

- 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 V, 0.5 A with 10 W Max Power
- Fast Operating Speed <math><300 \mu\text{s}</math>
- Ease of Maintenance & Repair Through the Use of Leaded Relays
- Relay Cycle Counting Included
- Drivers Supplied for Windows & Linux, Plus Support for Real-time Systems
- Supported by PXI or LXI Chassis
- Supported by *eBIRST*™
- 3 Year Warranty



## 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](http://pickeringtest.com/ebirst)

## Front Panel Connector

The 40-540A-021 module is based on the obsolete Molex LFH series connector that has been superseded by a Pickering commissioned, form, fit and function equivalent.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.

## Updated Product Information

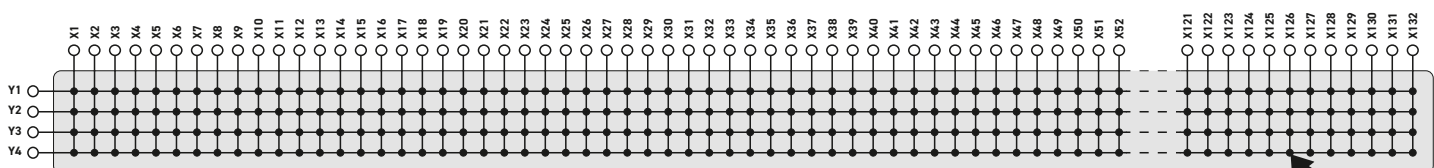
These modules have been introduced as a "form & fit" update to the 40-540/541/542, the changes are to provide an updated bus interface which will require the use of an updated software driver. Otherwise, the electrical performance is very similar and the pinout is identical.

The world's highest density single slot PXI reed relay matrix modules, the 40-540A/541A/542A, are 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  $>10^9$  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. However, for applications that require a very large matrix, Pickering's BRIC™ modules are best suited.

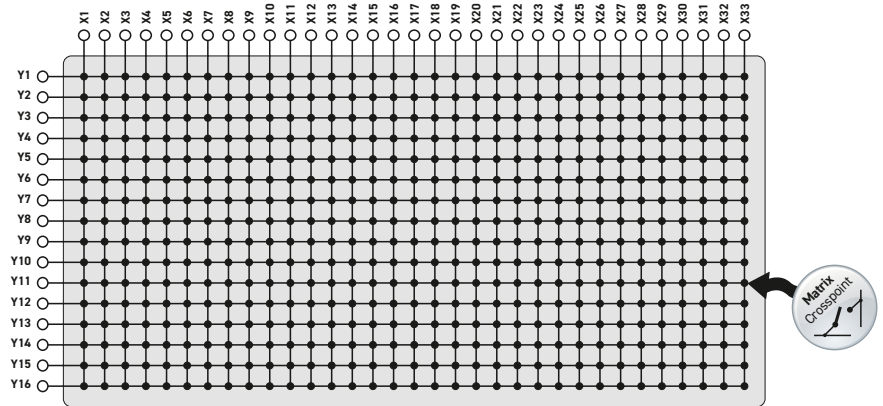
Pickering Interfaces can construct custom cable assemblies for all of our PXI modules, please contact sales office for assistance.



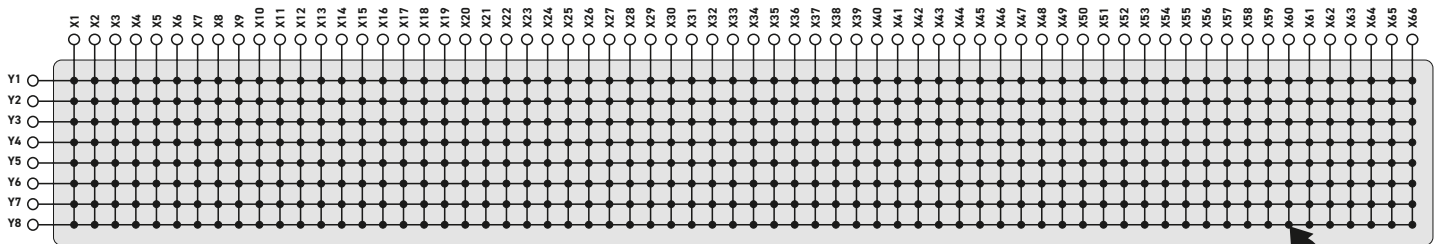
132x4 1-Pole Matrix (Part No. 40-540A-021)

