- Available as a PXI or PXIe Module
- High Density Matrix in 2-Slot PXI Format
- 32x8 and 16x8 2-Pole Configurations
- Maximum Current 2 A Hot or Cold Switching
- Switch up to 220 VDC/250 VAC
- Bandwidth up to 70 MHz
- Automatic Isolation Relay Switching
- Relay Cycle Counting Included
- Drivers Supplied for Windows & Linux, Plus Support for Real-time Systems
- PXI Versions Supported by PXI or LXI Chassis
- PXIe Versions Supported by PXI Hybrid or PXIe Chassis
- Supported by *eBIRST™* Test Tools
- 3 Year Warranty
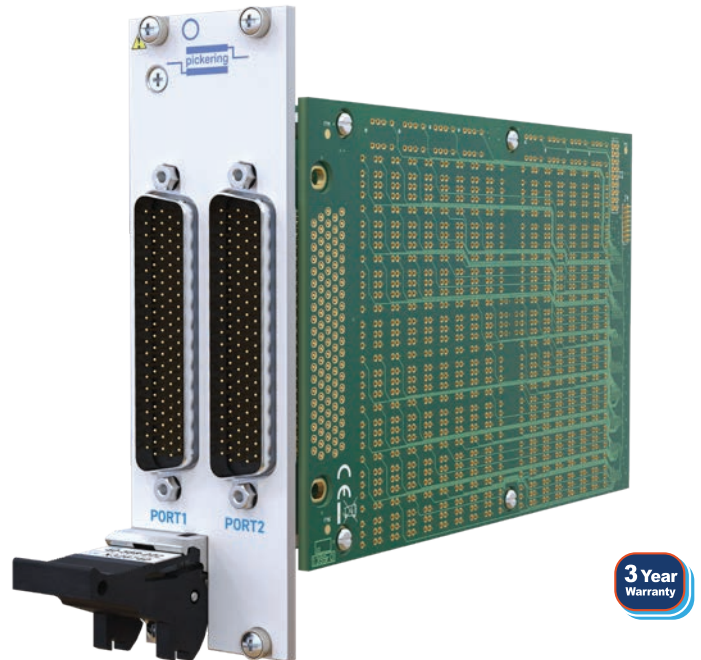
The 40-588 (PXI) and 42-588 (PXIe) are high density 2-pole matrix modules capable of switching up to 2 A at 220 VDC/250 VAC. The module is in 2-slot format and is constructed using quality electromechanical relays for high switching confidence. A smaller 16x8 2-pole version is also available.

The matrix has been optimised for applications that require high signal bandwidth. With careful matrix design and the use of isolation switching, the 4x-588 has a bandwidth in the range of 35 MHz to 70 MHz depending upon the path selected.

High Reliability and Ease of Use

The 4x-588 matrix is formed from two 16x8 matrix daughter cards with their Y-connections linked via an internal analog bus. This is designed to minimise the cost and complexity of interconnecting cable assemblies. Pickering can construct custom cables for all of our PXI modules, please contact sales office for further assistance
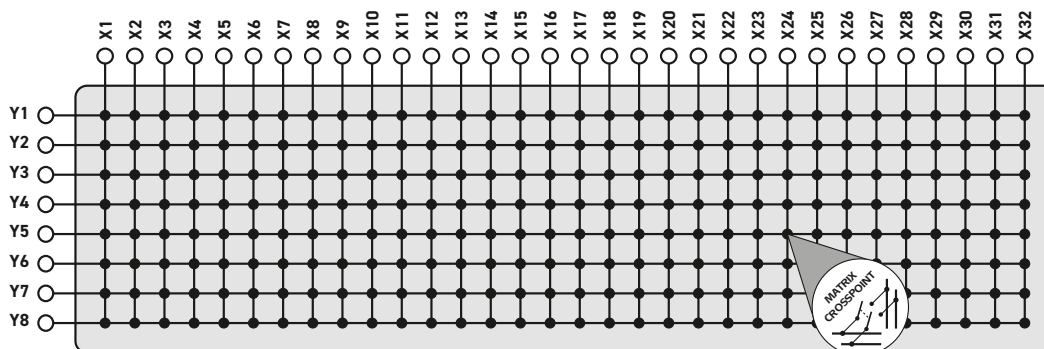
The 4x-588-222 is a 2-pole matrix with a size of 32x8 occupying 2 PXI Slots
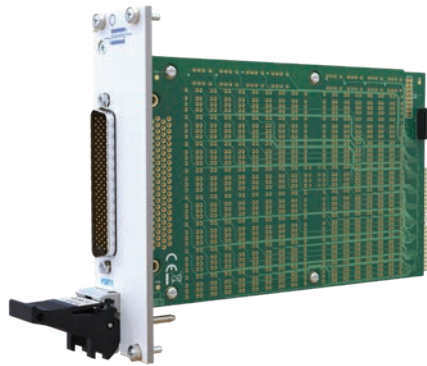
The PXI 40-588-212
16x8 2-pole matrix
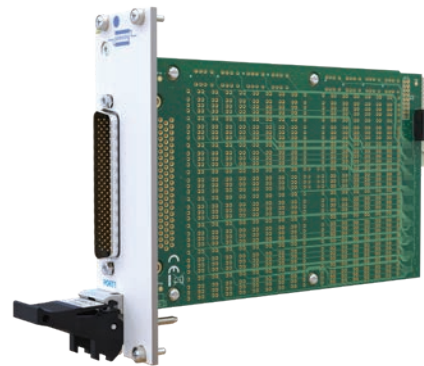
42-588-212 16x8 2-pole
matrix in PXIe format

