

- Integrated PXI 2 A Matrix Module With Built In High Performance Screened Analog Bus
- 2-Slot Configurations to 48x8 (2-Pole), 4-Slot Configurations to 96x8 (2-Pole) & 8-Slot Configurations to 192x8 (2-Pole)
- Load Just The Number of Daughter Switch Cards You Need For Your Application
- Custom Versions Available
- Maximum Current 2 A Hot or Cold Switching
- 2-Pole Switching up to 150 VDC/100 VAC and up to 60 W Max Power
- 3 ms Operate/Release Time
- Automatic Analog Bus Isolation Switching Gives >25 MHz Bandwidth
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- Built-In Diagnostics - *BIRST*™
- 3 Year Warranty



The 2 A Matrix BRIC is a higher power/voltage version of Pickering's established range of PXI Matrix BRIC modules. It features higher voltage, current and power handling than the ultra high density reed relay based BRICs. However, it is not suited to switching low level signals - specifically signals <100 µV - here ruthenium reed relays are a better choice and have a very long lifetime of up to 1000 million operations. For superior low level switching please refer to our 40-560A/561A/562A range.

Pickering's Range of 2 A BRIC Matrix Modules				
Model No.	Poles	Y-Bus Size	Min. Matrix Size	Max. Matrix Size
40-568	1	4	75x4	600x4
40-596	1	6	58x6	464x6
40-567	1	8	44x8	352x8
40-597	1	12	32x12	256x12
40-598	1	16	24x16	192x16
40-566A	2	4	55x4	385x4
40-565A	2	8	24x8	192x8

BRIC™ 2nd Generation PXI 2 A Switch Matrix

The 40-565A BRIC is a range of high density matrix modules able to switch up to 2 A at 150 VDC/100 VAC. They are available in 2, 4 or 8-slot PXI sizes to suit most high performance matrix requirements, constructed using quality electro-mechanical relays for high switching confidence.

Typical applications include signal routing for functional ATE systems. With this high level of switching density, 40-565A matrix modules allow 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 14-slot PXI chassis.

- **BRIC2** - 2-slot PXI Module, this can hold 1 or 2 matrix daughtercards, 384 crosspoints (up to 48x8 2-pole).
- **BRIC4** - 4-slot PXI Module, this can hold up to 4 matrix daughtercards, 768 crosspoints (up to 96x8 2-pole).
- **BRIC8** - 8-slot PXI Module, which can hold up to 8 matrix daughtercards, 1536 crosspoints (up to 192x8 2-pole).

High Reliability and Easy of Use

The 40-565A PXI BRIC is designed to minimise the cost and complexity of cable assemblies to the device under test and instrumentation. Analog busing 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 - *BIRST*

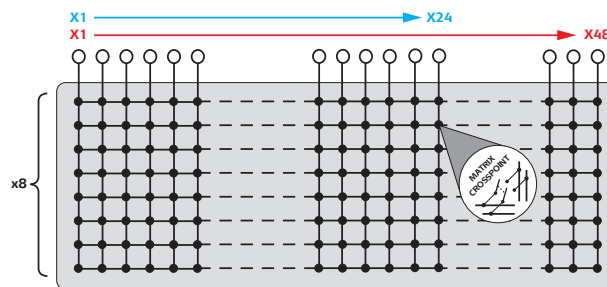
The BIRST facility provides a quick and simple way of finding relay failures. No test equipment is required, simply disconnect the UUT from the BRIC's connectors, launch the BIRST application and the tool will run a diagnostic test that will find all relays with faulty contacts.

