

## DEVICE SPECIFICATIONS

# NI PXI/PXIe-2593

## 500 MHz Dual 8×1 50 Ω Multiplexer

This document lists specifications for the NI PXI/PXIe-2593 (NI 2593). All specifications are subject to change without notice. Visit [ni.com/manuals](http://ni.com/manuals) for the most current specifications.

Topology	16 × 1 multiplexer 8 × 1 terminated multiplexer Dual 4 × 1 terminated multiplexer Dual 8 × 1 multiplexer Independent
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Refer to the *NI Switches Help* at [ni.com/manuals](http://ni.com/manuals) 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 ambient temperature. Typical specifications are not warranted.

All voltages are specified in DC, AC<sub>pk</sub>, or a combination unless otherwise specified.



**Caution** The protection provided by the NI 2593 can be impaired if it is used in a manner not described in this document.

## Input Characteristics

Maximum switching voltage	150 V, CAT I (channel-to-channel and channel-to-ground)
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**Caution** This module is rated for Measurement Category I. It is intended to carry signal voltages no greater than 100 V<sub>rms</sub>, 150 V<sub>pk</sub>, or 150 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.



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

Maximum switching current (per channel)	0.5 A
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Maximum carry current (per channel)	1 A
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Simultaneous channels at maximum current	Up to 2
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**Caution** The switching power is limited by the maximum switching current and the maximum voltage and must not exceed 10 W.

Maximum switching power (per channel)	10 W
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**Note** NI recommends against switching active RF signals. As a relay actuates, the channel is momentarily unterminated. Some RF sources can be damaged by reflections if their outputs are not properly terminated. Refer to your RF source documentation for more information.

Minimum switch load	10 $\mu$ A, 10 mV
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Maximum RF carry power (per channel)	10 W up to 500 MHz
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DC path resistance	
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Initial	$<1.0 \Omega$
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End-of-life	$\geq 2.0 \Omega$
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Path resistance is a combination of relay contact resistance and trace resistance. Contact resistance typically remains low for the life of a relay. At the end of relay life, the contact resistance rises rapidly above 1.0  $\Omega$ .

## RF Performance Characteristics

Characteristic impedance ( $Z_0$ )	50 $\Omega$ nominal
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Insertion Loss	
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$8 \times 1$	
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DC to 200 MHz	$<0.9$ dB
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200 MHz to 500 MHz	$<1.6$ dB
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16 × 1		
	DC to 200 MHz	<1.2 dB
	200 MHz to 500 MHz	<1.9 dB
Typical bandwidth (3 dB)		
	8 × 1	>900 MHz
	16 × 1	>750 MHz
VSWR		
8 × 1		
	DC to 200 MHz	<1.4
	200 MHz to 500 MHz	<1.8
16 × 1		
	DC to 200 MHz	<1.4
	200 MHz to 500 MHz	<1.8

Channel-to-channel skew within each 8-channel bank is less than 100 ps. Only channels from standard topologies are listed in Table 1.

**Table 1.** Propagation Delay (ns)

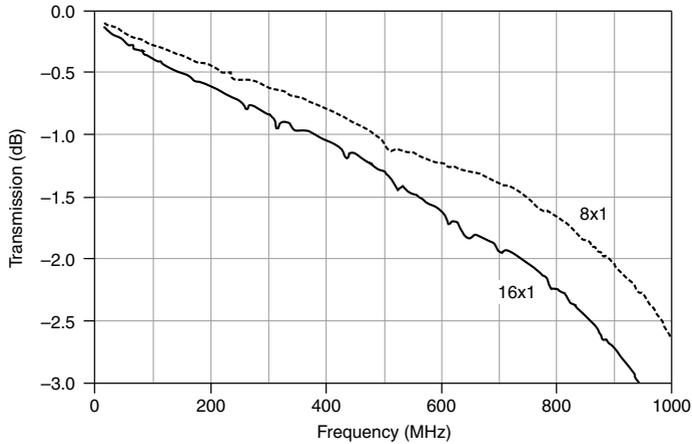
COM	CH0-CH7	CH8-CH15
0	1.90 to 2.00	2.55 to 2.65
1	—	1.90 to 2.00

Typical rise time (10% to 90%)

