- 12x8 RF Coaxial Matrix
- Up to 300 MHz Bandwidth
- 50 Ω and 75 Ω Versions Available
- **Easy To Use Loop Thru Options, Enabling Simple Expansion Via Built-In Cabling With No Hidden Expense**
- High Density SMB Coaxial Connectors
- 75 Ω 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 300 MHz. It is available in either 50 Ω or 75 Ω versions with front panel SMB coaxial connectors. The module provides a simple and scalable bidirectional matrix for RF frequencies and is intended for the easy construction of high performance matrix switching systems.

All X and Y connections have isolation switches. These can be used to disconnect the matrix from the external test fixture to maximize 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.
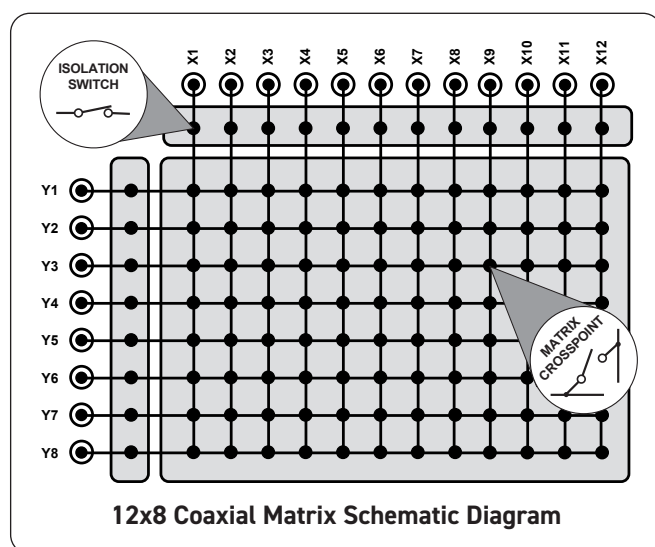


| Other RF Matrix Modules in Pickering's PXI Range: | |
|---|---|
| 40-725 | 8x9 500 MHz, 50 Ω/75 Ω |
| 40-727 | 16x4 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru |
| 40-728 | 16x2 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru |
| 40-729 | 8x4 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru |
| 40-750 | 8x2 1.5 GHz, 50 Ω/75 Ω - Y Loop-Thru |
| 40-872 | single/dual 2x2 3 GHz, 50 Ω |
| 40-832 | 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 |

**Supported by *eBIRST***

The 50 Ω non-loop thru version of the 40-726A is supported by *eBIRST* switching system test tools. These simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

For more information go to: pickeringtest.com/ebirst

**Y Axis Loop Thru Option**

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 200 MHz.

These versions have built in Y loop-thru cables fitted to the front panel which are simply plugged into the Y connectors of the adjacent matrix module.