For more information go to: pickeringtest.com/birst

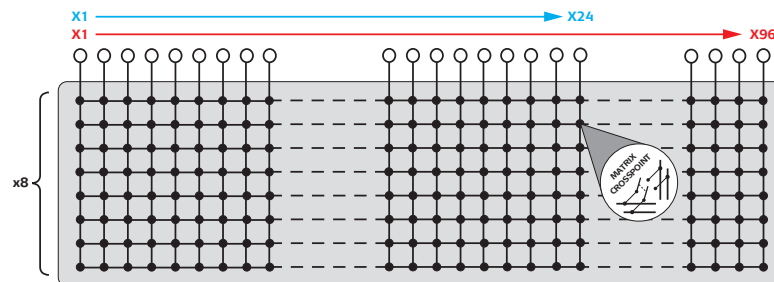
40-565A BRIC Key Advantages

- Complete PXI Switching Solution in one PXI Module.
- Simplified cabling, easy to connect to the DUT thus minimizing costs.
- Internal Shielded Analog Bus giving maximum signal integrity with easy expansion at minimal cost with maximum bandwidth and isolation.
- Program as one whole matrix, so very easy to achieve fast operate time.
- Targeted at high performance matrix switching with minimized cost.
- Build just the matrix configuration you need. Modular architecture allows users to buy just as much matrix capacity as they require, expansion cards can be added later.
- BRICs allow use of much lower cost 8 or 14 slot PXI chassis (such as 40-908 or 40-914).
- Simpler and faster programming with Direct I/O, VISA and IVI Drivers + LabView Soft Front Panels. Fully compatible with NI Switch Executive.
- Built-in BIRST self-test.
- Custom versions built to order.

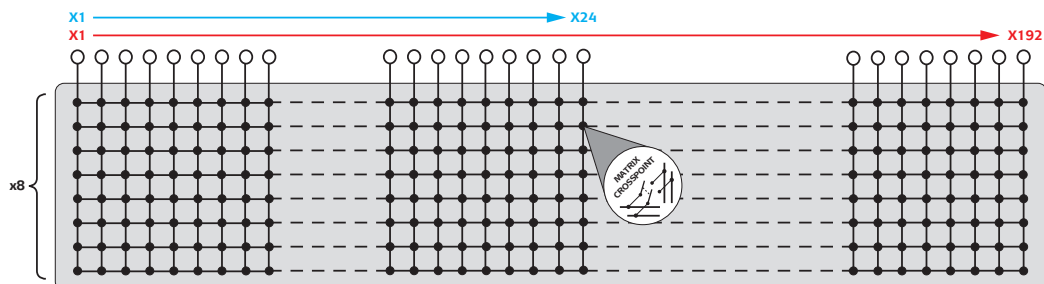
The 40-565A in BRIC2 Format is Available With Matrix Configurations of 24x8 or 48x8 (2-Pole)



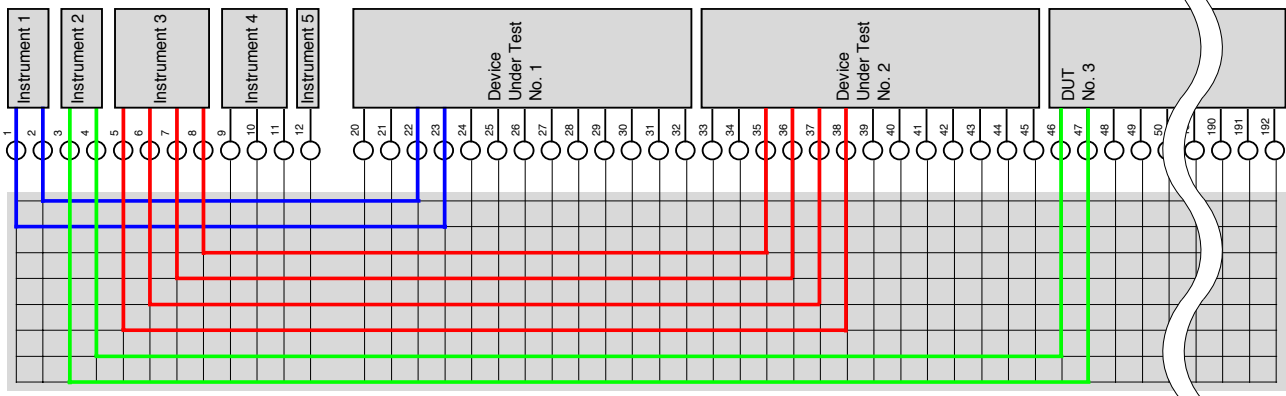
The 40-565A in BRIC4 Format is Available With Matrix Configurations Between 24x8 and 96x8 (2-Pole)



