

# PXI/PXIe Very High Density Versatile Multiplexer 4x-612B

## • Versatile Multiplexer - For Now & The Future

- Available as PXI or PXIe Modules
- 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 2 A Hot or Cold Switching
- Switch up to 300 VDC/250 VAC & up to 60 W Max Power
- Isolation Switches Reduce Capacitive Loading in Large Systems
- VISA, IVI & Kernel Drivers Supplied for Windows
- PXI Version Supported by PXI or LXI Chassis
- Supported by *eBIRST*™
- 3 Year Warranty

The 40-612B (PXI) and 42-612B (PXIe) versatile multiplexers modules feature a wide range of software selectable switching configurations. They are 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 4x-612B uses high quality electro-mechanical relays, connections are via a front panel 160-pin DIN 41612 connector.

## MUX Configurations

The module can be software configured as one of a large number of different multiplexers. Relays allow the banks to be set as 1 or 2-pole and inter-bank switching allows a maximum of 128 channels (refer to schematic diagram overleaf). Typical configurations are:

- 8 Banks - 16-channel 1-pole or 8-channel 2-pole
- 4 Banks - 32-channel 1-pole or 16-channel 2-pole
- 2 Banks - 64-channel 1-pole or 32-channel 2-pole
- 1 Bank - 128-channel 1-pole or 64-channel 2-pole

The versatility of the architecture allows all banks to be inter-linked and common connections used as extra inputs.



Versatile Multiplexer Modules With the Same Architecture

Model No.	Max Voltage	Max Current	Operate Time	Relay Type
4x-612B	300 VDC/ 250 VAC	2 A	3 ms	Electro-mechanical
40-681A	±60 V	350 mA	200 µs	Solid State
40-682A	±40 V	250 mA	80 µs	
40-683A	±100 V	125 mA	500 µs	

The 4x-612B can be operated as a conventional multiplexer with break-before-make action when a new channel is selected. Alternatively, product variants can be supplied that allow multiple channels to be simultaneously selected.

Isolation switching connects only the currently active multiplexer bank to the analog common, keeping capacitive loading and leakage currents in large multiplexer systems to a minimum. The multiplexers may be expanded by daisy chaining the common signals from multiple modules.

