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High-Density Multiconfiguration Matrix Switch Modules

NI PXI-2531, NI PXIe-2531, NI PXI-2532, NI PXIe-2532

- 512-crosspoint matrix in a single 3U PXI slot
- 4x128 (1-wire), 8x64 (1-wire), 4x64 (2-wire), and 8x32 (2-wire) matrix configurations
- Switch capacity
  - NI 2531: Up to 60 VDC/30 VAC, 0.5 A
  - NI 2532: Up to 100 VDC/100 VAC, 0.5 A
- 2,000 cycles/s
- 32,000-step scan list for deterministic scanning
- Fully software programmable
- Onboard relay count tracking
- Multiple-module synchronization with hardware triggers
- Sixteen 2x16 matrix banks for custom matrix configurations
- Available in both PXI and PXI Express versions for optimal slot placement

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
- NI-DAQmx

Compliance
- UL (NI 2532 only)
- CE



Module	Maximum Voltage	Maximum Current	Module Connector	Terminal Block Connector
NI 2531	60 VDC, 30 VAC	0.5 A per channel (10 W max)	2x 150 pos, Samtec ERM8 series (optimized for ruggedness)	2x female VHDCI (with optional screw terminal breakout)
NI 2532	100 VDC, 100 VAC	0.5 A per channel (10 W max)	2x 160 pos, Samtec BTE-EM (optimized for high voltage)	Standard 0.050 in. pitch headers to ribbon cables (with optional screw terminal breakout)

Overview

The NI PXI-2531, PXIe-2531, PXI-2532, and PXIe-2532 are 512-crosspoint, high-speed matrix switch modules. With the ability to create up to a 4x2176 or 8x1088 one-wire matrix in a single PXI chassis and even larger configurations with multichassis solutions, an NI 2531/2 is ideal for high-channel-count automated test configurations. Featuring compact reed relays with switching speeds up to 2,000 cycles/s and the ability to synchronize with instruments, these modules provide maximum throughput in a test system for signals up to 100 VDC/100 VAC or 0.5 A.

Matrix Operation

The NI 2531/2 modules are general-purpose matrices used to route referenced or differential signals. Through software, you can control the modules to connect any row to any column. One of the key advantages of these matrices is you can adapt them to your switching needs. You can configure them in many different matrix configurations by using NI terminal blocks listed. For example, you can create a 4x128 one-wire matrix by using the TB-2640 terminal block with an NI 2531/2 module. You can easily transform the same module into an 8x64 one-wire matrix by using a TB-2641 terminal block. Because the NI 2531/2 modules are built with sixteen 2x16 matrices, you can also create matrix sizes outside the standard terminal block configurations. Other one-wire configurations include a 16x32 matrix or four independent 4x32 matrices. In a two-wire configuration, you can build a dual 4x32 or 16x16 matrix. Contact NI for more information on creating custom configurations.

Relay Count Tracking

An NI 2531/2 counts relay closures on each of its 512 relays. Relay counts are incremented each time a relay is actuated. You can programmatically retrieve the counts, which are stored on board the module, and use them for predictive maintenance to reduce unexpected system downtime.

Automatic Scanning

These modules maximize throughput in automated test applications by 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 2531/2 with an instrument such as the NI PXI-4070 6½-digit FlexDMM, which issues a trigger after each measurement.

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Signal Connections

You can choose from several solutions for your signal connections. Terminal blocks provide connectivity to strain-relieved 0.050 in. pitch headers ideal for ribbon cable or to 68-pin VHDCI connectors with cabled breakout accessories. You also can use mass interconnect solutions from industry leaders such as Virginia Panel and MAC Panel. Contact NI for details on these products or for information on creating your own custom connectivity solutions.

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, consider using NI Switch Executive.

NI Switch Executive Software

NI Switch Executive is an intelligent switch management and routing application. With NI Switch Executive, you gain increased development productivity by interactively configuring and naming switch modules, external connections, and signal routes. You also increase test code reuse and system performance with switch programming combined with NI TestStand test management software, the LabVIEW and LabWindows/CVI development environments, and Measurement Studio for Microsoft Visual Basic 6.0. Ultimately, NI Switch Executive simplifies switch system configuration and increases test performance, thus lowering your cost of test.

