

# NI SCXI™-1166 Specifications

## 32-Channel SPDT Relay Module

This document lists specifications for the NI SCXI-1166 general purpose relay module. All specifications are subject to change without notice. Visit [ni.com/manuals](http://ni.com/manuals) for the most current specifications.

Configuration ..... 32-channel SPDT, nonlatching

## Input Characteristics

---

Maximum switching voltage

Channel-to-channel ..... 150 VDC, 125 VAC

Channel-to-ground ..... 150 VDC, 125 VAC, CAT I



**Caution** This module is rated for Measurement Category I and intended to carry signal voltages no greater than 150 V. 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 or 230 VAC. Refer to the *NI Switches Getting Started Guide* for more information on measurement categories.

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

Maximum switching power ..... 60 W, 62.5 VA (DC to 60 Hz)  
(per channel, not to exceed 2 A per channel)

Maximum switching current ..... 2 ADC, 2 AAC  
(per channel)

Simultaneous channels at maximum  
switching current ( $\leq 25^\circ C$ ) ..... 32

Maximum carry current ..... 5 ADC, 5 AAC  
(per channel)

Simultaneous channels at maximum  
carry current ( $\leq 25^\circ C$ ) ..... 8

## Module Load Derating at >25 °C

Load derating is dependent on the ambient temperature and the sum of the current squared of each channel simultaneously carrying a signal. The result must fall within the shaded region of Figure 1. The following examples represent this calculation.

Example 1:

5 channels carry 3 A, while 15 channels carry 1 A

$$(5 \times 3^2) + (15 \times 1^2) = 60 \text{ A}$$

Example 1 can be used at ambient temperatures between 0 °C and 50 °C.

Example 2:

3 channels carry 5 A, while 25 channels carry 2 A

$$(3 \times 5^2) + (25 \times 2^2) = 175 \text{ A}$$

Example 2 can be used at ambient temperatures between 0 °C and 30 °C.

