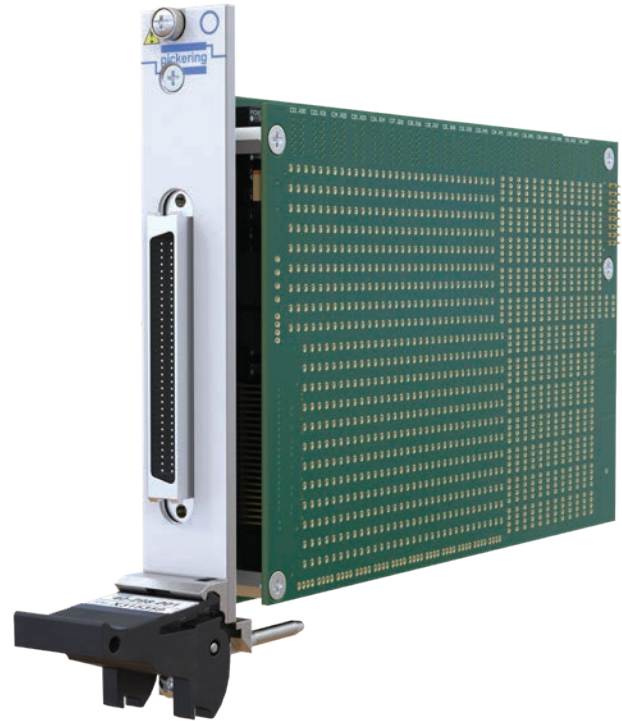


- **World's Highest Density Single-Slot 3U PXI Reed Relay Matrix Module With 528 Crosspoints**
- Uses High Reliability Pickering Ruthenium Reed Relays For Maximum Performance
- Minimize Cost Using Partially Populated Configurations - Available for All Models
- Switch up to 150V, 0.5A with 10W Max Power
- Fast Operating Speed <300 μs
- Drivers Supplied for Windows & Linux, Plus Support for Real-time Systems
- 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, is available as a 132x4, 66x8 or 33x16 matrix with 1-pole switching.

Typical applications include signal routing in functional ATE and data acquisition systems. These matrices are constructed using high reliability sputtered ruthenium reed relays, offering >10⁹ 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. 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 assistance.

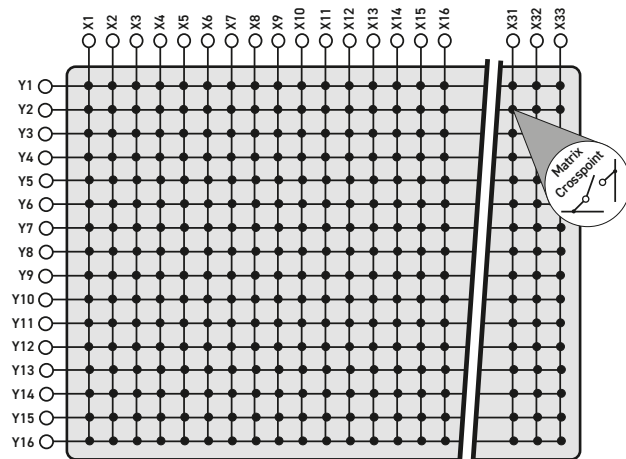
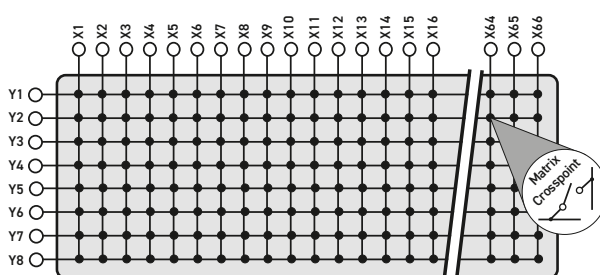
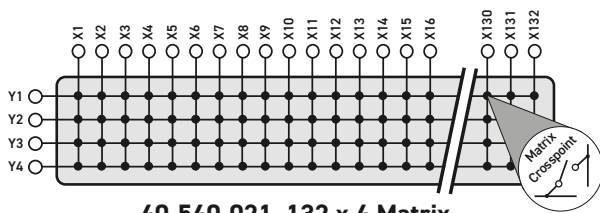
Supported by *eBIRST*

These test tools simplify fault-finding by quickly testing the system and graphically identifying the faulty relay.

