High-Frequency Multiplexer/Matrix Modules

NI PXI-2593, NI PXIe-2593, NI SCXI-1193 *NEW!*

- 500 MHz bandwidth
- 50 Ω characteristic impedance
- 10 W RF carry power
- 150 V, CAT I switching
- Fully software configurable
- Unterminated multiplexer
- Available in both PXI and PXI Express versions for optimal slot placement

Configurations

- NI SCXI-1193: 32x1, dual 16x1, quad 8x1, nine 3x1
- NI PXI-2593/ NI PXIe-2593 (NI 2593): 16x1, dual 8x1, quad 3x1
- Terminated multiplexer configurations
  - NI SCXI-1193: 16x1, dual 8x1, quad 4x1
  - NI 2593: 8x1, dual 4x1
- Sparse matrix configurations
  - NI SCXI-1193: 36-terminal
  - NI 2593: 18-terminal

Operating Systems

- Windows XP/2000/Me/9x/NT

Recommended Software

- LabVIEW
- LabWindows™/CVI
- Measurement Studio for Visual C++
- NI Switch Executive

Other Compatible Software

- Visual Basic
- ANSI C/C++

Driver/Software (included)

- NI-SWITCH

Overview and Applications

NI PXI-2593, PXIe-2593, and SCXI-1193 are high-density 50 Ω RF relay modules. You can programmatically configure them as unterminated multiplexers, externally terminated multiplexers, or dimensionally flexible sparse matrices. Each configuration handles signal frequencies from DC to beyond 500 MHz. These single-slot switch modules use high-density push-on MCX connectors for discrete yet manageable cabling. NI 2593 modules are designed to integrate with high-frequency instruments such as the NI PXI-5404 frequency generator and the NI PXI-5112 high-speed digitizer.

Multiplexer Configurations

The NI 2593 and SCXI-1193 are 16- and 32-channel unterminated multiplexers, respectively. With external 50 Ω MCX terminators (P/N: 761930-01) on half of the channels, you can use these modules as terminated multiplexers. Table 1 shows multiplexer configurations for each module.

Multiplexer Topology	NI SCXI-1193		NI 2593	
	Unterminated	Terminated	Unterminated	Terminated
32x1	1 bank	–	–	–
16x1	2 banks	1 bank	1 bank	–
8x1	4 banks	2 banks	2 banks	1 bank
4x1	–	4 banks	–	2 banks
3x1	9 banks	–	4 banks	–

Table 1. This table shows available multiplexer configurations.

Dimensionally Flexible Sparse Matrix Configurations

You can configure the NI 2593 modules as flexible sparse matrices, which you can use to route signals between any pair of channels or commons while maintaining >500 MHz bandwidth and minimizing reflections. Unlike a traditional sparse matrix made from two multiplexers with their COM terminals connected, these modules use a flexible architecture in which you can define the row and column dimensions. There is no restriction on row-to-row or column-to-column connections. For example, you can configure the 18 terminals on the NI 2593 modules as a 2x16, 4x14, or 9x9 sparse matrix, or any size in between. It is even possible to connect multiple crosspoints simultaneously. Figure 1 demonstrates the configuration capabilities of an NI 2593 as a dimensionally flexible sparse matrix.

NATIONAL INSTRUMENTS™

System Integration

The NI 2593 modules have a flexible scan list architecture that can reduce overall data acquisition and test time. A scan list delivers the fastest scan possible by providing a hardware-timed solution. You can configure the module to process the scan list once or to continuously loop through the scan list. Commands in the scan list can open or close relays, wait for an external trigger, and generate a scanner advanced trigger. The external trigger, sourced by an instrument, such as an NI PXI-5411 arbitrary waveform generator, causes the switch module to advance to the next entry in the scan list. The scanner advanced trigger indicates when the module has closed all specified relays and the relays have settled. The scanner advanced trigger is typically connected to a measurement device, such as the NI PXI-4070 FlexDMM, which is configured to take a reading upon receiving the trigger.

Software

All National Instruments PXI and SCXI switch modules are shipped with NI-SWITCH, an IVI-compliant driver that offers complete functionality for all switch modules. For additional assistance in configuring, programming, and managing higher-channel- count switching systems, NI Switch Executive software provides an easy-to-use intelligent switch management and visual routing environment.

