PXIe-4311 Specifications

2026-10-23

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These specifications apply to the PXIe-4311.

Revision History

Version	Date changed	Description
379220A-01	June 2026	Initial release.

Looking For Something Else?

For information not found in the specifications for your product, such as operating instructions, browse *Related Information*.

Related information:

- PXIe-4311 User Manual
- Software and Driver Downloads
- Dimensional Drawings
- Product Certifications
- Letter of Volatility
- Discussion Forums
- NI Learning Center

Definitions

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**—describes the performance met by a majority of models.

Values are *Typical* at 25 °C unless otherwise noted. This value represents the temperature outside of the module.

- T_{extcal} is the device temperature at last external calibration.
- $T_{selfcal}$ is the device temperature at last self-calibration.

Both T_{extcal} and $T_{selfcal}$ represent readings of an internal temperature sensor on the board.

Conditions

Maximum and *minimum* values describe the performance of the instrument within the recommended calibration interval and under the stated operating conditions. These values are subject to production verification or guaranteed by design.

Specifications are valid under the following conditions unless otherwise noted.

- Values are *Typical* at 25°C.

PXIe-4311 Pinout

The following figure shows the terminals on the PXIe-4311 I/O connector.

Figure 1. PXIe-4311 Connector Pinout

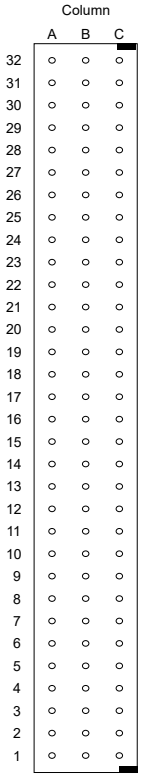


Table 1. Connector Signal Pin Assignments

Row Number	Column A	Column B	Column C
32	GND	AI16+	AI0+
31	AI8+	AI16-	AI0-
30	AI8-	AI24-	AI24+
29	GND	AI20+	AI4+
28	AI12+	AI20-	AI4-
27	AI12-	AI28-	AI28+
26	GND	AI21+	AI5+
25	AI13+	AI21-	AI5-
24	AI13-	AI29-	AI29+
23	GND	AI17+	AI1+
22	AI9+	AI17-	AI1-
21	AI9-	AI25-	AI25+
20	GND	NC	NC
19	NC	NC	NC
18	GND	NC	NC
17	GND	AI18+	AI2+
16	AI10+	AI18-	AI2-
15	AI10-	AI26-	AI26+
14	GND	AI22+	AI6+
13	AI14+	AI22-	AI6-
12	AI14-	AI30-	AI30+
11	GND	AI23+	AI7+
10	AI15+	AI23-	AI7-
9	AI15-	AI31-	AI31+
8	GND	AI19+	AI3+
7	AI11+	AI19-	AI3-

Row Number	Column A	Column B	Column C
6	AI11-	AI27-	AI27+
5	PFI GND	PFI0	PFI1
4	NC	GND	GND
3	NC	NC	NC
2	RSVD	RSVD	RSVD
1	RSVD	RSVD	RSVD

Table 2. Signal Descriptions

Signal	Description
AI<0..31>+	Positive inputs of differential analog input channels 0 to 31.
AI<0..31>–	Negative inputs of differential analog input channels 0 to 31.
PFI <0..1>	Programmable Function Interface I/O channels 0 and 1. Configurable 5.0 V tolerant digital input or 3.3 V digital output for sending or receiving trigger and synchronization signals. PFI lines are referenced to PFI GND.
PFI GND	Digital ground reference for PFI lines. The TB-4309 only has PFI_GND to serve as the ground pin. You may use PFI_GND as the signal ground reference between two systems.
GND	Ground
RSVD	Reserved for communication with the accessory.
NC	No connection

Note When using the TB-4309 (ST) screw terminal variant, you must connect

> the PFI_GND pin as the signal ground reference for all AI+ and AI− connections. This is a requirement because the TB-4309 (ST) does not expose the dedicated ground terminals. This requirement does not impact the safety of the system. PFI_GND and GND are internally common in the PXIe-4311.

