PXI/PXIe 8x2 RF Matrix Module   40/42-750A

- Available as PXI or PXIe Modules

- 8x2 RF Coaxial Matrix

- 1 GHz Bandwidth

- 50 Ω or 75 Ω Characteristic Impedance

- Built-in Y-Axis Loop-Thru Simplifies the Construction of Larger RF Matrices

- High Density SMA, SMB or MS-M Coaxial Connectors

- Drivers Supplied for Windows & Linux, Plus Support for Real-time Systems

- PXI Versions Supported by PXI or LXI Chassis

- SMB & MS-M Versions Supported by *eBIRST ™*

- 3 Year Warranty

The 40-750A (PXI) and 42-750A (PXIe) are 8x2 RF matrix modules suitable for switching frequencies up to 1000 MHz. They have a 50 Ω or 75 Ω characteristic impedance with front panel mounted SMA, SMB or MS-M multiway coaxial connectors. The matrix intended for the easy construction of high performance bi-directional switching systems.

Automatic loop-thru switching of Y-axis signals is also provided. This means Y signals that are not connected to the matrix are automatically routed to connectors on the front panel. Loop-thru Y signals can be routed to adjacent modules for matrix expansion or to 50 Ω or 75 Ω 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.

40/42-750A - 8x2 RF Matrix Schematic Diagram (Switch positions in "Initialized State")

Other RF Matrix Modules in Pickering's PXI/PXIe Range:	
40/42-724	16x4, 16x8, 32x4, 32x8 300 MHz, 50 Ω
40-725	8x9 500 MHz, 50 Ω/75 Ω
40/42-726B	12x8 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40/42-727A	16x4 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40/42-728A	16x2 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40/42-729A	8x4 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40/42-872A	single/dual 2x2 3 GHz, 50 Ω
40/42-832A	single/dual 2x2 3 GHz, 75 Ω
45-720A	6U, 16x16 250 MHz, 50 Ω/75 Ω - Y Loop-Thru
Alternative LXI Ethernet Controlled RF Matrices:	
60-760	Single/Dual 24x8 25 MHz, 50 Ω
60-711	Single/Dual 24x8 25 MHz, 75 Ω
60-110	Scalable 24x8 to 104x16 200 MHz, 50 Ω

Updated Product Information

This product has been introduced as a "form & fit" update to the 40-750, the changes are to provide PXIe options and an updated bus interface which will require the use of an updated software driver. Otherwise, the electrical performance is very similar and the software and pinout are identical.
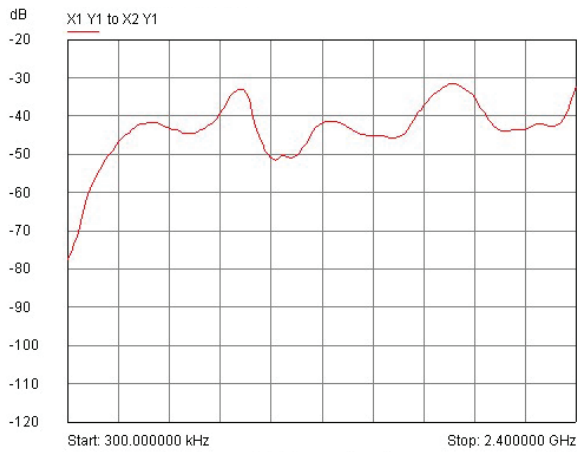
Supported by eBIRST