## Supported by *eBIRST*

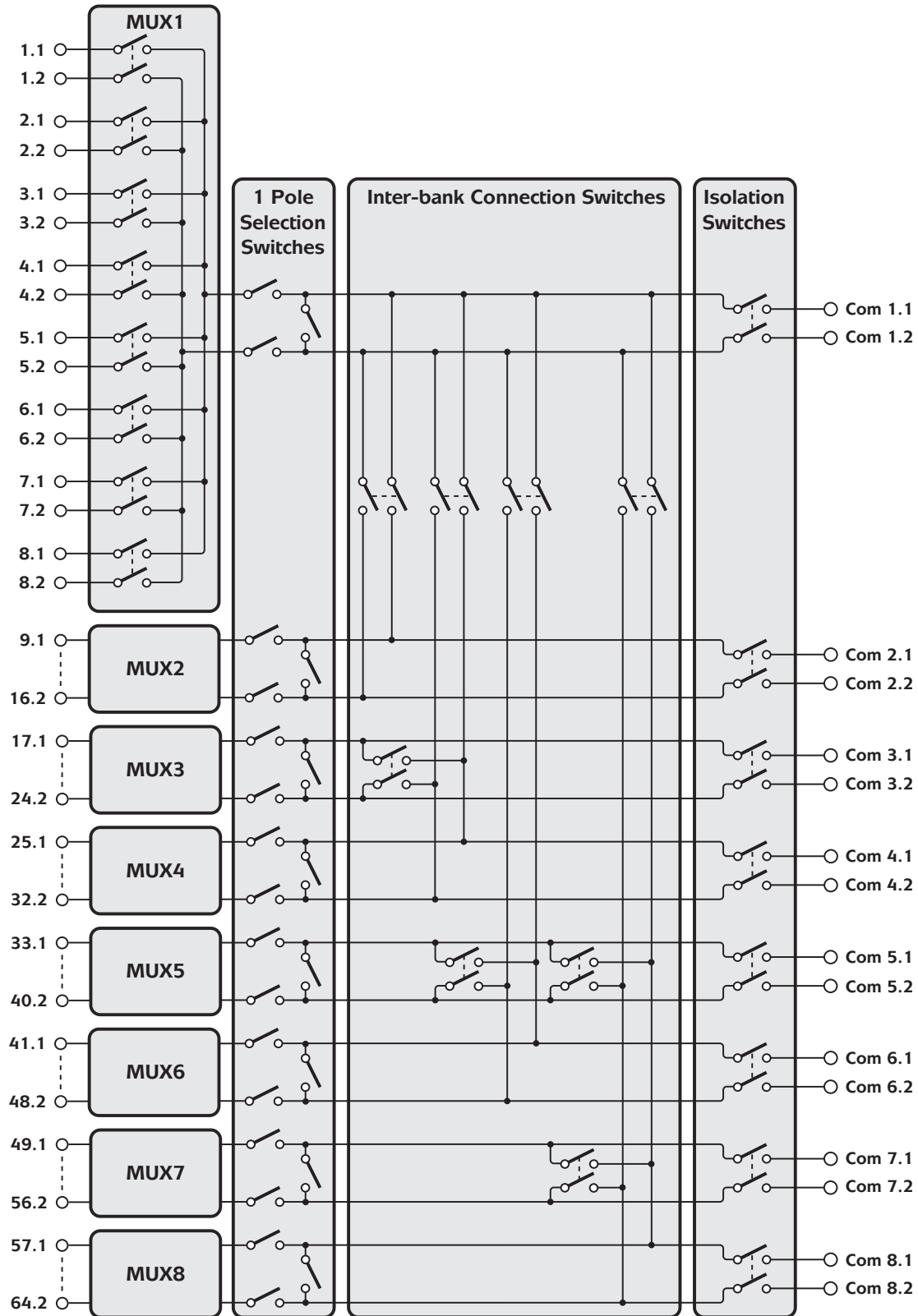
*eBIRST* test tools simplify fault-finding by quickly testing the system and graphically identifying the faulty relay. For more information go to: [pickeringtest.com/ebirst](http://pickeringtest.com/ebirst)

## Updated Product Information

This product has been introduced as a “form & fit” update to the 40-612A, the changes are to provide PXIe options. Otherwise, the electrical performance is very similar, the pinout and software are identical.

Issue 1.0 October 2022

# PXI/PXIe Very High Density Versatile Multiplexer 4x-612B



Switching Diagram for the 4x-612B-002 Very High Density 8 Bank, 8 Channel, 2 Pole Versatile Multiplexer

## Relay Type

The 4x-612B is fitted with electro-mechanical 2-pole relays, palladium-ruthenium gold covered contacts. A spare relay is built onto the circuit board to allow easy maintenance with minimum downtime.

## Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	300 VDC/250 VAC*
Max Power:	62.5 VA, 60 W from 30 V to 220 VDC, 30 W to 300 VDC (resistive load)
Max Switch Current:	2 A
Max Continuous Carry Current:	2 A
Max Pulsed Carry Current	
Example (for a single switch path):	6 A for 100 ms (up to 10 % duty cycle)
Initial Path Resistance - On:	500 mΩ (max) 300 mΩ (typical) †
Path Resistance - Off:	>10 <sup>9</sup> Ω
Minimum Voltage:	100 μV
Thermal Offset:	5 μV (typical) †
Operate Time:	3 ms (typical)
Expected Life (operations)	
Very low power signal load:	>1x10 <sup>8</sup>
Low power load (2 W):	>1.5x10 <sup>7</sup> (0.1 A 20 VDC)
Medium power load (30 W):	>5x10 <sup>6</sup> (1 A 30 VDC)
Full power load (60 W):	>1x10 <sup>5</sup> (2 A 30 VDC) >1x10 <sup>5</sup> (0.1 A 300 VDC)

\* For full voltage rating, signal sources to be switched must be fully isolated from mains supply and safety earth.