## Relay Cycle Counting

To aid with module "health" monitoring all versions are provided with a relay cycle counting cycle feature. The number of operations per contact are stored on the module and can be used to determine if a relay is approaching EOL. This information could allow system connections to be revised so that signals applied to heavily used contacts are swapped with lightly used contacts to prolong the working life of the relay(s).



33x16 1-Pole Matrix (Part No. 40-542A-021)



66x8 1-Pole Matrix (Part No. 40-541A-021)

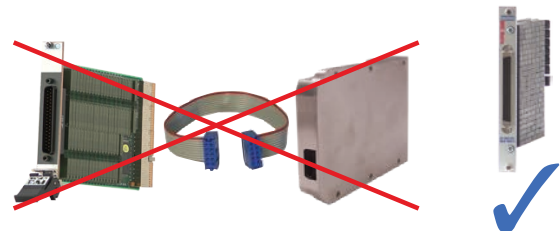
## Pickering Interfaces' BRIC™ Matrix Modules

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

Pickering's ranges of PXI BRIC modules are available in 2, 4, 8 and 12-slot configurations with a maximum crosspoint count of over 9000. Depending upon the range, single pole and double pole relay options are available and matrix Y dimensions of 4, 6, 8, 12, 16 or 32 can be specified. For more information, please refer to the data sheets for the ranges of BRIC modules, these are available for download from our web site - [pickeringtest.com](http://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.

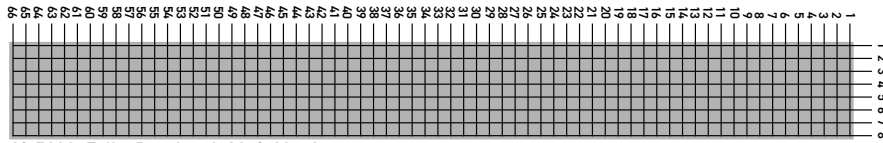
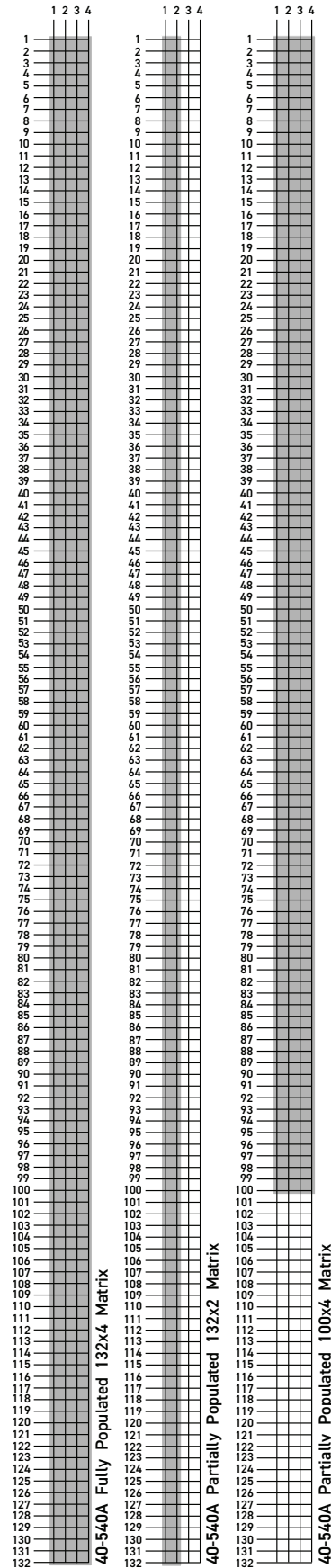
The 40-540A, 40-541A and 40-542A may be ordered partially populated as a specific matrix configuration, the diagrams show some example configurations.