The 40-565A in BRIC8 Format is Available With Matrix Configurations Between 44x8 and 352x8 (2-Pole)



Example Configurations of the 40-565A 2 Amp BRIC Matrix



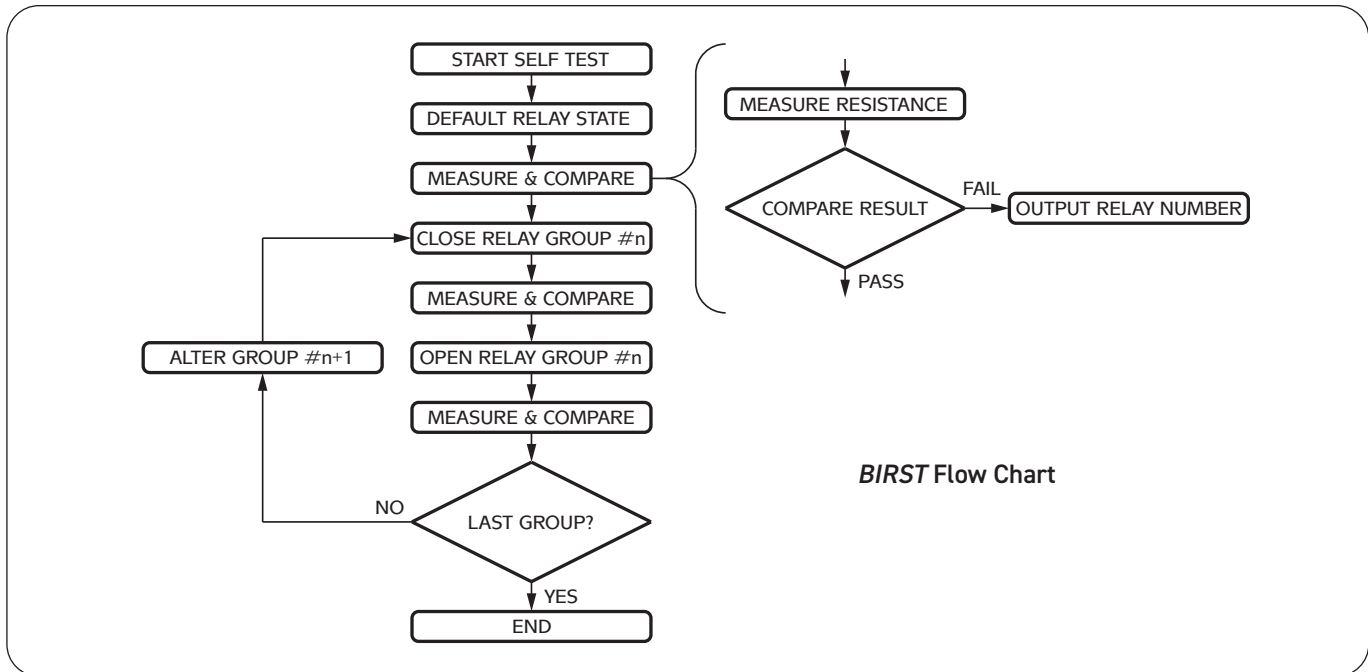
Schematic diagram showing a 192x8 BRIC Matrix being used to parallel test multiple DUTs. The BRIC Matrix allows tremendous test system flexibility.