† Path resistance & thermal offset are dependent upon the signal route selected.

## Operating/Storage Conditions

Operating Temperature:	0 °C to +55 °C
Humidity:	Up to 90 % non-condensing
Altitude:	5000 m
Storage Temperature:	-20 °C to +75 °C
Humidity:	Up to 90 % non-condensing
Altitude:	15000 m

## RF Specification

Bandwidth (-3 dB):	8 Bank, 8 Channel, 2-Pole: 35 MHz (typical) 1 Bank, 64 Channel, 2-Pole: 20 MHz (typical)
Bandwidth (1.5:1 VSWR):	8 Bank, 8 Channel, 2-Pole: 20 MHz (typical) 1 Bank, 64 Channel, 2-Pole: 7 MHz (typical)
Isolation (typical):	10 kHz: 65 dB 100 kHz: 60 dB 1 MHz: 50 dB 10 MHz: 30 dB
Crosstalk (typical):	10 kHz: -65 dB 100 kHz: -60 dB 1 MHz: -40 dB 10 MHz: -20 dB

## Power Requirements - 40-612B

+3.3 V	+5 V	+12 V	-12 V
150 mA (typical)	470 mA (typical)	0	0

## Power Requirements - 42-612B

+3.3 V	+12 V
380 mA (typical)	230 mA (typical)

## Mechanical Characteristics

40-612B - Single slot 3U PXI (CompactPCI card).

42-612B - Single slot 3U PXIe, compatible with PXIe hybrid slot.

Module weight: 235 g

3D models for all versions in a variety of popular file formats are available on request.

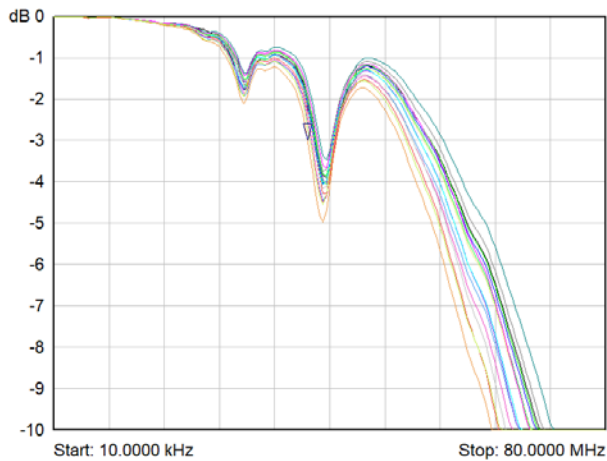
## Connectors

40-612B - PXI bus via 32-bit P1/J1 backplane connector.

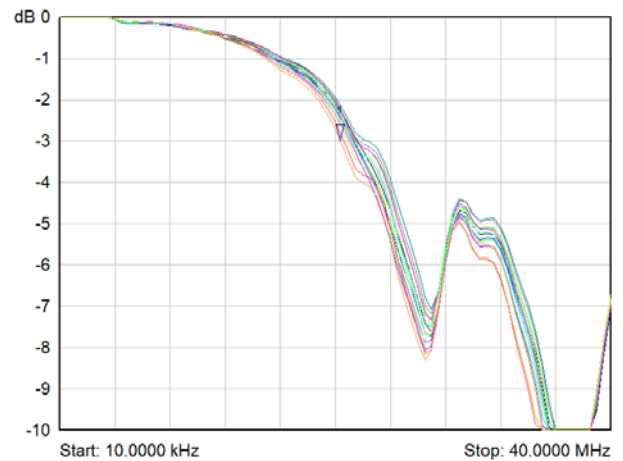
42-612B - PXIe bus via XJ3 and XJ4 backplane connectors.

Signals via front panel 160-pin male DIN 41612 connector, for pin outs please refer to the operating manual.