For more information go to: pickeringtest.com/ebirst

Front Panel Connector

The 40-540-021 module is based on the obsolete Molex LFH series connector that has been superseded by a Pickering commissioned form, fit, function equivalent. The new connector series is 100% compatible with the Molex connectors allowing either gender of Pickering connector to mate with the corresponding Molex part without issue.



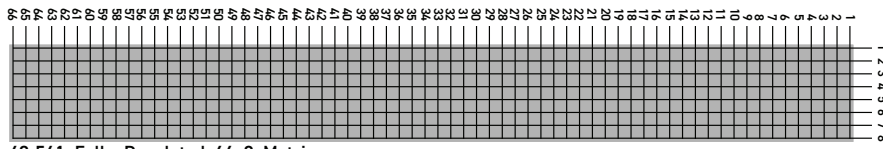
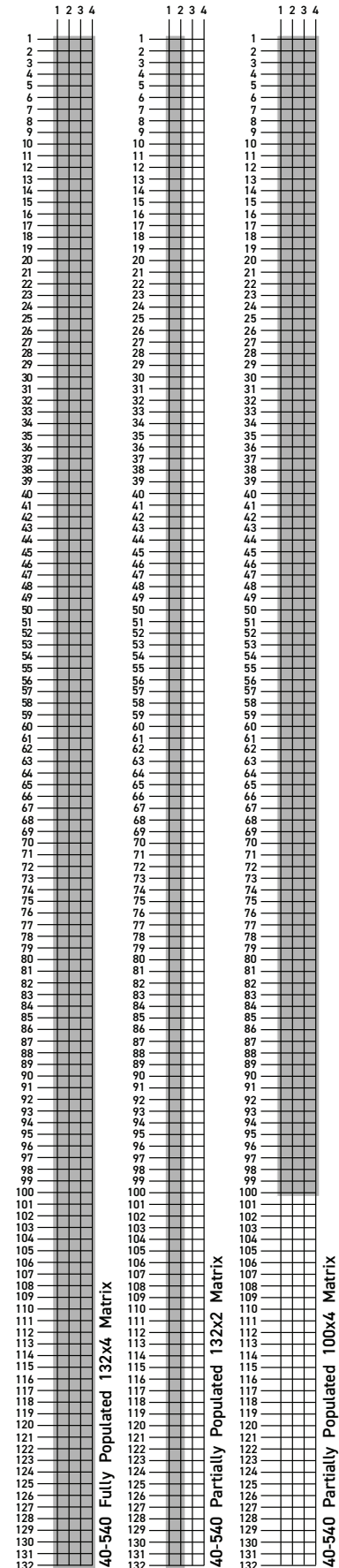
The 40-540, 40-541 and 40-542 may be ordered partially populated to a specific matrix configuration (if volumes dictate), the diagrams show some example configurations.

The illustrations right show:

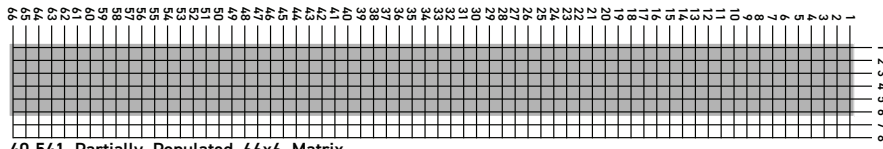
- A 40-540 fully populated 132x4 matrix.
- A 40-540 partially populated 132x2 matrix.
- A 40-540 partially populated 100x4 matrix.