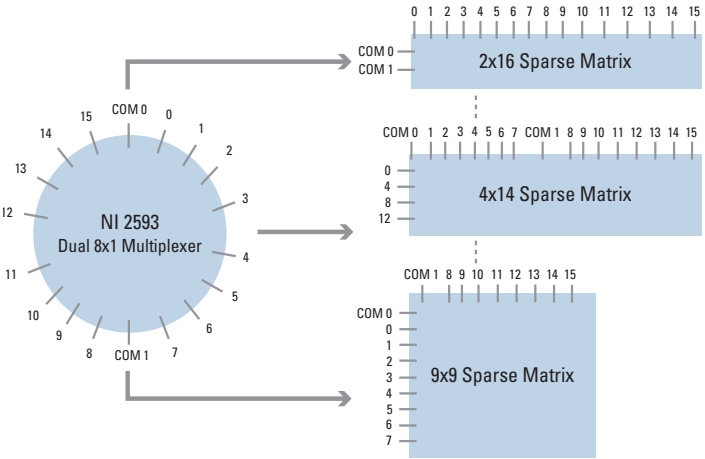

Figure 1. NI 2593 Configuration Capabilities as a Dimensionally Flexible Sparse Matrix

Ordering Information

NI PXI-2593 778793-01
NI PXIe-2593 780587-93
NI SCXI-1193 776572-93
Includes NI-SWITCH driver software.

Recommended Accessory

50 Ω MCX terminator 778831-01

NI Switch Executive

Development system..... 778546-01
Deployment engine 778548-00

BUY NOW

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/switches**.

Specifications

Specifications subject to change without notice. Visit **ni.com/manuals** for the latest full specifications.

RF Performance Characteristics

Characteristic impedance (Z0)	50 Ω nominal
Insertion loss	
8x1	
DC to 200 MHz	<0.9 dB
200 to 500 MHz	<1.6 dB
16x1	
DC to 200 MHz	<1.2 dB
200 to 500 MHz	<1.9 dB
32x1 (SCXI-1193 only)	
DC to 200 MHz	<1.4 dB
200 to 500 MHz	<2.4 dB
Typical bandwidth (3 dB)	
8x1	>900 MHz
16x1	>750 MHz
32x1 (SCXI-1193 only)	>600 MHz
VSWR	
8x1	
DC to 200 MHz	<1.4
200 to 500 MHz	<1.8
16x1	
DC to 200 MHz	<1.4
00 to 500 MHz	<1.8
32x1 (SCXI-1193 only)	
DC to 200 MHz	<1.4
200 to 500 MHz	<1.8
Maximum RF carry power	10 W up to 500 MHz (per channel)

Input Characteristics

Maximum switching voltage	150 V, CAT I
Maximum switching current	0.5 A (per channel)
Maximum carry current	1 A (per channel)
Simultaneous channels at maximum current	
NI 2593	up to 2
NI SCXI-1193	up to 4
DC path resistance	
Initial	<1.0 Ω
End of life	≥2.0 Ω

Dynamic Characteristics

Maximum scan rate	100 operations/s
Expected relay life	
Mechanical	$5x10^7$ operations
Electrical	$3x10^5$ operations (30 V, 0.3 ADC resistive)

Physical Characteristics

Relay type	Electromechanical, latching
Relay contact material	Silver palladium and gold
I/O connectors	
NI 2593	18 MCX jacks
NI SCXI-1193	36 MCX jacks
Trigger connectors	2 SMB jacks
Dimensions	
NI 2593	13 by 21.7 cm (5. by 8.6 in.)
NI SCXI-1193	3.0 by 17.3 by 19.6 cm (1.2 by 6.7 by 7.6 in.)
Weight	
NI 2593	330 g (12 oz)
NI SCXI-1193	960 g (2 lb, 2 oz)

Environment

Operating temperature	0 to 50 °C
Storage temperature	- 20 to 70 °C
Relative humidity	5 to 85% noncondensing
Pollution degree	2

Approved at altitudes up to 2,000 m.

Safety Compliance

- IEC 61010-1, EN 61010-1
- UL 61010-01, CSA 61010-1

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note: For EMC compliance, operate this product according to the documentation.

CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

NI Services and Support

NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing.
Visit **ni.com/services**.

Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products.
Visit **ni.com/training**.

Professional Services

Our NI Professional Services team is composed of NI applications and systems engineers and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit **ni.com/alliance**.

NATIONAL INSTRUMENTS™
Certified Alliance Partner

OEM Support

We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit **ni.com/oem**.

Local Sales and Technical Support

In offices worldwide, our staff is local to the country, giving you access to engineers who speak your language. NI delivers industry-leading technical support through online knowledge bases, our applications engineers, and access to 14,000 measurement and automation professionals within NI Developer Exchange forums. Find immediate answers to your questions at **ni.com/support**.

We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit **ni.com/ssp**.

Hardware Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at **ni.com/advisor** to find a system assurance program to meet your needs.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

NATIONAL INSTRUMENTS™

ni.com ▪ 800 813 3693
National Instruments ▪ info@ni.com