

# High-Density Multiconfiguration Matrix Modules

## NI PXI-2529, NI PXIe-2529, NI SCXI-1129 **NEW!**

- 8 matrix configurations
- Switch capacity
  - 150 VDC, 150 V<sub>rms</sub> CAT I
  - 1 A switching/2 A carry
- 32,000-step scan list for deterministic scanning
- Fully software programmable
- Effortless matrix expansion
- Multiple-module synchronization with hardware triggers
- Electromechanical relays
- Available in both PXI and PXI Express versions for optimal slot placement
- NI PXI-2529/PXIe-2529
  - 128-crosspoint matrix
  - 4x32 and 8x16 2-wire matrix configurations
- NI SCXI-1129
  - 256-crosspoint matrix
  - Six 2-wire matrix configurations

### Operating Systems

- Windows XP/2000/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

The NI PXI-2529, PXIe-2529, and SCXI-1129 are high-density matrix relay modules built for applications with high-channel counts. The modules are two-wire matrices that are configurable with front mounting terminal blocks to achieve many different matrix configurations. Table 1 provides a complete list of possible configurations. Expanding the matrix channel count is as easy as adding more modules. With the SCXI-1129, you can pass analog signals between two or more switch modules via a high-voltage backplane (HVAB), matrix expansion cables, or matrix expansion plugs. Using these connections, you can instantly expand your matrix without external wiring. The NI 2529 modules are designed to work well with both low- and high-voltage levels. They use relays with low thermal offset to ensure accurate low-voltage measurements. These relays can switch up to 150 V<sub>rms</sub> or 150 VDC.



Figure 1. The matrix expansion plug simplifies expansion.

## Matrix Operation

The NI 2529 modules are general-purpose, two-wire matrices used to route differential signals. Through software, you can control the matrices to connect any row to any column. One of the key advantages of these modules is their adaptability to your switching needs. You can configure the SCXI-1129 in six different matrix configurations and an NI 2529 in two

configurations by simply changing the terminal block. For example, you can create an 8x32 two-wire matrix by using the NI SCXI-1335 terminal block with an SCXI-1129 module. You can easily transform the same SCXI-1129 module into a 16x16 two-wire matrix by simply replacing the SCXI-1335 with an NI SCXI-1336 terminal block.

The NI 2529 modules use latching relays in the matrices to ensure that the state of each matrix remains unchanged in the event of accidental power loss. This feature prevents instruments and units under test from switching during potentially damaging conditions. All relays open when power returns.

## Automatic Scanning

NI 2529 modules can maximize throughput in automated test applications with the use of scanning. Scanning improves throughput by downloading a list of up to 32,000 connections to the switch and cycling through the list using an event (trigger) without any interruption from the host processor. You can most efficiently implement scanning by mating an NI 2529 or SCXI-1129 with an instrument such as the NI PXI-4070 6½-digit FlexDMM, which issues a trigger after each measurement.

## Safety Disconnect

The SCXI-1129 incorporates a safety interlock that disconnects the SCXI high-voltage analog bus from the matrix if the front terminal block is removed. This arrangement prevents potentially hazardous voltages from appearing on exposed front panel connector pins.

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	Terminal Block	Configuration (Row by Column)	Column Expansion Via Row Connection	Row Expansion Via Column Connection
NI SCXI-1129	SCXI-1333	Quad 4x16	External wires	With matrix expansion plug. Examples: quad 8x16, quad 16x16
	SCXI-1334	4x64	With HVAB or matrix expansion cable. Examples: 4x128, 4x256	With matrix expansion plug. Examples: 8x64, 16x64, 32x64
	SCXI-1335	8x32	With matrix expansion cable (2 cables required). Examples: 8x64, 8x128	With matrix expansion plug. Examples: 16x32, 32x32
	SCXI-1336	16x16	External wires	With matrix expansion plug. Examples: 32x16, 64x16
	SCXI-1337	Dual 8x16	External wires	External wires
	SCXI-1339	Dual 4x32	External wires	External wires
NI 2529	TB-2634	4x32	External wires	External wires
	TB-2635	8x16	External wires	External wires

Table 1. NI 2529 and SCXI-1129 Configuration and Matrix Expansion

## Expansion with the SCXI-1129

Matrix modules can serve as building blocks for creating configurations well beyond the size of a single module. Connecting the rows of two modules doubles the column count. Likewise, connecting the columns of two modules doubles the row count. For example, you can expand a 4x64 matrix, made up of one SCXI-1129 module and one SCXI-1334 terminal block, to a 4x128, 4x192, 4x256, and so forth, by connecting the columns of multiple SCXI-1129 modules via the terminal block. To expand the columns of the SCXI-1129, you can use expansion cables. Expansion cables connect four differential signals. Hence, you must use two matrix expansion cables for each expansion with the SCXI-1335 because it has eight rows. You can expand the row count of the SCXI-1129 with expansion plugs, which connect the columns of two adjacent switch modules as shown in Figure 1. With the expansion plugs, you can create the 128x16 matrix in less than five minutes. For further information on matrix expansion, refer to the tutorial, *Matrix Switch Expansion Guide*, at <http://zone.ni.com/devzone/cda/tut/p/id/3628>.

