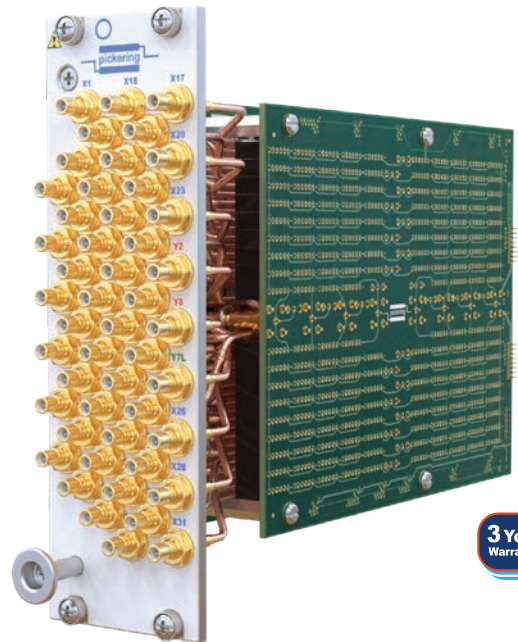


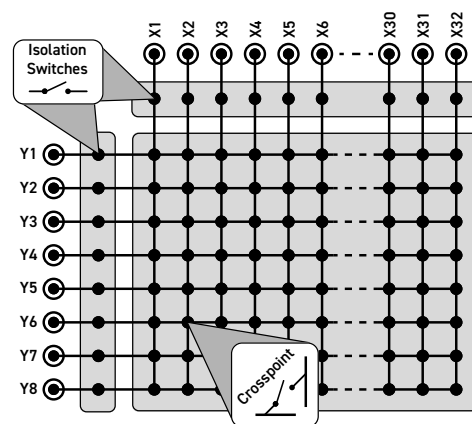
- Available as PXI or PXIe Modules
- Easy to Use Loop-thru Option Allows Unlimited X Axis Expansion
- 300 MHz Usable Bandwidth, 150 MHz With Loop-thru
- Relay Cycle Counting Included
- VISA & IVI Drivers Supplied for Windows
- Drivers Supplied for Windows and Linux, Plus Support for Real-time Systems
- PXI Versions Supported by PXI or LXI Chassis
- Supported by *eBIRST*™
- 3 Year Warranty



The 40-724 (PXI) and 42-724 (PXIe) are RF matrix modules suitable for switching frequencies up to 300 MHz. Having a 50 Ω characteristic impedance and front panel SMB connectors, these modules provide a simple and scalable bidirectional matrix for RF and are intended for the easy construction of high performance switching systems.

The 4x-724-021-L version includes Y loop-thru connectors to allow easy matrix expansion between adjacent modules.

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.



4x-724-021 32x8 Matrix Without Loop-Thru

## Matrix Operation

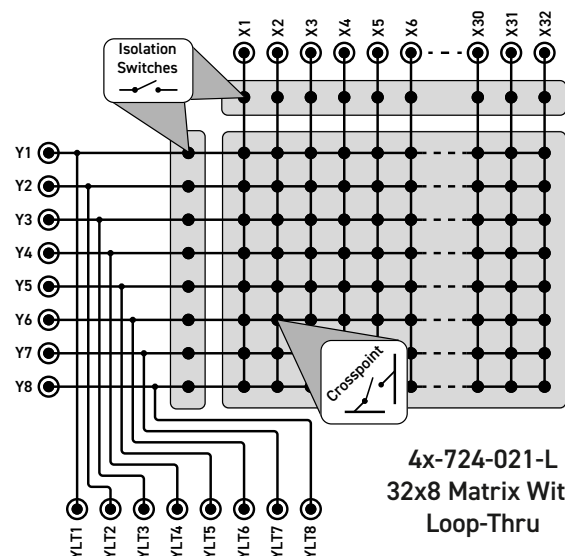
The 4x-724 is a high density matrix designed to provide a Y to X connection to maximize bandwidth.

This module is based on the same construction as the popular 40-725 RF matrix, but has increased capacity and optional Y axis loop thru allowing easy expansion.

## Supported by *eBIRST*

This module is supported by *eBIRST* test tools. These simplify switching 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)



4x-724-021-L  
32x8 Matrix With  
Loop-Thru

## 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).

## Y Axis Loop-Thru

The easy to use loop-thru option allows 4x-724 modules to be cascaded to form larger matrices whilst minimizing impact on RF performance.

