

DEVICE SPECIFICATIONS

NI PXI/PXIe-2593

500 MHz Dual 8x1 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 for the most current specifications.

| | |
|----------|--|
| Topology | 16 × 1 multiplexer 8 × 1 terminated multiplexer Dual 4 × 1 terminated multiplexer Dual 8 × 1 multiplexer Independent |
|----------|--|

Refer to the *NI Switches Help* at 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_{pk}, 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) |
|---------------------------|---|



Caution This module is rated for Measurement Category I. It is intended to carry signal voltages no greater than 100 V_{rms}, 150 V_{pk}, 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 ($>42.4\text{ V}_{\text{pk}}/60\text{ VDC}$) are present on any relay terminal, safety low-voltage ($\leq 42.4\text{ V}_{\text{pk}}/60\text{ VDC}$) cannot be connected to any other relay terminal.

| | |
|--|---------|
| Maximum switching current (per channel) | 0.5 A |
| Maximum carry current (per channel) | 1 A |
| Simultaneous channels at maximum current | Up to 2 |



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 |
|---------------------------------------|------|



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 μA , 10 mV |
| Maximum RF carry power (per channel) | 10 W up to 500 MHz |
| DC path resistance | |
| Initial | $<1.0\ \Omega$ |
| End-of-life | $\geq 2.0\ \Omega$ |

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 Ω .

RF Performance Characteristics

| | |
|------------------------------------|---------------------|
| Characteristic impedance (Z_0) | 50 Ω nominal |
| Insertion Loss | |
| 8×1 | |
| DC to 200 MHz | $<0.9\text{ dB}$ |
| 200 MHz to 500 MHz | $<1.6\text{ dB}$ |

| | | |
|--------------------------|--------------------|----------|
| 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

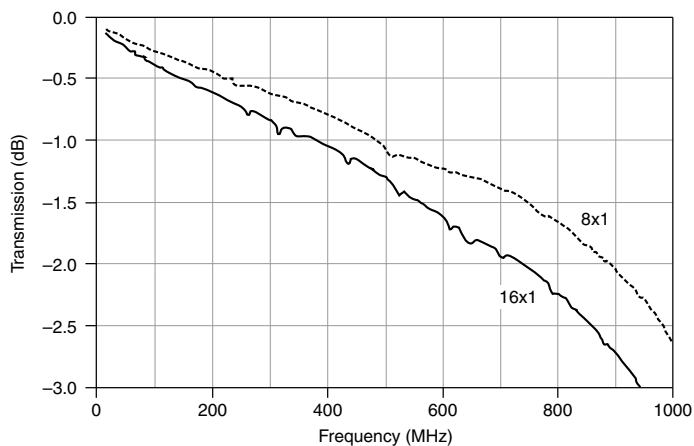


Figure 2. Typical VSWR

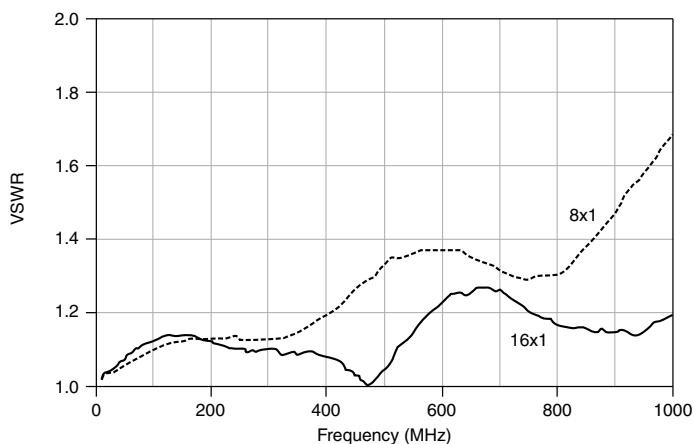


Figure 3. Typical Channel-to-Channel Isolation

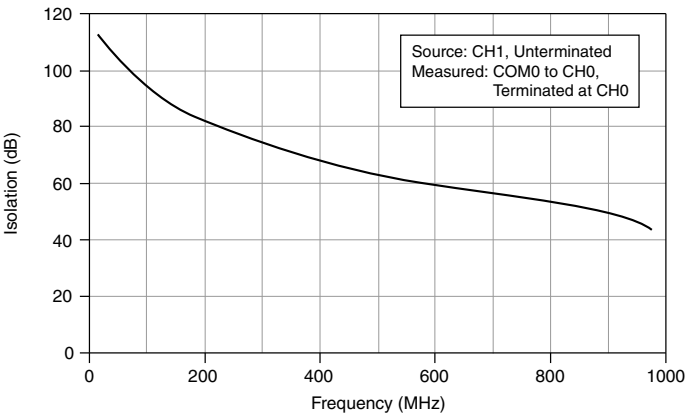
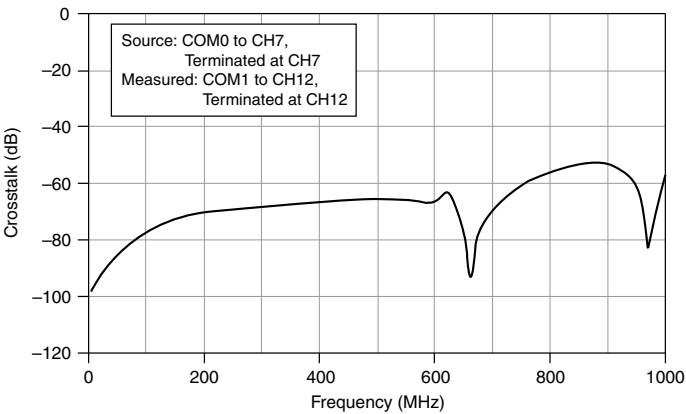


