DEVICE SPECIFICATIONS

NI PXI/PXIe-2532B

512-Crosspoint Matrix

This document lists specifications for the NI PXI/PXIe-2532B (NI 2532B) 512-crosspoint matrix. All specifications are subject to change without notice. Visit *ni.com/manuals* for the most current specifications.

Topology	1-wire 4 x 128 matrix, 1-wire 8 x 64 matrix, 1-wire 16 x 32 matrix, 1-wire dual 4 x 64 matrix, 1-wire dual 8 x 32 matrix, 1-wire dual 16 x 16 matrix, 1-wire quad 4 x 32 matrix, 1-wire sixteen 2 x 16 matrix, 2-wire 4 x 64 matrix, 2-wire 8 x 32 matrix, 2-wire 16 x 16 matrix, 2-wire dual 4 x 32 matrix

Related Information

Refer to the NI Switches Help for detailed topology information.

Contents

NATIONAL INSTRUMENTS

About These Specifications

Specifications characterize the warranted performance of the instrument under the stated operating conditions.

Typical Specifications are specifications met by the majority of the instrument under the stated operating conditions and are tested at 23 °C ambient temperature. Typical specifications are not warranted.

All voltages are specified in DC, AC_{pk}, or a combination unless otherwise specified.

Clean devices and terminal blocks by brushing off light dust with a soft, nonmetallic brush. Remove other contaminants with a soft, lint-free, dampened cloth. Do not use detergent or chemical solvents. The unit must be completely dry and free from contaminants before returning to service.

Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for important safety and electromagnetic compatibility information. To obtain a copy of this document online, visit *ni.com/manuals*, and search for the document title.

Caution The protection provided by the NI 2532B can be impaired if it is used in a manner not described in this document.

Input Characteristics

Maximum switching voltage

Channel-to-channel.....100 V
Channel-to-ground.....100 V, CAT I

Caution This module is rated for Measurement Category I and intended to carry signal voltages no greater than 100 V. This module can withstand up to 500 V impulse voltage. Do not use this module for connection to signals or for

measurements within Categories II, III, or IV. Do not connect to MAINs supply circuits (for example, wall outlets) of 115 or 230 VAC.

Caution When hazardous voltages (>42.4 V_{pk}/ 60 VDC) are present on any relay terminal, safety low-voltage (<42.4 V_{pk}/60 VDC) cannot be connected to any other relay terminal.

Maximum current.....0.5 A (switching or carry, per channel)

Caution The maximum switching power is limited by the maximum switching current and the maximum voltage, and must not exceed 10 W.

Maximum switching power.....10 W (per channel)

DC path resistance

- Initial.....<1 Ω
- End-of-life.....≥2 Ω
- Open channel.....>1 × 10^9 Ω

Note DC path resistance typically remains low for the life of the relay. At the end of relay life, the path resistance rapidly rises above 2 Ω. Load ratings apply to relays used within the specification before the end of relay life.

Thermal EMF

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

Bandwidth, typical (-3 dB, 50 Ω termination)

- 1-wire row/column.....≥30 MHz
- 2-wire row/column.....≥25 MHz

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

- 10 kHz.....<-85 dB
- 100 kHz.....<-65 dB
- 1 MHz.....<-45 dB

Isolation, typical (50 Ω termination) Open channel

- 10 kHz.....>84 dB
- 100 kHz.....>64 dB
- 1 MHz.....>44 dB

Related Information

Electromagnetic Compatibility on page 12

Dynamic Characteristics

Simultaneous drive limit

- PXI.....40 relays
- PXI Express.....64 relays

Relay operate time.....0.25 ms

Note Certain applications may require additional time for proper settling.

Release time.....0.25 ms

Typical relay life (no load)

- Mechanical.....1×10^9 cycles
- Electrical (resistive, <10 pF load)
  - 10 V, 100 mA.....1×10^7 cycles
  - 20 V, 500 mA.....5×10^6 cycles
  - 100 V, 10 mA.....5×10^5 cycles

Note Optional series protection resistance, available for the terminal blocks, increases the expected relay life at higher voltages. This series protection resistance shields the reed relays from the effects of cable and load capacitance. For more information, refer to the *Reed Relay Protection* tutorial at *ni.com/zone*.