The PXIe-4311 automatically detects compatible accessories or terminal blocks. The RSVD pins on the I/O connector provide power to the accessories and digital communication lines. This allows software to detect when accessories are inserted or removed. In addition, software automatically identifies the specific terminal block as well as accesses any calibration or scaling information associated with the terminal block.

> **Note** Only NI-DAQmx 2026 Q3 and later supports automatic detection of compatible accessories, terminal blocks, and PFI lines.

Input Characteristics

This section details the primary analog-to-digital conversion and channel properties of the PXIe-4311.

Characteristic	Description
Number of channels	32 simultaneous analog input channels
Calculated power channels	16 virtual channels that return the product (A x B) of any two physical channels
Sample rate range	1 S/s–4 MS/s
Number of timing engines	1
Measurement resolution[1]	16 bits–22 bits
Input range	• 0–25 V • 0–6 V • ±150 mV
Valid measurements	Both AI+ and AI− must independently remain

1. Measurement resolution depends on the sample rate. For more information, refer to the DC Voltage Noise Specifications section.

Characteristic	Description
	within −0.5 V to 25 V relative to GND. The differential voltage between AI+ and AI− must remain within the measurement range.

Impedance

Table 3. Input Impedance, Device On

Connection	Value
AI+ to GND	>1 GΩ
AI− to GND	>1 GΩ

Table 4. Input Impedance, Device Off

Connection	Value
AI+ to GND	10 kΩ
AI− to GND	10 kΩ

Overvoltage Protection

Table 5. Overvoltage Protection for All Analog Input Channels

Device State	Value
On	+60 V, −34 V
Off	±30 V

Timing

Table 6. Timing Characteristics

Characteristic	Value
Timing accuracy	50 ppm of sample rate
Timing resolution	10 ns

Accuracy Specifications

Range	Maximum Absolute Accuracy			Temperature Coefficient[2]
	2 Year T_{extcal} ± 5 °C $T_{selfcal}$ ± 2 °C	2 Year T_{extcal} ± 10 °C $T_{selfcal}$ ± 5 °C	2 Year T_{extcal} ± 30 °C $T_{selfcal}$ ± 5 °C	0 °C – 55 °C
	± (% of reading + V)			± (% of reading + V) / °C
0 V to 25 V	0.06% + 1.9 mV	0.07% + 2.8 mV	0.09% + 6.5 mV	0.001% + 182 µV
0 V to 6 V	0.06% + 0.5 mV	0.07% + 0.7 mV	0.09% + 1.6 mV	0.001% + 45 µV
±150 mV	0.06% + 13 µV	0.06% + 17 µV	0.08% + 17 µV	0.001% + 1.5 µV
Add the range-specific CMRR error from the *Common-Mode Rejection Ratio (CMRR)* table using the AI− voltage as the common-mode voltage.				
Non-linearity is ±28 ppm of the values in the range column.				

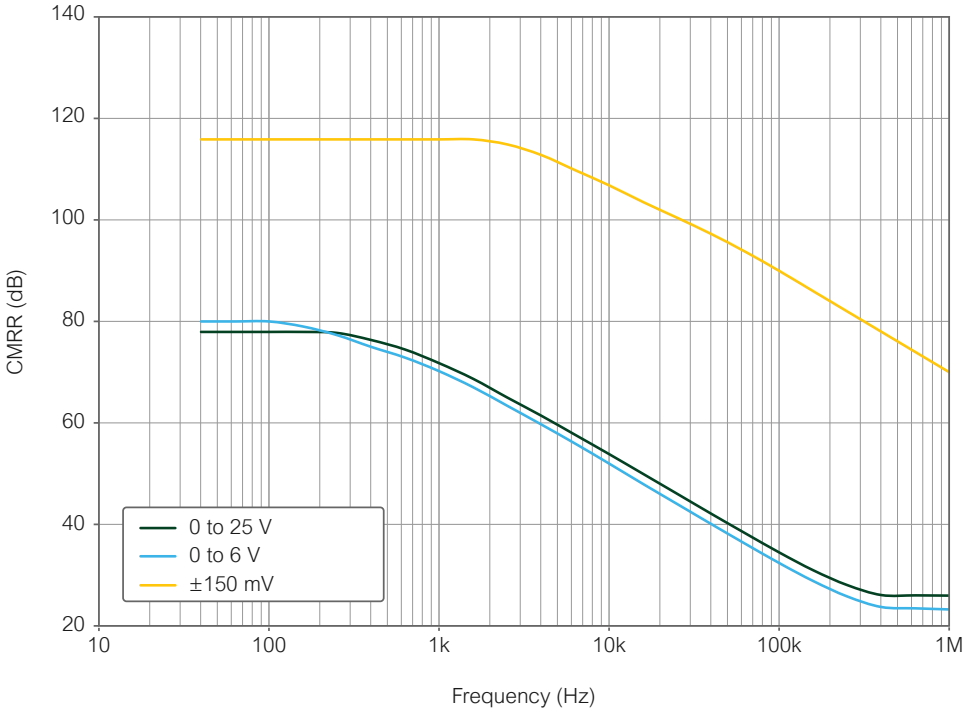
Common-Mode Rejection Ratio (CMRR)

