PXIe-2527

Specifications

Provided by:

Test & Measurement Automation

Embedded Control & Monitoring

Cyth Systems
9939 Via Pasar
San Diego, CA 92126

phone (858) 537-1960
support@cyth.com

Authorized Distributor

Integration Partner

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Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

Characteristics describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- ***Typical*** specifications describe the performance met by a majority of models.
- ***Nominal*** specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are ***Typical*** unless otherwise noted.

Conditions

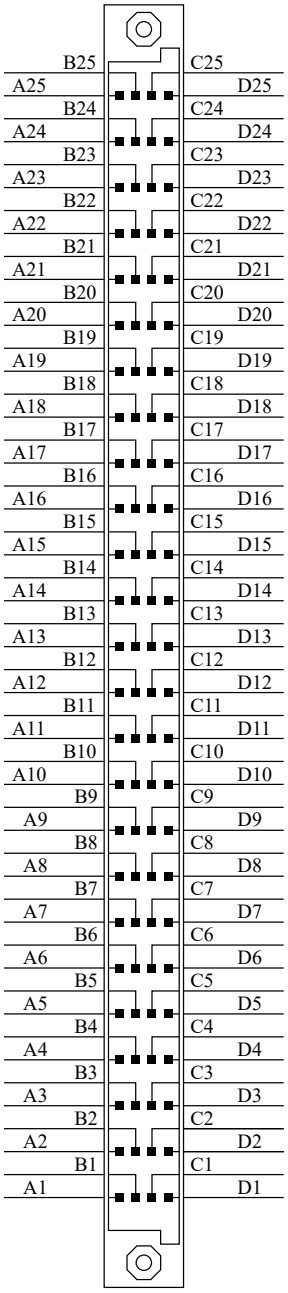
Specifications are valid at 23 °C unless otherwise noted.

All voltages are specified in DC, AC_{pk}, or a combination unless otherwise specified.

PXIe-2527 Pinout

The following figure shows the terminals on the PXIe-2527 connector.

Figure 1. PXIe-2527 Pinout



1-Wire 64x1 Multiplexer Signal Descriptions

Signal	Description
CHx	Channel terminals
COM0+	Routing destination for all channel terminals
COM0-	Routing destination for the 1WREF0 lead

Note In the 1-wire 64×1 multiplexer topology, do not connect to A18 or B18, as they are internally connected to certain routes.

1-Wire Dual 32×1 Multiplexer Signal Descriptions

Signal	Description
CH0 through CH31	Channel terminals that route to COM0+
CH 32 through CH63	Channel terminals that route to COM1+
COM0+	Routing destination for CH0 through CH31
COM1+	Routing destination for CH32 through CH63
COM0-	Routing destination for the 1WREF0 lead
COM1-	Routing destination for the 1WREF1 lead

2-Wire 32×1 Multiplexer Signal Descriptions

Signal	Description
CH0+ through CH31+	Channel terminals that route to COM0+
CH0- through CH31-	Channel terminals that route to COM0-
COM0+	Routing destination for all positive channels
COM0-	Routing destination for all negative channels

Note In the 2-wire 32×1 multiplexer topology, do not connect to A18 or B18, as they are internally connected to certain routes.

2-Wire Dual 16×1 Multiplexer Signal Descriptions

Signal	Description
CH0+ through CH15+	Channel terminals that route to COM0+
CH0- through CH15-	Channel terminals that route to COM0-
CH16+ through CH31+	Channel terminals that route to COM1+

Signal	Description
CH16- through CH31-	Channel terminals that route to COM1-
COM0+	Routing destination for CH0+ through CH15+
COM0-	Routing destination for CH0- through CH15-
COM1+	Routing destination for CH16+ through CH31+
COM1-	Routing destination for CH16- through CH31-