Performance & Cost Comparison With Competing Platforms for a Typical 192x8 Matrix (2-pole switching)

		Pickering PXI 2Amp BRIC	VXI Industry Density	SCXI Highest Density
192 x 8 Matrix, 2 Pole	Matrix Model Used	40-565A-102-192x8	6 units (32x8 Matrix)	6 x units (32x8 Matrix)
	Overall Matrix Size	192x8 (1536 crosspoints)	192x8 (1536 crosspoints)	192x8 (1536 crosspoints)
	Analog Bus	Yes	No	Yes
	No of Slots	8-Slot 3U PXI Module	6 Slots of 6U VXI	6 Slots of 4U SCXI
	Use Low Cost Chassis?	Yes (8 or 14-slot)	No	No
	Operate Time	3 ms	2 ms	4 ms
	Max Volts	150 VDC/100 VAC	200 VDC	150 VDC/150 VAC
	Max Current/Power	2 A, 60 W	1 A, 30 W	1 A, 30 W
	Bandwidth	25 MHz	<2 MHz	<5 MHz
	Relay Lifetime	10 ⁸	10 ⁷	5x10 ⁷
	Relay Type	Electro-mechanical Relay	Electro-mechanical Relay	Electro-mechanical Relay
	Relative Cost †	<40%	100%	75%

† Relative Costs are for switching cards only, so additional chassis, cabling, etc have not been included.

Built-In Relay Self Test - BIRST



BIRST Flow Chart

It can be hard to identify faulty relays on complex switching matrices. The user may be aware that the test system is not behaving as expected but may be unsure if it is a cabling fault, a software problem or a faulty matrix. Discovering the source of the problem takes time and effort users may not have when working to tight schedules.

To ensure low cost of ownership, Pickering Interfaces has now incorporated a test tool, BIRST, into the BRIC.

BIRST

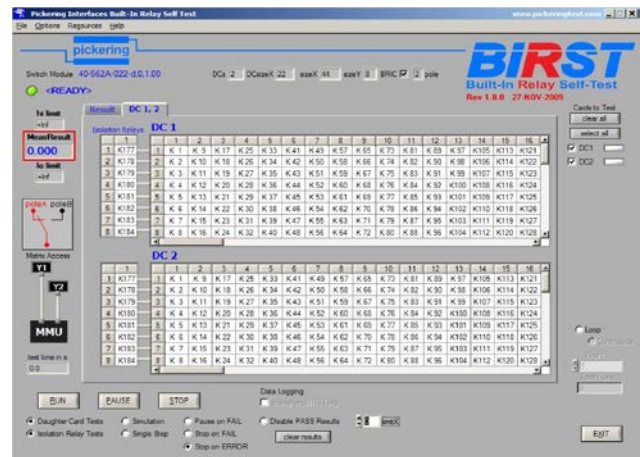
This is a sophisticated diagnostic tool, which allows a complete relay self test of a BRIC module. It is an easy to use, tool that is especially useful in remote production sites where local technical support may be limited. It provides the following features and capabilities:

- Complete BRIC, Matrix self-test capability
- High fault coverage, self-test tool
- Tests for all relay fault types (bad open or bad close)
- Identifies faults to individual component relay level
- Test sequencer allows detailed control of testing
- Test results shown on screen or sent to log file
- Runs single or repeat tests for maximum confidence

Designed for Reliability and Serviceability

BIRST provides a quick and cost effective way of identifying the fault or simply providing reassurance that the matrix is working correctly.

The design of Pickering Interfaces' products ensures that relay replacement is with a minimum of investment in tools. The use of leaded relays in preference to surface



Test Sequencer Front Panel for BIRST. This allows any combination of tests to be run in either single or multiple sequences. All test data is displayed in the results window and can be written to a data file.

mount ensures that the replacement of one device will not stress others through the use of re-flow techniques. Individual relay failures can be corrected with little impact on the others in the matrix. This maximizes service life even after a failure has occurred and been repaired.

The repairer's skills required are a good understanding of the extraction and replacement of leaded components. Spare relays are included with many of Pickering's lower density matrix modules. Alternatively replacement parts are readily available from Pickering Interfaces representatives. The ability to replace failures locally ensures that system downtime is minimized and transportation costs are avoided.