eBIRST test tools simplify switching fault-finding by quickly testing the system and graphically identifying the faulty relay. For more information go to: pickeringtest.com/ebirst
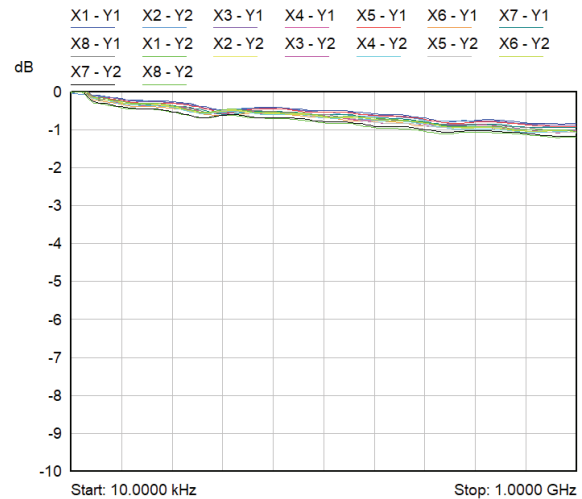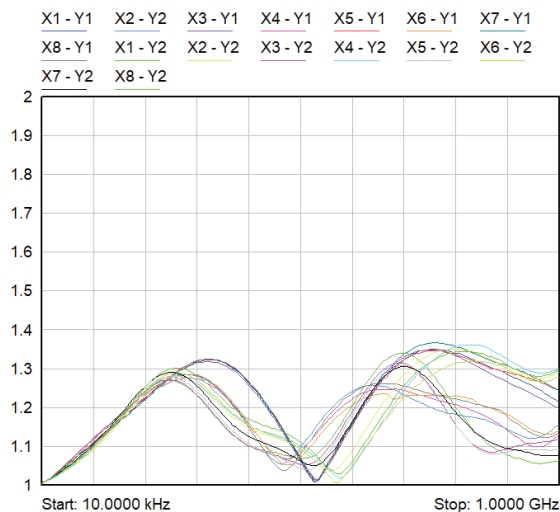
Issue 1.1 May 2024

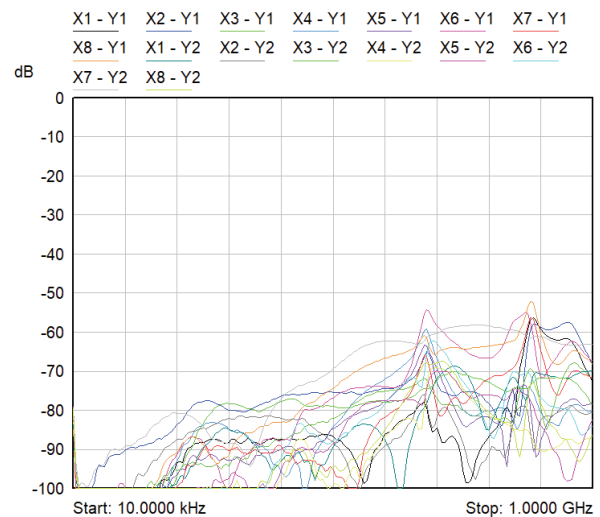## Performance Plots - 50 Ω Versions with SMA Connectors

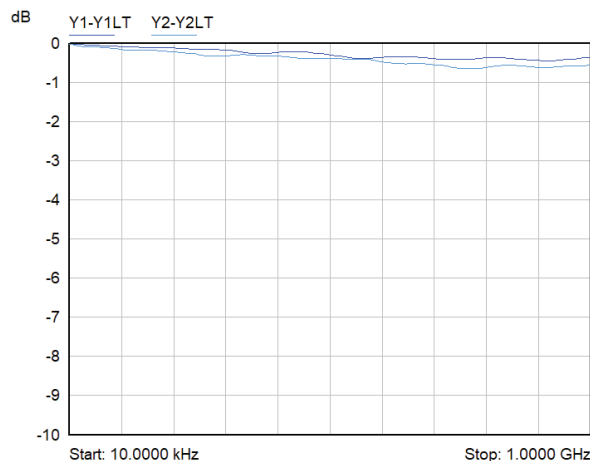**40/42-750A-521 RF Matrix Typical Crosstalk Plot**