4-Wire 16×1 Multiplexer Signal Descriptions

Signal	Description
CH0A+ through CH15A+	Channel terminals that route to COM0+
CH0A- through CH15A-	Channel terminals that route to COM0-
CH0B+ through CH15B+	Channel terminals that route to COM1+
CH0B- through CH15B-	Channel terminals that route to COM1-
COM0+	Routing destination for all positive channels (A and B)
COM0-	Routing destination for all negative channels (A and B)

Table 1. Independent Topology Signal Descriptions

Signal	Description
CHx	Channel terminals
COM0+	Routing destination for all channel terminals
COM0-	Routing destination for the 1WREF0 lead

Related information:

- PXIe-2527 Hardware Diagram
- NI Switches Cable and Accessory Compatibility
- Pinouts for Different Topologies and Terminal Blocks

Topology

Topologies	1-wire 64 × 1 multiplexer 1-wire dual 32 × 1 multiplexer 2-wire 32 × 1 multiplexer 2-wire dual 16 × 1 multiplexer 4-wire 16 × 1 multiplexer Independent

Input Characteristics

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

Caution This module is rated for Measurement Category I and is intended to carry signal voltages no greater than 300 V. This module can withstand up to 1,500 V impulse voltage. Do not use this module for connections to signals or for measurements within Measurement Categories II, III, or IV.

Attention Ce module est conçu pour la catégorie de mesure I et pour supporter des tensions de signal ne dépassant pas 300 V. Ce module peut supporter une tension d'impulsion allant jusqu'à 1500 V. N'utilisez pas ce module pour le connecter à des signaux ou effectuer des mesures de catégorie de mesure CAT II, III ou IV.

Caution Do not connect to MAINs supply circuits (e.g., wall outlets) of 115 or 230 VAC. Refer to the ***Read Me First: Safety and Electromagnetic Compatibility*** document for more information about Measurement Categories.

Attention Ne connectez pas ce module au réseau d'alimentation électrique du secteur (prises murales, par exemple) de 115 VCA ou 230 VCA. Reportez-vous au document Read Me First: Safety and Electromagnetic Compatibility pour en savoir plus sur les catégories de mesure.

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

Attention Lorsque des tensions dangereuses (> 42,4 V_{pic}/60 VCC) sont présentes sur une borne de relais, la basse tension de sécurité (≤42,4 V_{pic}/60 VCC) ne peut être connectée à aucune autre borne de relais.

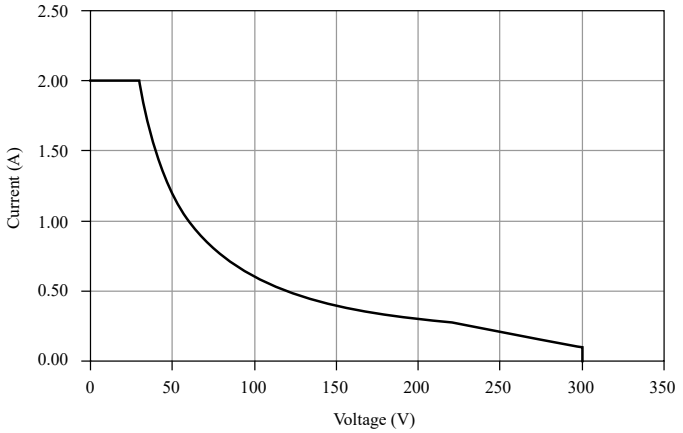
Maximum switching voltage[1]	
Channel-to-channel	300 V
Channel-to-ground	300 V, CAT I

Caution The maximum switching power is limited by the maximum switching current, the maximum voltage, and must not exceed 60 W, 62.5 VA.

Maximum switching power (per channel)	
AC systems	60 W, 62.5 VA (up to 60 Hz)
DC systems	Refer to the following figure.

1. Switching inductive loads (for example, motors and solenoids) can produce high voltage transients in excess of the module's rated voltage. Without additional protection, these transients can interfere with module operation and impact relay life. For more information about transient suppression, visit ni.com/info and enter the Info Code induct.