Isolation Switching

The 4x-588 daughter cards are fitted with isolation switches between the matrix Y-bus and the interconnecting analog bus. These ensure that only the required Y signal is routed to the front panel connector helping to preserve the bandwidth and crosstalk performance.

Supported by *eBIRST*

This module is supported by our *eBIRST* test tools. These tools simplify switching fault-finding by quickly testing the system and graphically identifying the faulty relay. For more information go to: pickeringtest.com/ebirst

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).

Switching Architecture
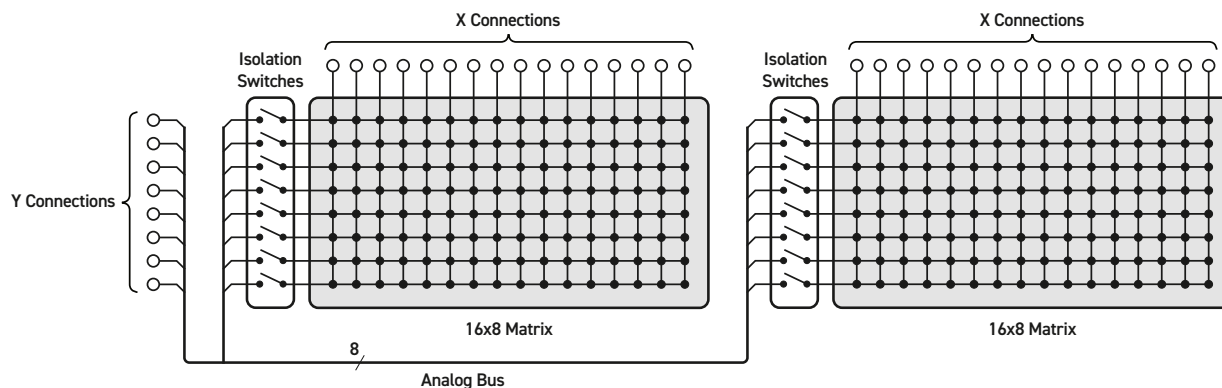
Architecture diagram for the 4x-588-222 showing how the two 16x8 daughter cards are interconnected with the analog bus to create a 32x8 matrix (all signal paths and crosspoints are 2-pole).

Switching Specifications

Switch Type:	Electro-mechanical
Contact Type:	Palladium-Ruthenium, Gold Covered Bifurcated
Max Switch Voltage:	220 V DC/250 VAC*
Max Power:	62.5 VA, 60 W
Max Switch Current:	2.0 A
Max Continuous Carry Current:	2.0 A
Max Pulsed Carry Current Example (for a single switch path):	6 A for 100 ms (up to 10 % duty cycle)
Initial Path Resistance On (Single Module):	<450 mΩ (X-Y connection)
Off (Single Module):	$>10^9 \, \Omega$
Minimum Voltage:	100 µV
Differential Thermal Offset:	<10 µV
Operate Times Crosspoint Relay:	<3 ms
Crosspoint & Isolation Relay:	<6 ms
Expected Life (operations) Very low power signal load:	$>1 \times 10^8$
Low power load (2 W):	$>1.5 \times 10^7$ (0.1 A 20V DC)
Medium power load (30 W):	$>5 \times 10^6$ (1 A 30 V DC)
Full power load (60 W):	$>1 \times 10^5$ (2 A 30 V DC)