Ordering Information

NI PXI-2531 778572-31
NI PXIe-2531 780587-31
NI PXI-2532 778572-32
NI PXIe-2532 780587-32
Includes switch module and NI-SWITCH driver software.

NI 2531 Accessories

NI TB-2648 4x128 terminal block for NI 2531 781181-01
NI TB-2649 dual 4x64 terminal block for NI 2531 781181-02
NI TB-2650 8x64 terminal block for NI 2531 781181-03
NI TB-2651 dual 8x32 terminal block for NI 2531 781181-04

NI 2532 Accessories

NI TB-2640 4x128 terminal block for NI 2532 779056-01
NI TB-2641 8x64 terminal block for NI 2532 779056-03
NI TB-2643 dual 4x64 terminal block for NI 2532 779056-07
NI TB-2644 dual 8x32 terminal block for NI 2532 779056-09

BUY NOW

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

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Specifications

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

Input Characteristics

All input characteristics are DC, AC_{pk}, or a combination, unless otherwise specified.

Maximum switching voltage

- NI 2531
  - Channel-to-ground ..... 60 V
  - Channel-to-channel ..... 60 V, CAT I
- NI 2532
  - Channel-to-ground ..... 100 V
  - Channel-to-channel ..... 100 V, CAT I
- Maximum switching current ..... 2 A
- Maximum switching current ..... 0.5 A (per channel)
- Maximum carry current ..... 0.5 A (per channel)
- Maximum switching power ..... 10 W (per channel)

DC path resistance

- Initial ..... <1 Ω
- End of life ..... >2 Ω
- Open channel ..... >1 GΩ

Transfer Characteristics

Thermal EMF

- 1-wire ..... <50 µV
- 2-wire ..... <20 µV

NI-2531 bandwidth, typical

- Module ..... 20 MHz
- TB-2648 (4x128) ..... 10 MHz
- TB-2649 (Dual 4x64) ..... 11 MHz
- TB-2650 (8x64) ..... 11 MHz
- TB-2651 (Dual 8x32) ..... 14 MHz

NI-2532 bandwidth, typical

- Module ..... 30 MHz
- TB-2640 (4x128) ..... 10 MHz
- TB-2643 (Dual 4x64) ..... 11 MHz
- TB-2641 (8x64) ..... 9 MHz
- TB-2644 (Dual 8x32) ..... 12 MHz

Crosstalk, typical (50 Ω termination) – channel-to-channel

- NI 2531
  - 10 kHz ..... <-70 dB
  - 100 kHz ..... <-70 dB
  - 1 MHz ..... <-58 dB
  - 10 MHz ..... <-38 dB
- NI 2532
  - 10 kHz ..... <-89 dB
  - 100 kHz ..... <-73 dB
  - 1 MHz ..... <-54 dB
  - 10 MHz ..... <-36 dB

Isolation, typical (50 Ω termination) – open channel

- 10 kHz ..... >91 dB
- 100 kHz ..... >71 dB
- 1 MHz ..... >51 dB
- 10 MHz ..... >32 dB

Dynamic Characteristics

- Maximum cycle speed ..... 2000 cycles/s
- Relay operate time ..... 0.25 ms
- Release time ..... 0.25 ms
- Simultaneous drive limit ..... 40 relays

Expected relay life

- Mechanical ..... 10^9 cycles

Electrical (resistive)

- 10 V, 100 mA ..... 10^8 cycles
- 25 V, 400 mA ..... $5x10^6$ cycles
- 60 V, 160 mA ..... 10^6 cycles

Physical

- Relay type ..... Reed
- Relay contact material ..... Rhodium
- Dimensions ..... 10 by 16 cm (3.9 by 6.3 in.) single-slot, 3U

Environment

- Operating temperature ..... 0 to 55 °C
- Storage temperature ..... -20 to 70 °C
- Relative humidity ..... 5 to 85% noncondensing
- Pollution degree 2

Approved at altitudes up to 2,000 m.

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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** to find a system assurance program to meet your needs.

Calibration Services

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