Figure 2. Maximum Switching Power for DC Loads (per channel)



Maximum total current (switching or carry)	2 A
Minimum switch load[2]	20 mV /1 mA

DC path resistance[3]	
Initial	<1 Ω, warranted
End-of-life	≥2 Ω

Differential thermal EMF	2.5 µV, typical[4] <12 µV, maximum
Channel-to-channel DC leakage at 300 V	500 GΩ

2. The minimum switch load is not recommended for 2-wire resistance measurements.
3. DC path resistance typically remains low for the life of the relay. At the end of relay life, the path resistance rapidly rises above 1 Ω. Load ratings apply to relays used within the specification before the end of relay life.
4. To ensure the typical thermal EMF, power down all relays and avoid pulsing high currents near the channels you

Bandwidth (-3 dB, 50 Ω termination)	
1-wire	>30 MHz
2-wire	>25 MHz

Channel-to-channel isolation (50 Ω termination) (1-wire and 2-wire)	
10 kHz	>80 dB
100 kHz	>60 dB
1 MHz	>40 dB

Open channel isolation (50 Ω termination) (1-wire and 2-wire)	
10 kHz	>80 dB
100 kHz	>60 dB
1 MHz	>40 dB

Dynamic Characteristics

Warning Device relays might change state momentarily during electrostatic discharge.

Relay operate time[5]	4 ms, maximum

Expected Relay Life

Note The relays used in the PXIe-2527 are field replaceable. Refer to the ***NI Switches Help*** for information about replacing a failed relay.

Mechanical	1×10^8 cycles

Electrical	300 VDC, 60 mADC resistive	5×10^5 cycles
	30 VDC, 2 ADC resistive	1×10^5 cycles
	<30 mV, <10 mA	2.5×10^6 cycles

Trigger Characteristics

Table 2. Input Trigger

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

Note The PXIe-2527 recognizes pulse widths less than 150 ns if digital filtering is disabled. Refer to the ***NI-SWITCH User Manual*** for information about disabling digital filtering.

Table 3. Output Trigger

Destinations	PXI trigger lines <0...7>
Default pulse width	2 µs, typical

5. Certain applications may require additional time for proper settling. Refer to the ***NI Switches Help*** for more information about including additional settling time.

Thermocouple Measurement

You can use the PXIe-2527 and the TB-2627 to measure thermocouples. NI software can convert a thermocouple voltage to the thermocouple temperature. For example code, visit ni.com/examples, and enter PXIe-2527 in the Search field.

When measuring thermocouples, be sure to account for error in your measurements. The total error in thermocouple measurement is the sum of the system error (determined by the thermal EMF of the PXIe-2527 and the CJC temperature of the TB-2627) and the thermocouple error (determined by the type of thermocouple used).

Determining the System Error

To determine the system error for the PXIe-2527 and TB-2627, first calculate the error due to thermal EMF of the PXI-2527 using the following equation:

$$E_{EMF} = \left(\frac{T_{+1} - T}{V_{+1} - V}\right)\left(V_{EMF}\right) \; E_{EMF} = \left(\frac{T_{+1} - T}{V_{+1} - V}\right)\left(V_{EMF}\right)$$

where[6]

- E_{EMF} = error due to thermal EMF of the PXIe-2527
- T = temperature being measured, in degrees Celsius
- T_{+1} = T + 1 °C
- V = voltage that corresponds to T
- V_{+1} = voltage that corresponds to T_{+1}
- V_{EMF} = thermal EMF of the PXIe-2527[7]

After you have determined the error due to thermal EMF, calculate the system error

6. In thermocouple reference tables, T and T_{+1} are known values used to calculate the slope of the thermocouple Temperature vs. Voltage graph. Refer to a thermocouple reference table to determine the values of V and V_{+1} that correspond to T and T_{+1}, respectively.
7. Refer to the ***Input*** section of this document to determine the thermal EMF value of the PXIe-2527. For optimal thermocouple measurement performance (V_{EMF} = 2.5 µV), power down the latching relays of the PXIe-2527. For more information about powering down latching relays, refer to the Power Down Latching Relays After Debounce property in NI-SWITCH or the Power Down Latching Relays After Settling property in NI-DAQmx.

using the following equation.