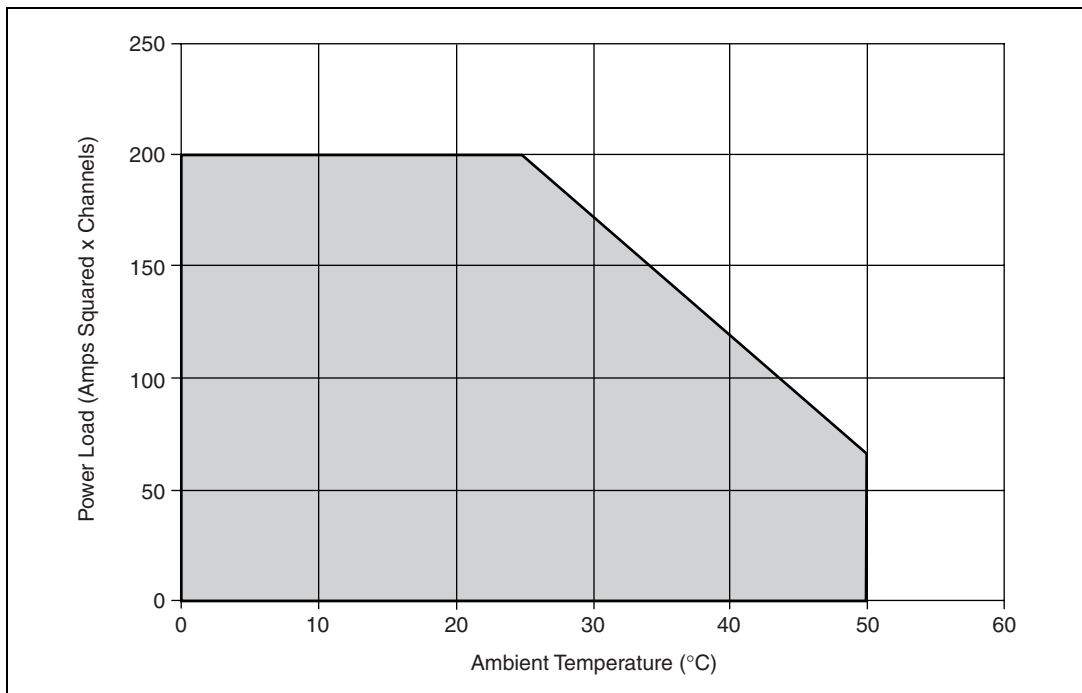


Figure 1. Module Load Derating

DC path resistance

Initial ..... <0.1  $\Omega$

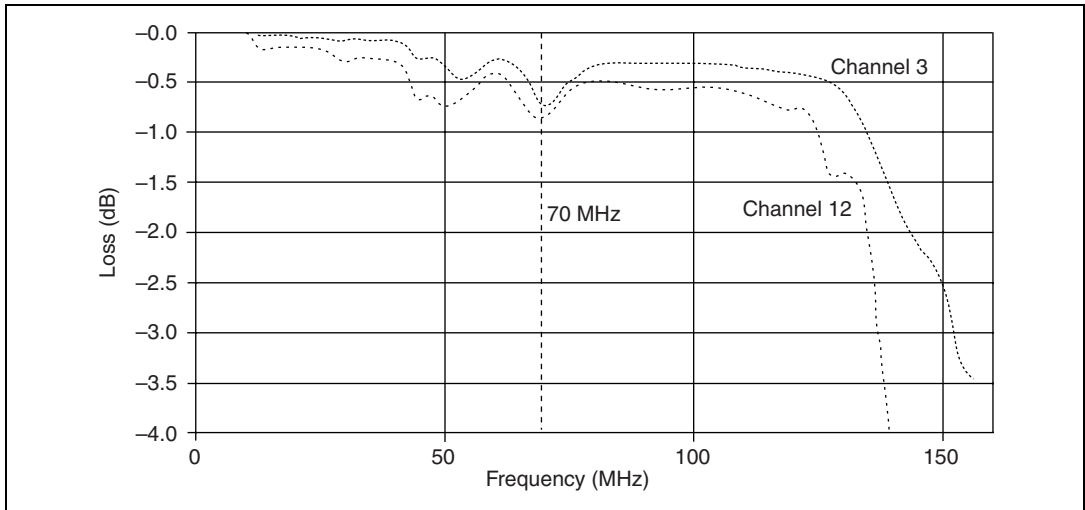
End of life .....  $\geq 1.0 \Omega$

DC path resistance typically remains low for the life of the relay. At the end of relay life, the path resistance rises rapidly above 1  $\Omega$ . Load ratings apply to relays used within the specification before the end of relay life.

Thermal EMF ..... <9  $\mu\text{V}$  (typical at 23  $^{\circ}\text{C}$ )

Minimum switching capacity ..... 10  $\mu\text{A}$  at 10 mV DC

Bandwidth (-3 dB) .....  $\geq 70 \text{ MHz}$



**Figure 2.** Insertion Loss Measured in a 50  $\Omega$  System (Worst Case, Based on 30 Engineering DUTs)

Crosstalk (typical at 23  $^{\circ}\text{C}$ )

Channel-to-channel

10 kHz .....  $\leq -75 \text{ dB}$

100 kHz .....  $\leq -65 \text{ dB}$

1 MHz .....  $\leq -45 \text{ dB}$

10 MHz .....  $\leq -25 \text{ dB}$

Isolation (typical at 23  $^{\circ}\text{C}$ )

Open channel

100 kHz .....  $\geq 65 \text{ dB}$

1 MHz .....  $\geq 45 \text{ dB}$

10 MHz .....  $\geq 25 \text{ dB}$

# Dynamic Characteristics

---

Maximum cycle speed .....	115 cycles/s
Relay operate time	
Typical.....	2 ms
Maximum .....	4.4 ms
Expected relay life	
Mechanical .....	100,000,000 cycles
Electrical	
30 VDC, 1 ADC resistive.....	500,000 cycles
30 VDC, 2 ADC resistive.....	100,000 cycles
125 VAC, 0.2 AAC resistive....	300,000 cycles
125 VAC, 0.5 AAC resistive....	100,000 cycles

