PXI 2 Amp BRIC™ Multi-Slot Matrix 40-566A

- Integrated PXI 2A Matrix Module With Built In High Performance Screened Analog Bus
- Fully Scalable Matrix Solution
- High Density Configurations With 4-Slot to 165x4 (2-Pole) & 8-Slot to 385x4 (2-Pole)
- Flexible Matrix Architecture Through Isolation Switching Enabling Multiple Independent Matrices (Up To 7 Per BRIC8)
- Partially Populated Versions Available
- Maximum Current 2A Hot or Cold Switching
- 2-Pole Switching up to 150VDC/100VAC and up to 60W Max Power
- VISA, IVI & Kernel Drivers Supplied for Windows
- Supported by *BIRST* ™ and *eBIRST* ™ Test Tools
- 3 Year Warranty

Pickering 2A BRIC matrices are higher signal power versions of our established range of PXI BRIC modules. Comprising high quality electro-mechanical relays they feature higher voltage, current and power handling capabilities than existing ultra high density reed relay based BRICs.

The 40-566A is an ideal choice for simultaneously busing up to four higher power signal pairs, where improved robustness is required (please refer to our 40-565 for busing up to eight higher power signal pairs simultaneously).

For lower level switching requirements, please also consider our 40-560A/561A/562A range of sputtered ruthenium reed relay solutions that exhibit superior operating speed & life performance.

BRIC™ 2nd Generation PXI 2A Switch Matrix

The 40-566A BRIC provides a range of high density matrix configurations able to switch up to 2A or 150VDC/100VAC. The 40-566A BRIC modules are available in 4 or 8-slot PXI sizes and are constructed using high quality electro-mechanical relays.

Typical applications include signal routing for functional ATE systems. With this high level of switching density, 40-566A matrix modules allow a complete functional ATE switching system to be housed in a single 3U PXI chassis. BRIC Modules allow the use of a much lower cost 8 slot PXI chassis.

- **40-566A BRIC4** is a 4-slot PXI Module which can hold up to 3 matrix daughtercards with 660 crosspoints (maximum matrix size of 165x4, 2-pole).
- **40-566A BRIC8** is an 8-slot PXI Module which can hold up to 7 matrix daughtercards with 1540 crosspoints (maximum matrix size of 385x4, 2-pole).

High Reliability and Easy of Use

The 40-566A 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.

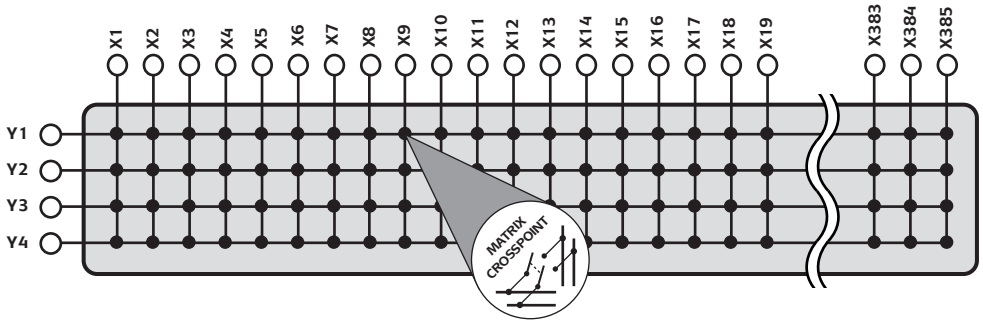
For more information go to: pickeringtest.com/birst

Supported by *eBIRST*

eBIRST switching system test tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.

