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Find the *National Instruments PXIe-2738* at our website: *Click HERE*

DEVICE SPECIFICATIONS

NI PXIe-2738

256-Crosspoint Relay Matrix

This document lists specifications for the NI PXIe-2738 (NI 2738) matrix relay card. All specifications are subject to change without notice. Visit *ni.com/manuals* for the most current specifications.

Topology.....2-wire 8 × 32 matrix

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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.

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Caution The protection provided by the NI 2738 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 O

Note This module is rated for Measurement Category I. It is intended to carry signal voltages no greater than 70 V_{rms}, 100 V_{pk}, or 100 VDC. 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 VAC or 230 VAC.

Measurement Categories CAT I and CAT O (Other) are equivalent and are for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. This category is for measurement of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special hardware, limited-energy parts of hardware, circuits powered by regulated low-voltage sources, and electronics.

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

Maximum switching power.....60 W, 62.5 VA

Caution The switching power is limited by the maximum switching current, the maximum voltage, and must not exceed 60 W, 62.5 VA.

Maximum current

Switching.....2 A (per channel)

Carry.....2 A (per channel)

Minimum switching load.....20 mV/1 mA

Note Switching inductive loads (for example, motors and solenoids) can produce high voltage transients in excess of the module's rated voltage. Without additional protection, these transients can interfere with module operation and impact relay life.

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For more information about transient suppression, visit *ni.com/info* and enter the Info Code `relayflyback`.

DC isolation resistance.....1 GΩ (typical at 25º C)
(channel-to-COM)

DC path resistance

Initial.....<1.3 Ω

End-of-life.....≥2.3 Ω

Path resistance is a combination of relay contact resistance and trace resistance. Measure path resistance by combining resistance of the high and low signal paths from one row to one column. Contact resistance typically remains low for the life of a relay. At the end of relay life, the contact resistance rises rapidly above ≥2.3 Ω.

Thermal EMF.....<10 µV

RF Performance Characteristics

Bandwidth (-3 dB, typical at 23º C)

1-wire 50 Ω termination.....≤ 10 MHz

2-wire 100 Ω termination.....≤ 10 MHz

Open channel isolation (typical at 23º C, 50 Ω termination)

10 kHz.....≥ 84 dB

100 kHz.....≥ 71 dB

1 MHz.....≥ 50 dB

Channel-to-channel crosstalk (typical at 23º C, 50 Ω termination)

10 kHz.....≤ -69 dB

100 kHz.....≤ -52 dB

1 MHz.....≤ -33 dB

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Dynamic Characteristics

Relay Operate Time

- Typical.....1 ms
- Maximum.....3.3 ms

Simultaneous drive limit.....90 relays

Expected mechanical relay life.....1×10^8 cycles

Expected electrical relay life

- ≤30 mV, ≤10 mA resistive.....2.5×10^6 cycles
- 30 V, 1 A.....5×10^5 cycles
- 30 V, 2 A.....1×10^5 cycles
- 60 VDC, 1 ADC resistive.....1×10^5 cycles

Note Relays are field replaceable. Refer to the NI Switches Help at *ni.com/manuals* for more information about replacing a failed relay.

Note Certain applications may require additional time for proper settling. Refer to the NI Switches Help at *ni.com/manuals* for more information about including additional settling time.

Physical Characteristics

Relay type.....Electromechanical, non-latching

Relay contact material.....Palladium-ruthenium, gold covered

Front panel connector.....160 DIN 41612, 160 positions, male

Power requirement

- PXI Express
  - 12 V.....24 W
  - 3.3 V.....3.6 W

Dimensions (L × W × H).....3U, one slot, PXI/cPCI module, PXI Express compatible 21.6 cm × 2.0 cm × 13.0 cm (8.5 in. × 0.8 in. × 5.1 in.)

Weight.....423 g (14.9 oz)

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Environment

Maximum altitude.....2,000 m (800 mbar) (at 25 °C ambient temperature)

Pollution Degree.....2

Indoor use only.

Operating Environment

Ambient temperature range.....0 °C to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)

Relative humidity range.....10% to 90%, noncondensing (Tested in accordance with IEC 60068-2-56.)