# Trigger Characteristics

---

Input trigger	
Sources .....	SCXI trigger lines 0–7, Front panel, Rear connector
Minimum pulse width.....	150 ns
Front panel/terminal block input voltage	
Minimum.....	–0.5 V
VL maximum .....	+0.7 V
VH minimum.....	+2.0 V
Nominal.....	+3.3 V
Maximum .....	+5.5 V
Output trigger	
Destinations .....	SCXI trigger lines 0–7, Front panel, Rear connector
Pulse width .....	Programmable (1 $\mu$ s to 62 $\mu$ s)
Front panel nominal voltage.....	3.3 V TTL, 8 mA

# Physical Characteristics

---

Relay type .....	Electromechanical, nonlatching
Relay contact material.....	Gold-clad silver alloy
I/O connectors .....	Two 62-pin D-SUBs
Power requirement, including optional internal drive power .....	6.3 W at $\pm 18.5$ V 200 mW at 5 V
Dimensions (W $\times$ H $\times$ D).....	3.0 cm $\times$ 17.3 cm $\times$ 19.8 cm (1.2 in. $\times$ 6.8 in. $\times$ 7.8 in.)
Weight.....	720 g (1 lb 10 oz)

## Environment

Operating temperature.....	0 °C to 50 °C
Storage temperature .....	-20 °C to 70 °C
Relative humidity .....	5% to 85% noncondensing
Pollution Degree .....	2
Approved at altitudes up to	2,000 m
Indoor use only	

## Accessories

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

**Table 1.** Accessories Available for the NI SCXI-1166

Accessory	Part Number
NI SCXI-1366 terminal block	777687-66
Backshell and connector kit	778720-01



**Note** The module and accessory kit connectors are keyed and have pins removed for safety isolation.



**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.

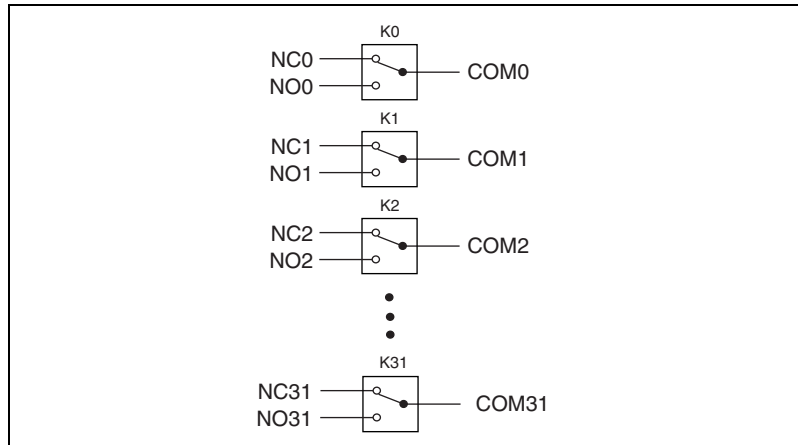
**Table 2.** Third-Party Accessory for the NI SCXI-1166