$E_S = E_{EMF} + E_{CJC}$

where

- E_S = system error of the PXIe-2527/TB-2627
- E_{EMF} = error due to thermal EMF of the PXIe-2527
- E_{CJC} = error due to CJC temperature sensor of the TB-2627[8]

Example

Measuring a K-type thermocouple at 200 °C with a CJC temperature of 25 °C, the system error of the PXIe-2527/TB-2627 is calculated below.[9]

Assuming typical thermal EMF (2.5 µV), first calculate the error due to thermal EMF using the following equation:

$$E_{EMF} = \left(\frac{201\ °C\ -\ 200\ °C}{8.178\ mV\ -\ 8.138\ mV}\right)(0.0025\ mV) = 0.063\ °C$$ $$E_{EMF} = \left(\frac{201\ °C\ -\ 200\ °C}{8.178\ mV\ -\ 8.138\ mV}\right)(0.0025\ mV) = 0.063\ °C$$

To determine the system error, add the error due to thermal EMF to the error due to the CJC temperature sensor using the following equation.

$E_S = 0.063\ °C + 0.5\ °C = 0.563\ °C$

Determining the Thermocouple Error

Independent of the PXIe-2527/TB-2627 system, thermocouple error is the greater of the following values: ±***temperature range*** or ±***percent of the measurement***.

In the example, a standard grade K-type thermocouple is used to measure 200 °C. The error for a standard grade K-type thermocouple is ±2.2 °C or ±0.75% of the

8. From 15 °C to 35 °C, the TB-2627 has an accuracy of ±0.5 °C. From 0 °C to 15 °C and 35 °C to 55 °C, the TB-2627 has an accuracy of ±1.0 °C. For more information about temperature sensor accuracy, refer to the ***TB-2627 Installation Instructions***.
9. In this example, the values of V and V_{+1} are found in the thermocouple reference tables of Omega Engineering's ***The Temperature Handbook***. Vol. 29. Stamford, CT: Omega Engineering Inc, 1995.

measurement temperature.[10] Because ±0.75% of 200 °C (±1.5 °C) is less than ±2.2 °C, the error of a standard grade K-type thermocouple is ±2.2 °C.

Determining the Total Error

The total error in thermocouple measurement is the sum of the system error and the thermocouple error. Use the following equation to determine the total error in thermocouple measurement:

$E_T = E_S + E_{Th}$

where

- E_T = total error in thermocouple measurement
- E_S = system error
- E_{Th} = thermocouple error

To determine the total error in thermocouple measurement in the example, add the thermocouple error to the system error using the following equation:

E_T = 0.56 °C + 2.2 °C = 2.76 °C

Assuming typical thermal EMF, the total error in thermocouple measurement at 200 °C for the PXIe-2527/TB-2627 with a K-type thermocouple is ±2.76 °C.

Physical Characteristics

Relay type	Electromechanical, latching
Relay contact material	Palladium-ruthenium, gold covered
I/O connector	100-position HDI right angle, male

10. Omega Engineering. ***The Temperature Handbook***. Vol. 29. Stamford, CT: Omega Engineering Inc, 1995.

Power requirement	
PXI	6 W at 5 V 2.5 W at 3.3 V
PXI Express	7.5 W at 12 V 2.5 W at 3.3 V

Dimensions (L × W × H)	3U, one slot, PXI/cPCI module 21.6 cm × 2.0 cm × 13.0 cm (8.5 in. × 0.8 in. × 5.1 in.)
Weight	209 g (7.4 oz)

Environment

Note If you are using the PXIe-2527 with the PXI-101x or the PXI-1000 chassis, the operating temperature for the PXIe-2527 is 0 °C to 45 °C. Do not operate the PXIe-2527 above the maximum operating temperature of the chassis.

Operating temperature	0 °C to 55 °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

Table 4. 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}
Random vibration, 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.)

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