Table 7. Common-Mode Rejection Ratio (CMRR)

Range	0 Hz to 60 Hz Frequency	100 kHz Frequency	1 MHz Frequency
0 V to 25 V	125 µV/V	17.8 mV/V	50.1 mV/V
0 V to 6 V	100 µV/V	22.4 mV/V	70.8 mV/V
±150 mV	1.6 µV/V	31.6 µV/V	316 µV/V

2. The Temperature Coefficient is added to the Absolute Accuracy values if the device operates outside of the stated self-calibration temperature intervals.

Figure 2. Common-Mode Rejection Ratio



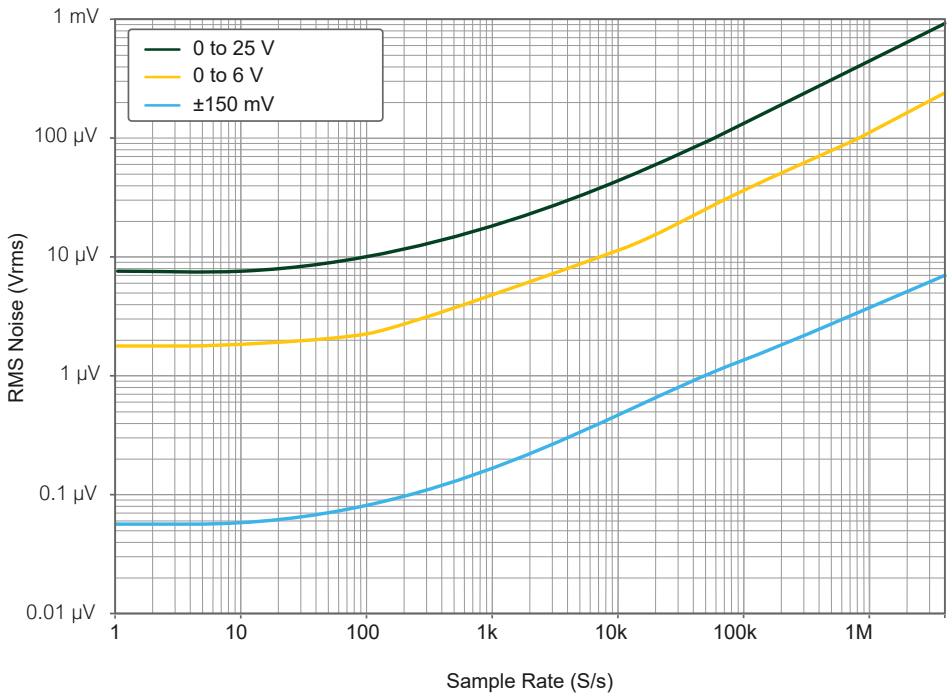
Noise Specifications

Noise

Table 8. Idle Noise Characteristics

Range	10 S/s Sample Rate	100 S/s Sample Rate	1 kS/s Sample Rate	10 kS/s Sample Rate	100 kS/s Sample Rate	4 MS/s Sample Rate
0 V to 25 V	8 µV RMS	9 µV RMS	18 µV RMS	46 µV RMS	140 µV RMS	920 µV RMS
0 V to 6 V	1.8 µV RMS	2 µV RMS	5 µV RMS	12 µV RMS	37 µV RMS	240 µV RMS
±150 mV	0.06 µV RMS	0.08 µV RMS	0.2 µV RMS	0.5 µV RMS	1.4 µV RMS	8 µV RMS