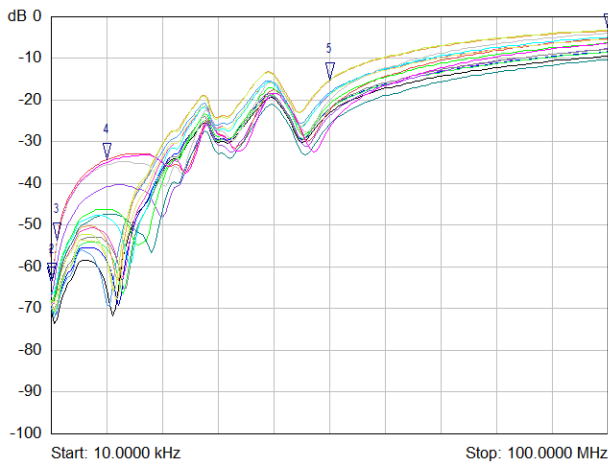
We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.



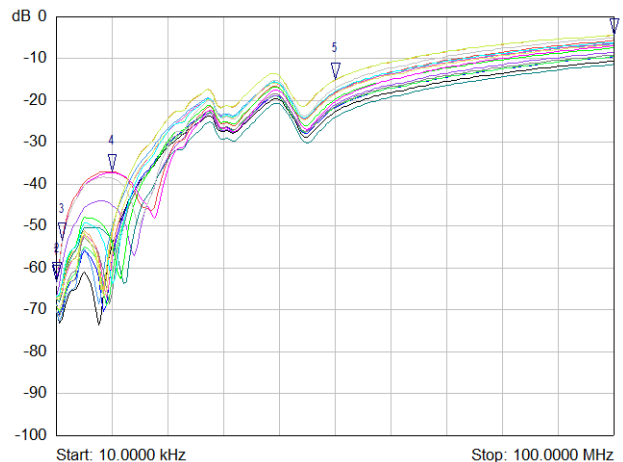
**4x-612B-002 Typical Insertion Loss to 80 MHz  
(8-bank, 8-channel, 2-pole configuration)**



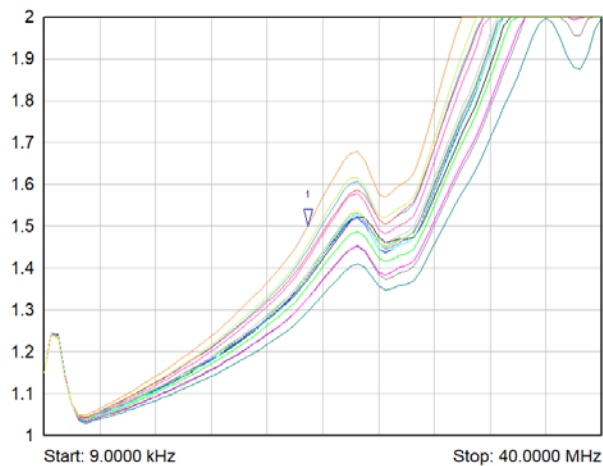
**4x-612B-002 Typical Insertion Loss to 40 MHz  
(1-bank, 64-channel, 2-pole configuration)**



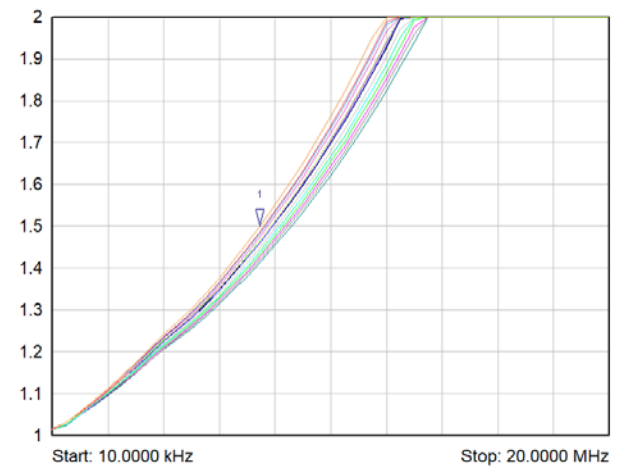
**4x-612B-002 Typical Isolation to 100 MHz  
(8-bank, 8-channel, 2-pole configuration)**