12x8 Coaxial Matrix Schematic Diagram
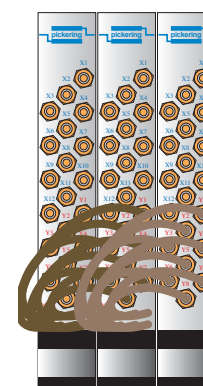


**Schematic Showing Construction of a 36x8 RF Matrix (Loop-Thru cables interconnect each 12x8 Matrix module)**

**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, ensure only one crosspoint is set in any one row/column. **Multiple crosspoints can be set on one row or column but this will seriously degrade RF performance**. Performance is also dependent upon the area of the matrix where the crosspoint is set. Best performance is obtained at the corners (for example X1-Y1), worse performance is obtained in the center (X6-Y4). This is outlined in the insertion loss and VSWR plots 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.
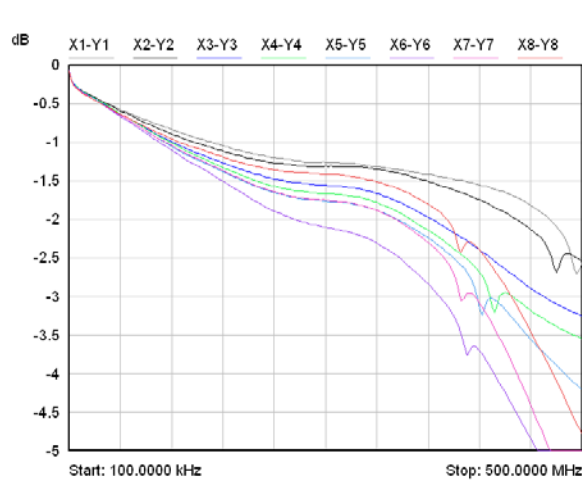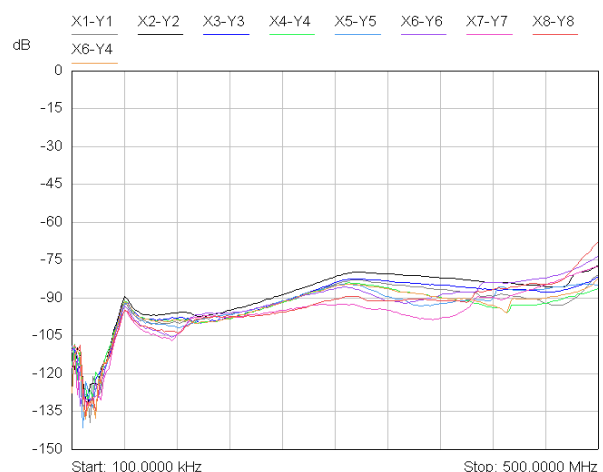


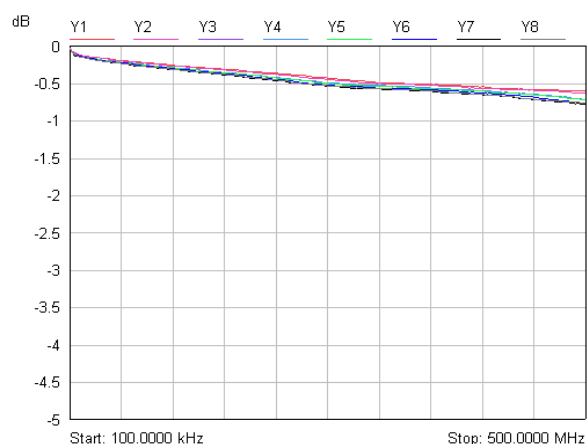**40-726A-511-L (50 Ω Version) Insertion Loss to 500 MHz**
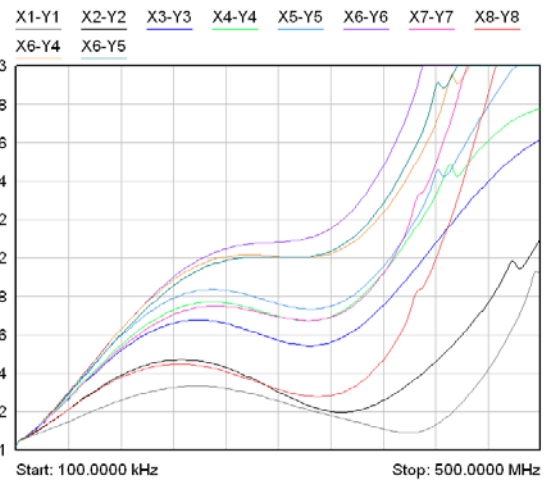