Note Reed relays are highly susceptible to damage caused by switching capacitive and inductive loads. Capacitive loads can cause high inrush currents while inductive loads can cause high flyback voltages. The addition of appropriate resistive protection can greatly improve contact lifetime. For more information about adding protection circuitry to a capacitive load, visit *ni.com/info* and enter the Info Code `relaylifetime`. For information about inductive loads, enter the Info Code `relayflyback`.

Note The relays used in the NI 2532B are field replaceable.

Related Information

Refer to the NI Switches Help for information about including additional settling time, and replacing a failed relay.

Reed Relay Life on page 10

Trigger Characteristics

Input trigger

Sources.....PXI trigger lines 0 –7

Minimum pulse width.....150 ns

Note The NI 2532B can recognize trigger pulse widths less than 150 ns if you disable digital filtering.

Output trigger

Destinations.....PXI trigger lines 0–7

Pulse width.....Programmable (1 µs to 62 µs)

Related Information

Refer to the NI Switches Help for information about disabling digital filtering.

Physical Characteristics

Relay type.....Reed

Note NI advises against installing reed relay modules directly adjacent to an embedded controller with a magnetic hard drive because of the sensitivity of reed relays and the possibility of interference.

Relay contact material.....Rhodium

I/O connectors.....2, 150 pos, Samtec ERM8-EM series

Note Terminal block connectivity is with standard 0.050 inch pitch headers.

Power requirement

PXI

5 V.....10 W

3.3 V.....2 W

PXI Express

12 V.....15 W

3.3 V.....2 W

Dimensions (L × W × H).....3U, one slot, PXI/cPCI module, PXI Express compatible 18.5 × 2.0 × 13.0 cm (7.3 × 0.8 × 5.1 in.)

Weight.....454 g (1 lb)

Related Information

Accessories on page 9

Environment

Operating temperature.....0 °C to 55 °C

Storage temperature.....-20 °C to 70 °C

Relative humidity.....5% to 85%, noncondensing

Pollution Degree.....2

Maximum altitude.....2,000 m

Indoor use only.

Shock and Vibration

Operational Shock.....30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)

Random Vibration

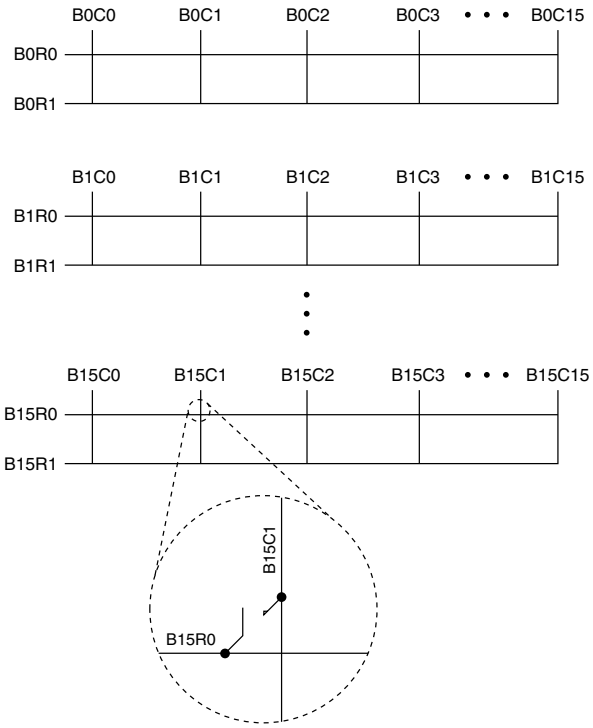
Operating.....5 to 500 Hz, 0.3 g_{rms}

Nonoperating.....5 to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC 60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Diagrams

The following figure shows the hardware diagram of the NI 2532B.