Built-In Relay Self Test - *BIRST*

Relays have specific voltage and current ratings and can be damaged if these parameters are exceeded – this can happen accidentally during test development and debug. Damaged relays can exhibit a variety of failures including:

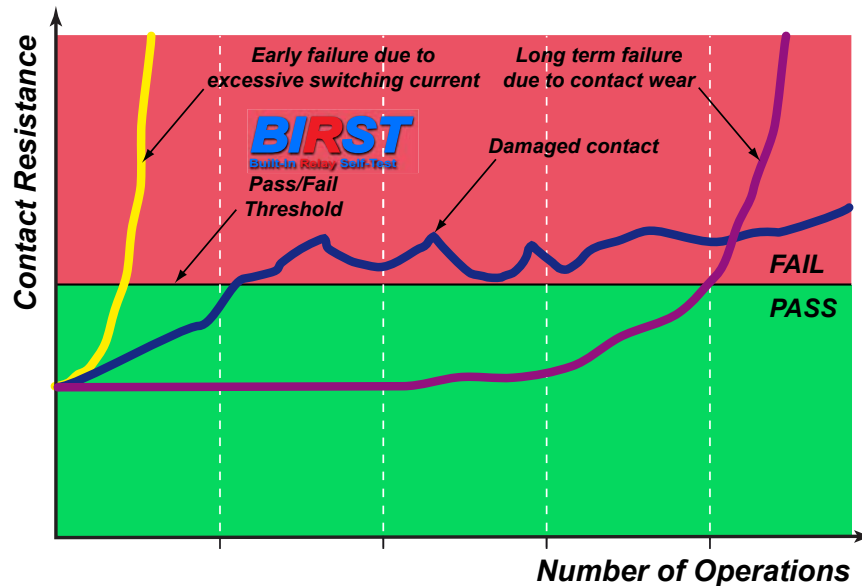
- Permanent or intermittent open/short circuits
- Variable path resistance.

These are often very difficult to diagnose as they can erroneously connect signals together causing unpredictable UUT behaviour.

Historically, complex switching systems on platforms such as VXI and Pickering's System 10/20 GPIB products have included a degree of self test for the relays. But in PXI, the industry has not included self test on switching because of the compromises introduced on density and cost when implementing previous self test architectures. As an alternative, some PXI switching solutions include relay operation counters to attempt to predict when a relay will fail. Although it may be helpful to know how intensively a relay might be being used it is not on its own a good indicator. The disadvantages are:

- Load conditions alone can impact the relay operating life by more than three orders of magnitude.
- Using the measure as a predictive maintenance tool (replacing relays when they have operated a number of times) can easily degrade the reliability of a switching system because of the disturbance that relay replacement causes to adjacent devices (not just relays), the risk of introducing a relay with "infant mortality" and even the potential for damaging the PCB when the change is made, especially if the relays are surface mount devices.

Pickering has greatly improved the test methodology to the extent it is now possible to include full self test in PXI switch modules with minimal impact on cost and switching density, welcome news for users who are used to having such features in their solutions. BIRST will identify any relay failures in the switch module and is also capable of detecting relays with deteriorating contacts which may indicate they are in the process of failing, as shown below.



To conduct a test the user simply disconnects the switching module from the UUT and test instrumentation and runs the supplied application program. No supporting test equipment is needed; the test runs automatically and identifies any defective or suspect relays within the module. If the switch module is connected directly to a Mass Interconnect receiver then BIRST may be executed without removing these connections. The BIRST tool is not intended to entirely displace user-developed self test applications that are built into some ATE systems. This system level test typically uses an external DMM and loop back mechanisms to check for switching and cable harness faults. BIRST conducts its test when the UUT and instrumentation are disconnected from the switching system, if BIRST finds no switching faults and a system level tool does find faults, the problem is with the cabling system. The user does not have to design software to diagnose switching faults, considerably simplifying the design task for system self test.

Relay Type

The 40-565A BRIC modules are fitted with electro-mechanical relays.

General Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	150 VDC/100 VAC*
Max Power:	62.5 VA, 60 W
Max Switch Current:	2 A
Max Continuous Carry Current:	2 A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100 ms (up to 10% duty cycle)
Initial Path Resistance	
On (Single Module):	<1 Ω (X-Y connection)
Off (Single Module):	>10 ⁹ Ω
Minimum Voltage:	100 μ V
Differential Thermal Offset:	<10 μ V
Operate Times	
Crosspoint Relay:	<3 ms
Crosspoint & Isolation Relay:	<6 ms
Expected Life (operations)	
Very low power signal load:	>1x10 ⁸
Low power load (2 W):	>1.5x10 ⁷ (0.1 A 20V DC)
Medium power load (30 W):	>5x10 ⁶ (1 A 30 VDC)
Full power load (60 W):	>1x10 ⁵ (2 A 30 VDC)

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

Typical Bandwidth and Crosstalk

Typical Bandwidth For Fully Loaded 192x8 Matrix (40-565A-102-192x8)	25 MHz
Crosstalk for 40-565A-102-192x8 @1MHz	-55 dB

Maximum Crosspoint Count

The 40-565A has a suggested maximum number of simultaneously operated crosspoints of 50 per BRIC4 or 100 per BRIC8, please contact factory if more information is required.

Power Requirements

+3.3V	+5V	+12V	-12V
0	4 A (typical 1 A)	0	0

Width and Dimensions

Two, four or eight slot 3U PXI module (CompactPCI).

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

Module Weight

	Empty BRIC	Fully Loaded BRIC
BRIC2	0.6 Kg	1.2 Kg
BRIC4	0.9 Kg	2.1 Kg
BRIC8	1.6 Kg	4.0 Kg
BRIC daughter card	0.2 Kg	

Connectors

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

Signals via multiple front panel 78-pin male D-type connectors (1 or 2 per 2-slot module, up to 4 per 4-slot module or up to 8 per 8-slot module), for pin outs please refer to the operating manual.

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 & 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.

40-565A BRIC Matrix Product Order Codes

BRIC2 - 2-Slot High Density Matrix

2 A 2-Pole 24x8 Matrix	40-565A-202-24x8
2 A 2-Pole 48x8 Matrix	40-565A-202-48x8

BRIC4 - 4-Slot High Density Matrix

2 A 2-Pole 24x8 Matrix	40-565A-002-24x8
2 A 2-Pole 48x8 Matrix	40-565A-002-48x8
2 A 2-Pole 72x8 Matrix	40-565A-002-72x8
2 A 2-Pole 96x8 Matrix	40-565A-002-96x8

BRIC8 - 8-Slot High Density Matrix

2 A 2-Pole 24x8 Matrix	40-565A-102-24x8
2 A 2-Pole 48x8 Matrix	40-565A-102-48x8
2 A 2-Pole 72x8 Matrix	40-565A-102-72x8
2 A 2-Pole 96x8 Matrix	40-565A-102-96x8
2 A 2-Pole 120x8 Matrix	40-565A-102-120x8
2 A 2-Pole 144x8 Matrix	40-565A-102-144x8
2 A 2-Pole 168x8 Matrix	40-565A-102-168x8
2 A 2-Pole 192x8 Matrix	40-565A-102-192x8

For the expansion of an existing BRIC matrix or replacement of faulty BRIC daughter cards please contact your local sales office.

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 relay types
- Mixture of 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.

Special Versions

BRIC modules can be built in special versions, for example where an exact matrix size is required then partly populated daughtercards may be ordered.

Upgrading With Daughtercards

BRIC modules can be upgraded to a larger matrix size using daughtercards, please consult your local sales office for further information.

Support Products

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
40-565A-002/102/202	91-100-001

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

Mating Connectors & Cabling

For connection accessories for the 40-565A module please refer to the [90-006D](#) 78-pin D-type Connector Accessories 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



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 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:

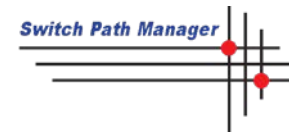
- **Pickering Interfaces Switch Path Manager**
- **National Instruments** products (LabVIEW, LabWindows/CVI, Switch Executive, MAX, TestStand, VeriStand, etc.)
- **Microsoft Visual Studio** products (Visual Basic, Visual C+)
- **Keysight** VEE and OpenTAP
- **Mathworks** Matlab
- **Marvin** ATEasy
- **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