The illustrations below show:

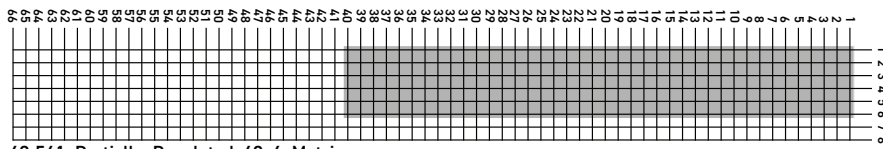
- A 40-541 fully populated 66x8 matrix.
- A 40-541 partially populated 66x6 matrix.
- A 40-541 partially populated 40x6 matrix.
- A 40-542 fully populated 33x16 matrix.
- A 40-542 partially populated 25x16 matrix.
- A 40-542 partially populated 33x12 matrix.



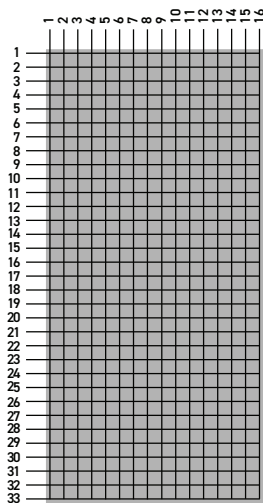
40-541 Fully Populated 66x8 Matrix



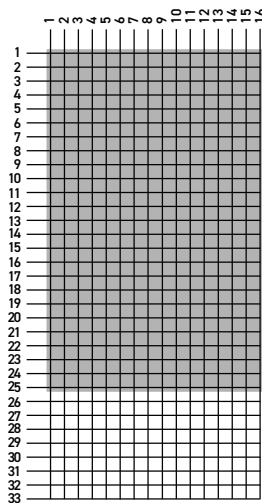
40-541 Partially Populated 66x6 Matrix



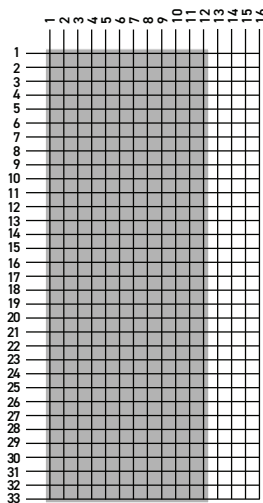
40-541 Partially Populated 40x6 Matrix



40-542 Fully Populated 33x16 Matrix



40-542 Partially Populated 25x16 Matrix



40-542 Partially Populated 33x12 Matrix

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 60-102D/103D 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 $>1 \times 10^6$ operations for high power loads).

Relay Type

The 40-540/541/542 modules are fitted with ruthenium sputtered 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 allow easy maintenance with minimum downtime.

All reed relays are manufactured by our Relay Division:

pickeringrelay.com

Switching Specification

Switch Type:	Ruthenium Reed
Max Switch Voltage:	150 VDC/100 VAC*
Max Power:	10 W
Max Switch Current:	0.5 A
Max Carry Current:	0.5 A
Initial Path Resistance	
On (Single Module):	<1 Ω
Off (Single Module):	>10 ⁹ Ω
Operate Time:	<300 μ s
Release Time:	<300 μ s
Maximum number of simultaneously operated relays:	135 (40-540) 100 (40-541/542)
Expected Life, low power load:	>10 ⁹ operations
Expected Life, full power load:	>1x10 ⁶ operations

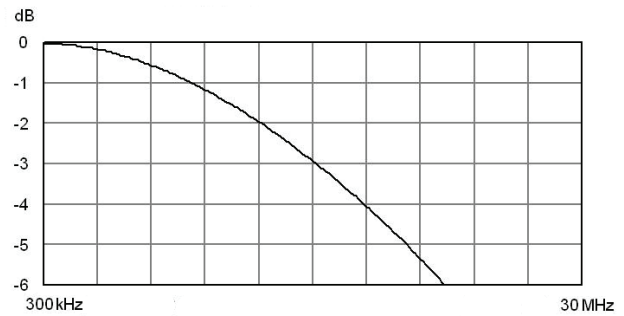
* For full voltage rating, signal sources to be switched must be fully isolated from mains supply and safety earth.