**The illustrations right show:**

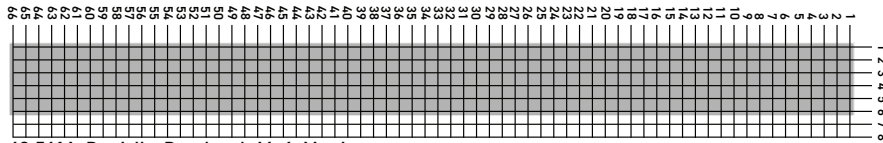
- A 40-540A fully populated 132x4 matrix.
- A 40-540A partially populated 132x2 matrix.
- A 40-540A partially populated 100x4 matrix.

**The illustrations below show:**

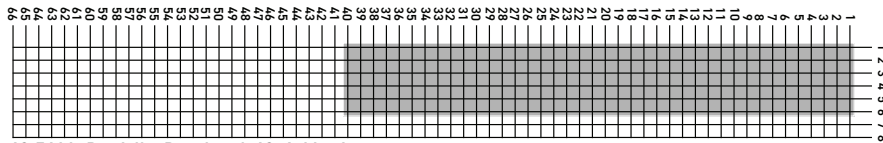
- A 40-541A fully populated 66x8 matrix.
- A 40-541A partially populated 66x6 matrix.
- A 40-541A partially populated 40x6 matrix.
- A 40-542A fully populated 33x16 matrix.
- A 40-542A partially populated 25x16 matrix.
- A 40-542A partially populated 33x12 matrix.



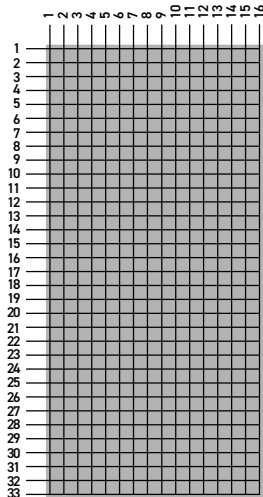
40-541A Fully Populated 66x8 Matrix



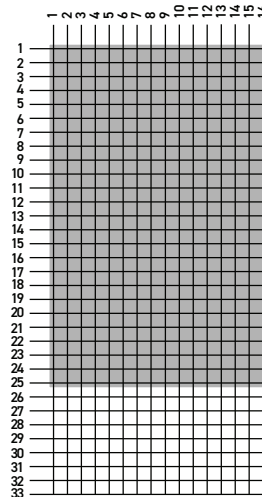
40-541A Partially Populated 66x6 Matrix



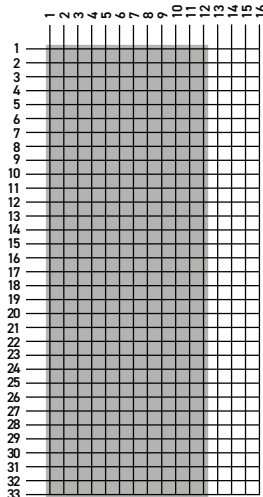
40-541A Partially Populated 40x6 Matrix



40-542A Fully Populated 33x16 Matrix



40-542A Partially Populated 25x16 Matrix



40-542A Partially Populated 33x12 Matrix

Advantages Over Competing PXI High Density Matrix Solutions		
	40-540A/541A/542A 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	135	40
Spare relays conveniently located within PXI module	Yes	No
Diagnostic Tool available	Yes - Supported by eBIRST	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

## Relay Type

The 40-540A/541A/542A 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](http://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 <sup>9</sup> Ω
Thermal Offset:	10 μV (typical)
Operate Time:	<300 μs
Maximum number of simultaneously operated relays:	135 (40-540A) 100 (40-541A/542A)
Expected Life, low power load:	>10 <sup>9</sup> operations
Expected Life, full power load:	>1x10 <sup>6</sup> operations

