

NI 2833/2834 Specifications

2 A Matrix Cards for the NI SwitchBlock

This document lists specifications for the NI 2833A/B and NI 2834A/B matrix relay cards. All specifications are subject to change without notice. Visit ni.com/manuals for the most current specifications. Refer to the *NI Switches Help* for detailed topology information.

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. Typical specifications are not warranted.

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

Maximum Ratings

Maximum switching voltage 100 V, CAT I
(row/column-to-ground)

Maximum switching voltage 100 V
(row-to-column)

Maximum current 2A
(switching or carry, per channel)

Maximum switching power 60 W, 62.5 VA
(per channel)



Note Load ratings apply to relays used within the specification before the end of relay life.

Operating temperature 0 °C to 55 °C

Cautions



Caution These modules are rated for Measurement Category I and intended to carry signal voltages no greater than 100 V_{rms}/100 VDC. This module can withstand up to 800 V impulse voltage. Do not use these modules 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. Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for more information on measurement categories.



Caution In systems that include cards with different maximum voltages, the lowest safety voltage rating as specified on the front of the card applies for the entire system. This includes all cards in the carrier, and all cards in other carriers that are connected with the NI 2806 expansion bridge.



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.



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 To ensure the specified EMC performance, operate this product only with shielded cables and accessories.



Caution The protection provided by this product may be impaired if it is used in a manner not described in this document.

Specifications

Specification	Value	
	NI 2833A/B	NI 2834A/B
Topologies	2-wire 4 × 71 matrix	2-wire 8 × 34 matrix
Analog bus line connections	AB0–AB7 (8 Lines)	AB0–AB15 (16 Lines)
Maximum switching voltage (row/column-to-ground)	100 V, CAT 1	
Maximum switching voltage (row-to-column)	100 V	
Maximum current (switching or carry, per channel)	2.0 A	

Specification		Value	
		NI 2833A/B	NI 2834A/B
Maximum switching power (per crosspoint)*		60 W	
Simultaneous channels at maximum current		4	8†
DC path resistance‡	Initial	<1 Ω	<1 Ω
	End-of-life	≥2 Ω	≥2 Ω
	Open channel	>10 GΩ	>10 GΩ
Thermal EMF, typical		<10 μV	<10 μV
Bandwidth, typical (-3 dB, 50 Ω termination, column-row-column)		≥10 MHz	≥10 MHz
Expected relay life, mechanical (no load)**		1 × 10 ⁸ cycles	
Expected relay life, electrical (resistive, <10 pF load)	10 V, 100 mA	2.5 × 10 ⁶ cycles	
	10 V, 1 A	1 × 10 ⁶ cycles	
	30 V, 1 A	5 × 10 ⁵ cycles	
	60 V, 1 A	1 × 10 ⁵ cycles	
	100 V, 0.3 A	5 × 10 ⁵ cycles	
	30 V, 2 A	1 × 10 ⁵ cycles	
Minimum switching load††		20 mV/10 mA	

* Load ratings apply to relays used within the specification before the end of relay life.

† Refer to current derating graphs for operation ≥ 40 °C.

‡ Path resistance is a combination of relay contact resistance and trace and connector resistance. Path resistance typically remains low until the end of relay life, then rapidly rises above the specified value.

** Relays are field replaceable. Refer to the *NI Switches Help* for more information.

†† The minimum switch load is not recommended for 2-wire resistance measurements.

Specification		Value	
		NI 2833A/B	NI 2834A/B
Relay operate/release time, typical ****		<5 ms	
Crosstalk, typical (50 Ω termination) Channel-to-channel	10 kHz	<−75 dB	<−75 dB
	100 kHz	<−60 dB	<−70 dB
	1 MHz	<−40 dB	<−50 dB
Isolation, typical (50 Ω termination) Open channel	10 kHz	>75 dB	>80 dB
	100 kHz	>60 dB	>65 dB
	1 MHz	>40 dB	>45 dB
** Relay operate and release times depend on PC and PXI bus performance and application software. For more information about NI SwitchBlock relay operate times, visit ni.com/info and enter the Info Code exa9ee. *** Certain applications may require additional time for proper settling. Refer to the <i>NI Switches Help</i> for more information.			

NI 2834 Module Load Derating at >40 °C

Load derating is dependent on the ambient temperature, the sum of the current squared of each channel simultaneously carrying a signal, and the presence or absence of a high-density card (NI 2815/2816) in the carrier. The result must fall within the shaded region of Figure 1. The following examples represent this calculation.

Example 1—No high-density module in the carrier

3 channels carry 2 A
while 4 channels carry 1.7 A

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

The module in Example 1 can be used at ambient temperatures between 0 °C and 55 °C.

Example 2—An NI 2815 high-density module in the carrier

3 channels carry 2 A while
4 channels carry 1.7 A

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

The module in Example 2 can be used at ambient temperatures between 0 °C and 50 °C.