RF Specification - In a 50 Ω System

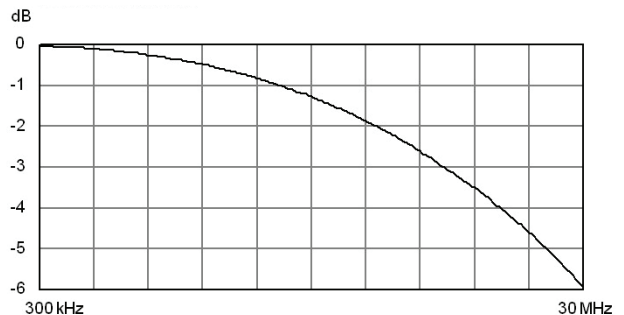
Bandwidth (-3 dB):	15 MHz	(40-540-021)
	20 MHz	(40-541-021)
	25 MHz	(40-542-021)
Crosstalk (typical):	10 kHz:	-90 dB
	100 kHz:	-75 dB
	1 MHz:	-55 dB
	10 MHz:	-35 dB
Isolation (typical):	10 kHz:	90 dB
	100 kHz:	85 dB
	1 MHz:	70 dB
	10 MHz:	60 dB

Power Requirements

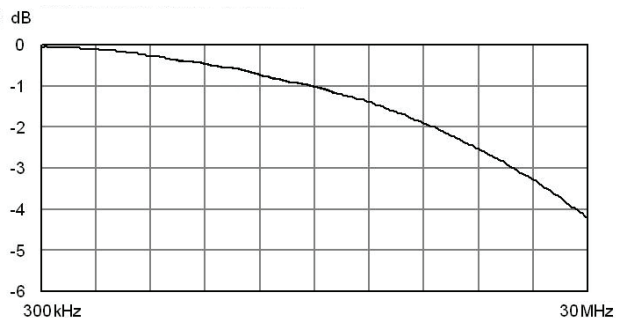
+3.3V	+5V	+12V	-12V
0	800 mA (typ 280 mA)	0	0



40-540-021 Insertion Loss Plot (typical worst case)



40-541-021 Insertion Loss Plot (typical worst case)



40-542-021 Insertion Loss Plot (typical worst case)

Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 400 g (40-542-021).

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 connectors:

- 132x4 Matrix (40-540-021): 200-pin female LFH*
- 66x8 Matrix (40-541-021): 96-pin male micro-D
- 33x16 Matrix (40-542-021): 68-pin male micro-D

For pin outs please refer to the operating manual.

* LFH relates to the obsolete Molex connector series and is retained for continuity, products will be fitted with a form, fit, function Pickering equivalent connector that is intermateable with the original Molex parts.

Operating/Storage Conditions

Operating Conditions

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

Storage and Transport Conditions

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

PXI & CompactPCI Compliance

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

Uses a 33 MHz 32-bit backplane interface.

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.

Pickering Electronics State-Of-The-Art Reed Relays

PXI Matrix modules are constructed using very high density reed relays manufactured by our Relay Division.

Sputtered Ruthenium Reed Relays offer maximum performance, they are hermetically sealed and offer a very stable, long life relay contact (typically 10⁹ 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 our Relay Division, these offer maximum switching performance. Please visit the reed relay web site at pickeringrelay.com for further information.

PICKERING INTERFACES BRIC™ MATRIX MODULES

For applications that require a very large number of matrix crosspoints, Pickering's range of versatile BRIC modules should be considered.

The BRIC4 is a 4-slot PXI module available with over 2200 crosspoints, the BRIC8 is an 8-slot PXI module available with over 4400 crosspoints. Single pole, double pole or screened relay options are available and matrix Y dimensions of 4, 8, 16 or 32 can be specified. For more information, please refer to the 40-560A BRIC data sheet available for download from our web site - pickeringtest.com

40-560A
PXI BRIC™ Multi-Slot Matrix

- 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 - **eBIRST™**
- Supported by **eBIRST™**
- 3 Year Warranty

BRIC™ PXI Reed Relay Matrices
 The 40-560A PXI BRIC is an ultra high density matrix module. It is available in 2, 4 or 8-slot sizes to suit high performance PXI matrix requirements and is constructed using instrumentation quality reed relays.