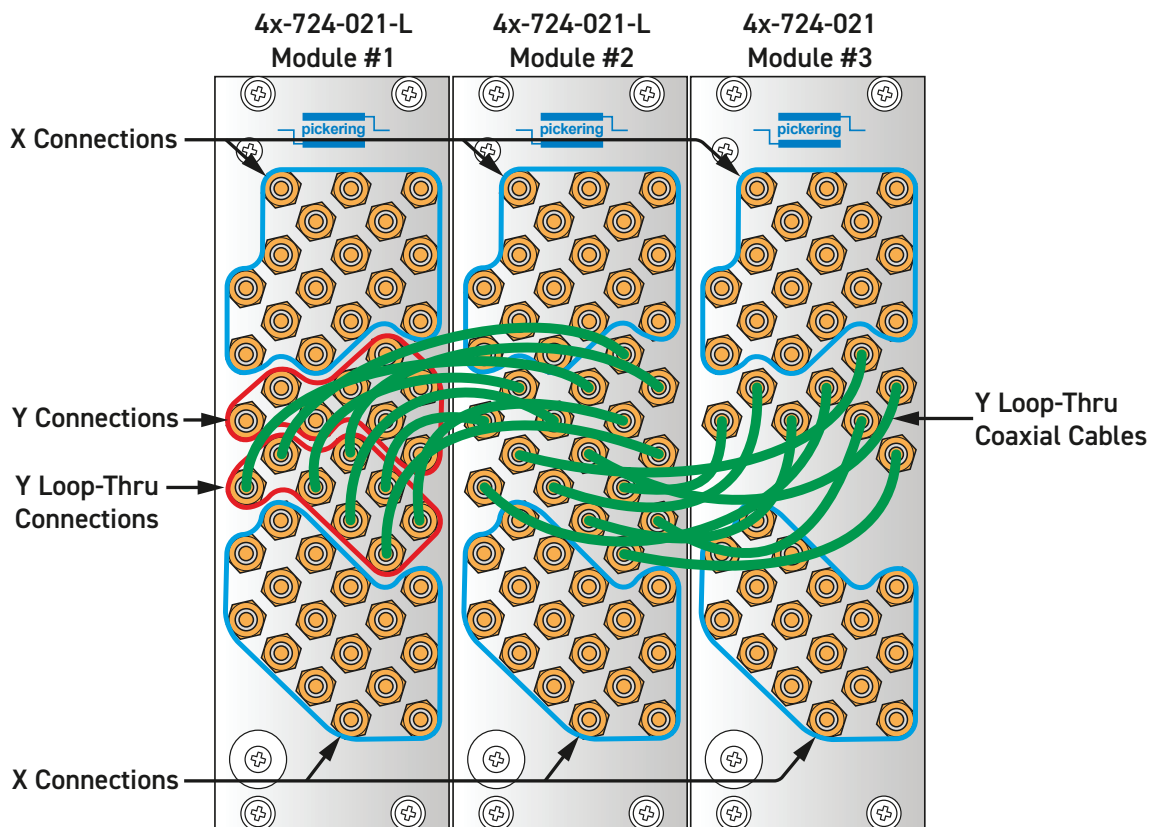
The 4x-724-021-L version of the module has Y loop-thru connectors on the front panel which are simply plugged into the Y connectors of the adjacent matrix module via SMB to SMB coaxial cables. The loop thru system is designed to provide an extended connection from Y to X. The inter-module front panel wiring for an example 96x8 matrix is shown below and the switching diagram is show overleaf.