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

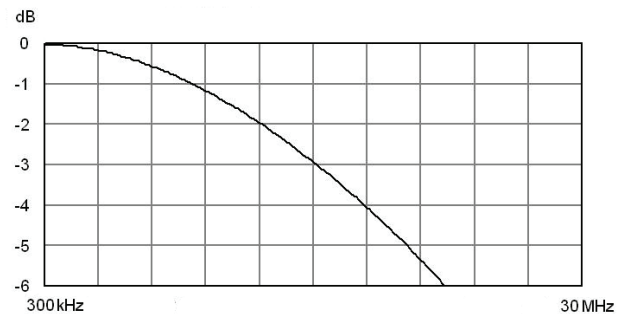
## Power Requirements

	+3.3 V	+5 V	+12 V	-12 V
40-540A	140 mA	1.6 A (800 mA typical)	0	0
40-541A	140 mA	1.2 A (600 mA typical)	0	0
40-542A	140 mA	1.2 A (600 mA typical)	0	0

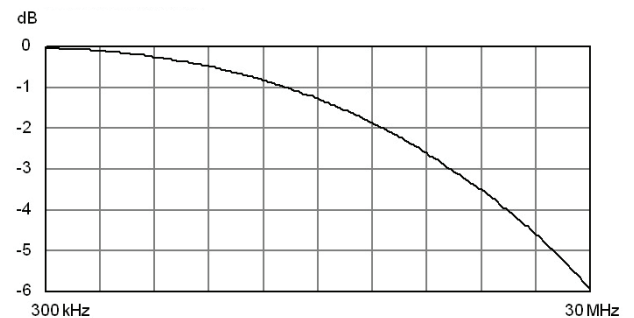
## RF Specification - In a 50 Ω System

Bandwidth (-3 dB) typical	40-540A	14 MHz
	40-541A	20 MHz
	40-542A	20 MHz

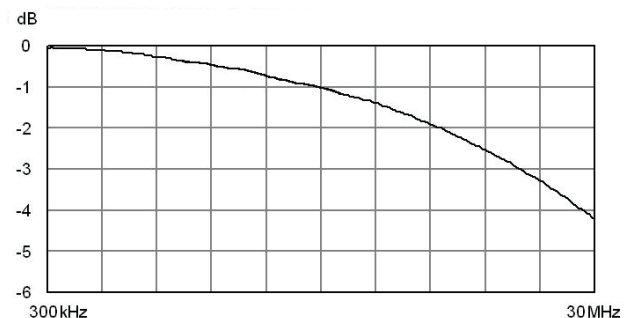
		10 kHz	100 kHz	1 MHz	10 MHz
Crosstalk (typical)	40-540A	-70 dB	-60 dB	-40 dB	-20 dB
	40-541A	-70 dB	-65 dB	-40 dB	-25 dB
	40-542A	-75 dB	-65 dB	-40 dB	-15 dB
Isolation (typical)	40-540A	70 dB	70 dB	60 dB	35 dB
	40-541A	70 dB	70 dB	60 dB	40 dB
	40-542A	70 dB	65 dB	50 dB	25 dB



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



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



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

## Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).

Module weight: 420 g (40-540A-021)

432 g (40-541A-021)

411 g (40-542A-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 (40-540A-021): 200-pin female LFH\*
- 66x8 Matrix (40-541A-021): 96-pin male micro-D
- 33x16 Matrix (40-542A-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.

## PXI & CompactPCI Compliance

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.

## 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.

## 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

## Pickering Electronics State-Of-The-Art Reed Relays

These 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 10<sup>9</sup> 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](http://pickeringrelay.com) for further information.



## Product Order Codes

Ultra High Density PXI Matrix Modules:

Single 132x4 Matrix, 1 Pole	40-540A-021
Single 66x8 Matrix, 1 Pole	40-541A-021
Single 33x16 Matrix, 1 Pole	40-542A-021

Partially Populated Versions:

These are available by specifying the X and Y size in the product code, for example:

40-540A-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](http://pickeringtest.com/ebirst)

Product	Test Tool	Adaptor	Termination
40-540A	93-002-001	Not Reqd	Not Reqd
40-541A	93-002-001	93-002-226	93-016-103
40-542A	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
40-540A/541A/542A	91-100-129 & 91-100-010

For further assistance, please contact your local Pickering sales office.