Related Information

Derating NI 2738 Load at >50 °C on page 8

Storage Environment

Ambient temperature range.....-40 °C to 71 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)

Relative humidity range.....5% to 95%, noncondensing (Tested in accordance with IEC 60068-2-56.)

Shock and Vibration

Operating shock.....30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)

Random vibration

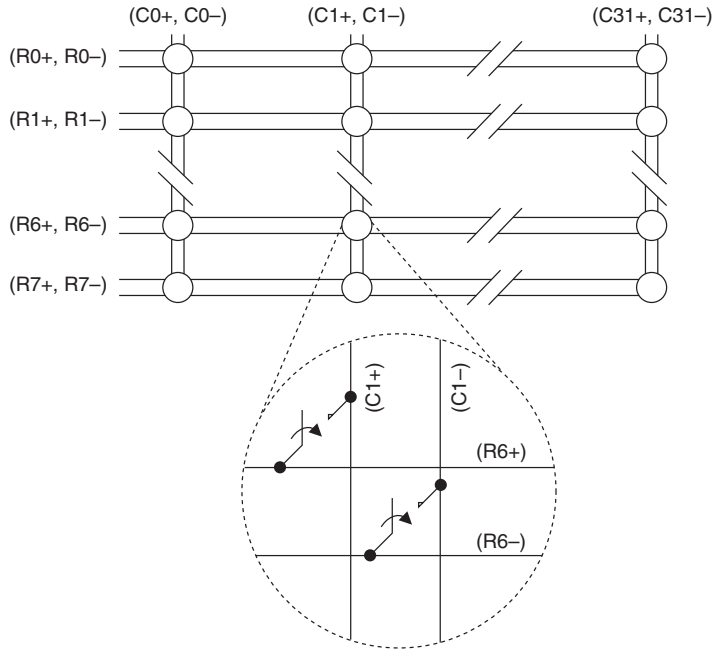
- Operating.....5 Hz to 500 Hz, 0.3 g_{rms}
- Nonoperating.....5 Hz to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC 60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

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Diagrams

The following figure shows the NI 2738 power-on state.