For more information go to: pickeringtest.com/ebirst

ISSUE 5.1 MAY 2019

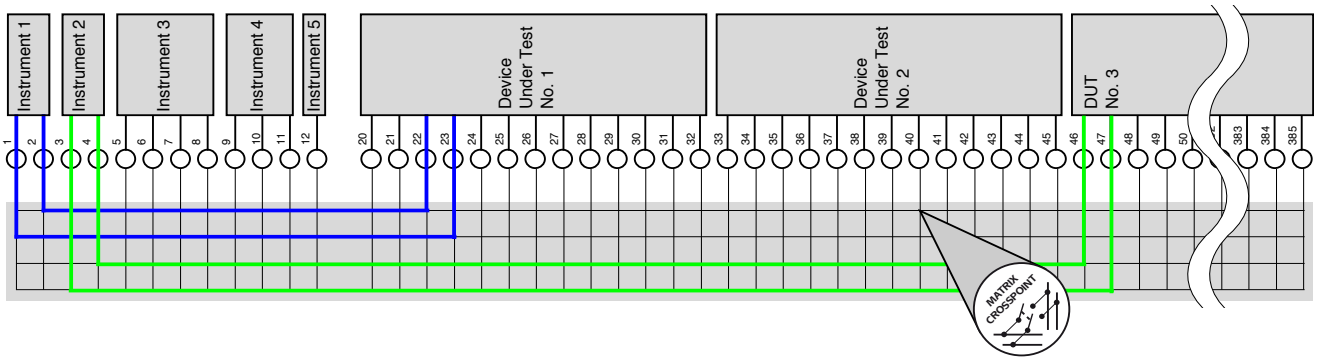


Schematic diagram for 385x4 2-Pole BRIC Matrix (40-566A-107)

40-566A 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, extra cards can be added later to expand the matrix.
- BRICs allow use of much lower cost 8 slot PXI chassis (40-908).
- Simpler and faster programming with Direct I/O, VISA and IVI Drivers + LabVIEW Soft Front Panels. Fully compatible with NI Switch Executive.
- Custom versions built to order.
- Built-In Relay Self Test (BIRST & eBIRST)

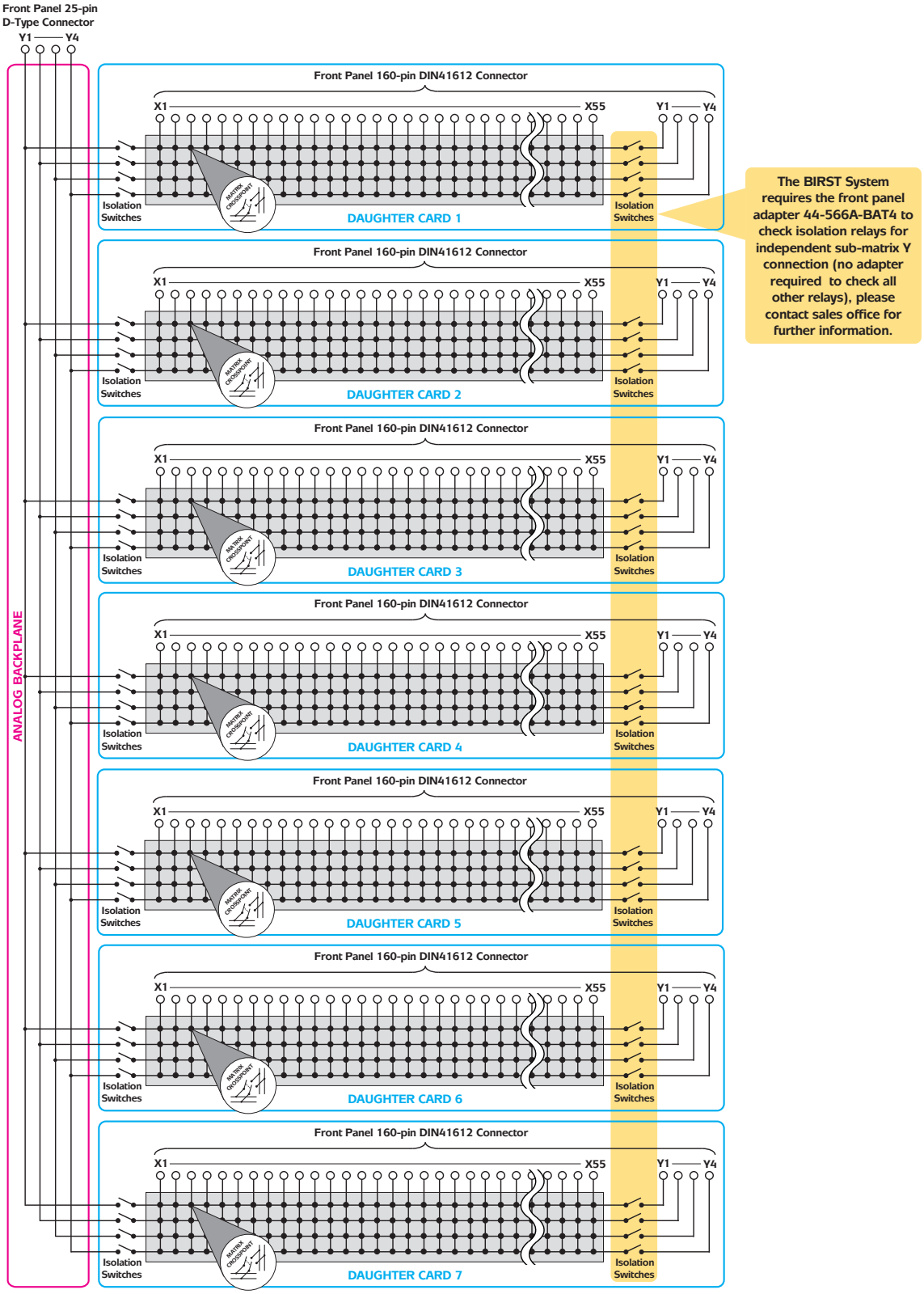
Example Configurations of the 40-566A 2 Amp BRIC Matrix (All connections via X-axis for maximum efficiency)



