
- Provides Static or Dynamic Routing
- Manual Control Capability
- Supports PXI, LXI, PCI and GPIB Systems
- Modules Pack for all Pickering Switch Modules, Third-Party Switch Modules on Request
- APIs available for C, C++, .NET, LabWindows™/CVI and LabVIEW®
- Free 90-Day Evaluation License
- Free SPM Software Upgrades, Free SPM Lifetime Support, No Software Subscription Required

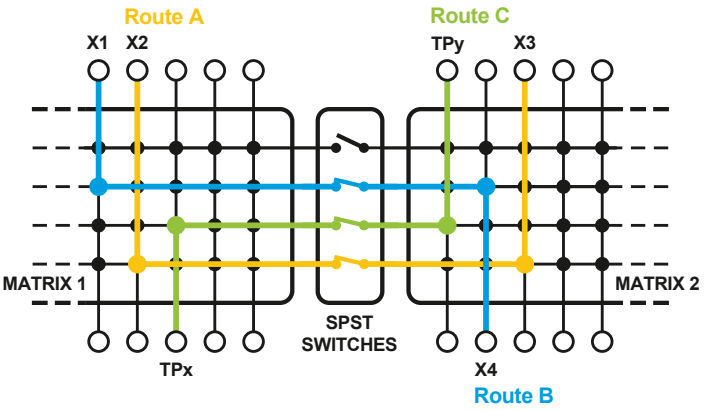


Signal Routing Made Simple

Switch Path Manager, simplifies the routing of signals through switching systems and speeds up the development of switching system software. Switch Path Manager supports Pickering Interfaces switching products and the interconnection between these products. Third-party products can be supported on request.

Once a switching system model has been created, signal routing can be performed by simply defining the endpoints that are required to be connected together. The ability to automate signal routing results in simple and effective switching system management, safe and fast. The short circuit detection feature avoids unwanted shorts between routes.

The software package contains the Modules Pack (the collection of switching module libraries), the Switching Control Center, the Application Programmable Interfaces, the standalone Soft Front Panel, and a License Manager.



The software package can be used in Online and Offline Mode. In Offline Mode no physical hardware needs to be available.

Modules Pack

The Modules Pack contains the libraries for all Pickering Interfaces switching hardware.

Libraries for third-party switching products are available on request.

System Architect

The System Architect provides project handling, system configuration and interactive control for all the supported switch modules using a text based interface.

The system configuration defines the addressing and the interconnection of the switching hardware, the system endpoint definitions, the pre-defined signal routes and route groups, as well as relay groups for direct relay channel control.

Product Order Codes

Switch Path Manager Base License	**90-900-001**

Licensing

Switch Path Manager is license key protected. PC related keys can be obtained from Pickering Interfaces.

Switch Path Manager comes with a free 90-day evaluation license, after this evaluation period a license will need to be purchased to continue to use the software.

Inquiries

Inquiries should be sent to: desales@pickeringtest.com

Pickering Built-In Relay Self Test

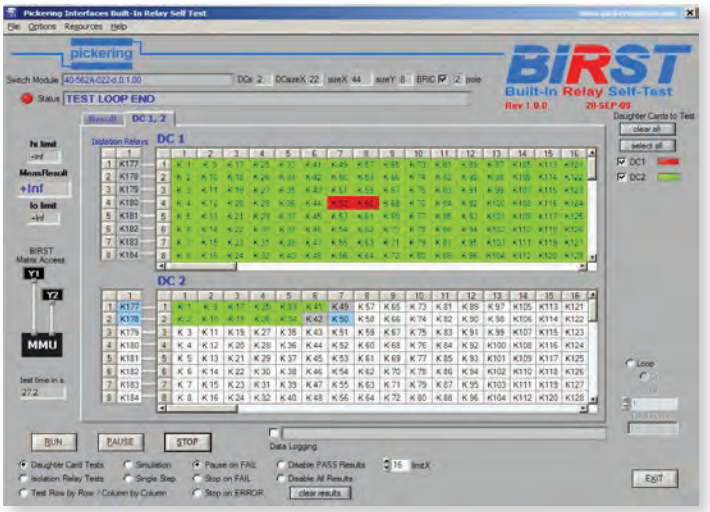
BIRST
Built-In Relay Self-Test

Verification and diagnosis of complex switching operation in a test system has always been an issue, especially in the PXI platform. For this reason, Pickering Interfaces has introduced built in self test to selected matrix models in the PXI switching range. This feature is called BIRST™, or Built In Relay Self Test.