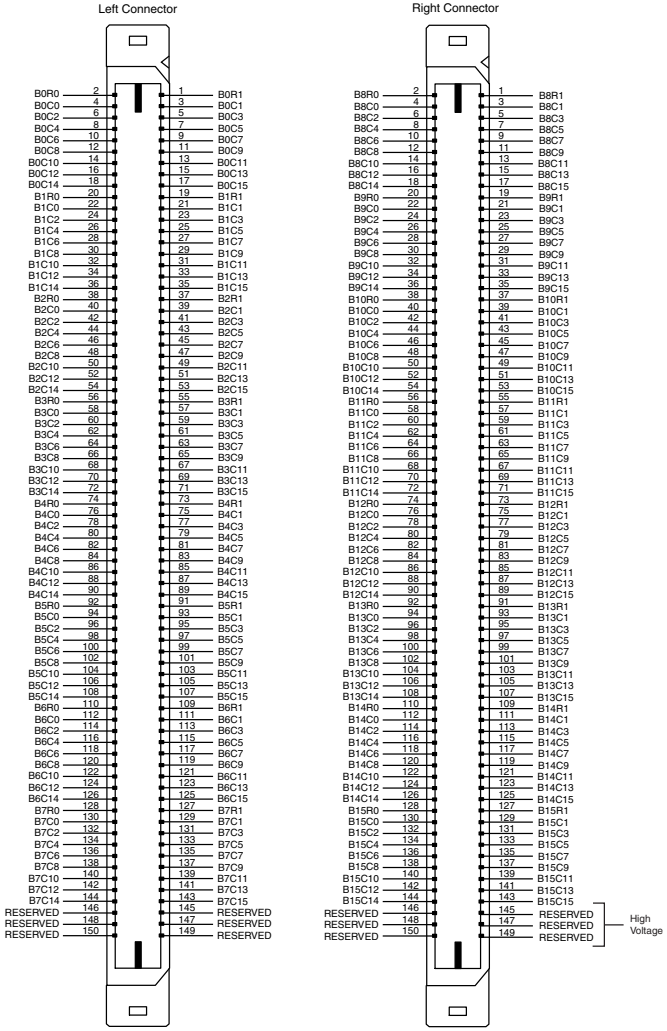
Figure 1. NI 2532B Hardware Diagram



Note All NI 2532B relays are open when the device is powered on.

The following figure shows the NI 2532B connector pinout for the left and right connectors.

Figure 2. NI 2532B Connector Pinout



Related Information

For topology-specific connection information, refer to your device in the NI Switches Help and the installation instructions for any associated accessories or terminal blocks.

Accessories

Visit *ni.com* for more information about the following accessories.

Note The specifications listed in this document, including the safety and compliance certifications, also apply to the terminal blocks for the NI 2532B unless otherwise noted in the terminal block installation instructions.

Table 1. NI Accessories for the NI 2532B

Accessory	Part Number
NI TB-2640B terminal block (1-wire 4 × 128 matrix)	782385-01
NI TB-2640B terminal block, with protection resistance	782385-02
NI TB-2641B terminal block (1-wire 8 × 64 matrix)	782385-03
NI TB-2641B terminal block, with protection resistance	782385-04
NI TB-2642B terminal block (1-wire 16 × 32 matrix)	782385-05
NI TB-2642B terminal block, with protection resistance	782385-06
NI TB-2643B terminal block (2-wire 4 × 64 matrix or 1-wire dual 4 × 64 matrix)	782385-07
NI TB-2643B terminal block, with protection resistance	782385-08
NI TB-2644B terminal block (2-wire 8 × 32 matrix or 1-wire dual 8 × 32 matrix)	782385-09
NI TB-2644B terminal block, with protection resistance	782385-10
NI TB-2645B terminal block (2-wire 16 × 16 matrix or 1-wire dual 16 × 16 matrix)	782385-11
NI TB-2645B terminal block, with protection resistance	782385-12
NI TB-2646B terminal block (1-wire quad 4 × 32 matrix or 2-wire dual 4 × 32 matrix)	782385-13
NI TB-2646B terminal block, with protection resistance	782385-14

Note Refer to the terminal block installation instructions for signal connectivity options. Contact NI for custom terminal block designs.

Caution You must install mating connectors according to local safety codes and standards and according to the specifications provided by the connector manufacturer. You are responsible for verifying safety compliance of third-party

connectors and their usage according to the relevant standard(s), including UL and CSA in North America and IEC and VDE in Europe.

