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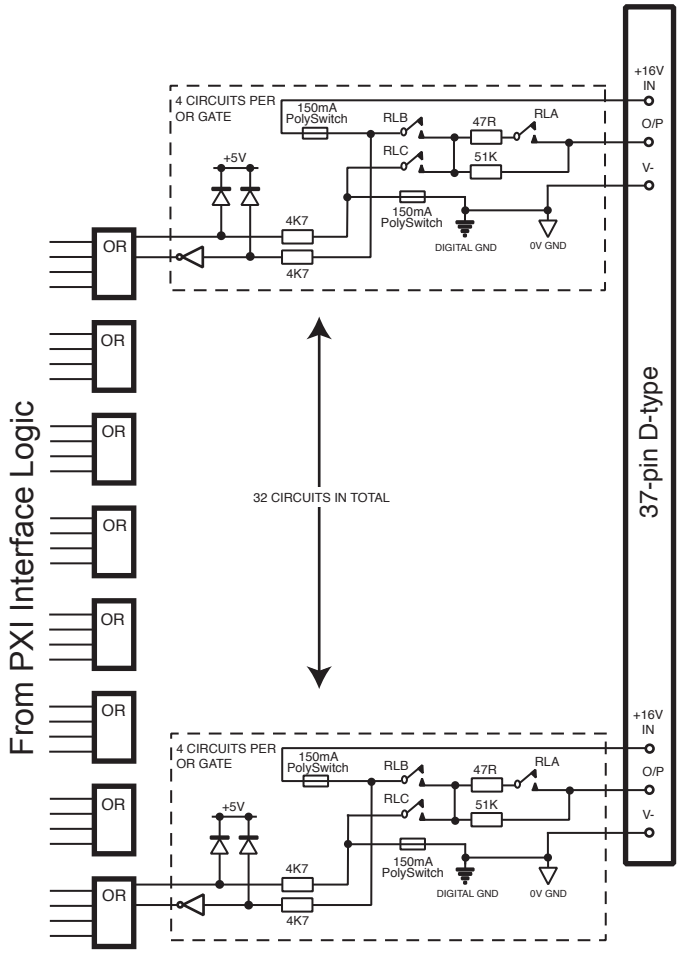
# PXI Automotive Switch Simulator 40-480

- Simulates 8, 16 or 32 Switches
- Simulates Leaky or Dirty switches
- Protects UUT From Fault Conditions
- Robust Design Protected Against Faults In DUT
- Suitable for 12V and 24V Systems
- Built In Fault Monitoring
- Suitable For Switch Simulation In Transportation Electronics Module Testing
- VISA & Kernel Drivers Supplied for Windows
- Supported by PXI or LXI Chassis
- 3 Year Warranty



The 40-480 is designed to simulate the operation of automotive switches. It can be used to test the capability of automotive controllers to cope with dirty contacts or leaking current caused by switch contamination. It allows automotive I/O devices to be tested for correct operation under adverse conditions. The design includes protection circuits that ensure module damage cannot be caused by wiring faults or UUT failures. The module is available with 8, 16 or 32 channels and is suitable for both 12V and 24V automotive applications.

The module uses high quality instrument grade reed relays to ensure long service life, fast response and repeatable performance.




**Functional Block Diagram for the 40-480**
**8, 16 or 32 Channel Switch Simulator Module**

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### Relay Type

The 40-480 is fitted with ruthenium sputtered reed relays, these offer very long life with good low level switching performance and excellent contact resistance stability. Spare reed relays are built onto the circuit board to allow easy maintenance with minimum downtime.

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

### Specification

| | |
|---|---|
| Input Voltage Range: | 8V-24VDC* |
| Power Rating: | 0.25W per channel |
| PolySwitch Rating: | 150mA threshold current, 50mA hold current (each bank). |
| Switch Simulation (typical): | 47Ω, 51kΩ or open circuit to ground or input voltage. |
| Off State Resistance: | $>10^9\Omega$ |
| Operate Time: | <0.5ms |
| Release Time: | <0.5ms |
| Expected Life (operations) | |
| Low power load: | $>1x10^8$ |

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

### Power Requirements

| +3.3V | +5V | +12V | -12V |
|---|---|---|---|
| 0 | 750mA (typ 400mA) | 0 | 0 |

### Module Operation

The module has a common input voltage connection for all channels. Each output can be set to as open circuit by opening all the relays. With RLC closed (see diagram overleaf) the output can simulate a switch with a leakage resistance of 51kΩ to the supply voltage, simulating a condition caused by oil or dirt contamination across the terminals or contacts of an automotive switch.

With the output set to simulate a switch closure, channels can be set to have a resistance of 47Ω by closing RLA and RLB. This simulates a switch with a high contact resistance caused by contamination. The module can be configured to simulate switches operating to ground or to the common input voltage.

The 40-480 includes protection systems that ensure neither the device under test or the module can be easily damaged by programming errors, faulty wiring connections or faults in the device under test. Each channel includes PolySwitches to prevent the drawing of large currents that could damage the system. The condition of the PolySwitches can be monitored via the PXI interface, and if one becomes open circuit it can be reset by opening all the relays contacts, curing the the fault, then resetting the module.