## Other RF Matrices in Pickering's PXI/PXIe Range:

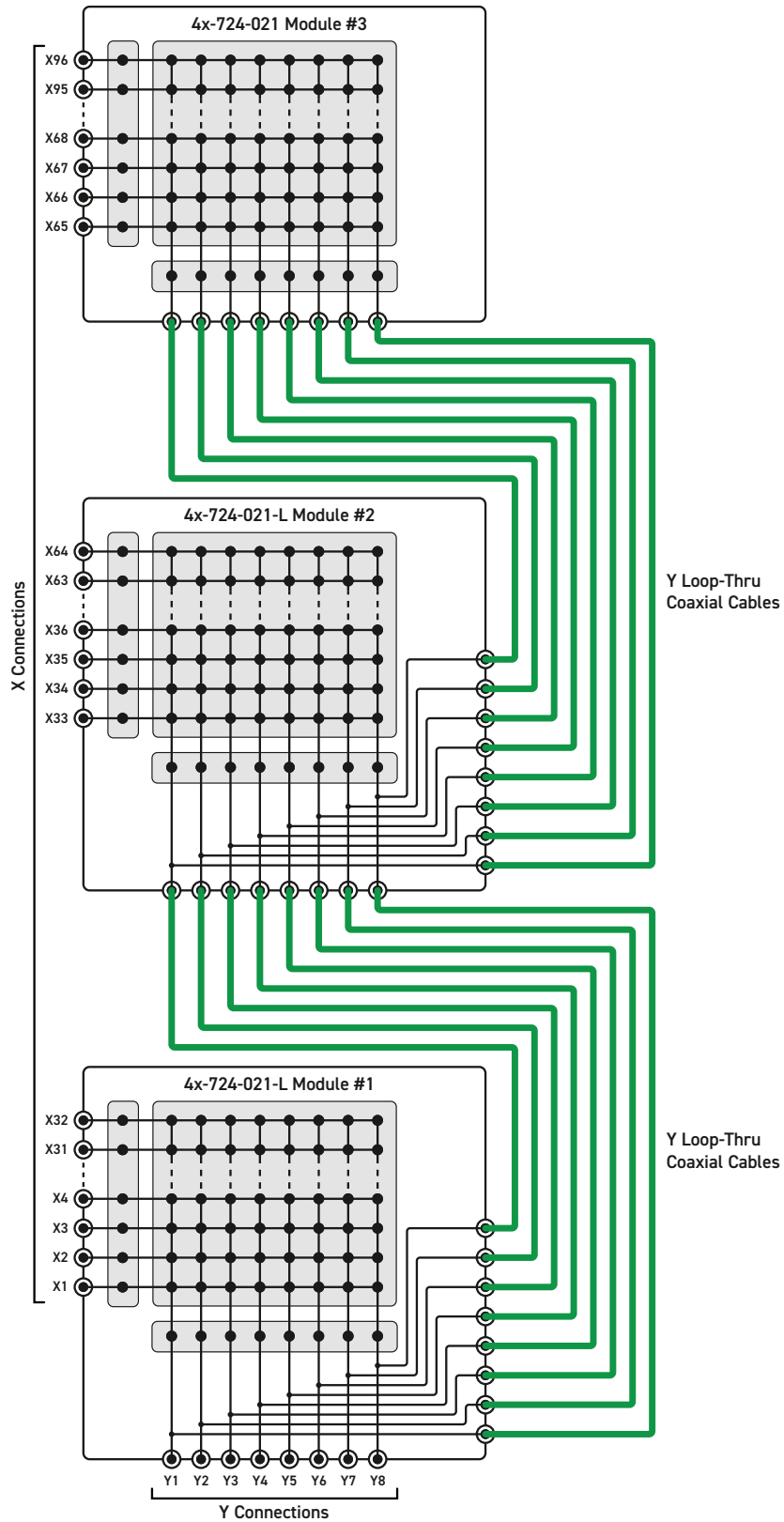
40-725	8x9 500 MHz, 50 Ω/75 Ω
40-726A	12x8 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40-727	16x4 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40-728	16x2 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40-729	8x4 300 MHz, 50 Ω/75 Ω - Optional Y Loop-Thru
40-750	8x2 1.5 GHz, 50 Ω/75 Ω - Y Loop-Thru
4x-877A	Single/dual 2x2 2.5 GHz, 50 Ω
4x-837A	Single/dual 2x2 2.5 GHz, 75 Ω
45-720A	6 U, 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
65-110A	Scalable 24x8 to 104x16 200 MHz, 50 Ω



**96x8 RF Matrix Created from 2-off 4x-724-021-L and 1-off 4x-724-021 (Loop-thru cables interconnect the Y-buses of each 32x8 matrix module)**



2 off 4x-724-021-L and 1 off 4x-724-021 32x8 RF Matrix Modules Interconnected as a 96x8 Matrix

## Relay Type

The 4x-724 is fitted with ruthenium sputtered reed relays. A spare reed relay is built onto the daughter board to allow easy maintenance with minimum downtime. All reed relays are manufactured by our Relay Division: [pickeringrelay.com](http://pickeringrelay.com)