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

RF Specification

Bandwidth (-3 dB):	35 MHz to 70 MHz (depending upon path selected, see manual for details)
VSWR (typical):	<1.5:1 to 85 MHz
Crosstalk (typical):	10k Hz: -65 dB 100 kHz: -65 dB 1 MHz: -45 dB 10 MHz: -25 dB 25 MHz: -25 dB 50 MHz: -25 dB
Isolation (typical):	10k Hz: 65 dB 100 kHz: 65 dB 1 MHz: 65 dB 10 MHz: 50 dB 25 MHz: 30 dB 50 MHz: 30 dB

Power Requirements - 40-588

+3.3 V	+5 V	+12 V	-12 V
150 mA	750 mA (max)	0	0

Power Requirements - 42-588

+3.3 V	+12 V
150 mA	370 mA
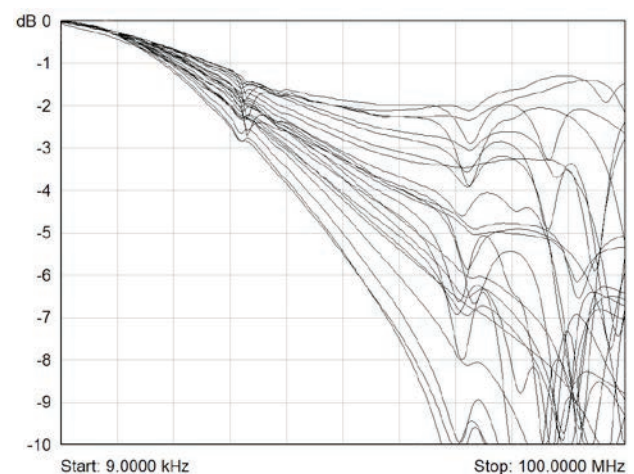
4x-588-222 Typical Insertion Loss Plot
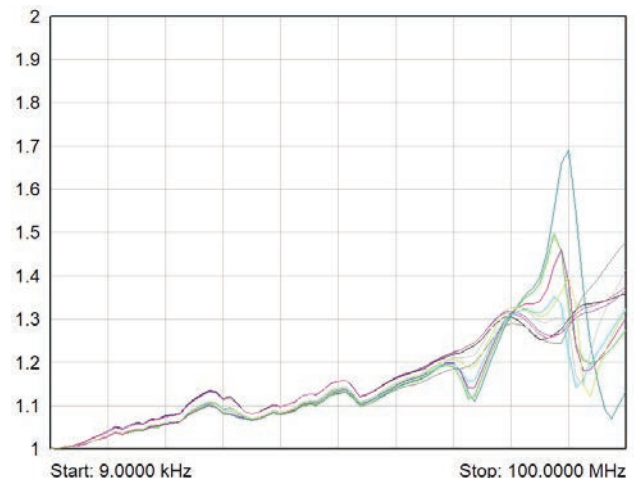
4x-588-222 Typical VSWR Plot

Maximum Crosspoint Count

The 4x-588 has a suggested maximum number of simultaneously operated crosspoints of 50 (please contact factory for applications requiring higher closure counts).

Mechanical Characteristics

40-588 - Two slot 3U PXI (CompactPCI card).

42-588 - Two slot 3U PXIe, compatible with PXIe hybrid slot.

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

Module weight: 720 g

Connectors

40-588 - PXI bus via 32-bit P1/J1 backplane connector.

42-588 - PXIe bus via XJ3 and XJ4 backplane connectors.

Signals via front panel mounted connectors:

- 4x-588-222 - Two 104-pin male D-types.
- 4x-588-212 – One 104-pin male D-type.

For pin outs please refer to the operating manual.

PXI & CompactPCI Compliance - 40-588

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.

