

SPECIFICATIONS

NI PXIe-4357

Français Deutsch 日本語 한국어 简体中文
ni.com/manuals

This document lists specifications for the NI PXIe-4357 module. These specifications are typical for the range of 0 °C to 55 °C unless otherwise stated. The system must be allowed to warm up for 15 minutes to achieve the rated accuracy. All specifications are subject to change without notice. Visit ni.com/manuals for the most current specifications and product documentation.



Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for important safety and electromagnetic compatibility information. To obtain a copy of this document online, visit ni.com/manuals, and search for the document title.



Caution To ensure the specified EMC performance, operate this product only with shielded cables and accessories.



Note Keep the filler panels on all unused slots in your chassis to maintain forced air cooling.

Input Characteristics

Number of channels.....	20 RTD channels
ADC resolution.....	24 bits
Type of ADC.....	Delta-Sigma
Sampling mode.....	Scanned
Maximum sample rate.....	100 S/s (Refer to the <i>Timing</i> section for more details.)

Measurement Range

Temperature.....	-200 °C to 850 °C, PT100 RTD
Resistance.....	0 Ω to 400 Ω
Excitation current.....	0.9 mA per channel

50/60 Hz noise rejection

Timing Mode	50 Hz \pm 1 Hz	60 Hz \pm 1 Hz
1 (High Resolution)	-124 dB	-131 dB
2	-105 dB	-121 dB
3	-131 dB	-125 dB
4	-103 dB	-83 dB
5	-47 dB	-106 dB
6	-6 dB	-8 dB
7	-1.4 dB	-2 dB
8	—	—
9 (High Speed)	—	—

DC linearity..... \pm 15 ppm max

Common Mode Voltage Range

Channel-to-earth ground..... \pm 60 VDC

Common Mode Rejection Ratio (CMRR)

COM-to-earth ground at DC, 50/60 Hz..... 1 m Ω /V_{cm}, -120 dB

Filter Response

ADC Timing Modes*	Input Bandwidth (-3 dB)
1 (High Resolution)	1.1 Hz
2	1.8 Hz
3	2.4 Hz
4	11.9 Hz
5	14.2 Hz
6	35.6 Hz
7	71.1 Hz
8	227.5 Hz
9 (High Speed)	566.4 Hz

* Refer to the [Timing](#) section for more information about ADC timing modes.

Overvoltage Protection

Between any AI± or EX±
(except between two EX- pins) 60 V

Between any two EX- pins None

Between RSVD lines and any other pin None

Measurement Accuracy

Operating Temperature	Offset Error (Ω)*, †, ‡		Gain Error (% of Reading)	
	Typical	Maximum	Typical	Maximum
23 °C \pm 5 °C	0.008 Ω	0.034 Ω	0.02	0.04
0 °C - 55 °C	0.010 Ω	0.060 Ω	0.03	0.06

* Offset error is exclusive of noise.
† For 2-wire mode, add an additional 1.33 Ω .
‡ For 3-wire mode, add an additional 0.04 Ω .

Input Noise

Timing Modes*	Input Noise ($m\Omega_{rms}$)	
	3-Wire	2- and 4-Wire
1 (High Resolution)	0.10	0.05
2	0.12	0.06
3	0.14	0.07
4	0.30	0.16
5	0.33	0.18
6	0.52	0.28
7	0.73	0.40
8	1.30	0.71
9 (High Speed)	2.2	1.12

* Refer to the [Timing](#) section for more information about ADC timing modes.

Input Stability

Input Stability	Typical	Max
Offset stability	100 $\mu\Omega/^{\circ}\text{C}$	960 $\mu\Omega/^{\circ}\text{C}$
Gain stability	4 ppm/ $^{\circ}\text{C}$	9 ppm/ $^{\circ}\text{C}$

Temperature Measurement Accuracy

The following RTD measurement table shows the accuracy for PT100 RTDs under the following conditions:

- Scaling from resistance to $^{\circ}\text{C}$ is performed using the Callendar-Van Dusen equation with the following constants:
 - $R_0 = 100$
 - $A = 3.908 \times 10^{-3}$
 - $B = -5.775 \times 10^{-7}$
 - $C = -4.183 \times 10^{-12}$
- The module is connected to a TB-4357.
- Accuracies do not include the accuracy of the RTD.
- The accuracy table is valid for one year from the last calibration and include all measurement errors of the module and the terminal block, excluding noise.
- The 3-wire and 2-wire accuracy specifications are inclusive of 10 meter 24 gauge lead wires.
- The 3-wire accuracy specification assumes lead wire resistances are matched to within 5%.

RTD Measurement Accuracy (°C)

Mode	Operating Temperature	-200 °C	-100 °C	0 °C	100 °C	300 °C	500 °C	700 °C	850 °C
4-Wire Mode*	Typical 23 °C ±5 °C	0.03	0.05	0.07	0.09	0.13	0.18	0.24	0.28
	Max 23 °C ±5 °C	0.09	0.14	0.18	0.22	0.32	0.41	0.52	0.61
	Max 0 °C - 55 °C	0.16	0.24	0.31	0.38	0.53	0.70	0.88	1.02
3-Wire Mode†	Typical 23 °C ±5 °C	0.12	0.15	0.17	0.20	0.25	0.30	0.37	0.42
	Max 23 °C ±5 °C	0.19	0.24	0.29	0.33	0.43	0.54	0.65	0.75
	Max 0 °C - 55 °C	0.26	0.34	0.41	0.49	0.65	0.82	1.01	1.16
2-Wire Mode	Typical 23 °C ±5 °C	3.10	3.33	3.47	3.59	3.87	4.17	4.52	4.82
	Max 23 °C ±5 °C	3.17	3.42	3.58	3.73	4.05	4.40	4.81	5.15
	Max 0 °C - 55 °C	3.24	3.52	3.71	3.89	4.26	4.69	5.16	5.56

* The accuracies listed are valid for timing modes up to and including timing mode 5.
For timing modes higher than 5, include an additional 0.019 °C.