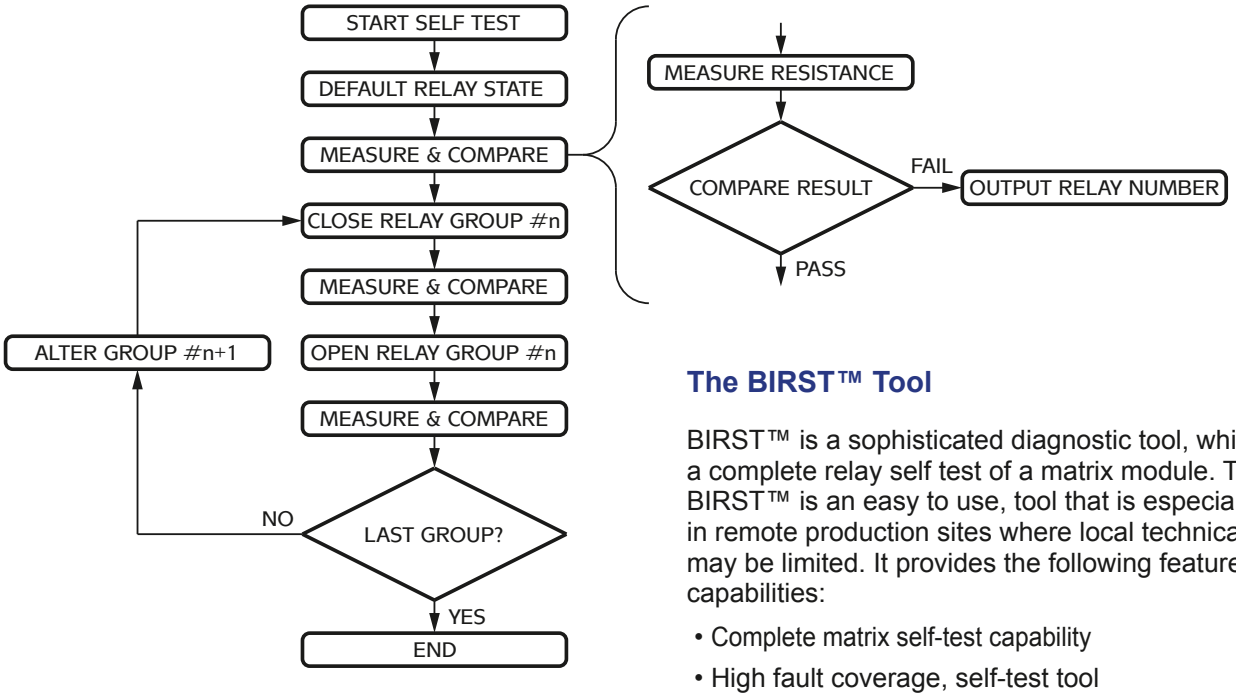
The BIRST tool allows the user to very easily check system switching operation on command. BIRST will identify any relay failures in the switch module and is capable of detecting relays with deteriorating contacts which may indicate they are in the process of failing.

BIRST is a far more effective method for managing the life of switching systems than older measures such as relay operation counting as they do not take account of the switching load conditions – factors that have an impact of three or four orders of magnitude on relay life.

To conduct a test the user simply disconnects the switching module from the UUT and runs the supplied application program. No supporting test equipment is needed; the test simply runs and identifies the position of any defective or suspect relays within the module.



Test Sequencer Front Panel for BIRST™. This allows any combination of tests to be run in either single or multiple sequences. All test data is displayed in the results window and can be written to a data file.