PXIe Compliance - 42-588

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 High Density Matrix, 32x8 2-Pole	40-588-222
PXI High Density Matrix, 16x8 2-Pole	40-588-212
PXIe High Density Matrix, 32x8 2-Pole	42-588-222
PXIe High Density Matrix, 16x8 2-Pole	42-588-212

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.

System Ordering Information

The small form factor of the 60-104 LXI/USB modular chassis allows the 40-588 to be installed near the DUT using just the following items:

· **40-588-222**, 32x8 2-pole Switching Matrix, qty 1
· **60-104-001**, LXI/USB Modular Switching Chassis, 2-slot, qty 1
· **63-104-005**, Chassis Low Profile Mounting Kit, qty 1

The above components can be ordered by using the system level part number **60-104-901**.

Support Products

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 listed 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

Product	Test Tool	Adaptor
4x-588-xxx	93-022-001	Not Required

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
4x-588-xxx	91-100-113

For further assistance, please contact the Pickering sales office.

Mating Connectors & Cabling

For connection accessories for the 4x-588 module please refer to the 90-022D 104-pin D-type Connector Accessories data sheets where a complete list and documentation can be found for accessories, or refer to the website

Pickering can supply mating 104-pin connectors and cable assemblies to enable easy integration of the 4x-588 matrix modules

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

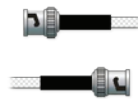· Independence from Windows operating system

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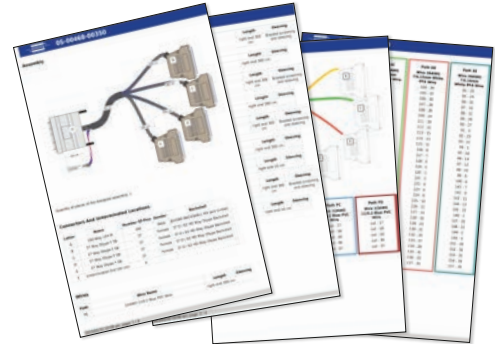
Start designing your custom cabling, go to pickeringtest.com/cdt

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
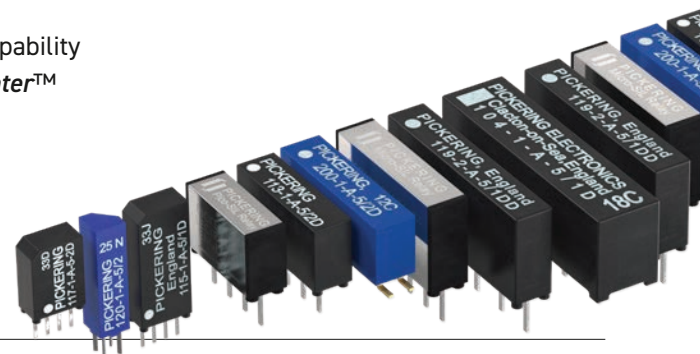
Programming

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
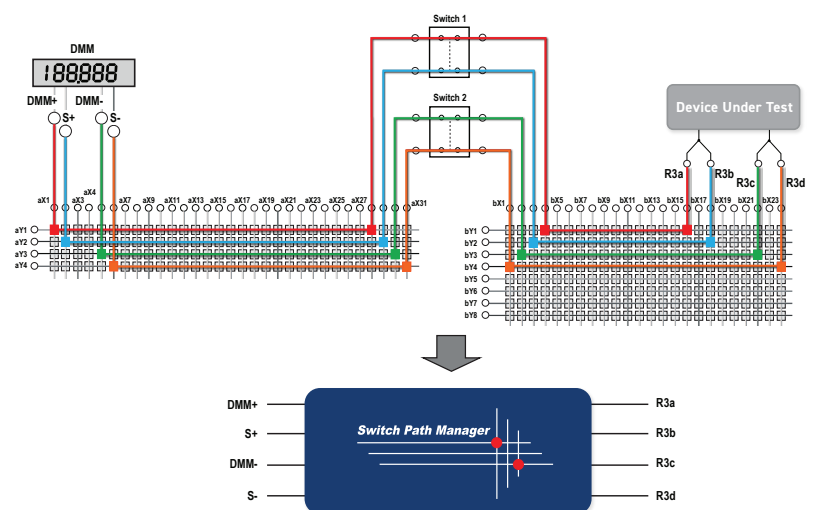
Diagnostic Relay Test Tools

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