† The accuracies listed are valid for timing modes up to and including timing mode 7.
For timing modes higher than 7, include an additional 0.036 °C.

Timing



Note The maximum allowable sample rate is 100 S/s.

ADC Timing Modes*	ADC Conversion Time	Max Sample Rate (20 Channels)
1 (High Resolution)†	909 ms	0.275 S/s
2	556 ms	0.45 S/s
3	435 ms	0.575 S/s
4	84 ms	2.975 S/s
5	70 ms	3.55 S/s
6	29 ms	8.75 S/s
7	15 ms	17 S/s
8	5 ms	49 S/s
9 (High Speed)	2.5 ms	100 S/s

* Refer to the *NI PXIe-4357 User Manual* for more information about ADC timing modes.

† ADC Timing Mode 1 is the default setting for the On Demand timing mode when sample rate is not explicitly selected.

Digital Triggers

Source	PXI_TRIG <0..7>, PXI_STAR, PXIe_DSTAR <A..B>
Purpose.....	Start Trigger, Reference Trigger, Pause Trigger
Polarity.....	Software-selectable
Debounce filter settings	Disable, 90 ns, 5.12 μ s, 2.56 ms, Custom interval

Clocking

Source	Onboard Clock, PXI_Trig <0..7>, PXI_STAR, PXIe_DSTAR <A..B>, PXIe_Clk100 (RefClk only)
Destination.....	Sample Clock, Sample Clock Timebase, Reference Clock
Polarity.....	Software-selectable (except Reference Clock)
Debounce filter settings (Sample clock only).....	Disable, 90 ns, 5.12 μ s, 2.56 ms, Custom interval

Reference clock locking frequencies

Reference Signal	Locking Input Frequency (MHz)		
	10	20	100
PXIe_DSTAR <A..B>	✓	✓	✓
PXI_STAR	✓	✓	—
PXIe_CLK100	—	—	✓
PXI_TRIG <0..7>	✓	✓	—



Note National Instruments does not recommend locking to non-selected frequencies.

Output Timing Signals

Source	Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Various derived timebases and clocks
Destination	PXI_Trig <0..7>, PXIe_DSTAR C
Polarity	Software-selectable

Bus Interface

Form factor	x1 PXI Express peripheral module, Specification v1.0 compliant
Slot compatibility	x1 and x4 PXI Express or PXI Express hybrid slots
DMA channels	1, analog input

Power Requirements

+3.3 V	568 mA
+12 V	162 mA

Calibration

You can obtain the calibration certificate and information about calibration services for the NI PXIe-4357 at ni.com/calibration.

Recommended warm-up time	15 minutes
Calibration interval	1 year

Physical Requirements

Dimensions	Standard 3U PXI Express, 16 cm × 10 cm (6.3 in. × 3.9 in.)
Weight	145 g (5.1 oz)
I/O connector	96-pin male DIN 41612/IEC 60603-2 connector

Environmental Specifications

Maximum altitude 2,000 m (800 mbar)

Pollution Degree 2

Indoor use only

Operating Environment

Ambient temperature range 0 °C to 55 °C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit and MIL-PRF-28800F Class 2 high temperature limit.)

Relative humidity range 10% to 90%, noncondensing
(Tested in accordance with IEC-60068-2-56.)

Storage Environment

Ambient temperature range -40 °C to 71 °C
(Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 limits.)

Relative humidity range 5% to 95%, noncondensing
(Tested in accordance with IEC-60068-2-56.)

Shock and Vibration

Operating shock 30 g peak, half-sine, 11 ms pulse
(Tested in accordance with IEC-60068-2-27. Meets MIL-PRF-28800F Class 2 limits.)

Random vibration

Operating 5 Hz to 500 Hz, 0.3 g_{rms}

Non-operating 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.)

Safety Voltages

Isolation

Channel-to-channel.....	None
Channel-to-earth ground	
Continuous.....	60 VDC, Measurement Category I
Withstand.....	1,000 V _{rms} , verified by a 5 s dielectric withstand test

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment.



Caution Do *not* connect the NI PXIe-4357 to signals or use for measurements within Measurement Categories II, III, or IV.



Caution The protection provided by the NI PXIe-4357 can be impaired if it is used in a manner not described in this document.

Safety

This product meets the requirements of the following standards of safety for electrical equipment 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 and 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:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; 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 products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, 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.)

Where to Go for Support

The National Instruments Web site is your complete resource for technical support. At ni.com/support you have access to everything from troubleshooting and application development self-help resources to email and phone assistance from NI Application Engineers.

National Instruments corporate headquarters is located at 11500 North Mopac Expressway, Austin, Texas, 78759-3504. National Instruments also has offices located around the world to help address your support needs. For telephone support in the United States, create your service request at ni.com/support and follow the calling instructions or dial 512 795 8248. For telephone support outside the United States, visit the Worldwide Offices section of ni.com/niglobal to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

LabVIEW, National Instruments, NI, ni.com, the National Instruments corporate logo, and the Eagle logo are trademarks of National Instruments Corporation. Refer to the *Trademark Information* at ni.com/trademarks for other National Instruments trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering National Instruments products/technology, refer to the appropriate location: **Help»Patents** in your software, the `patents.txt` file on your media, or the *National Instruments Patents Notice* at ni.com/patents. Refer to the *Export Compliance Information* at ni.com/legal/export-compliance for the National Instruments global trade compliance policy and how to obtain relevant HTS codes, ECCNs, and other import/export data.

© 2012 National Instruments. All rights reserved.