Table 2. Third-Party Accessory for the NI 2532B

Accessory	Manufacturer	Manufacturer Part Number
Module mating connector [1]	Samtec	ERF8-075-01-L-D-EM2-TR

Note Third-party vendors offer mass-interconnect solutions for this module. Refer to Virginia Panel at *www.vpc.com* or MAC Panel at *www.macpanel.com* for connectivity offerings.

Related Information

Refer to the NI Switches Help for matrix expansion options.

Reed Relay Life

The following figure shows the reed relay lifetime nomograph. The purpose of this graph is to estimate reed relay lifetime.

Note This nomograph is not meant to be an exact or guaranteed specification and should only be used as a guideline to estimate lifetime. Actual reed relay lifetimes may vary depending on application.

Complete the following steps to use this nomograph:

1. Determine the peak voltage experienced across the relay while switching and mark this value on the *Volts* line.
2. Determine the sum of the DUT, cable, and instrumentation capacitances and mark this value on the *Load Capacitance* line.
3. Draw a straight line between both values.

   The intersection points of this line and the *No Protection* and *100 W Protection* axes are the corresponding estimated relay lifetimes in cycles. For more information on adding protection resistance, visit *ni.com/info* and enter the Info Code `relaylifetime`. Refer to the following example and figure for an example application.

   > The reed relay module is connected to a DMM via 1 meter of cable. The DMM and cable capacitances are 100 pF and 30 pF respectively. The maximum voltage switched across the relay is 50 V. Determine the estimated number of relay cycles with and without protection resistance.

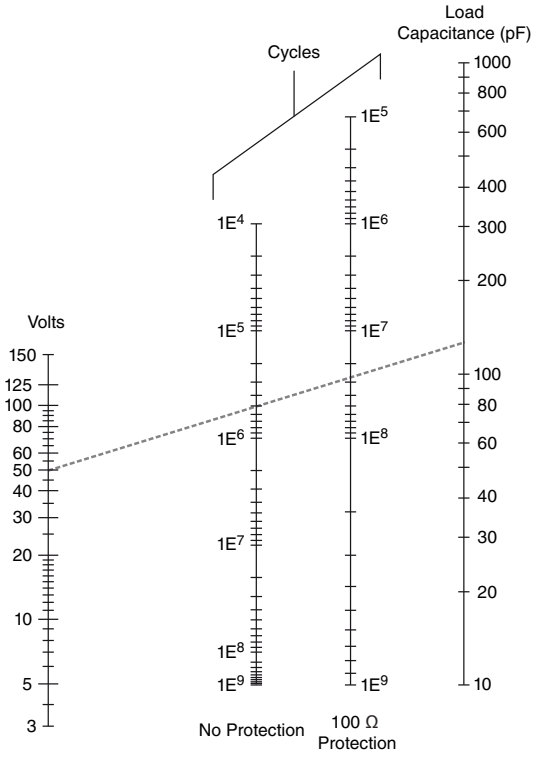
[1] PCB mount, additional cover or enclosure required. Refer to previous safety caution.

Solution

The total load capacitance is the sum of the cable and DMM capacitance, which is 130 pF. Draw a line between the 50 V point on the *Volts* axis and 130 pF on the *Load Capacitance* axis.

The line drawn intersects the *Cycles* axes at approximately 500,000 on the *No Protection* axis and about 25,000,000 on the *100 Ω Protection* axis (refer to Figure 3). This series resistance should be placed as close as possible to the relay for maximum effect.

Figure 3. Reed Relay Lifetime Nomograph



Compliance and Certifications

Safety

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

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

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

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

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11), Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations and certifications, refer to the *Online Product Certification* section.

CE Compliance CE

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)

Online Product Certification

To obtain product certifications and the DoC for this product, visit *ni.com/certification*, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *Minimize Our Environmental Impact* web page at *ni.com/environment*. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment, visit *ni.com/environment/weee.htm*.

电子信息产品污染控制管理办法（中国 RoHS）

中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令(RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 `ni.com/environment/rohs_china`。(For information about China RoHS compliance, go to `ni.com/environment/rohs_china`.)

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