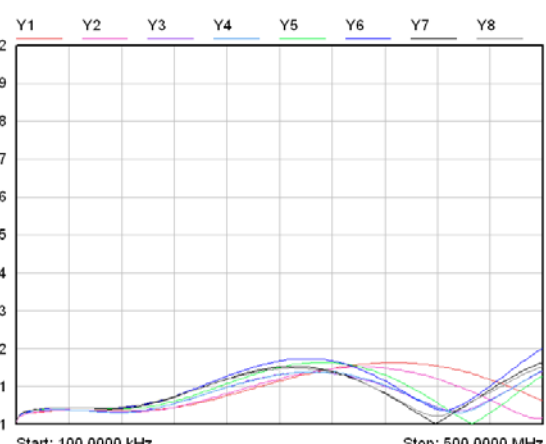**40-726A-511-L (50 Ω Version) VSWR Plot to 500 MHz**
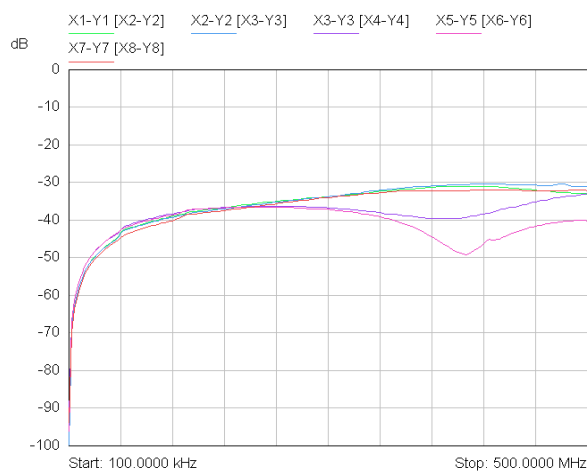