BIRST™ Flow Chart

The BIRST™ Tool

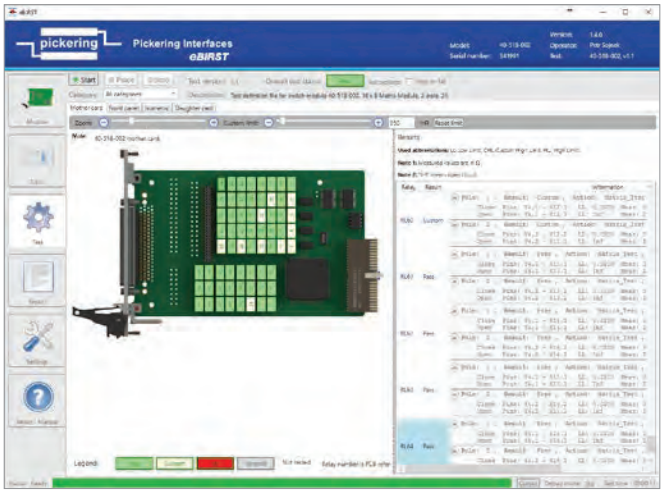
BIRST™ is a sophisticated diagnostic tool, which allows a complete relay self test of a matrix module. The BIRST™ is an easy to use, tool that is especially useful in remote production sites where local technical support may be limited. It provides the following features and capabilities:

- Complete matrix self-test capability
- High fault coverage, self-test tool
- Tests for all relay fault types (bad open or bad close)
- Identifies faults to individual component relay level
- Test sequencer allows detailed control of testing
- Test results shown on screen or sent to log file
- Runs single or repeat tests for maximum confidence

eBIRST Switching System Test Tool

- Test Operation of Pickering Interfaces Switching Products
- Finds Faulty and Failing Relays
- Displays Position of Relays to be Replaced
- Simple USB Control From Any Windows® PC
- Uses USB Power, No External Power Source Required
- Simply Connect, Identify Test Target & Run the Software
- Test PXI, LXI or PCI Controlled Products
- Reduces Cost of Ownership and Switch System Down Time

eBIRST is a range of USB controlled test tools capable of performing automated path resistance tests on Pickering Interfaces switching solutions. Each tool simply interfaces with the switching system connector so a test can be run using the supplied Windows based software.
The tool is offered in a variety of versions for testing different switching products, each version dedicated to one connector style and capable of testing any relay with a consistent path resistance at 30mA (any reed relay, solid state relay or typical EMR with 2A or less current rating). There are three core tools and a set of adapter interfaces to cover each connector used in Pickering Interfaces switching system range.



Benefits of eBIRST

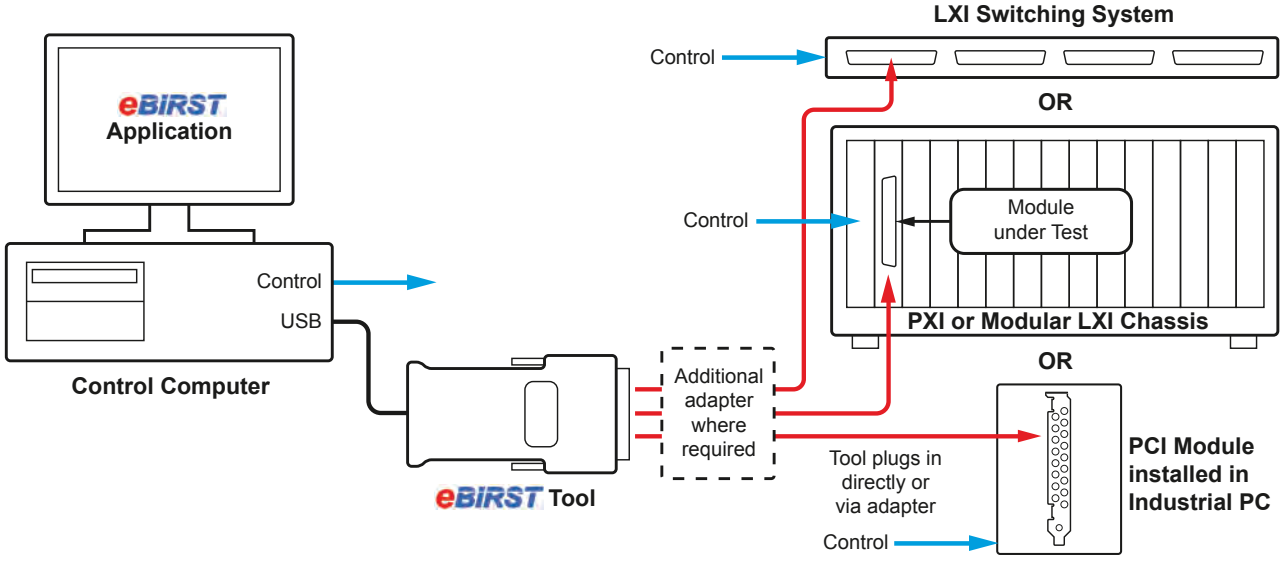
The eBIRST range drives down the cost of ownership of switching systems:

- Easy local repair of switching systems
- Right first time repairs reduce the time and stress introduced by incorrect fault diagnosis
- Minimise system down time, eliminate the expense and time in returning damaged systems
- Reduces service cost
- Ease the time and cost of regular calibration intervals

Testing a Switching System

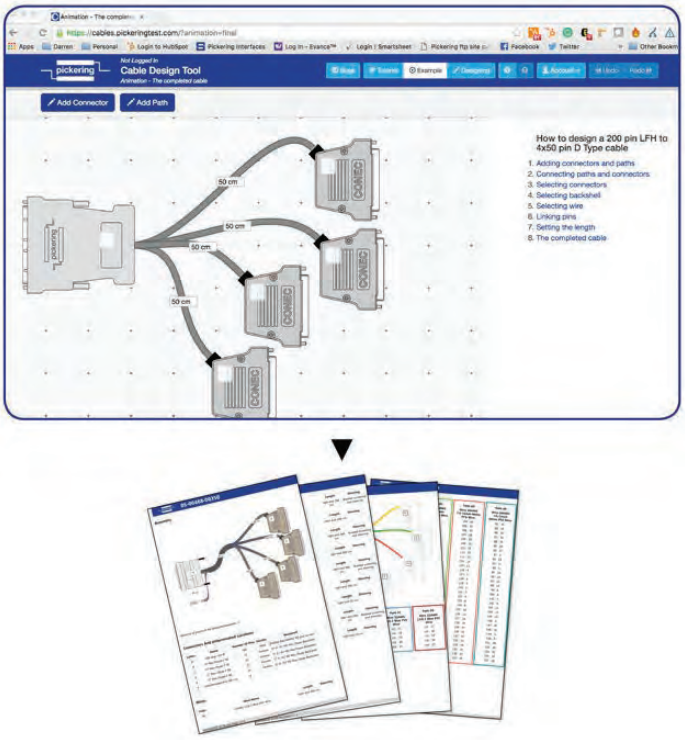
To test a switching system, most products require just a single test tool. Support for some connectors requires the use of a PCB based adapter or a cable adapter and a termination fixture. The supplied application program allows the tool to measure the switching system path resistance and identify relays which fail to open (are welded), fail to close or have high path resistance.

The eBIRST software will automatically choose the correct tool settings for measuring the path resistance to match the requirements of the relays in the switching system under test. Once a test is completed the application software highlights relay failures and issues, identifying the physical location of the defective relay on a graphical representation of the switch system layout. Once identified, the switching product can be repaired locally and the test re-run to ensure the corrective action has been successful.