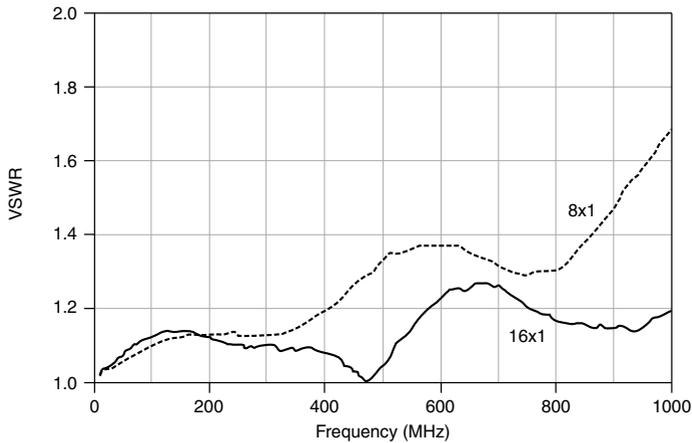
8 × 1	385 ps
16 × 1	460 ps

Refer to the following figures for typical insertion loss, typical VSWR, typical isolation, and typical bank-to-bank crosstalk, respectively.

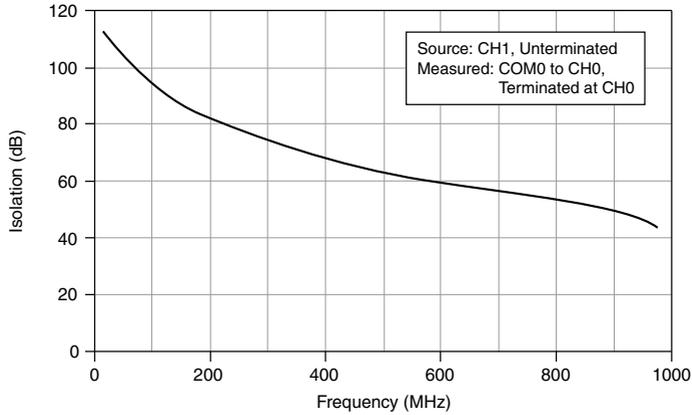
**Figure 1. Typical Insertion Loss**



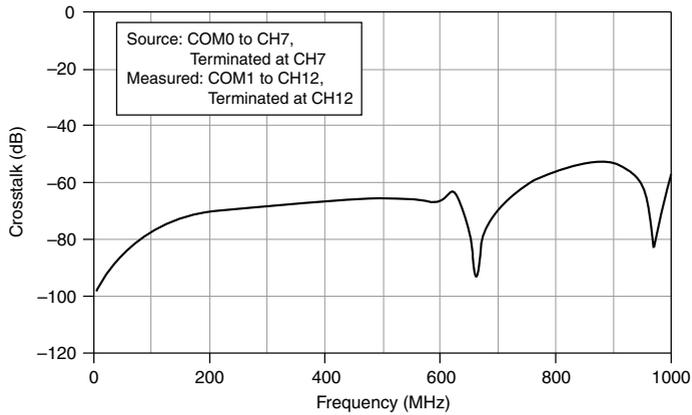
**Figure 2. Typical VSWR**



**Figure 3.** Typical Channel-to-Channel Isolation



**Figure 4.** Typical Bank-to-Bank Crosstalk



## Dynamic Characteristics

### Relay operate time

Typical	2.4 ms
Maximum	4.4 ms



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

### Expected relay life

Mechanical	$5 \times 10^7$ cycles
Electrical (30 V, 0.3 A, DC resistive)	$3 \times 10^5$ cycles

## Trigger Characteristics

### Input trigger

Sources	PXI trigger lines <0...7>, Front panel
Minimum pulse width	150 ns



**Note** The NI 2593 can recognize trigger pulse widths less than 150 ns if you disable digital filtering. Refer to the *NI Switches Help* at [ni.com/manuals](http://ni.com/manuals) for information about disabling digital filtering.

### Front panel input voltage

Minimum	-0.5 V
$V_L$ Maximum	+0.7 V
$V_H$ Minimum	+2.0 V
Nominal	+3.3 V
Maximum	+5.5 V

### Output trigger

Destinations	PXI trigger lines <0...7>, Front panel
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, latching
Relay contact material	Silver palladium and gold
I/O connectors	18 MCX jacks
Trigger connectors	2 SMB jacks
Power requirement	
PXI	3.5 W at 5 V, 1 W at 3.3 V
PXI Express	4.5 W at 12 V, 1 W at 3.3 V
Dimensions (L × W × H)	3U, one slot, PXI/cPCI module, PXI Express compatible 21.6 × 2.0 × 13.0 cm (8.5 × 0.8 × 5.1 in.)
Weight	330 g (12 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
Maximum altitude	2,000 m

Indoor use only.

