PXI-2514 Specifications

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PXI-2514 Specifications

This document lists specifications for the PXI-2514 (PXI-2514) fault insertion unit (FIU) switch module. All specifications are subject to change without notice. Visit ni.com/manuals for the most current specifications.

Topology	Independent

Refer to the NI Switches Help for detailed topology information.

Caution The protection provided by the PXI-2514 can be impaired if it is used in a manner not described in this document.

About These Specifications

Specifications characterize the warranted performance of the instrument under the following operating conditions:

- The PXI/PXIe chassis fan speed is set to High.
- The fan filters are clean.
- The empty slots contain filler panels.

For more information, refer to the **Maintain Forced-Air Cooling Note to Users** document available at ni.com/manuals.

Typical specifications are specifications met by the majority of the instruments under the stated operating conditions. Typical specifications are not warranted.

Data provided in this document are specifications unless otherwise noted.

Input Characteristics

All input characteristics are DC, AC_{rms}, or a combination unless otherwise specified.

Maximum switching voltage	28 VDC, 19.8 V AC_{rms}, CAT I[1]

Caution Steady state voltages applied to the NI 2514 between any two I/O connector pins in excess of the maximum switching voltage specification may damage this module.

Caution This module is rated for Measurement Category I and intended to carry signal voltages no greater than19.8 V_{rms}/28 V_{pk}/28 VDC. 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.

Note Signal connections through the PXI-2514 are intended to go through the DUTn pin connections. Signal paths that do not use the DUTn pin connections may exceed the module's thermal capabilities. Refer to the connector pinout in the Diagrams section of this document for DUTn pin connections.

Maximum continuous current (per channel or common, switching or carry)	
Single path closed	40 A
Multiple paths closed	25A
Maximum pulsed current	200 A (for 1100 µs max)

Caution The maximum switching power is limited by the maximum switching current and the maximum voltage, and must not exceed 1,120 W.

Maximum switching power (per channel)	1,120 W

Use the following equation to determine the Maximum Possible Pulse Width (seconds) for a given Maximum Inrush Current “peak” amplitude (Amps) and Steady State Current (Amps).

$$\text{MaxPulseWidth} = \frac{45.5 - 0.02 \quad (I_{SteadyState})^2}{(I_{PeakInrush})^2}$$

DC path resistance	
Typical	5.5 mΩ
Maximum	10 mΩ
Typical bandwidth (50 Ω system)	>800 kHz

Overcurrent Detection[2]

Overcurrent detection limit	41 A typical
Overcurrent detection delay	20 ms

Overtemperature Detection

To help protect against fault conditions, the PXI-2514 incorporates circuitry to detect overtemperature conditions.

Note Exceeding the module’s thermal limit induces an overtemperature condition.

Note Overtemperature conditions are created when excessive power is dissipated in the channel paths such as when switching large impulses created by switching into capacitive or inductive loads or when switching

a signal at a higher rate than the module dissipates the generated heat. Refer to the figures below for information about the maximum cycle rate.

The Switching Current Waveform graph indicates where on the inrush waveform you can find the parameters necessary for determining maximum cycle rate.