## SCXI Relay Control

Every SCXI switch system requires an external switch controller. The switch controller uses the digital communications bus on the SCXI chassis to control the switch circuitry. An NI 4021 switch controller, available for both PCI and PXI, is the recommended SCXI switch controller.

## SCXI Analog Routing

You can increase the flexibility of your switch system with the addition of the high-voltage analog bus (HVAB). Using the HVAB, you can easily route high-voltage or low-voltage analog signals between multiple switch modules or instruments without the need for external wiring (assuming it is safe to do so). For example, you can use the HVAB to effortlessly create a 4x256 matrix from four SCXI-1129 modules in the 4x64 matrix configuration (SCXI-1334 terminal block). Without the HVAB, the 4x256 matrix requires external wiring or cables. The HVAB works with the SCXI-1127, SCXI-1128, and SCXI-1129 modules.

## Signal Connections

You can choose from several solutions for your signal connections:

- Terminal blocks provide screw terminals, solder cups, or headers for easy connections
- A shielded backshell features a 180-pin connector housing to accommodate custom cables on the SCXI-1129
- Mass interconnect solutions from industry leaders

Contact your local National Instruments sales representative for information on these products.

## 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.

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## Specifications

Specifications subject to change without notice. Visit [ni.com/manuals](http://ni.com/manuals) for the latest full specifications.

### Input Characteristics

Maximum switching voltage.....	150 V <sub>rms</sub> or 150 VDC (channel-to-channel and channel-to-ground)
Maximum switching current.....	1 A (per channel)
Maximum carry current.....	2 A (per channel)
Maximum module current	
NI 2529 .....	8 A
NI SCXI-1129 .....	5 A
Maximum switching power .....	37.5 VA, 30 W (per channel)
Path resistance.....	<1 $\Omega$

### Transfer Characteristics

Thermal EMF .....	<9 $\mu$ V
Typical single crosspoint bandwidth	
1 row – 1 column .....	>10 MHz
Typical crosstalk	
50 $\Omega$ system	
10 kHz.....	$\leq$ 80 dB
100 kHz.....	$\leq$ 65 dB
1 MHz.....	$\leq$ 50 dB

### Dynamic Characteristics

Maximum operating speed	
110 crosspoints/s .....	NI 2529
125 crosspoints/s .....	NI SCXI-1129
Relay operate time (at 20 °C) .....	4 ms max
Expected relay life	
Mechanical .....	5x10 <sup>7</sup> operations
Electrical	
30 VDC, 1 A.....	10 <sup>5</sup> operations
30 VDC, 100 mA.....	5x10 <sup>5</sup> operations
150 V <sub>rms</sub> , 0.25 A.....	10 <sup>5</sup> operations

### Physical

NI 2529	
Dimensions .....	2 by 10 by 16 cm (0.8 by 3.9 by 6.4 in.)
I/O connector .....	100-pin HDI
NI SCXI-1129	
Dimensions .....	3.0 by 17.2 by 20.3 cm (1.18 by 6.9 by 8.0 in.)
I/O connector .....	180-pin HDI

## Environment

Operating temperature	
NI 2529 .....	0 to 55 °C
NI SCXI-1129 .....	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.	

## Ordering Information

NI PXI-2529 .....	778739-01
NI PXIe-2529 .....	780587-29
NI SCXI-1129.....	776572-29
Includes NI-SWITCH driver software.	

### Accessories

NI TB-2634 (4x32).....	778840-01
NI TB-2635 (8x16).....	778839-01
NI SCXI-1333 (quad 4x16).....	777687-33
NI SCXI-1334 (4x64).....	777687-34
NI SCXI-1335 (8x32).....	777687-35
NI SCXI-1336 (16x16).....	777687-36
NI SCXI-1337 (dual 8x16).....	777687-37
NI SCXI-1339 (dual 4x32).....	777687-39
NI matrix expansion plugs .....	778364-01
NI matrix expansion cables	
40 cm.....	185440-0R4
75 cm.....	185440-0R75

### 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](http://ni.com/switches).

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## 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)

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## 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](http://ni.com/advisor) to find a system assurance program to meet your needs.

### Calibration Services

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