**40-726A-511-L (50 Ω) Crosstalk to 500 MHz**



**40-726A-511-L (50 Ω) Isolation to 500 MHz**



**40-726A-511-L (50 Ω) Loop-Thru Insertion Loss to 500 MHz**



**40-726A-511-L (50 Ω) Loop-Thru VSWR to 500 MHz**

**40-726A-751-L (75 Ω) Insertion Loss to 300 MHz**

**40-726A-751-L (75 Ω) VSWR to 300 MHz**

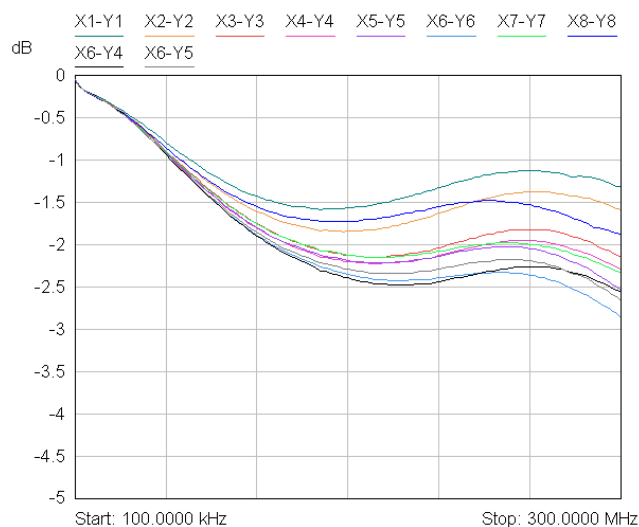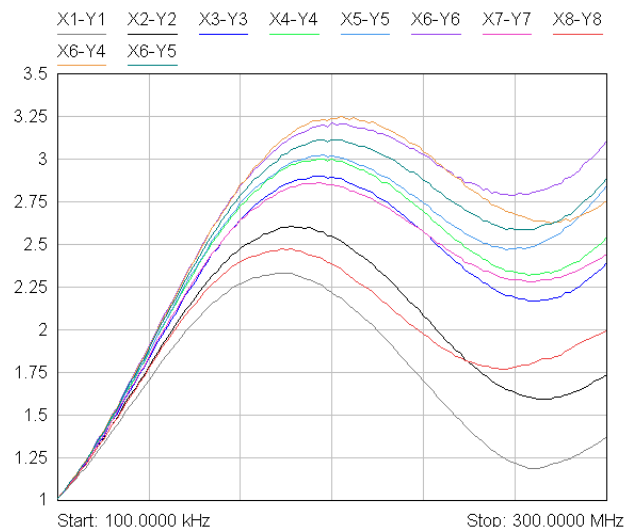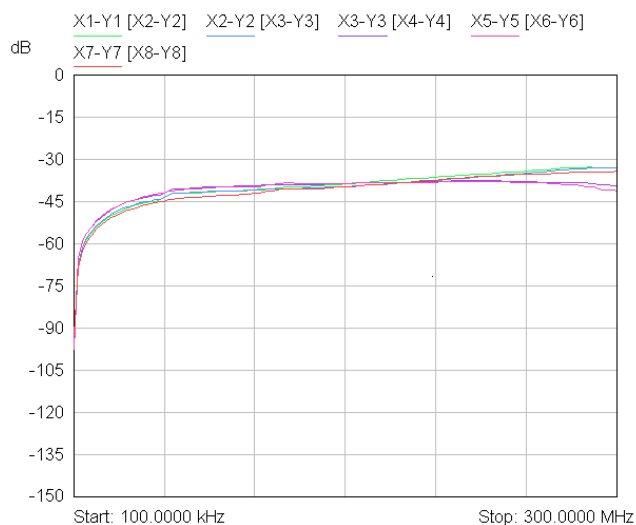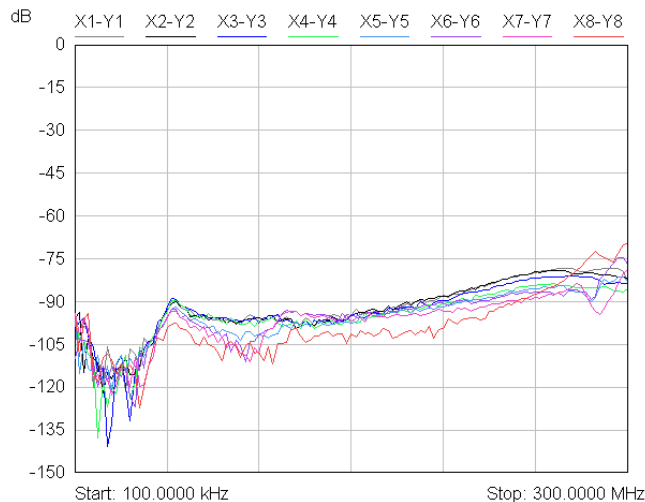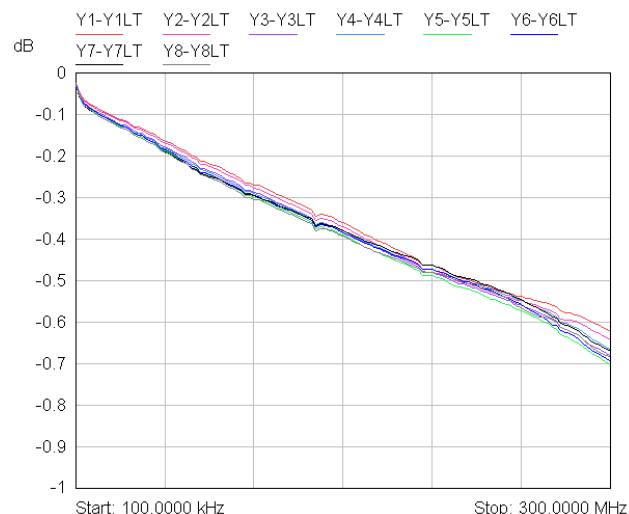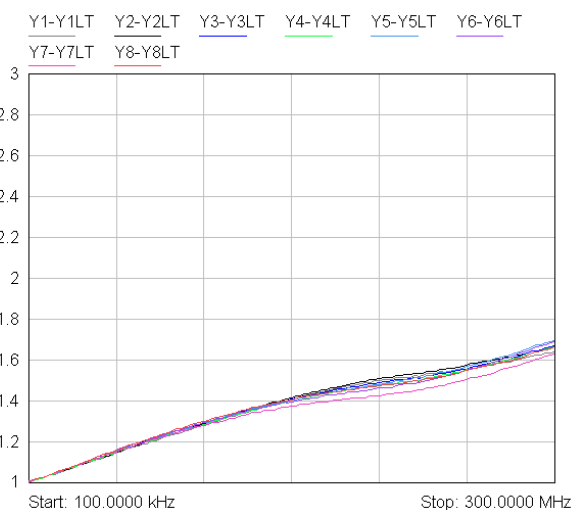**40-726A-751-L (75 Ω) Crosstalk to 300 MHz**