Figure 3. PXIe-4311 Noise versus Sample Rate



Dynamic Characteristics

Crosstalk

Table 9. Crosstalk

Frequency	Crosstalk
1 kHz	91 dB
100 kHz	86 dB

Bandwidth

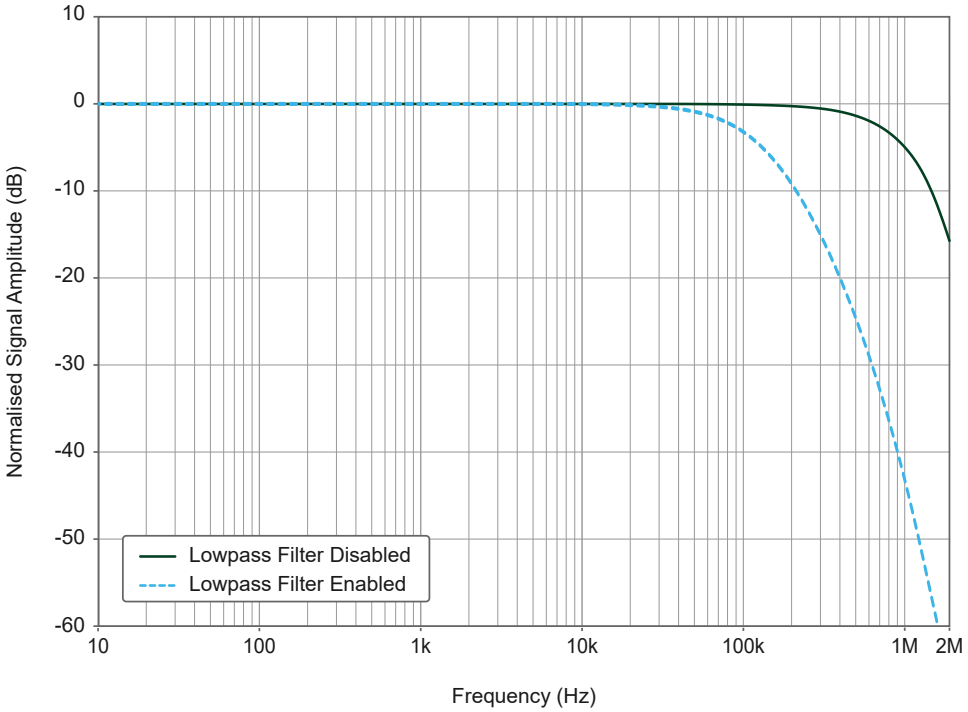
Table 10. -3 dB Bandwidth Characteristic at 4 MS/s

Characteristic	Value
Bandwidth	800 kHz
Bandwidth with lowpass filter enabled	100 kHz

Note Sample averaging reduces the effective measurement bandwidth. For

more information, refer to the *Channel Averaging* section of the PXIe-4311 User Manual.

Figure 4. Magnitude Response



Related information:

- Channel Averaging

Flatness

Table 11. Flatness

Frequency	Value
DC – 20 kHz	-8 mdB / -0.09%
DC – 100 kHz	-171 mdB / -1.95%
DC – 2 kHz with 100 kHz lowpass filter enabled	-2 mdB / -0.02%
DC – 10 kHz with 100 kHz lowpass filter enabled	-34 mdB / -0.39%

Timing and Synchronization

Table 12. Timing and Synchronization Characteristics

Characteristic	Description
Number of timing engines	1
Reference clock source	• Onboard clock • PXIe_CLK100
Input delay tolerance	±50 ns

Note For more information, refer to the *Channel Averaging* section of the PXIe-4311 User Manual.