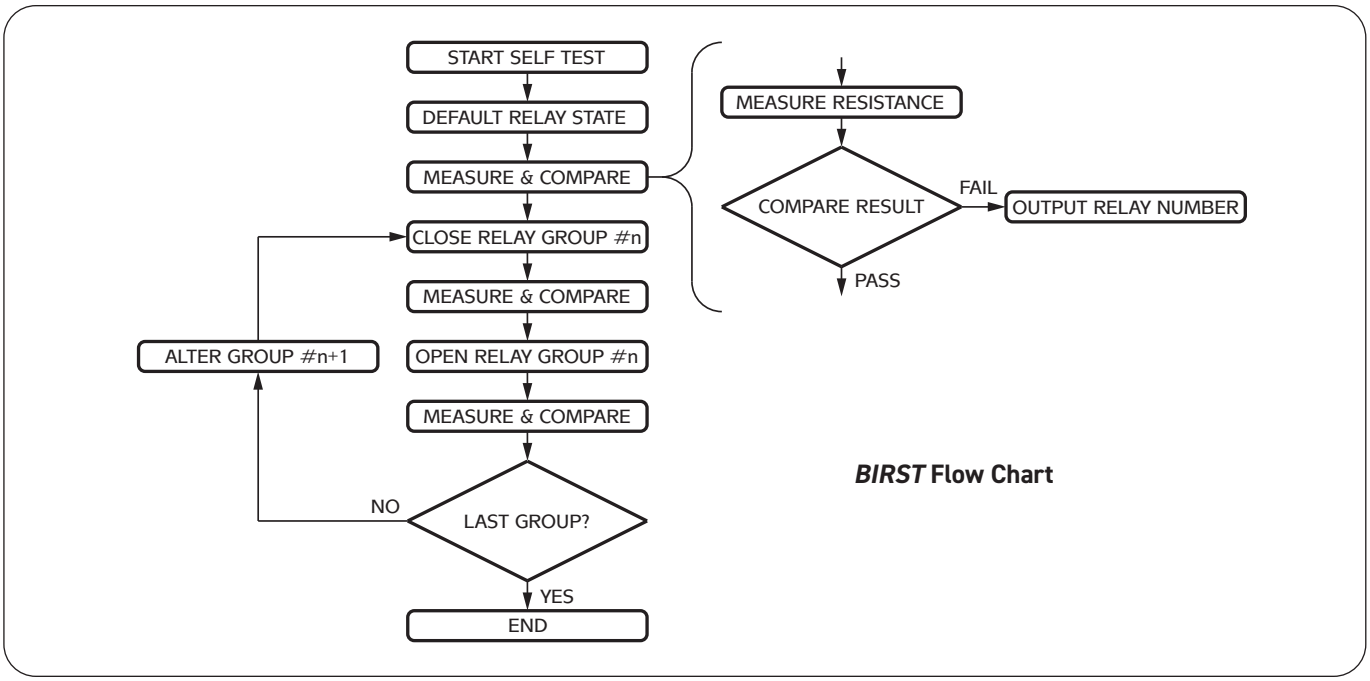
Schematic diagram showing a 385x4 BRIC Matrix being used to parallel test multiple DUTs. The BRIC Matrix allows tremendous test system flexibility.

Flexible Matrix Architecture

Isolation Switching within the 40-566A enables the configuration of multiple independent matrices (up to 7 per BRIC8). These switches allow the removal of redundant rows/columns within a system, maintaining signal integrity through maximized bandwidth as well as keeping interconnection capacitance, leakage and crosstalk to a minimum.