Custom Cable Design Tool

- **Graphical design of customized cable assemblies**
- **Built-in library of standard cable sets can be used as the basis for customization, or cables can be defined from scratch**
- **The ability to store cable assemblies in the Cloud and develop them over time**
- **Each cable design has a PDF documentation file detailing all the specifications**
- **Allows detailed design including; connector types, wire type, pin definitions, pin & cable labelling, cable bundling, length selection, sleeving, comments, etc.**
- **Runs on modern browsers such as Chrome, FireFox or Edge**
- **Fully supported on major tablet operating systems**

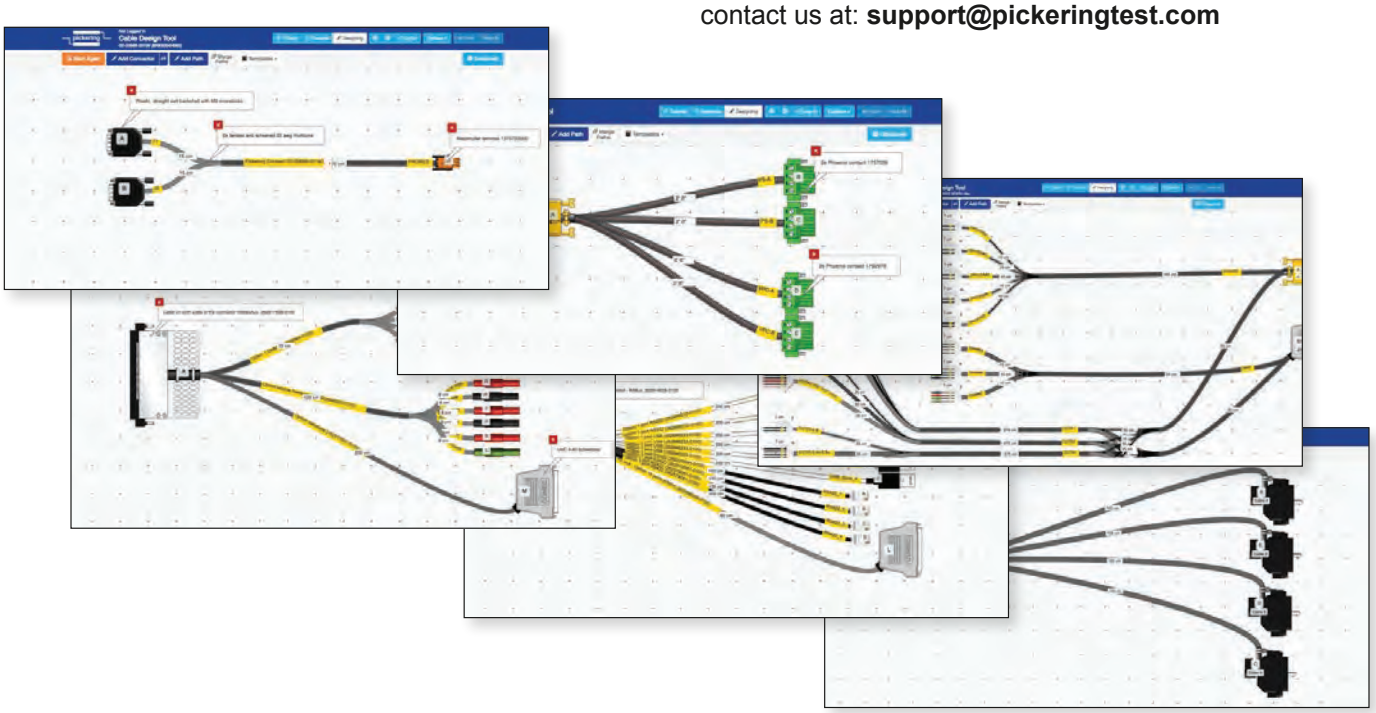


Our Custom Cable Design Tool is a web based application that allows you to define a cable assembly to exactly meet you requirements. This greatly simplifies the integration of our PXI, PCI and LXI products into your test system. The tool can be accessed from: **www.pickeringtest.com/cdt**

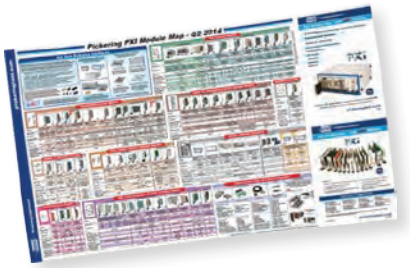
We are continually updating the tool to better accommodate your requirements and to include new features. Your data is not trapped, complete details of designs are always available to you at any time via the documentation or spreadsheet file.