Figure 1. Switching Current Waveform

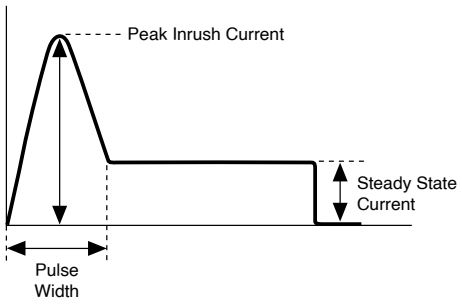


Figure 2. Maximum Cycle Rate for Single Path Closed

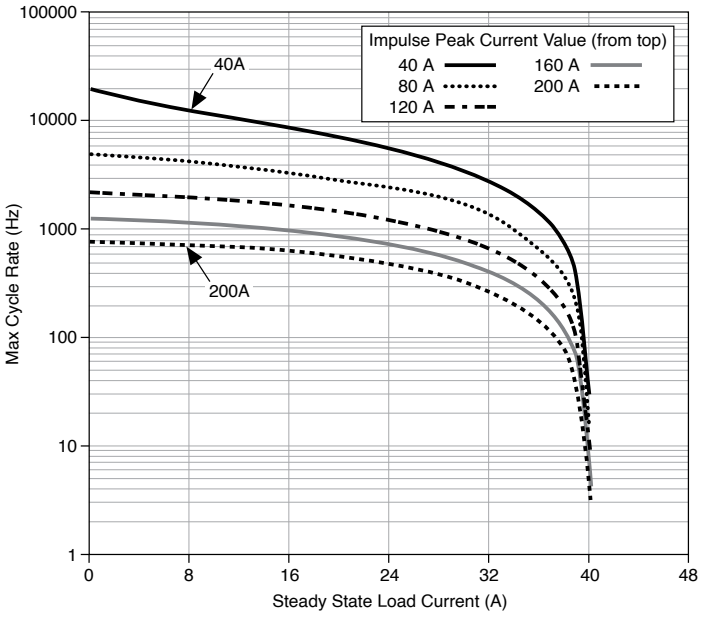


Figure 3. Maximum Cycle Rate for Multiple Paths Closed

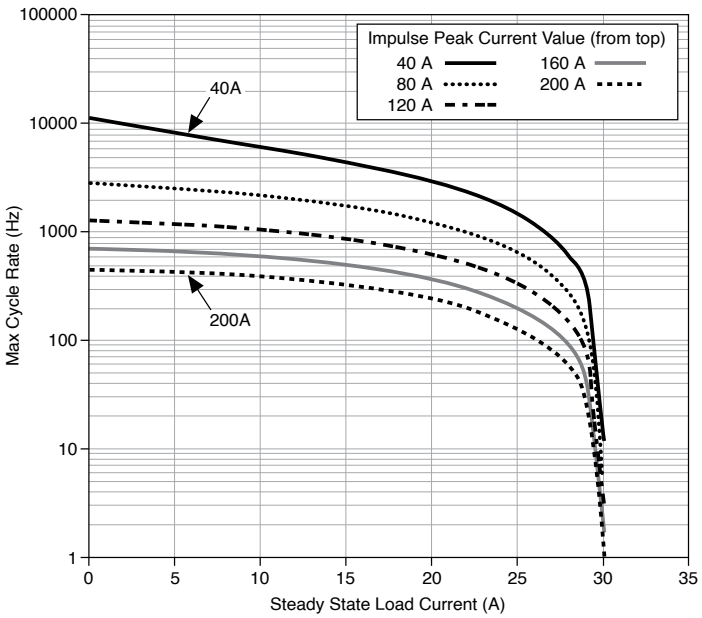
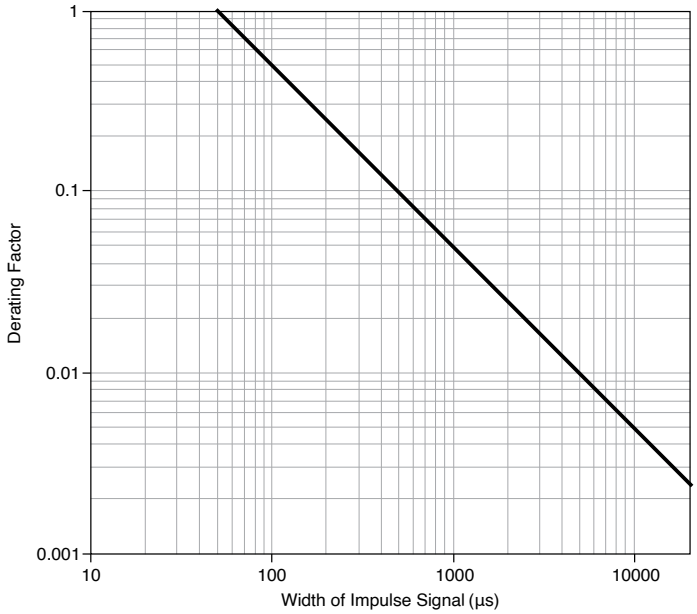


Figure 4. Maximum Cycle Rate Derating Factor by Pulse Width



Determining the Maximum Cycle Rate

Complete the following steps and use the figures above to determine the maximum cycle rate at which a channel can be switched when the peak impulse current value and duration are known.