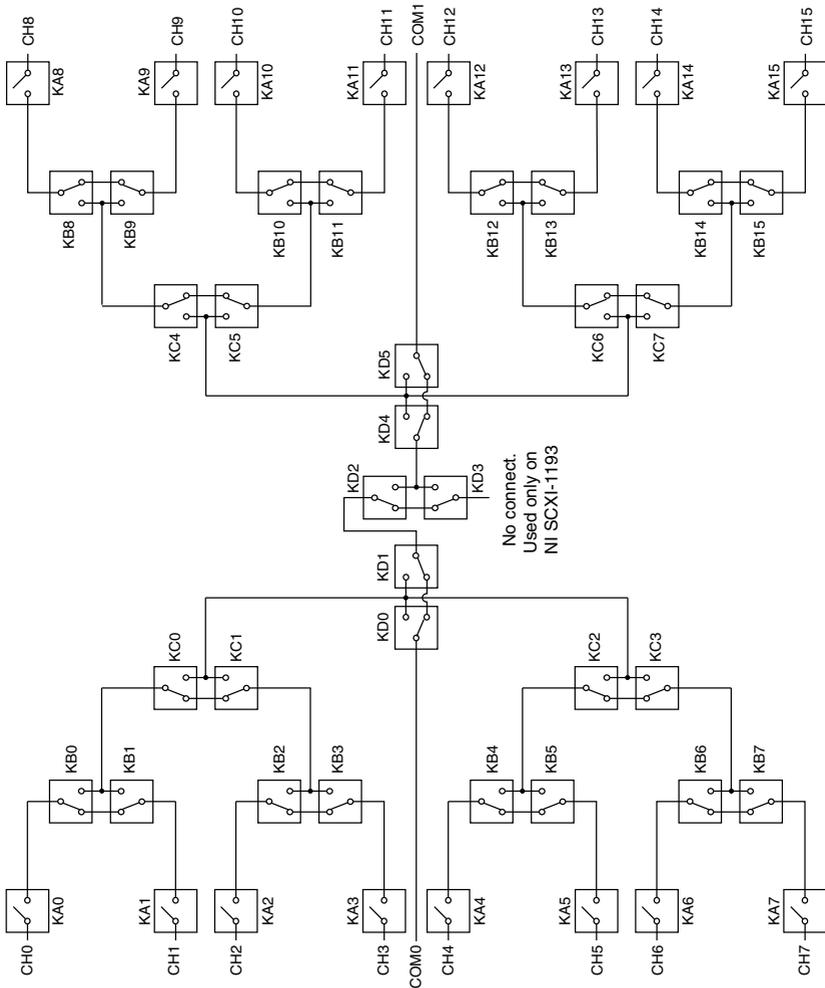
## Shock and Vibration

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 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.)

# Diagrams

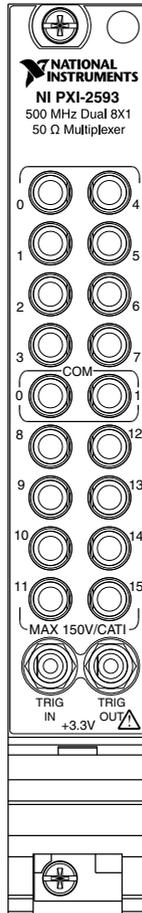
Refer to the following figure for the power-on state diagram of the NI 2593.

**Figure 5. NI 2593 Power-On State**



Refer to the following figure for the front panel connector pinout of the NI 2593.

**Figure 6.** NI 2593 Front Panel 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

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

**Table 2.** Cabling available for the NI 2593

Connectors	Length	Part Number
MCX-MCX	0.3 m	188374-0R3
	1.0 m	188374-01
MCX-BNC	0.3 m	188375-0R3
	1.0 m	188375-01
MCX-SMB	0.3 m	188376-0R3
	1.0 m	188376-01
MCX-SMA	0.3 m	188377-0R3
	1.0 m	188377-01
50 $\Omega$ MCX terminator (1 GHz maximum)	—	778831-01

## 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
- 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:

- 2014/35/EU; 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](#).

## 电子信息产品污染控制管理办法（中国 RoHS）



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