If you get stuck creating a cable or the application doesn't allow you to draw the desired feature, just submit the semi-completed assembly and one of our experienced engineers will provide guidance through the complete process. Once the cable design is finished, we will provide pricing typically within one working day. Ordering small quantities is slightly more expensive per piece, but the pricing becomes the same as standard cables when typically fifteen or more pieces are ordered.

If you have questions about the cable design tool or need more information about our custom cables, please contact us at: **support@pickeringtest.com**

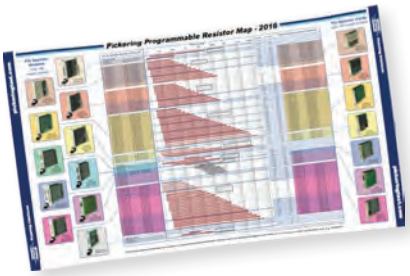


Product Reference Maps From Pickering Interfaces



PXI Module Map - a simple fold-out selection guide to all our 1000+ PXI switching, simulation and instrument modules.

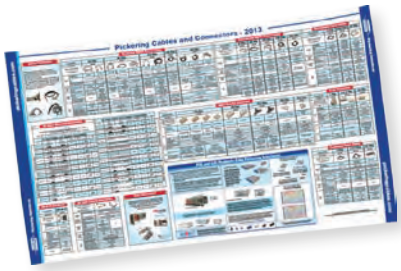
PCI Card Map - a simple fold-out selection guide to our range of over 100 PCI Cards.



Programmable Resistor Map - outlines our ranges or PXI and PCI programmable resistors and their basic specifications.

LXI Solutions Map - a simple fold-out selection guide to all our LXI switching systems including LXI modular switching solutions.

RF & Microwave Map - a reference guide to over 300 PXI, LXI & PCI RF and microwave switching solutions with outline specifications.



Cables & Connectors Map - outlines the cable and connector options available to support all our switching, simulation and instrument products.

Reed Relay Map - a reference guide to the ranges of instrumentation grade reed relays manufactured by Pickering Electronics.

The product reference maps and all other literature can be ordered from our sales offices or downloaded from www.pickeringtest.com/resources/literature

pickering

Pickering Interfaces

Pickering operates globally with direct operations in the US, UK, Germany, Sweden, France, Czech Republic and China—with additional representation in countries throughout the Americas, Europe and Asia.

Direct Sales & Support Offices

Pickering Interfaces Inc., USA
Tel: +1 781-897-1710 | e-mail: ussales@pickeringtest.com

Pickering Interfaces Ltd., UK
Tel: +44 (0)1255-687900 | e-mail: sales@pickeringtest.com

Pickering Interfaces Sarl, France
Tel: +33 1 60 53 55 50 | e-mail: frsales@pickeringtest.com

Pickering Interfaces GmbH, Germany
Tel: +49 89 125 953 160 | e-mail: desales@pickeringtest.com

Pickering Interfaces AB, Sweden
Tel: +46 340-69 06 69 | e-mail: ndsales@pickeringtest.com

Pickering Interfaces s.r.o., Czech Republic
Tel: +420 558 987 613 | e-mail: desales@pickeringtest.com

Pickering Interfaces, China
Tel: +86 10 57025883 | e-mail: chinasales@pickeringtest.com

Local Sales Agents in **Australia, Belgium, Canada, China, India, Indonesia, Israel, Italy, Japan, Malaysia, Netherlands, New Zealand, Philippines, Singapore, South Korea, Spain, Taiwan, Thailand, Vietnam and throughout the USA.**

Oct 2016 - Lit–003 Issue 2

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