40/42-750A-521 RF Matrix Typical Insertion Loss Plot

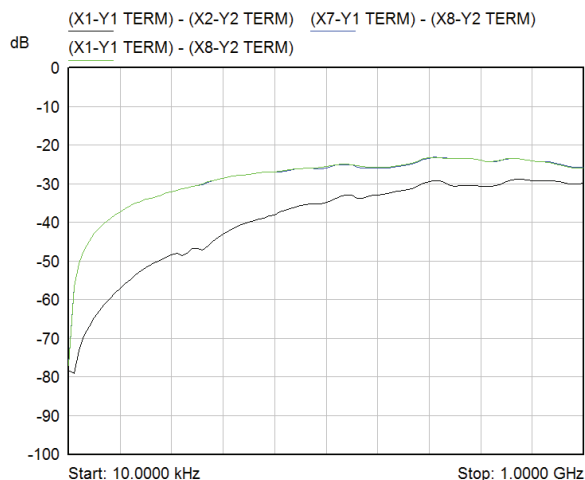**40/42-750A-521 RF Matrix Typical VSWR Plot**

40/42-750A-521 RF Matrix Typical Isolation Plot

40/42-750A-521 RF Matrix Typical Insertion Loss Plot Using Loop Thru

Performance Plots - 50 Ω Versions with MS-M Connector

(X1-Y1 TERM) - (X2-Y2 TERM)   (X7-Y1 TERM) - (X8-Y2 TERM)
(X1-Y1 TERM) - (X8-Y2 TERM)

40/42-750A-531 RF Matrix Typical Crosstalk Plot

X1-Y1 X2-Y1 X3-Y1 X4-Y1 X5-Y1 X6-Y1 X7-Y1 X8-Y1
X1-Y2 X2-Y2 X3-Y2 X4-Y2 X5-Y2 X6-Y2 X7-Y2 X8-Y2

40/42-750A-531 RF Matrix Typical Insertion Loss Plot

X1-Y1 TERM X2-Y1 TERM X3-Y1 TERM X4-Y1 TERM
X5-Y1 TERM X6-Y1 TERM X7-Y1 TERM X8-Y1 TERM
X1-Y2 TERM X2-Y2 TERM X3-Y2 TERM X4-Y2 TERM
X5-Y2 TERM X6-Y2 TERM X7-Y2 TERM X8-Y2 TERM

40/42-750A-531 RF Matrix Typical VSWR Plot

X1-Y1 X2-Y1 X3-Y1 X4-Y1 X5-Y1 X6-Y1 X7-Y1 X8-Y1
X1-Y2 X2-Y2 X3-Y2 X4-Y2 X5-Y2 X6-Y2 X7-Y2 X8-Y2

40/42-750A-531 RF Matrix Typical Isolation Plot

Y1-Y1LT   Y2-Y2LT

40/42-750A-531 RF Matrix Typical Insertion Loss Plot Using Loop Thru

Performance Plots - 75 Ω Versions with MS-M Connector

40/42-750A-731 RF Matrix Typical Crosstalk Plot

40/42-750A-731 RF Matrix Typical Insertion Loss Plot

40/42-750A-731 RF Matrix Typical VSWR Plot

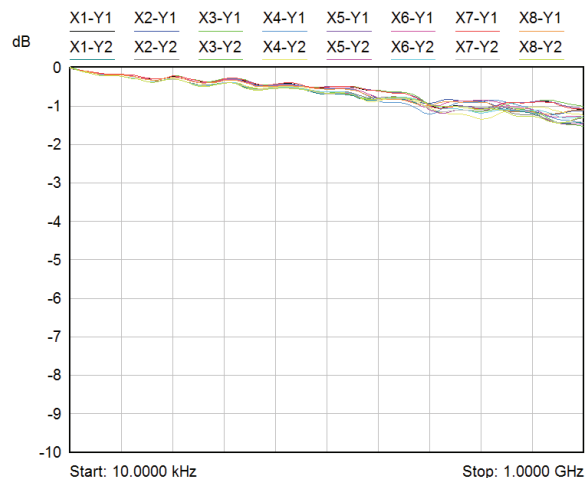**40/42-750A-731 RF Matrix Typical Isolation Plot**