## General Matrix Switching Specification

Maximum Switch Voltage:	100 V
Maximum Switch Current:	0.5 A
Maximum Switch Power:	10 W
Characteristic Impedance:	50 Ω
On Path Resistance:	<1000 mΩ
Off Path Resistance:	>10 <sup>8</sup> Ω
Expected Life - Matrix:	1x10 <sup>9</sup> operations
Expected Life - Loop-Thru:	1x10 <sup>7</sup> operations
Operate Time:	<1 ms, 0.5 ms typical
Release Time:	<1 ms, 0.5 ms typical
Matrix Closure Limit:	Only a single X should be switched to any Y point at the same time.

## Power Requirements - 40-724

+3.3 V	+5 V	+12 V	-12 V
65 mA	1.8 A	0	0

## Power Requirements - 42-724

+3.3 V	+12 V
65 mA	900 mA

## 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 - 4x-724-0xx

Maximum Frequency:	Usable to 300 MHz	
Insertion Loss (typical) †:	300 MHz	<3 dB
VSWR (typical) †:	<2.5:1 to 150 MHz	
Crosstalk (typical) †:	10 MHz:	-60 dB
	100 MHz:	-40 dB
	300 MHz:	-30 dB
Isolation (typical):	10 MHz:	100 dB
	100 MHz:	80 dB
	300 MHz:	70 dB

## Loop Thru RF Specification - 4x-724-0xx-L

Maximum Frequency:	Usable to 150 MHz *	
Insertion Loss (typical):	100 MHz:	<3 dB
VSWR (typical):	<2.5:1 to 100 MHz	
Crosstalk (typical):	10 MHz:	-60 dB
	100 MHz:	-40 dB
Isolation (typical):	10 MHz:	100 dB
	100 MHz:	80 dB

† 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. For further assistance on getting maximum performance from the 4x-724 please refer to the operating manual.

\* The lower RF performance of the 4x-724-0xx-L versions is due to the loop-thru connections not having isolation switching.

## Mechanical Characteristics

40-724 - Single slot 3U PXI (CompactPCI card).

42-724 - Single slot 3U PXIe, compatible with PXIe hybrid slot

Module weight: 580 g (fully populated 32x8 with loop-thru)

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

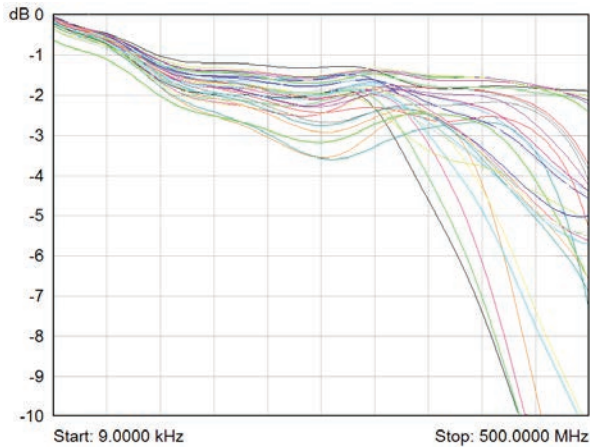
## Connectors

40-724 - PXI bus via 32-bit P1/J1 backplane connector.

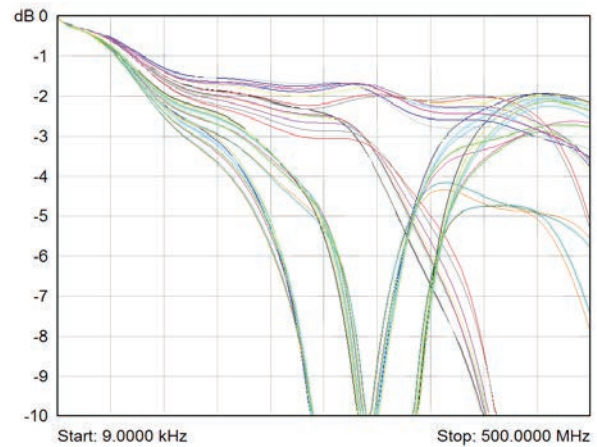
42-724 - PXIe bus via XJ3 and XJ4 backplane connectors.

Signals via front mounted SMB coaxial panel connectors, for connector layout, please refer to the operating manual.