With its high level of switching density, the 40-560A PXI matrix 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 16 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 modules are constructed using the world's smallest and highest reliability ruthenium reed relays, offering >10⁹ 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. Avoiding bonding is housed within the module using a high performance screened analog 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 - eBIRST
 The eBIRST facility provides a quick and simple way of finding relay failures within the module. No test equipment is required, simply disconnect the VU1 from the BRIC's connectors, launch the eBIRST application and the tool will run a diagnostic test that will find all relays with faulty contacts.

For more information go to: pickeringtest.com/bric

Supported by **eBIRST**
 In addition to eBIRST, these modules are also supported by our eBIRST test tools. These tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

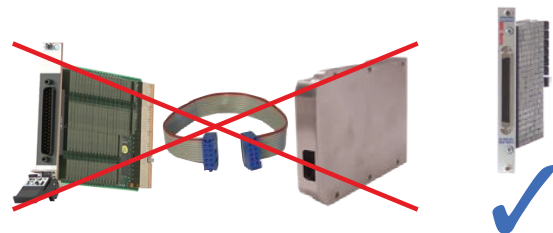
For more information go to: pickeringtest.com/ebirst

ISSUE 14, MAY 2018

pickeringtest.com



Servicing the competitor's high density matrix requires the use of expensive SMT rework equipment. Pickering's Matrix requires simple hand tools.



To upgrade the competitor's solution, extra PXI cards are needed as well as terminal blocks and cables. With Pickering's BRIC, extra daughter cards are simply added.

Product Order Codes

Ultra High Density PXI Matrix Modules:

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).

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 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 go to:

pickeringtest.com/ebirst

Product	Test Tool	Adaptor	Termination
40-540	93-002-001	Not Reqd	Not Reqd
40-541	93-002-001	93-002-226	93-016-103
40-542	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
40-540/541/542	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-pin LFH, [90-016D](#) 96-pin micro-D and [90-015D](#) 68-pin micro-D Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the Connection Solutions catalog.



Pickering can supply mating 200-pin connectors and cable assemblies to enable easy integration of the 40-540/541/542 series of matrix modules

Chassis Compatibility

This PXI module must be used in a suitable chassis. It is 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

Chassis Selection Guide

Standard PXI or hybrid PXIe Chassis from any Vendor:

- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI 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 1000+ PXI Switching & Simulation 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

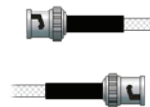
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed to mechanically and electrically mate to our modules.



Connectors & Backshells



Multiwire Cable Assemblies



RF Cable Assemblies



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. Visit: pickeringtest.com/cdt to start your design.

Mass Interconnect

We recommend the use of a mass interconnect solution when an Interchangeable Test Adapter (ITA) is required for a PXI or LXI based test system. Our modules are fully supported by both 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, please go to: 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 a list of all supporting operating systems, please see: pickeringtest.com/os

The VISA driver support is provided for LabVIEW Real Time Operating Systems (Pharlap and Linux-RT). For other RTOS support contact Pickering. These drivers may be used with a variety of programming environments and applications including:

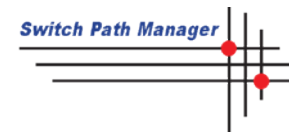
- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C++)
- **Programming Languages** C, C++, C#, Python
- **Keysight** VEE and OpenTAP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

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, please go to: 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, please go to: 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, please go to: 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 a period of three years from the date of delivery to the original purchaser. Extended warranty and service agreements are available for all our modules and systems with various levels to suit 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, please go to: pickeringtest.com/support

Available Product Resources

We have a large library of product resources including success stories, product and support videos, articles and white papers as well as application specific product brochures to assist when looking for the switching, simulation and connection solutions you need. We also have handy reference books on Switching Technology and for the PXI and LXI standards.



To view, download or request any of our product resources, please visit: pickeringtest.com/resources