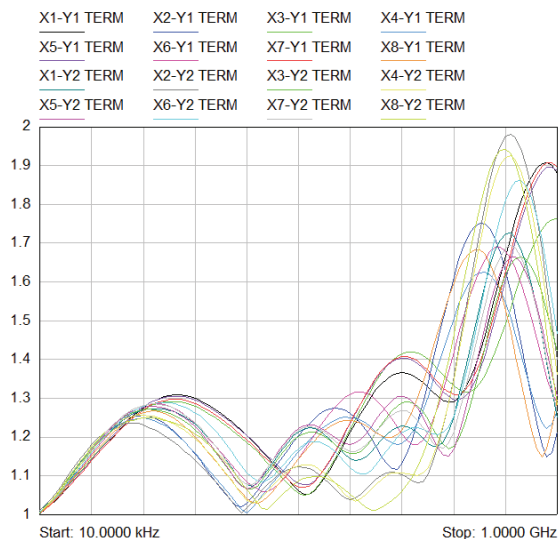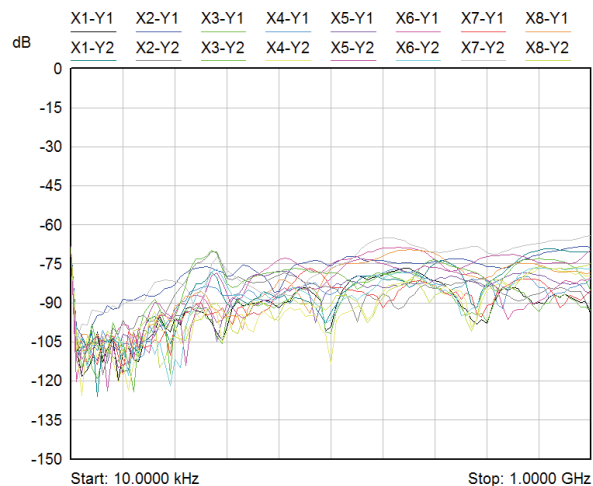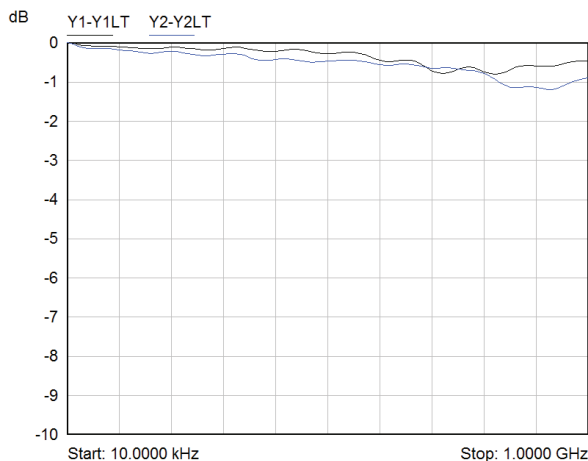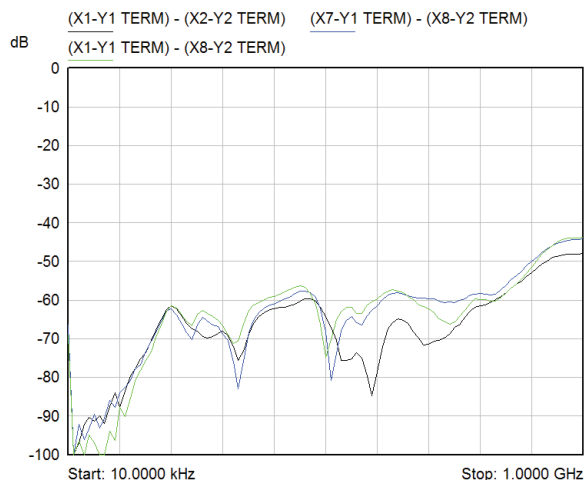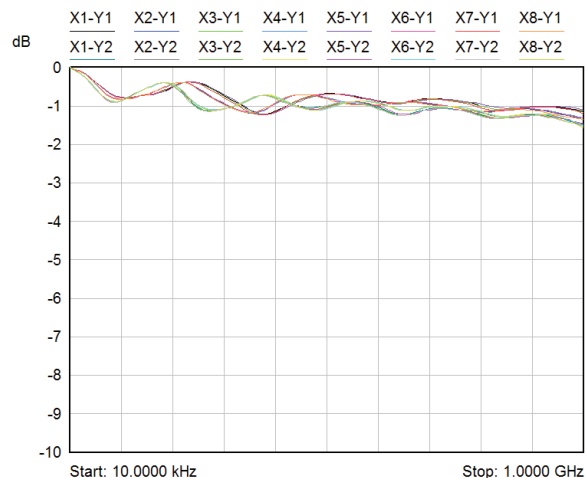