Related information:

- Channel Averaging

Digital Triggers

Table 13. Digital Trigger Characteristics

Trigger Characteristic	Options
Debounce filter settings	• 90 ns • 5.12 µs • 2.56 ms • Custom interval • Disable
Polarity	Software-selectable
Purpose	• Start trigger • Reference trigger

Trigger Characteristic	Options
Source	• PFI 0 • PFI 1 • PXI_Trig <0..7> • PXI_Star • PXIe_DStar A • PXIe_DStar B

Clock and Trigger Routing

Table 14. Clock and Trigger Signals

Signal Type	Options
Source	• Start trigger • Reference trigger • Sample clock
Destination	• PFI 0 • PFI 1 • PXI_Trig <0..7> • PXIe_DStar C

PFI 0 and PFI 1 (Front Panel Digital Triggers)

Table 15. Input Triggers

Characteristic	Value
Logic compatibility	3.3 V or 5 V
High, VIH	2.40 V minimum
Low, VIL	0.95 V maximum
Input impedance	10 kΩ
Input current	≤ 500 µA
Overvoltage protection	±30 V minimum

Table 16. Output Triggers

Characteristic	Value
High, VOH	2.88 V minimum, sourcing 5 mA
Low, VOL	0.33 V maximum, sinking 5 mA
Output impedance	50 Ω
Output current	±30 mA minimum
Overvoltage protection	±30 V minimum

Environmental Guidelines

Notice Failure to follow the mounting instructions in the product documentation can cause temperature derating.

Notice This product is intended for use in indoor applications only.

Notice All cabling should be strain-relieved near input connectors. Take care not to directionally bias cable connectors within input connectors when applying strain relief.

Environmental Characteristics

Table 17. Temperature

Characteristic	Specification
Operating	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.
Storage	−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.

Table 18. Humidity

Characteristic	Specification
Operating	10% RH to 90% RH, noncondensing, tested in accordance with IEC 60068-2-78.
Storage	5% RH to 95% RH, noncondensing, tested in accordance with IEC 60068-2-78.

Table 19. Pollution Degree

Characteristic	Specification
Pollution Degree	2

Table 20. Maximum Altitude

Characteristic	Specification
Maximum Altitude	2,000 m (800 mbar)

Table 21. Shock and Vibration

Characteristic	Specification
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.
Operating Vibration	5 Hz to 500 Hz, 0.3 g RMS
Non-operating Vibration	5 Hz to 500 Hz, 2.4 g RMS, tested in accordance with IEC 60068-2-64. Non-operating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.

Calibration

You can get the calibration certificate and information about calibration services for the PXIe-4311 at *ni.com/calibration*.

Table 22. Calibration Information

Characteristic	Description
Self-calibration	On software command, the module computes offset corrections in a ±150 mV range by referencing the internal GND.
Self-calibration interval	Depending on required absolute accuracy, self-calibration is recommended whenever the current device temperature differs by more than the specified temperature range from the device temperature at which the last self-calibration was performed. For more information on how changes in temperature ($T_{selfcal}$) affect accuracy, refer to *DC Voltage Specifications*.
Calibration interval	2 years
Warm-up time	15 minutes

Related reference:

- Accuracy Specifications

Bus Interface

Characteristic	Description
Form factor	PCI Express Gen 1 x4
Slot compatibility	PXI Express or PXI Express hybrid slots
DMA channels	1, analog input
FIFO buffer size	1,023 samples
Data transfers	Direct memory access (DMA), programmed I/O

Power Requirements

Voltage	Value
3.3 V	1 A, maximum

Voltage	Value
12 V	2.8 A, maximum

Physical Characteristics

Table 23. Physical Characteristics

Characteristic	Description
Dimensions	3U, one-slot, PXI Express/Compact PCI Express module, 2.0 cm × 13.0 cm × 21.6 cm (0.8 in. × 5.1 in. × 8.5 in.) For more information, visit *ni.com/dimensions* and search by module number.
Weight	421.5 g (14.87 oz)
I/O connector	96-pin male DIN 41612/IEC 60603-2 connector
Measurement Category	I[3]

Caution Do not use the PXIe-4311 for connections to signals or for measurements within Categories II, III, or IV.

Caution The protection provided by the PXIe-4311 can be impaired if it is used in a manner not described in this document.

Caution Clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

3. Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are not intended for direct connections to the MAINS building installations of Measurement Categories CAT II, CAT III, CAT IV.

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