Built-In Relay Self Test - *BIRST*



***BIRST* Flow Chart**

It can be hard to confirm or 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

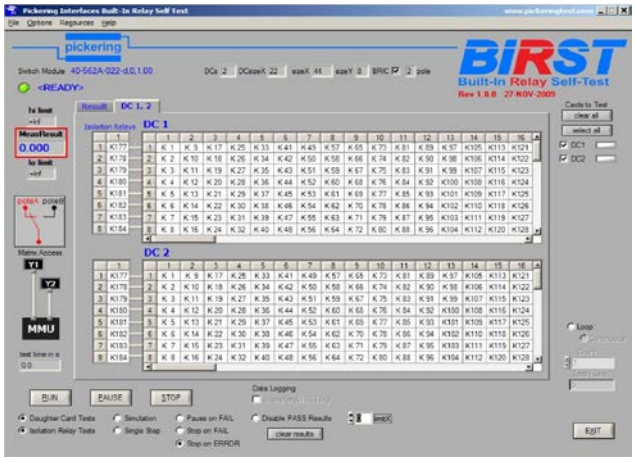
The BIRST is a sophisticated diagnostic tool, which allows a complete relay self test of a BRIC module. The BIRST is an easy to use, tool that is especially useful in remote production sites where local technical support may be limited. It provides the following features and capabilities:

- 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

The 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 can be accomplished with a minimum of investment in tools. The use of leaded relays in preference to surface mounted



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.

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

The repairer's skills required are confined to 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. The damaged relays can exhibit a variety of failures including:

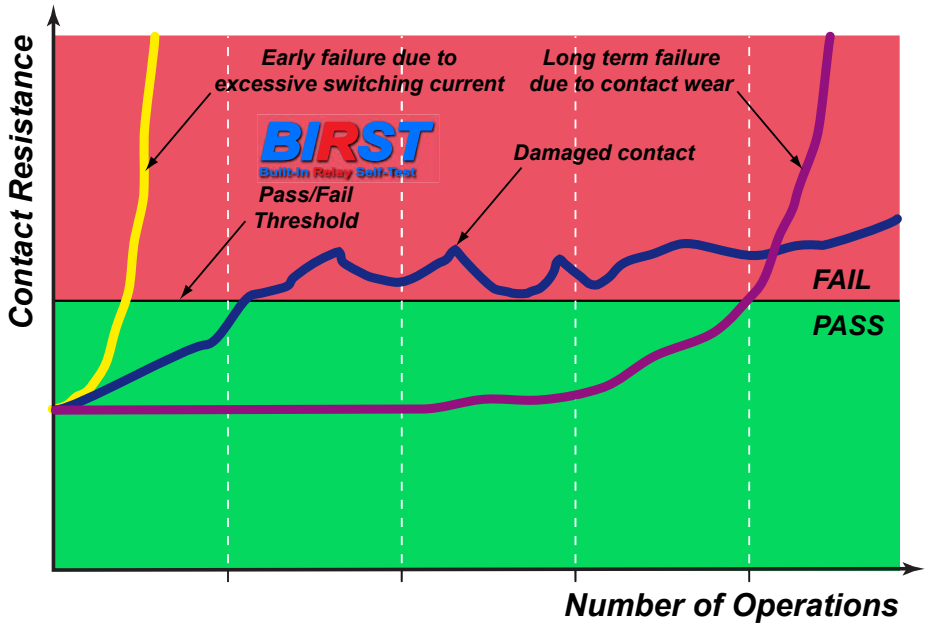
- Permanent or intermittent open/short circuits
- Variable path resistance.

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 40-566A BRIC modules are fitted with electro-mechanical relays.

Switching Specification

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	150VDC/100VAC*
Max Power:	62.5VA, 60W
Max Switch Current:	2A
Max Continuous Carry Current:	2A
Max Pulsed Carry Current Example (for a single switch path):	6A for 100ms (up to 10% duty cycle)
Initial Path Resistance	
On (Single Module):	<850mΩ (X to X) <750mΩ (X to Y)
Off (Single Module):	$>10^9\Omega$
Differential Thermal Offset:	<10µV per relay
Operate Time:	<3ms
Expected Life (operations)	
Very low power signal load:	$>1x10^8$
Low power load (2W):	$>1.5x10^7$ (0.1A 20VDC)
Medium power load (30W):	$>5x10^6$ (1A 30VDC)
Full power load (60W):	$>1x10^5$ (2A 30VDC)

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

Typical Bandwidth

Typical Bandwidth For Fully Loaded 385x4 Matrix (40-566A-107)	10MHz

Maximum Crosspoint Count

The 40-566A has a suggested maximum number of simultaneously operated crosspoints:

- BRIC4 = 50
- BRIC8 = 100

Please contact factory for higher closure requirements.