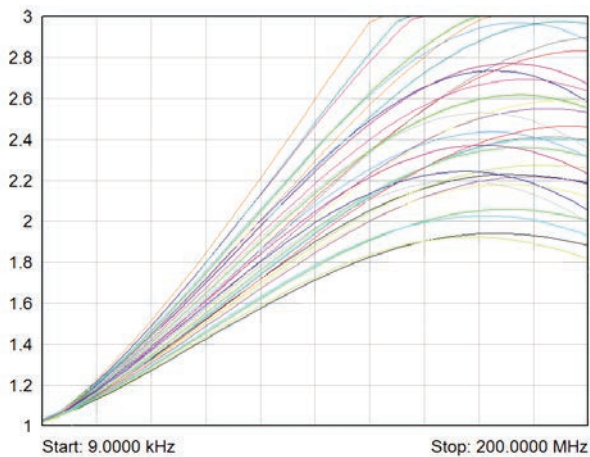
## RF Performance Plots for 4x-724 RF Matrix Module



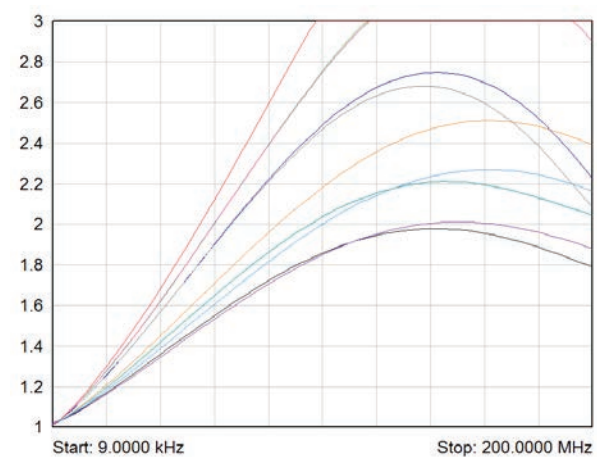
**4x-724-0xx Insertion Loss For X to Y Signal Paths**



**4x-724-0xx-L Insertion Loss For X to Y Signal Paths**



**4x-724-0xx VSWR For X to Y Signal Paths**



**4x-724-0xx-L VSWR For X to Y Signal Paths**

### PXI & CompactPCI Compliance - 40-724

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 - 42-724

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.

## Product Order Codes

PXI 32x8 RF Coaxial Matrix:		
SMB, 50Ω		40-724-021
SMB, 50Ω with loop-thru on Y axis		40-724-021-L
PXI 32x4 RF Coaxial Matrix:		
SMB, 50Ω		40-724-022
SMB, 50Ω with loop-thru on Y axis		40-724-022-L
PXI 16x8 RF Coaxial Matrix:		
SMB, 50Ω		40-724-011
SMB, 50Ω with loop-thru on Y axis		40-724-011-L
PXI 16x4 RF Coaxial Matrix:		
SMB, 50Ω		40-724-012
SMB, 50Ω with loop-thru on Y axis		40-724-012-L
PXIe 32x8 RF Coaxial Matrix:		
SMB, 50Ω		42-724-021
SMB, 50Ω with loop-thru on Y axis		42-724-021-L
PXIe 32x4 RF Coaxial Matrix:		
SMB, 50Ω		42-724-022
SMB, 50Ω with loop-thru on Y axis		42-724-022-L
PXIe 16x8 RF Coaxial Matrix:		
SMB, 50Ω		42-724-011
SMB, 50Ω with loop-thru on Y axis		42-724-011-L
PXIe 16x4 RF Coaxial Matrix:		
SMB, 50Ω		42-724-012
SMB, 50Ω with loop-thru on Y axis		42-724-012-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

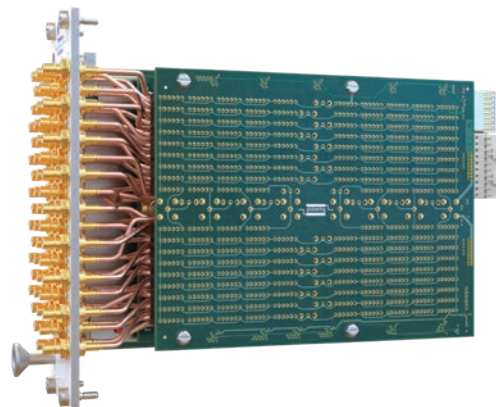
4x-724 is supported by the eBIRST test tools which simplify the identification of failed relays, the required eBIRST tools are below. For more information go to:

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

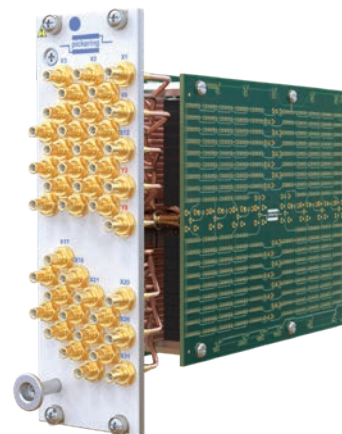
Product	Test Tool	Adaptor
4x-724-0xx	93-002-001	93-002-202
4x-724-0xx-L	93-002-001	93-002-202

### Mating Connectors & Cabling

For a complete list of connection accessories and documentation for the 4x-724 modules please refer to the [RF Cable Assemblies data sheet \(90-011D\)](#).



42-724-021-L PXIe 32x8 Matrix With Loop-Thru



42-724-021 32x8 Matrix Without Loop-Thru

## 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

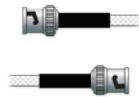
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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



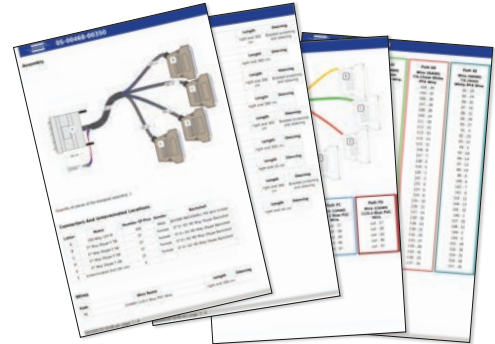
Breakouts



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)

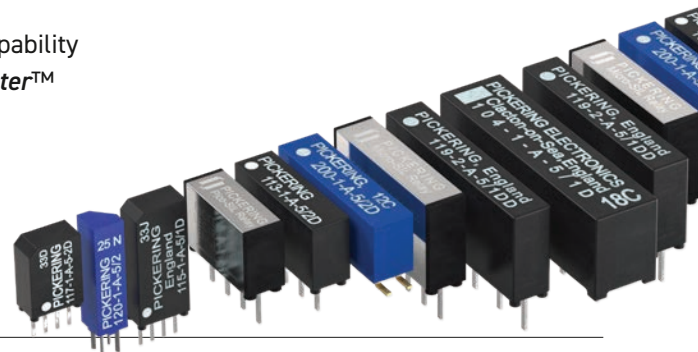
## Mass Interconnect

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 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

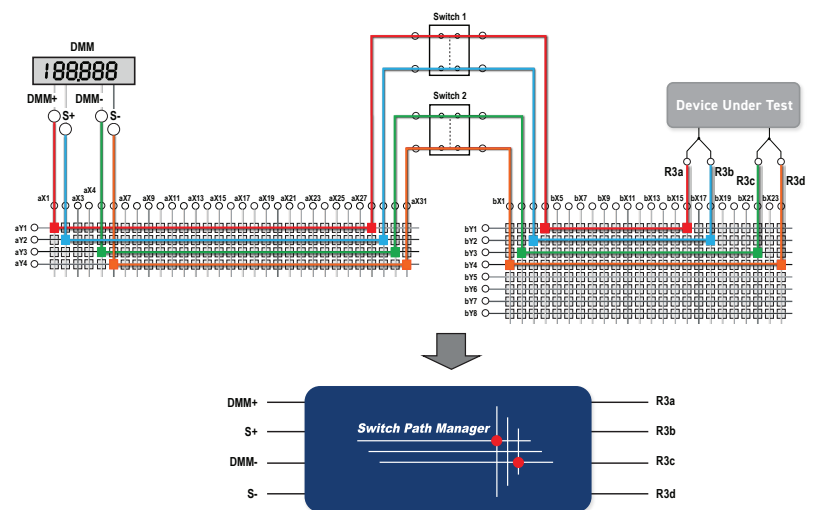
Drivers for popular Linux distributions are available, other environments are also supported, please contact Pickering with specific enquiries. We provide Soft Front Panels (SFPs) for our products for familiarity and manual control, as well as comprehensive documentation and example programs to help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