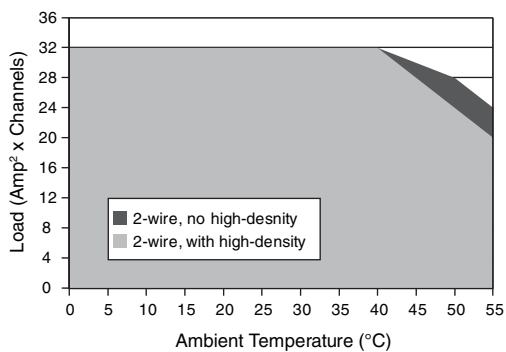
Example 3—No high-density module in the carrier

8 channels carry 2 A

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

The module in Example 3 can be used at ambient temperatures between 0 °C and 40 °C.

Figure 1. NI 2834 Load Derating



Physical Characteristics

Specification	Value	
	NI 2833A/B	NI 2834A/B
Relay type	Electromechanical, latching	
Relay contact material	Palladium-ruthenium, gold covered	
I/O connectors	160 pos, DIN	
Power requirement, carrier	20 W at 5 V, 5 W at 3.3 V	
Dimensions (L × W × H)	11.2 × 2.4 × 17.1 cm (4.4 × 1.0 × 6.7 in.)	
Weight	373 g (13.2 oz)	

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.)