Figure 4. Typical Bank-to-Bank Crosstalk



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 for more information about including additional settling time.

Expected relay life

| | |
|--|------------------------|
| Mechanical | 5×10^7 cycles |
| Electrical (30 V, 0.3 A, DC resistive) | 3×10^5 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 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 μ s to 62 μ 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.

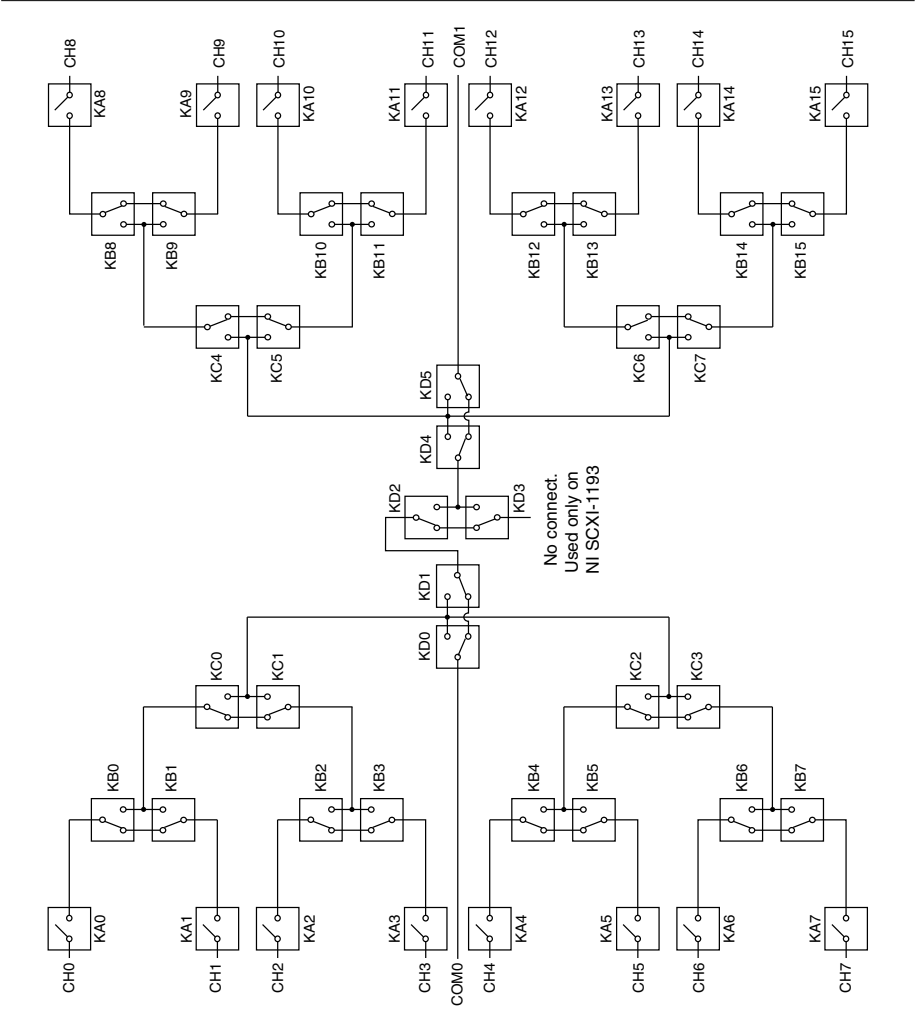
Shock and Vibration

| | |
|-------------------|---|
| 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 _{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.) |

Diagrams

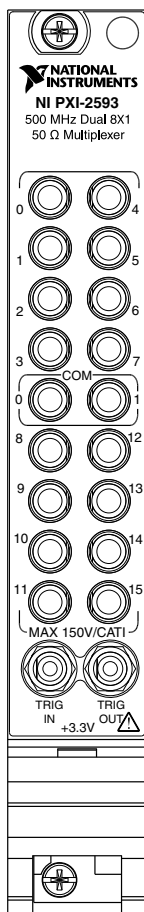
Refer to the following figure for the power-on state diagram of the NI 2593.

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 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 Ω 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）



中国客户 National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息, 请登录 ni.com/environment/rohs_china。(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)