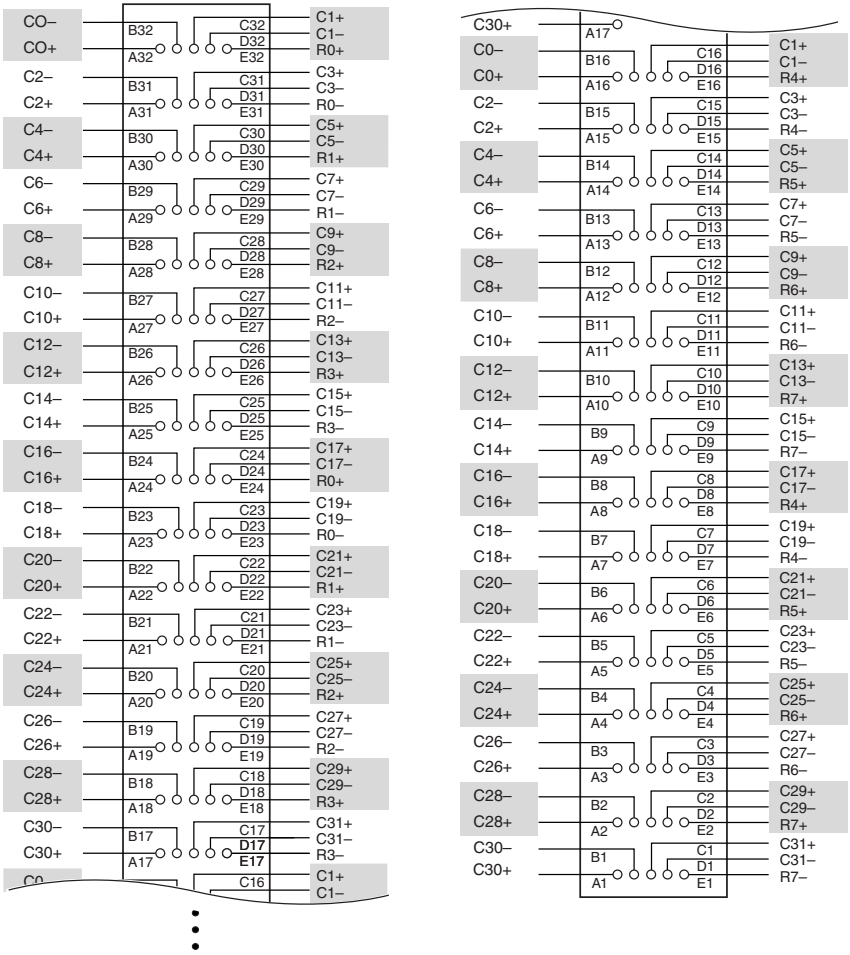
Figure 1. NI 2738 Power-On State



The following figure shows the NI 2738 connector pinout.

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Figure 2. NI 2738 Connector Pinout



Accessories

Table 1. NI Accessories for the NI 2738

Accessory	Part Number
DIN160 to 50-pin D-SUB switch cable, 1 m	782417-03
DIN160 to DIN160 switch cable, 1 m	782417-02

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Table 1. NI Accessories for the NI 2738 (Continued)

Accessory	Part Number
DIN160 to bare wire switch cable, 1 m	782417-01
Relay replacement kit for IM02PNS Relays	781089-10

Derating NI 2738 Load at >50 °C

To verify you are operating the NI 2738 within supported 2-wire derating conditions, complete the following steps:

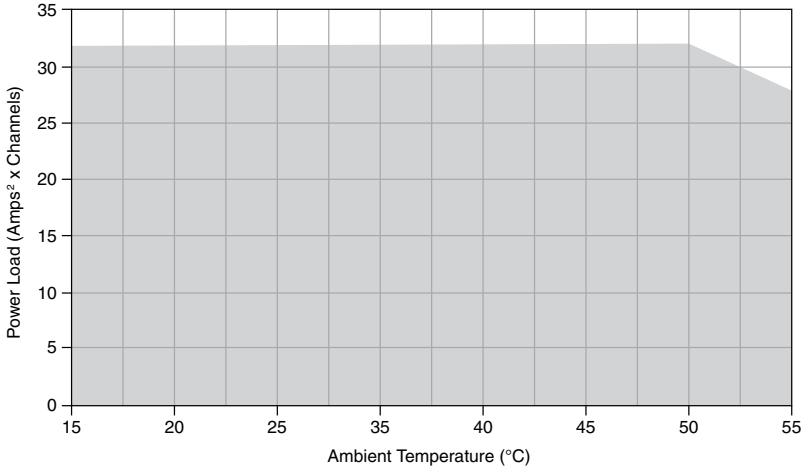
1. Use the following equation to calculate the load:

$$\text{Load} = \text{Channels}_1 \times \left(\text{Current}_1\right)^2 + \text{Channels}_2 \times \left(\text{Current}_2\right)^2 + \ldots + \text{Channels}_n \times \left(\text{Current}_n\right)^2$$

   where Channels is the number of channels that simultaneously carry a signal, Current, for 1, ... , *n*.

2. Verify that the load at your ambient operating temperature falls within the shaded region of the following figure.

Figure 3. NI 2738 Load Derating, 2-Wire



Module Load Derating at >50 °C

The following examples calculate supported derating conditions for the NI 2738.

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Example 1

$$(3 \times 2^2) + (4 \times 1.7^2) = 23.6A^2 \times \text{channels}$$

where	3 channels carry 2 A
	4 channels carry 1.7 A

You can use this module at ambient temperatures between 0 °C and 55 °C.

Example 2

$$(8 \times 2^2) = 32A^2 \times \text{channels}$$

where	8 channels carry 2 A

You can use this module at ambient temperatures between 0 °C and 50 °C.

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

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- 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, certifications, and additional information, 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)
- 2014/30/EU; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. 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 to the environment and 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 NI products must be disposed of according to local laws and regulations. For more information about how to recycle NI products in your region, visit *ni.com/environment/weee*.

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