**4x-612B-002 Typical Isolation to 100 MHz  
(1-bank, 64-channel, 2-pole configuration)**



**4x-612B-002 Typical VSWR to 40 MHz  
(8-bank, 8-channel, 2-pole configuration)**



**4x-612B-002 Typical VSWR to 20 MHz  
(1-bank, 64-channel, 2-pole configuration)**

## Product Order Codes - Versatile Multiplexer

Channel Selection	Model Variant	Order Code
Single	PXI 8-Bank, 8-Channel, 2-Pole	40-612B-002
Single	PXle 8-Bank, 8-Channel, 2-Pole	42-612B-002

**Note:** The above modules are available in multiple channel selection mode by adding the “-M” suffix to the part number.

## Product Customization

Pickering 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 relay types
- Mixture of 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.

## PXI & CompactPCI Compliance - 40-612B

The module is compliant with the PXI Specification 2.2. Local Bus, Trigger Bus & Star Trigger are not implemented.

Uses a 33 MHz 32-bit backplane interface.

## PXle Compliance - 42-612B

The module is compliant with the PXle Specification 1.0. Local Bus, Trigger Bus & Star Trigger are not implemented.

## Safety & CE Compliance

All modules are fully CE compliant and meet applicable EU directives:

Low-voltage safety EN61010-1:2010,  
EMC Immunity EN61326-1:2013,  
Emissions EN55011:2009+A1:2010.

## 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. Note; for the single channel selection mode version of this module (those without the -MUX suffix) eBIRST will, when applicable, confirm if a failure is present but is unable to localise it to a specific component. For more information go to: [pickeringtest.com/ebirst](http://pickeringtest.com/ebirst)

Product	Test Tool	Adaptor
4x-612B	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
4x-612B	91-100-001

For further assistance please contact our sales office.

### Mating Connectors & Cabling

For connection accessories for the 4x-612B modules please refer to the [90-001D](#) 160-pin DIN 41612 Connector data sheet where documentation and a list of accessories can be found.