### Mechanical Characteristics

Single slot 3U PXI (CompactPCI card).
Module weight: 240g (40-480-221).
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.
Signals via front panel 37-pin male D-type connector, 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: | 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.

# Ordering Information

## Product Order Codes

| | |
|---|---|
| 8 Channel Switch Simulation Module | 40-480-021 |
| 16 Channel Switch Simulation Module | 40-480-121 |
| 32 Channel Switch Simulation Module | 40-480-221 |

## 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.

## Support Products

### Spare Relay Kits

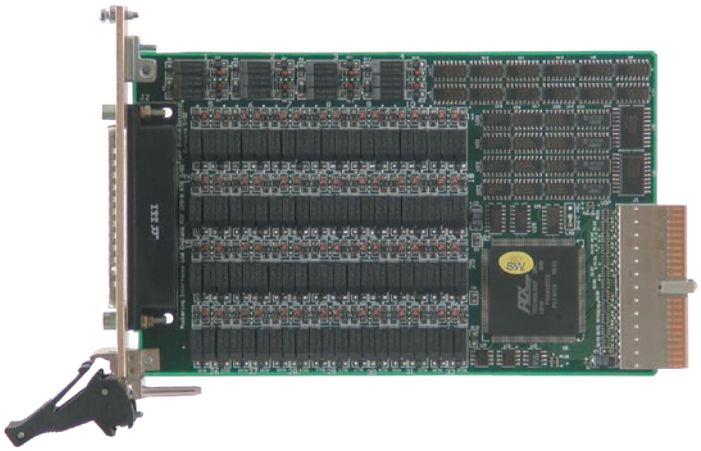
Kits of replacement relays are available for the majority of Pickering's PXI switching products, simplifying servicing and reducing down-time.

| Product | Relay Kit |
|---|---|
| 40-480-021/121/221 | 91-100-015 |

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

## Mating Connectors & Cabling

For connection accessories for the 40-480 please refer to the 90-007D 37-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

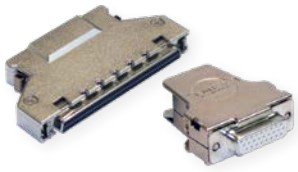


**Pickering LXI or LXI/USB Modular Chassis—only accept our 1000+ PXI Switching & Simulation Modules:**

- 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

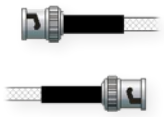
We provide a full range of supporting cable and connector solutions for all our switching products—20 connector families with 1200+ products. We offer everything from simple mating connectors to complex cables assemblies and terminal blocks. All assemblies are manufactured by Pickering and are guaranteed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



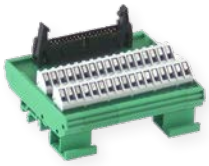
**Connectors & Backshells**



**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.



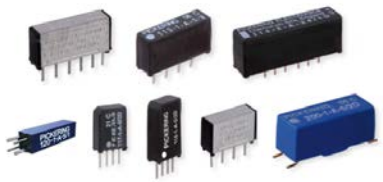
### Mass Interconnect

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

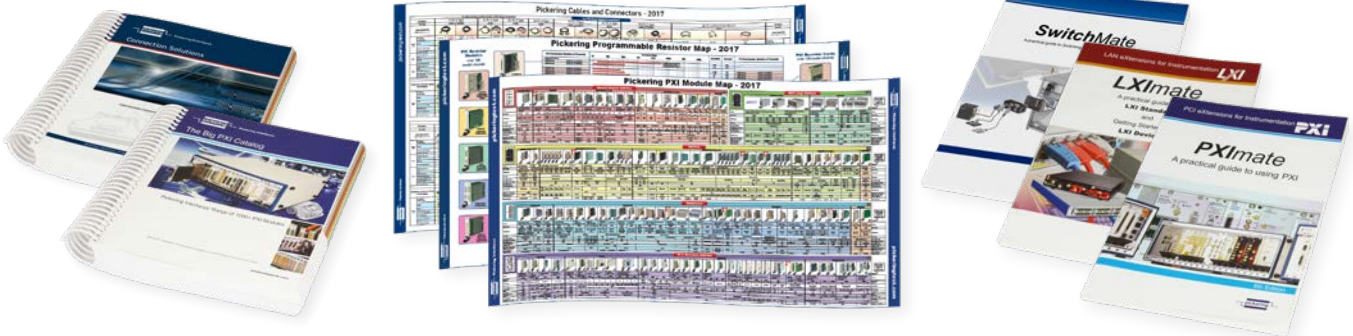
*eBIRST* Switching System Test Tools are designed specifically for our PXI, PCI or LXI products, these tools simplify switching system fault-finding by quickly testing the system and graphically identifying the faulty relay.
To learn more, please go to: pickeringtest.com/ebirst

## 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

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Pickering Interfaces maintains a commitment to continuous product development, consequently we reserve the right to vary from the description given in this data sheet.

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