Power Requirements

+3.3V	+5V	+12V	-12V
0	4A max (fully loaded 40-566A-107, 100 crosspoints energised), typically <2A	0	0

Width and Dimensions

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
BRIC4	0.9Kg	2.1Kg
BRIC8	1.6Kg	4.0Kg
BRIC daughter card	0.2Kg	

Connectors

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

X connections are made via multiple front panel 160-pin male DIN 41612 connectors (Up to 3 per 4-slot module or up to 7 per 8 slot module).
Y connections are made via a single front panel 25-pin male D-type connector.

Note: We recommend that Pickering mating connectors are used with this module which are designed to ensure there are no mechanical interference problems when used in a PXI chassis.

Operating/Storage Conditions

Operating Conditions

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

Storage and Transport Conditions

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

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 33MHz 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.

40-566A BRIC Matrix Product Order Codes

BRIC4 - 4-Slot High Density Matrix	
2 Amp 2-Pole 55x4 Matrix	40-566A-001
2 Amp 2-Pole 110x4 Matrix	40-566A-002
2 Amp 2-Pole 165x4Matrix	40-566A-003
BRIC8 - 8-Slot High Density Matrix	
2 Amp 2-Pole 55x4Matrix	40-566A-101
2 Amp 2-Pole 110x4 Matrix	40-566A-102
2 Amp 2-Pole 165x4 Matrix	40-566A-103
2 Amp 2-Pole 220x4 Matrix	40-566A-104
2 Amp 2-Pole 275x4 Matrix	40-566A-105
2 Amp 2-Pole 330x4 Matrix	40-566A-106
2 Amp 2-Pole 385x4 Matrix	40-566A-107

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

Product Customization

Pickering PXI 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

BIRST Adapter

For the BIRST tool to achieve full relay coverage the supplied **44-566A-BAT4** adapter is required to allow the front panel Y isolation switches to be tested. The adapter consists of a pre-wired 160-pin DIN41612 socket with back-shell, and is fitted to the front panel connector during testing.

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. This product requires master slave testing and two sets of tools are required together with the master slave cable **93-970-301**. For more information go to: pickeringtest.com/ebirst

Connector	Test Tool	Adaptor
160-pin DIN41612	93-002-001	93-002-410
25-pin D-type	93-005-001	93-005-414

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
40-566A	91-100-001

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

Mating Connectors & Cabling

For connection accessories for the 40-566A module please refer to the 90-001D 160-pin DIN 41612 and 90-008D 25-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:

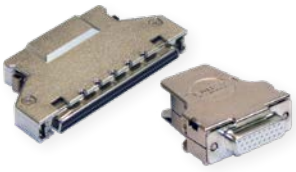
- Mix our 1000+ PXI switching & simulation modules with any vendor's PXI instrumentation
- Embedded or remote Windows PC control
- Real-time Operating System Support
- High data bandwidths, especially with PXI Express
- Integrated module timing and synchronization

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

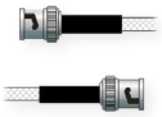
Connectivity Solutions

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.

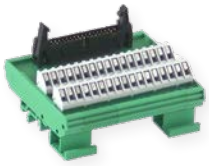


Connectors & Backshells

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 sister company, Pickering Electronics. 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

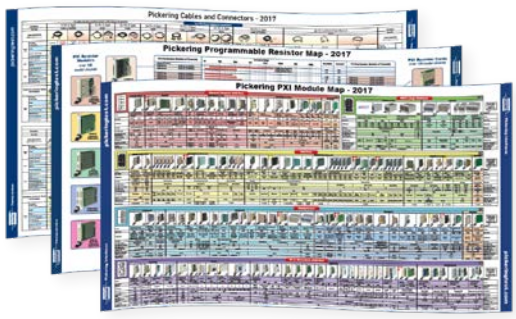
eBIRST Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.
To learn more, please go to: pickeringtest.com/ebirst

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, as well as complete product catalogs and product reference maps to assist when looking for the switching, simulation and cable and connector 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