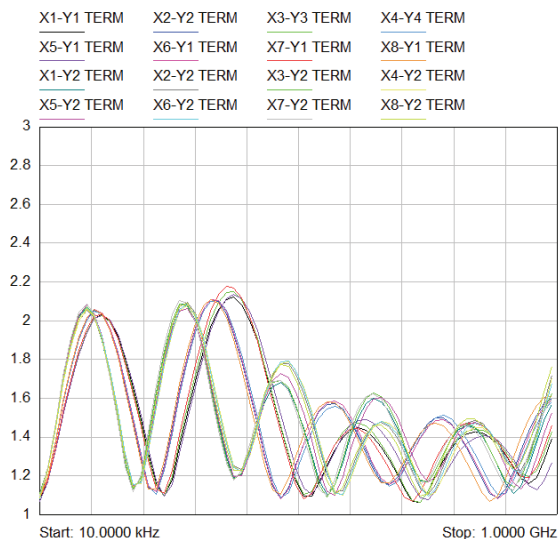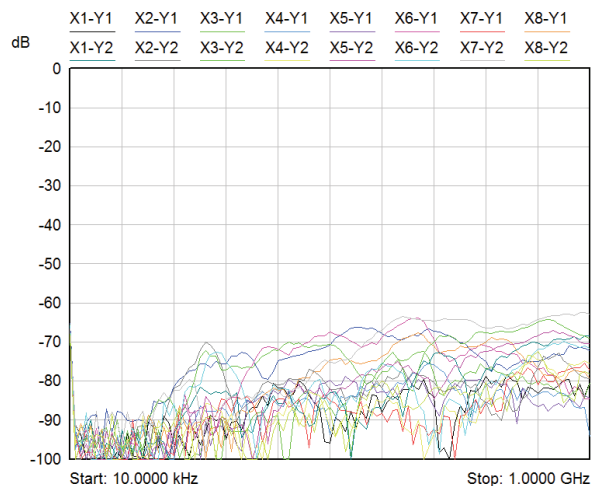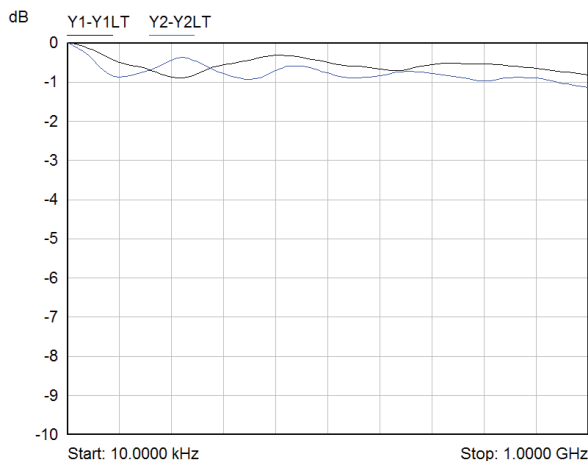**40/42-750A-731 RF Matrix Typical Insertion Loss Plot Using Loop Thru**