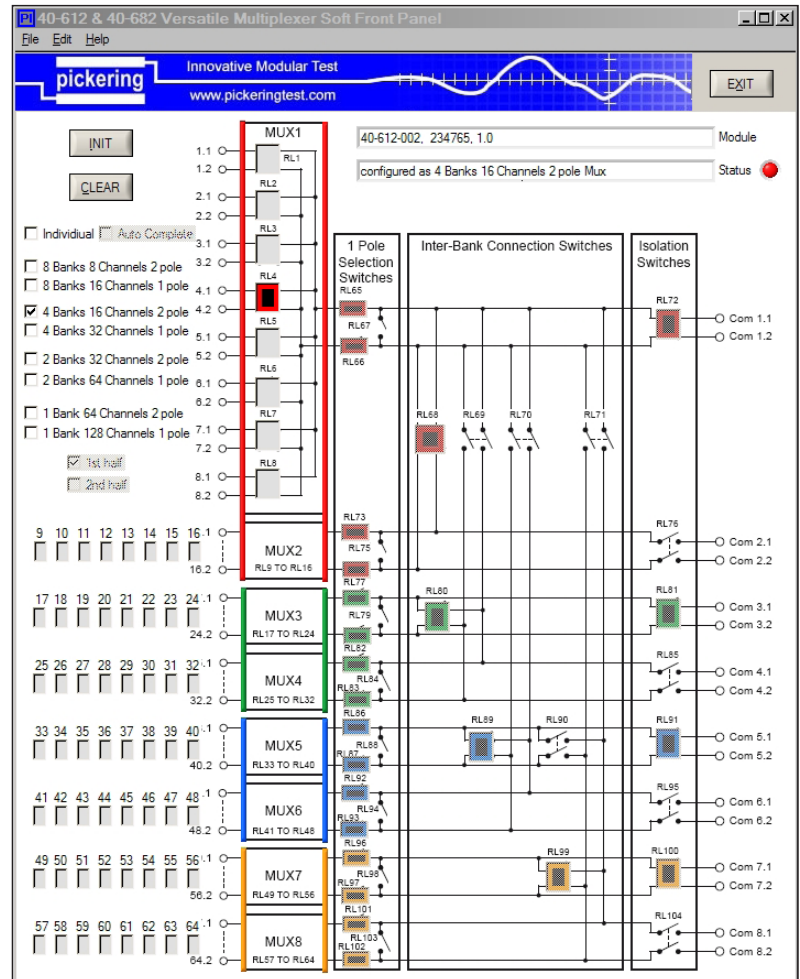


**42-612B-002 Very High Density Versatile Multiplexer Module in PXle Format**

# PXI/PXIe Very High Density Versatile Multiplexer 4x-612B

## Soft Front Panel For The Versatile MUX

The Versatile Multiplexer Soft Front Panel for the 4x-612B, 40-681A, 40-682A and 40-683A allows easy setting of various multiplexer configurations from 8-bank 8-channels 2-pole, up to 1-bank 128-channels 1-pole 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 4x-612B, 40-681A, 40-682A and 40-683A Very High Density Versatile Multiplexers



## Chassis Compatibility

The PXI versions of this module are compatible with the following chassis types:

- All chassis conforming to the 3U PXI and 3U Compact PCI (cPCI) specification
- Legacy and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis
- Pickering Interfaces LXI or LXI/USB Modular Chassis

The PXIe versions of this module are compatible with the following chassis types:

- All chassis conforming to the 3U PXIe specification
- PXIe and Hybrid Peripheral slots in a 3U PXI Express (PXIe) chassis

## Chassis Selection Guide

### PXI and PXIe (with PXIe and/or Hybrid slots) Chassis from any Vendor:

- Mix our 1000+ PXI/PXIe switching & simulation modules with any vendor's PXI/PXIe instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization



### Pickering LXI or LXI/USB Modular Chassis

#### Only accept our PXI Switching & Simulation Modules:

- Choose from 1000+ Pickering PXI Modules
- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation
- Independence from Windows operating system



## Connectivity Solutions

We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with **1200+** products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed to mechanically and electrically mate to our modules. These accessories are detailed in Connector Accessories data sheets, where a complete list and documentation can be found for each accessory.



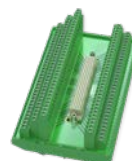
Connectors  
& Backshells



Multi-way  
Cable Assemblies



RF Cable  
Assemblies



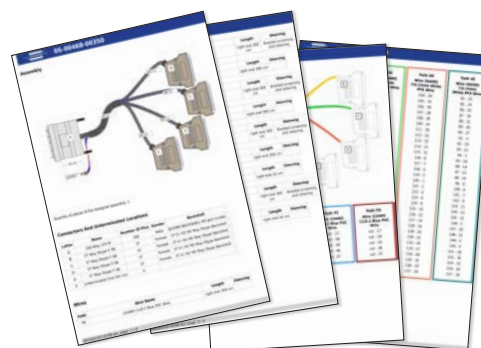
Breakouts



Connector  
Blocks

We also offer customized cabling and have a free online **Cable Design Tool** that can be used to create custom cable solutions for many applications.

- Fully supported on modern browsers and tablet operating systems.
- Built-in tutorials and videos allow you to get quickly up to speed.
- Store cable assemblies in the Cloud and develop over time.
- Each cable design has a downloadable PDF documentation file detailing all specifications



Start designing your custom cabling, go to [pickeringtest.com/cdt](http://pickeringtest.com/cdt)

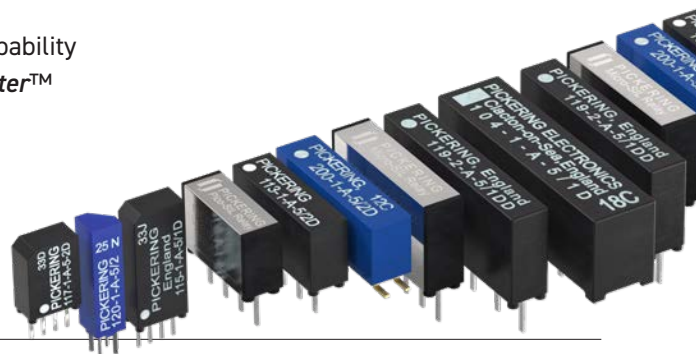
## Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for PXI/LXI based test systems. Our modules are fully supported by Virginia Panel and MacPanel.