Accessory	Manufacturer
62-pin D-SUB connector	Any

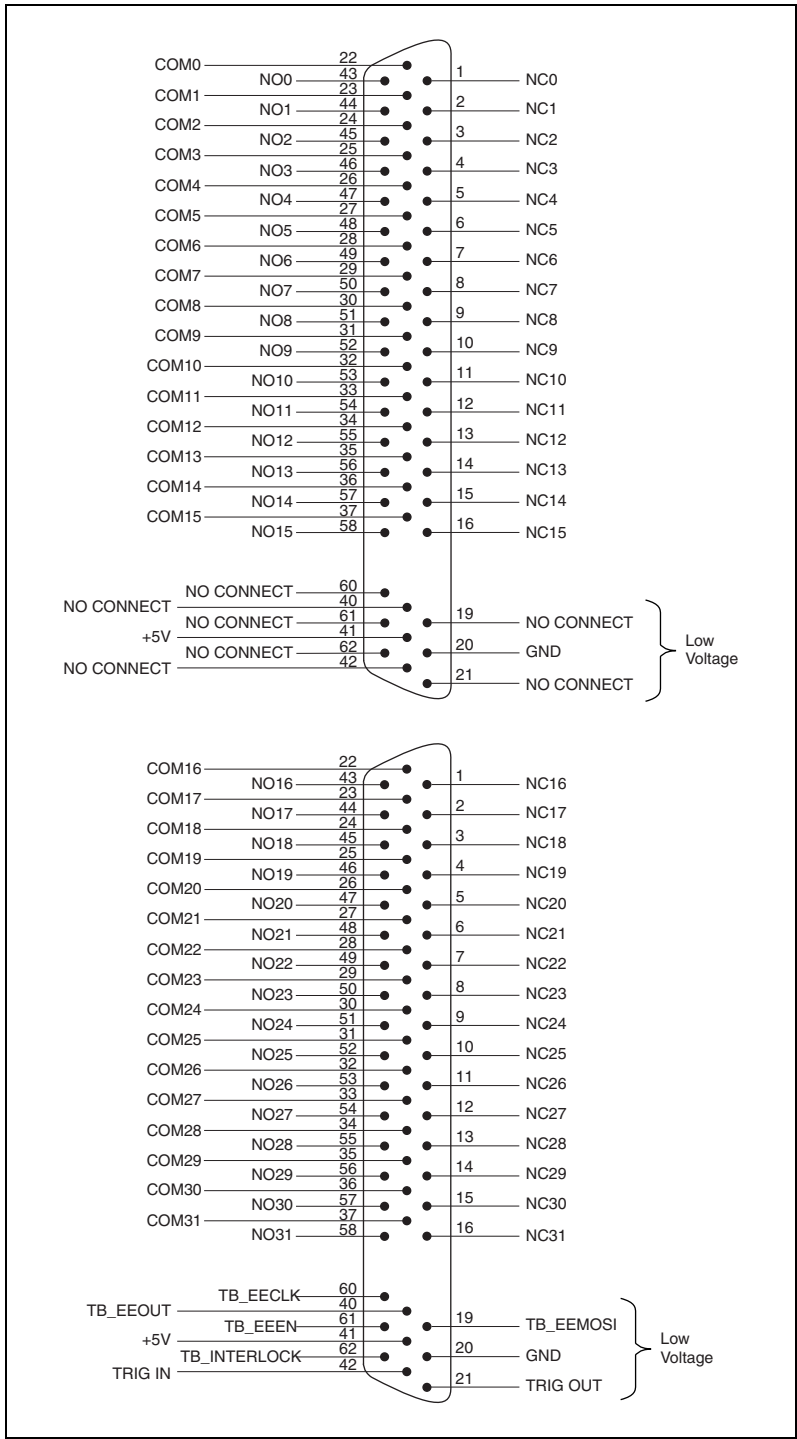
## Glossary

---

channel	a single SPDT (form C) relay. Each channel has three terminals—common (COM), normally closed (NC), normally open (NO).
cycle	actuate an SPDT relay twice, leaving it in its original state.
operate	actuate an SPDT relay once, leaving it in the opposite state.



**Figure 3.** NI SCXI-1166 Power-On State



**Figure 4. NI SCXI-1166 Front Connectors**

# Compliance and Certifications

---

## Safety

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

- IEC 61010-1, EN 61010-1
- UL 3111-1, UL 61010B-1
- CAN/CSA C22.2 No. 1010.1



**Note** For UL and other safety certifications, refer to the product label, or visit [ni.com/hardref.nsf](http://ni.com/hardref.nsf), search by model number or product line, and click the appropriate link in the Certification column.

## Electromagnetic Compatibility

Emissions .....	EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity .....	EN 61326:1997 + A2:2001, Table 1
EMC/EMI .....	CE, C-Tick, and FCC Part 15 (Class A) Compliant



**Note** For EMC compliance, you *must* operate this device with shielded cabling.

## CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety).....	73/23/EEC
Electromagnetic Compatibility Directive (EMC) .....	89/336/EEC



**Note** Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit [ni.com/hardref.nsf](http://ni.com/hardref.nsf), search by model number or product line, and click the appropriate link in the Certification column.