General Switching Specification

Maximum Voltage:	75 VDC
Maximum Power:	10 W
Maximum Carry Power (900 MHz):	10 W
Maximum Switch Current:	0.133 A
Characteristic Impedance:	50 or 75 Ω
Initial On Path Resistance:	516 mΩ (max measured)
Off Path Resistance:	$>1 \times 10^8$ Ω
Thermal Offset:	5 µV (max measured)
Expected Life (Low power):	$>2 \times 10^7$ operations
Expected Life (Max power):	$>3 \times 10^5$ operations
Operate Time:	<6 ms
Release Time:	<6 ms

RF Specification (50 Ω SMA)

Maximum Frequency:	1 GHz
Typical Rise Time:	500 ps
Insertion Loss (<1000 MHz):	<3 dB (Typical)
VSWR (<1000 MHz):	1.5:1
Isolation (<1000 MHz):	>50 dB
Crosstalk (<1000 MHz):	>35 dB

RF Specification (50 Ω MS-M)

Maximum Frequency:	1 GHz
Typical Rise Time:	500 ps
Insertion Loss (<1000 MHz):	<3 dB (Typical)
VSWR (<1000 MHz):	2.1:1
Isolation (<1000 MHz):	>64 dB
Crosstalk (<1000 MHz):	>25 dB

RF Specification (75 Ω MS-M)

Maximum Frequency:	1 GHz
Typical Rise Time:	500 ps
Insertion Loss (<1000 MHz):	<3 dB (Typical)
VSWR (<1000 MHz):	2.4:1
Isolation (<1000 MHz):	>62 dB
Crosstalk (<1000 MHz):	>43 dB

Mechanical Characteristics

40-750A - Single slot 3U PXI (CompactPCI card).
42-750A - Single slot 3U PXIe, compatible with PXIe hybrid slot.

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

Power Requirements - 40-750A

+3.3 V	+5 V	+12 V	-12 V	Relays Switched
140 mA	50 mA	0	0	0
140 mA	151 mA	0	0	2 (max closure limit)

Power Requirements - 42-750A

+3.3 V	+12 V	Relays Switched
140 mA	21 mA	0
140 mA	63 mA	2 (max closure limit)

Connectors

40-750A - PXI bus via 32-bit P1/J1 backplane connector.
42-750A - PXIe bus via XJ3 and XJ4 backplane connectors.
Signals via front panel coaxial connectors:

- 40/42-750A-511 - 10 x SMB 50 Ω
- 40/42-750A-521 - 10 x SMA 50 Ω
- 40/42-750A-531 - High density male 26-pin MS-M RF multiway
- 40/42-750A-711 - 10 x SMB 75 Ω
- 40/42-750A-731 - High density male 26-pin MS-M RF multiway

For pin outs please refer to the operating manual.

PXI & CompactPCI Compliance - 40-750A

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.

PXIe Compliance - 42-750A

The module is compliant with the PXIe 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.

Operating/Storage Conditions

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

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

Product Order Codes

PXI 8x2 1GHz RF Matrix:	
SMB Connectors, 50 Ω	40-750A-511
SMA Connectors, 50 Ω	40-750A-521
MS-M Multiway Connector, 50 Ω	40-750A-531
SMB Connectors, 75 Ω	40-750A-711
MS-M Multiway Connector, 75 Ω	40-750A-731
PXIe 8x2 1GHz RF Matrix:	
SMB Connectors, 50 Ω	42-750A-511
SMA Connectors, 50 Ω	42-750A-521
MS-M Multiway Connector, 50 Ω	42-750A-531
SMB Connectors, 75 Ω	42-750A-711
MS-M Multiway Connector, 75 Ω	42-750A-731

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.

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

SMB and MS-M versions are 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
40/42-750A-511/711	93-006-001	93-006-202	93-006-101
40/42-750A-531/731	93-006-001	93-006-255	93-006-101

Spare Relay Kits

Kits of replacement relays are available for the majority of our switching products, simplifying servicing & reducing down-time.

Product	Relay Kit
40/42-750A-xxx	91-100-014

For further assistance, please contact Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 40/42-750A module please refer to the 90-011D RF Cable Assemblies and 90-017D MS-M RF Connector data sheets where a complete list and documentation can be found for accessories, or refer to the website
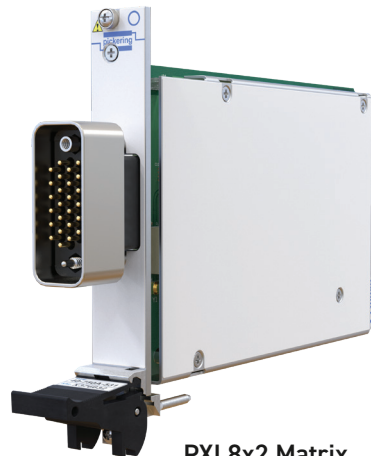
We can supply cable assemblies for all our modules. The cable shown (MS-M RF to unterminated coax) is suitable for multiway connector versions of the 40/42-750A.