1. Using the Maximum Cycle Rate figure, choose the plot line that meets or exceeds the peak inrush current value of the signal being switched. Find the point on the trace that equates to the steady state current being switched by the load.
2. Find the corresponding intersection on the y-axis that indicates the maximum cycle rate allowed for a signal with a 50 µs maximum inrush pulse duration.
3. Find the point on the Maximum Cycle Rate Derating Factor by Pulse Width graph that corresponds to the measured pulse width of the inrush current pulse. Find the corresponding derating factor.
   Then calculate the maximum cycle rate using the following equation:

   $$\text{MaxCycleRate} = CR50_{\mu s} \quad DF(\text{Hz})$$

   where $\mathbf{CR}_{50\ \mu s}$ = max cycle rate for a 50 µs wide inrush current pulse in Hz

   DF = derating factor

   Note If the peak impulse current does not exceed 40 A, do not derate the maximum cycle rate below 31 Hz.

Example 1—Single Path Closed

For switching a steady state current of 4 A into a load with peak inrush current of 180 A that lasts for 400 µs, choose the 200 A graph line in the Maximum Cycle Rate graph. Find the y-axis value that corresponds to the 16 A load current (650 Hz). Then find the derating factor in the Maximum Cycle Rate Derating Factor by Pulse Width graph that corresponds to 400 µs (0.1).

The maximum cycle rate at which this signal can be switched by the module is calculated as follows:

$$\text{MaxCycleRate} = 650\text{Hz} \quad 0.1 \quad 65\ \text{Hz}$$

For switching a steady state current of 15 A into a load with peak inrush current of 180 A that lasts for 400 µs while another channel is also carrying 25 A, choose the 200 A graph line in the Maximum Cycle Rate for Multiple Paths Closed graph. Find the y-axis value that corresponds to the 15 A load current (300 Hz.) Then find the derating factor in the Maximum Cycle Rate Derating Factor by Pulse Width graph that corresponds to 400 µs (0.1).

The maximum cycle rate at which this signal can be switched by the module is calculated as follows:

MaxCycleRate = 300Hz 0.1 = 30Hz

Dynamic Characteristics

Relay Operate Time	
Typical	8 µs
Maximum	35 µs
Typical relay life	Unlimited, when operated within specified limits

Trigger

Input trigger	
Sources	PXI trigger lines <0...7>
Minimum pulse width[3]	150 ns
Output trigger	
Destinations	PXI trigger lines <0...7>

Pulse width	Software-selectable: 1 µs to 62 µs

Physical Characteristics

Relay type	FET
Front panel connector	2 DSUB, 8 positions, male

Power requirement

PXI

3.3 V	1.0 W
5 V	13.0 W

PXI Express

12 V	14.7 W
3.3 V	1.4 W

Dimensions (L × W × H)	3U, two slots, PXI/cPCI module, PXI Express compatible 21.6 cm × 4.1 cm × 13.0 cm (8.5 in. × 1.6 in. × 5.1 in.)
Weight	513 g (18.1 oz)

Environment

Operating temperature	0 °C to 50 °C
Storage temperature	-40 °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.)

Compliance and Certifications

Safety Compliance Standards

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 C22.2 No. 61010-1

Note For safety certifications, refer to the product label or the Product Certifications and Declarations 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
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: 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 Product Certifications and Declarations section.

CE Compliance CE

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)

- 2011/65/EU; Restriction of Hazardous Substances (RoHS)
- 2014/53/EU; Radio Equipment Directive (RED)
- 2014/34/EU; Potentially Explosive Atmospheres (ATEX)

Product Certifications and Declarations

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and the DoC for NI products, visit ni.com/product-certifications, search by model number, and click the appropriate link.

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 **Engineering a Healthy Planet** 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.

EU and UK Customers

- Waste Electrical and Electronic Equipment (WEEE)—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 RoHS— NI 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 NI 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.)

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2 After a switch operation, an overcurrent error condition occurs when both the overcurrent limit of the module is exceeded, and the overcurrent delay time has expired.

3 The PXI-2514 can recognize trigger pulse widths less than 150 ns if you disable digital filtering. Refer to the **NI Switches Help** for information about disabling digital filtering.