Nonoperating shock 50 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

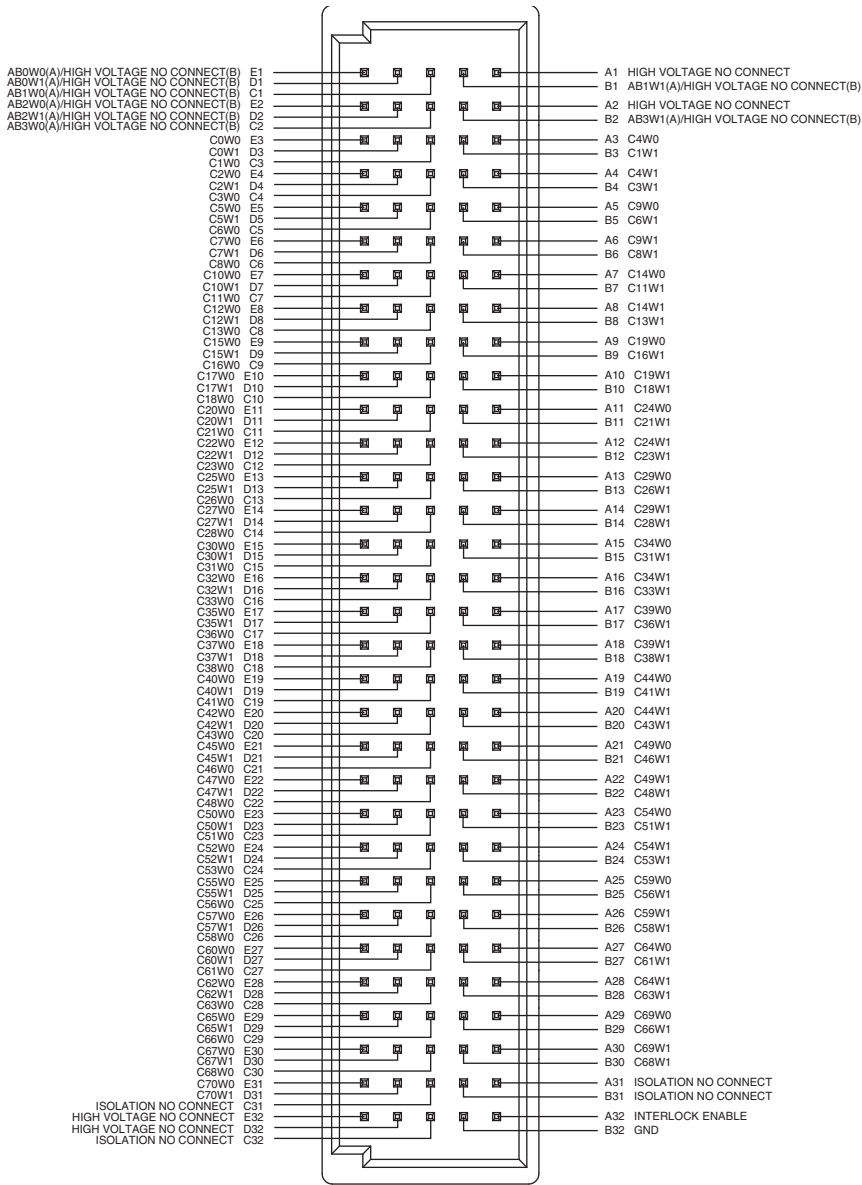
 Operating 5 to 500 Hz, 0.3 g_{rms}

 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

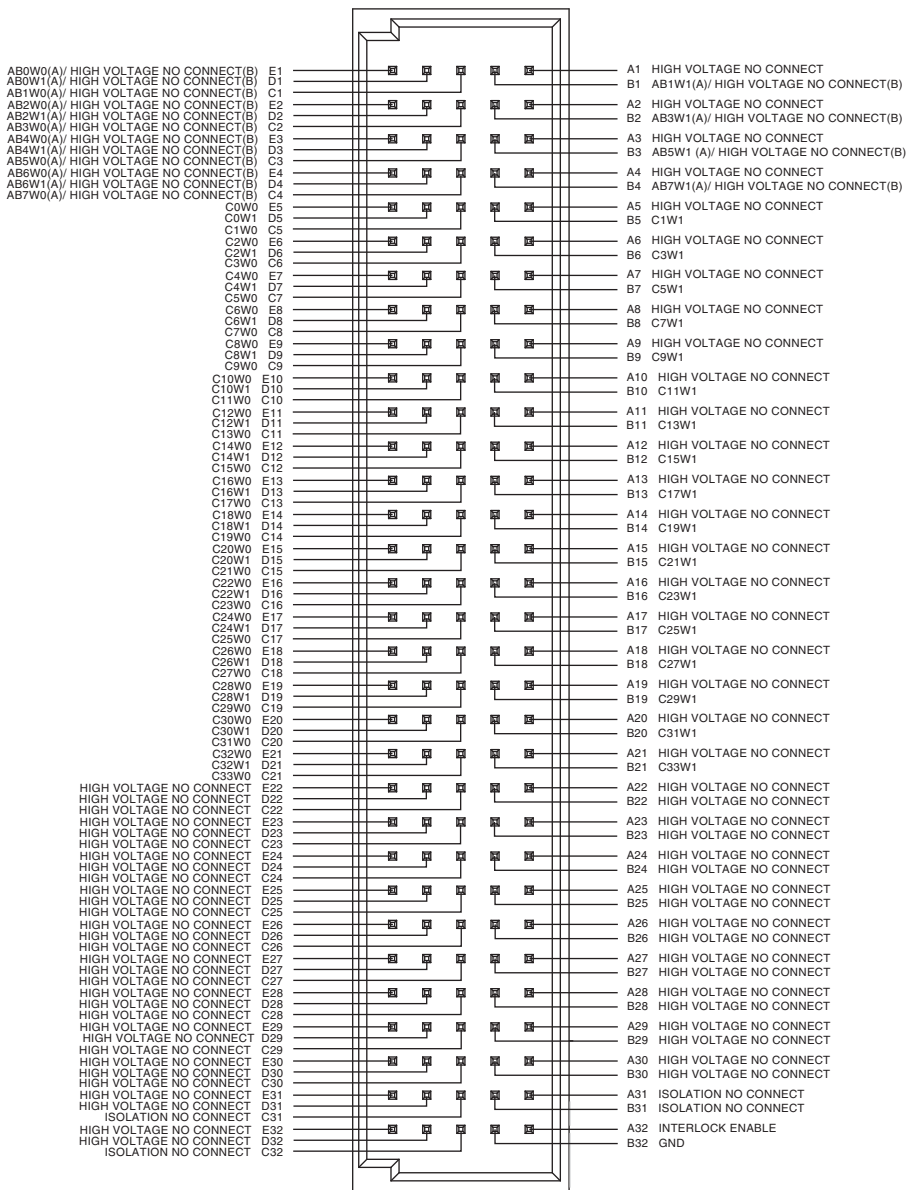
The following figure shows the NI 2833 connector pinout.

Figure 2. NI 2833 Connector Pinout



The following figure shows the NI 2834 connector pinout.

Figure 3. NI 2834 Connector Pinout





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

Accessories

Visit ni.com for more information about the accessories in Table 1.



Caution Use only NI cables. Cables with metal connectors might expose the user to hazardous voltages.



Caution This product must be operated with shielded cables and accessories to ensure compliance with Electromagnetic Compatibility (EMC) requirements. Do not use unshielded cables or accessories unless they are installed in a shielded enclosure with properly designed and shielded input/output ports and are connected to the NI product using a shielded cable. If unshielded cables or accessories are not properly installed and shielded, the EMC specifications for the product are no longer guaranteed.

Table 1. NI Accessories for the NI 2833/2834

Accessory	Part Number
SH160F-160M-NI SwitchBlock Cable	153028-01
NI TBX-2808 screw terminal accessory for NI SwitchBlock	781420-08

Compliance and Certifications

Safety

This product meets the requirements of the following standards of safety for electrical equipment 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
- AS/NZS CISPR 11: Group 1, 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 generates 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 C €

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 Declaration of Conformity (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 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.

电子信息产品污染控制管理办法（中国 RoHS）



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