### Mating Connectors & Cabling

For connection accessories for the 40-540A/541A/542A 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 connectors and cable assemblies to enable easy integration of the 40-540A/541A/542A 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 PXI Switching & Simulation Modules:

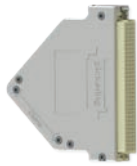
- Choose from 1000+ Pickering PXI Modules
- Ethernet or USB control enables remote operation
- Low-cost control from practically any controller
- LXI provides manual control via Web browsers
- Driverless software support
- Power sequencing immunity
- Ethernet provides chassis/controller voltage isolation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





## Connectivity Solutions

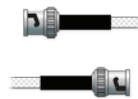
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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



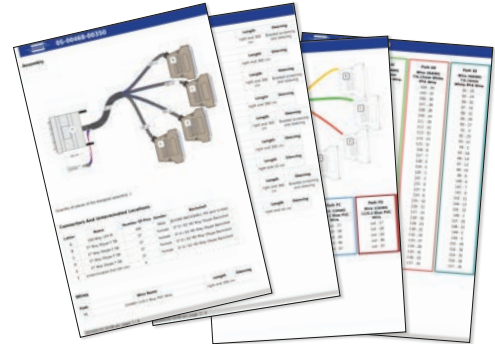
Breakouts



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)

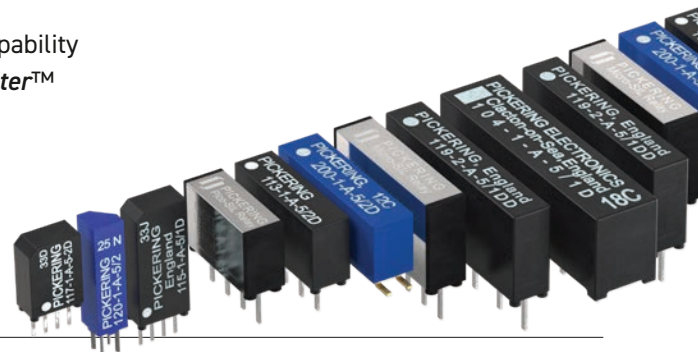
## Mass Interconnect

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 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, Simulink**
- **Marvin ATEasy**
- **MTQ Testsolutions Tecap Test & Measurement Suite**

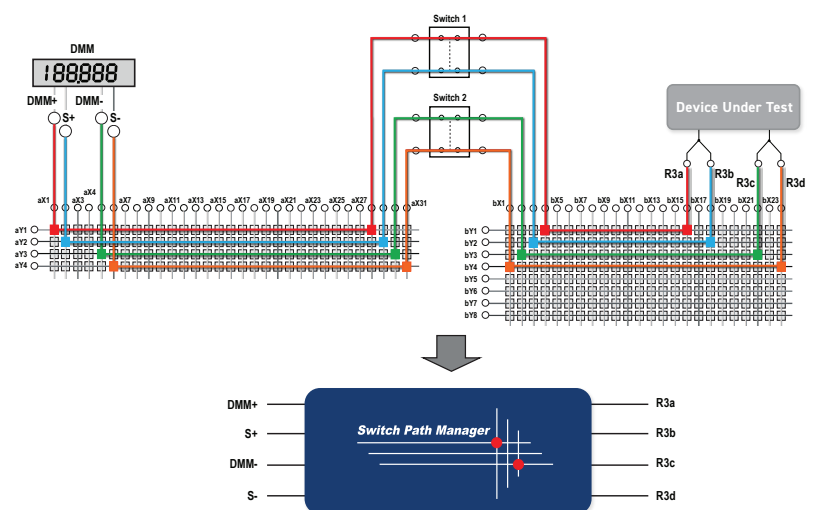
Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help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

To learn more about software drivers and development environments 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)

