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**SWB-2833**

## DEVICE SPECIFICATIONS

# NI 2833

## 2 A Matrix Card for the NI SwitchBlock

This document lists specifications for the NI 2833A/B matrix relay card. All specifications are subject to change without notice. Visit [ni.com/manuals](http://ni.com/manuals) for the most current specifications. Refer to the [NI Switches Help](#) for detailed topology information.

Topology.....2-wire 4 × 71 matrix

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## About These Specifications

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*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<sub>pk</sub>, 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.

## Cautions

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**Caution** This module is rated for Measurement Category I and intended to carry signal voltages no greater than  $100 V_{\text{rms}}/100$  VDC. This module can withstand up to 800 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. Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for more information on measurement categories.



**Caution** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.



**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. The system can include all cards in the carrier, and all cards in other carriers that are connected with the NI 2806 expansion bridge.



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



**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](http://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 the NI 2833A/B can be impaired if it is used in a manner not described in this document.



**Caution** Always disconnect or turn off power sources before powering on a chassis.

# Input Characteristics

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Maximum switching voltage	
Row/column-to-ground.....	100 V, CAT I
Row-to-column.....	100 V
Maximum switching current.....	2.0 A (per channel)
Maximum carry current.....	2.0 A (per channel)
Maximum switching power.....	60 W, 62.5 VA (per channel)
Maximum switching power.....	60 W (per crosspoint)
Simultaneous channels at maximum.....	4
current	
DC path resistance	
Initial.....	1 $\Omega$
End-of-life.....	$\geq 2 \Omega$
Open channel.....	$> 10 \text{ G}\Omega$



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

Thermal EMF, typical.....	$< 10 \mu\text{V}$
Bandwidth, typical (-3 dB,.....	$\geq 10 \text{ MHz}$
50 $\Omega$ termination, column-row- column)	
Crosstalk, typical (50 $\Omega$ termination) channel- to-channel	
10 kHz.....	$< -75 \text{ dB}$
100 kHz.....	$< -60 \text{ dB}$
1 MHz.....	$< -40 \text{ dB}$
Isolation, typical (50 $\Omega$ termination) open channel	
10 kHz.....	$> 75 \text{ dB}$
100 kHz.....	$> 60 \text{ dB}$
1 MHz.....	$> 40 \text{ dB}$

Minimum switching load<sup>1</sup>.....20 mV/10 mA  
 Analog bus line connections.....AB <0...7> (8 Lines)

## Dynamic Characteristics

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Relay operate/release time, typical<sup>2</sup>.....<5 ms



**Note** Certain applications may require additional time for proper settling. Refer to [NI Switches Help](#) for information about including additional settling time.

Expected relay life, mechanical..... $1 \times 10^8$  cycles  
 (no load)

Expected relay life, electrical  
 (resistive, <10 pF load)

10 V, 100 mA..... $2.5 \times 10^6$  cycles  
 10 V, 1 A..... $1 \times 10^6$  cycles  
 30 V, 1 A..... $5 \times 10^5$  cycles  
 60 V, 1 A..... $1 \times 10^5$  cycles  
 100 V, 0.3 A..... $5 \times 10^5$  cycles  
 30 V, 2 A..... $1 \times 10^5$  cycles



**Note** Relays are field replaceable. Refer to [NI Switches Help](#) for information about replacing failed relays.

## Physical Characteristics

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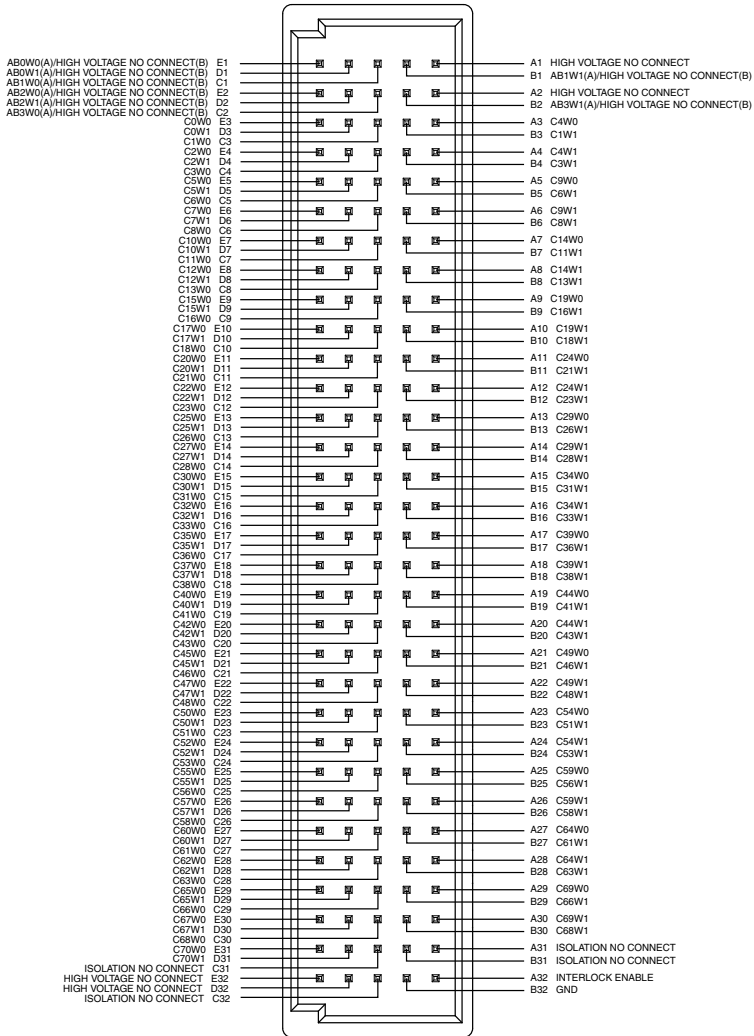
Relay type.....Electromechanical, latching  
 Relay contact material.....Palladium-ruthenium, gold covered  
 I/O connectors.....160 position, DIN  
 Power requirement, carrier.....20 W at 5 V, 5 W at 3.3 V  
 Dimensions (L × W × H).....11.2 cm × 1.2 cm × 17.1 cm  
 (4.4 in. × 0.5 in. × 6.7 in.)  
 Weight.....373 g (13.2 oz)

<sup>1</sup> The minimum switch load is not recommended for 2-wire resistance measurements.

<sup>2</sup> 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](http://ni.com/info) and enter the Info Code `exa9ee`.

# Connector Pinout

Figure 1. NI 2833A/B Connector Pinout



## Accessories

Refer to [ni.com](http://ni.com) for more information about the following accessories.



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



**Note** To ensure the specified EMC performance, operate this product only with shielded cables and accessories. 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 2833A/B

Accessory	Part number
SH160F-160M-NI SwitchBlock Cable	153028-01
NI TBX-2808 screw terminal accessory for NI SwitchBlock (unshielded)	781420-08

## Environment

Maximum altitude.....2,000 m (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.)

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

## Storage Environment

Ambient temperature range.....-20 °C to 70 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)

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

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 Hz to 500 Hz, 0.3 g <sub>rms</sub>
Nonoperating.....	5 Hz to 500 Hz, 2.4 g <sub>rms</sub> (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

# Compliance and Certifications

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## 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
- 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 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

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](http://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](http://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](http://ni.com/environment/weee).

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