## Pickering Reed Relays

We are the only switch provider with in-house reed relay manufacturing capability via our Relay Division. These instrument grade reed relays feature **SoftCenter™** technology, ensuring long service life and repeatable contact performance.

To learn more go to [pickeringrelay.com](http://pickeringrelay.com)





## Programming

Pickering provide kernel, IVI and VISA (NI & Keysight) drivers which are compatible with all Microsoft supported versions of Windows and popular older versions.

For more information go to [pickeringtest.com/os](http://pickeringtest.com/os)

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:

- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C++)
- **Keysight VEE** and **OpenTAP**
- **Mathworks MATLAB, Simulink**
- **Marvin ATEasy**
- **MTQ Testsolutions Tecap Test & Measurement Suite**
- **Python**

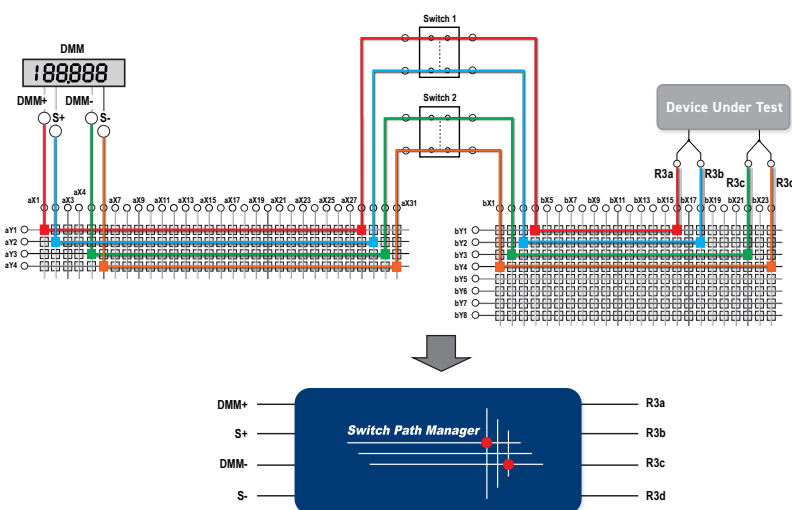
Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help you develop test routines with ease.

To learn more about software drivers and development environments go to [pickeringtest.com/software](http://pickeringtest.com/software)

## Signal Routing Software

Our signal routing software, Switch Path Manager, automatically selects and energizes switch paths through Pickering switching systems. Signal routing is performed by simply defining test system endpoints to be connected together, greatly accelerating Test System software development.

To learn more go to [pickeringtest.com/spm](http://pickeringtest.com/spm)



## Diagnostic Relay Test Tools

**eBIRST** Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

To learn more go to [pickeringtest.com/ebirst](http://pickeringtest.com/ebirst)



## Three Year Warranty & Guaranteed Long-Term Support

All standard products manufactured by Pickering Interfaces are warranted against defective materials and workmanship for three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available with various levels for your requirements. Although we offer a 3-year warranty as standard, we also include guaranteed long-term support—with a history of supporting our products for typically 15-20 years.

To learn more go to [pickeringtest.com/support](http://pickeringtest.com/support)

## Available Product Resources

We have a library of resources including success stories, product and support videos, articles and white papers as well as application-specific brochures to assist you. We have also published reference books on switching technology and the PXI and LXI standards.

To view, download or request any of our product resources go to [pickeringtest.com/resources](http://pickeringtest.com/resources)