**40-726A-751-L (75 Ω) Isolation to 300 MHz**

**40-726A-751-L (75 Ω) Loop-Thru Insertion Loss to 300 MHz**

**40-726A-751-L (75 Ω) Loop-Thru VSWR to 300 MHz**

## Relay Type

The 40-726A RF matrix is fitted with ruthenium sputtered reed relays, these offer very stable switch contact resistance with expected life of $10^9$ operations when switching typical RF signals.

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

## General Switching Specification

| | |
|---|---|
| Maximum Voltage: | 100 VDC |
| Maximum Power: | 10 W |
| Maximum Switch Current: | 0.5 A |
| Maximum Carry Current: | 0.5 A |
| Characteristic Impedance: | 50 Ω or 75 Ω |
| Initial On Path Resistance: | <1000 mΩ |
| Off Path Resistance: | >$10^8$ Ω |
| Thermal Offset: | <30 µV |
| Expected Life (Low Power): | 1x$10^9$ operations |
| Expected Life (Max Power): | >5x$10^6$ operations |
| Operate Time: | <1 ms, 0.5 ms typical |

## RF Specification

| | |
|---|---|
| Maximum Frequency - 50 Ω Version: | 300 MHz |
| Maximum Frequency - 75 Ω Version: | 250 MHz |
| Typical Rise Time: | 800 ps † |
| Insertion Loss -50 Ω Version: | <3 dB to 300 MHz † |
| Insertion Loss -75 Ω Version: | <3 dB to 250 MHz † |
| V.S.W.R. - 50 Ω Version: | <2.8:1 to 300 MHz † |
| V.S.W.R. - 75 Ω Version: | <3:1 to 100 MHz † |
| Crosstalk - 50 Ω Version: | <40 dB at 50 MHz |
| | <28 dB at 300 MHz |
| Crosstalk - 75Ω Version: | <40 dB at 50 MHz |
| | <30 dB at 250 MHz |

† RF performance is entirely dependant upon the combination of crosspoints selected, the figures shown are for one selected crosspoint on any X or Y channel only, refer to graphs. For further assistance on getting maximum performance from the 40-726A, please refer to the user manual.

## Power Requirements

| +3.3 V | +5 V | +12 V | -12 V |
|---|---|---|---|
| 0 | 500 mA (typ 350 mA) | 0 | 0 |

## Mechanical Characteristics

Single slot 3 U PXI (CompactPCI card).
Module weight: 340 g (40-726A-511).
            400 g (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 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 120 mm.
A clearance of 80 mm from the front panel of the module is required for routing the leads to an adjacent module.

## 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.



**Optional Y-axis loop-thru allows easy expansion. Shown here is a 60x8 RF matrix with over 200 MHz bandwidth.**

## Product Order Codes

| PXI 12x8 RF Coaxial Matrix: | |
| --- | --- |
| SMB, 50 Ω | 40-726A-511 |
| SMB, 50 Ω with loop-thru on Y axis | 40-726A-511-L |
| SMB, 75 Ω | 40-726A-751 |
| SMB, 75 Ω with loop-thru on Y axis | 40-726A-751-L |

## 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

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 go to: pickeringtest.com/ebirst

| Product | Test Tool | Adaptor |
| --- | --- | --- |
| 40-726A-511 | 93-005-001 | 93-005-202A |

### 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 |
| --- | --- |
| 40-726A | 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.

## 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
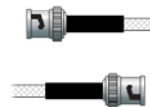- Independence from Windows operating system

## 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**  **Multiway 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 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
- **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`
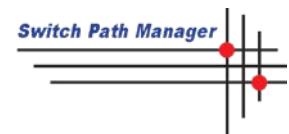
## Diagnostic Relay Test Tools

*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 have also published 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`

**pickeringtest.com**