PXIe 8x2 Matrix
With SMA Connectors
- Part No. 42-750A-521

PXI 8x2 Matrix
With SMB Connectors
- Part No. 40-750A-511

PXI 8x2 Matrix
With Multiway MS-M Connector
- Part No. 40-750A-531

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
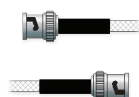
Connectivity Solutions

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.
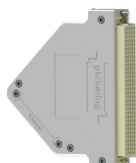
| Connectors & Backshells | Multi-way Cable Assemblies | RF Cable Assemblies | Breakouts | Connector Blocks |

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
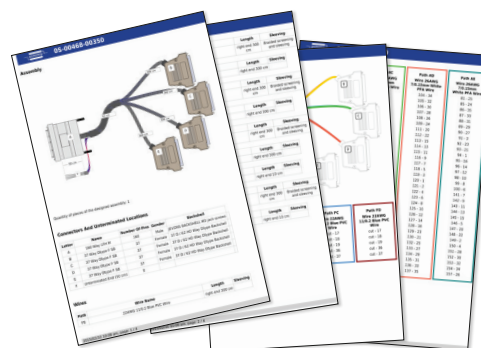
Start designing your custom cabling, go to pickeringtest.com/cdt

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
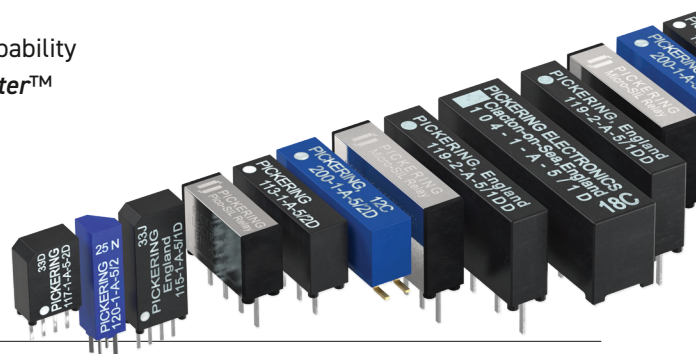
Programming

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

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

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
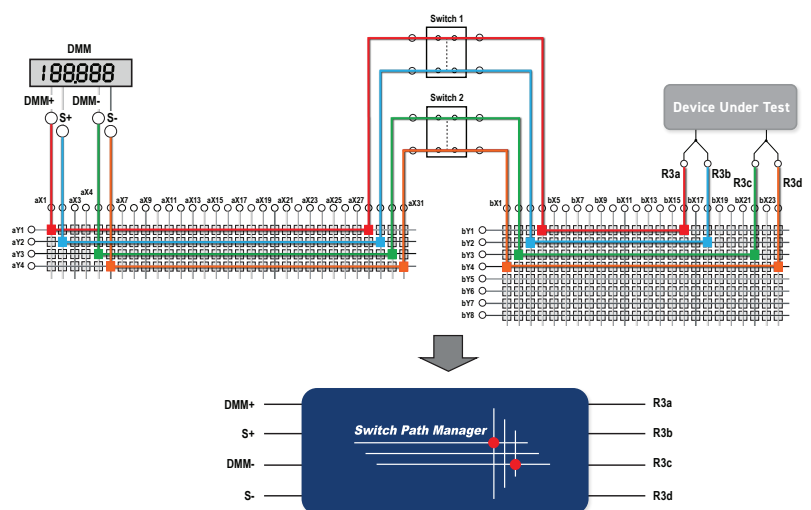
Diagnostic Relay Test Tools

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

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

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