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# PXle-1090 Specifications

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2022-08-03




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# PXIe-1090 Specifications

This document contains specifications for the PXIe-1090 chassis.



**Note** You will impair the protection the PXIe-1090 provides if you use it in a manner not described in this document.

## Electrical

The following section provides information about the PXIe-1090 AC input and DC output.

### AC Input

Input rating	100 VAC to 240 VAC, 50 Hz/60 Hz, 3 A to 1.5 A
Operating voltage range <sup>1</sup>	90 VAC to 264 VAC
Nominal input frequency	50 Hz/60 Hz
Operating frequency range <sup>1</sup>	47 Hz to 63 Hz
Efficiency	93.5% typical
Over-current protection	Internal fuse in line
Main power disconnect	The AC power cable provides main power disconnect. Do not position the equipment so that it is difficult to disconnect the power cord. The front-panel power switch causes the internal chassis power supply to provide DC power to the PXI Express backplane.



**Caution** Disconnect power cord to completely remove power.

## DC Output

DC output characteristics of the PXle-1090.

Voltage Rail	Maximum Current	Load Regulation	Maximum Ripple and Noise (20 MHz BW)
+5V_AUX	0.5 A	±5%	50 mVpp
+12 V	8.0 A	±5%	120 mVpp
+5 V	2.5 A	±5%	50 mVpp
+3.3 V	6.0 A	±5%	50 mVpp
-12 V	0.25 A	±5%	120 mVpp

Maximum total available card-cage power for the PXle-1090 is 116 W.

The maximum power available for each Thunderbolt port is 15 W (5 V/3 A).

Slot	+5 V	V (I/O)	+3.3 V	+12 V	-12 V	5 V <sub>AUX</sub>
Hybrid Peripheral Slot with PXI-5 Peripheral	—	—	3 A	6 A	—	1 A
Hybrid Peripheral Slot with PXI-1 Peripheral	2.5 A	2.5 A	6 A	1 A	1 A	—

Table 1. Backplane Slot Current Capacity



**Note** PCI V(I/O) pins in Hybrid Peripheral Slots are connected to +5 V.



**Note** The maximum power dissipated in a peripheral slot should not exceed 58 W. Refer to the **Operating Environment** section for ambient temperature considerations at 58 W.

Over-current protection	All outputs are protected from short circuit and overload. They recover and return to regulation when the overload is removed and the power is cycled.
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Over-voltage protection	+3.3 V clamped at 3.7 V to 4.3 V, +5 V clamped at 5.7 V to 6.5 V, +12 V clamped at 13.4 V to 15.6 V
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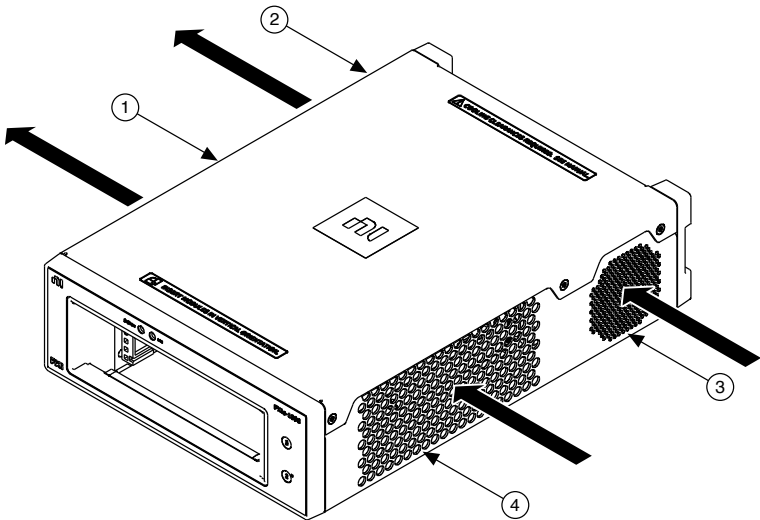
## Chassis Cooling

Module cooling	Forced air circulation (positive pressurization) through two 42 CFM fans
Module slot airflow direction	Bottom of module to top of module
Module intake	Right side or bottom <sup>[2]</sup> of chassis
Module exhaust	Left side or top <sup>2</sup> of chassis
Slot cooling capacity	58 W
Power supply cooling	Forced air circulation (positive pressurization) through one 17 CFM fan
Power supply intake	Right side or bottom <sup>2</sup> of chassis
Power supply exhaust	Left side or top <sup>2</sup> of chassis

## Minimum chassis cooling clearances

Intake	44.5 mm (1.75 in.)
Exhaust	44.5 mm (1.75 in.)

Figure 1. PXle-1090 Cooling Air Flow



- 1. Module Exhaust
- 2. Power Supply Exhaust
- 3. Power Supply Intake
- 4. Module Intake

Environmental

Maximum altitude	2,000 m (6,560 ft.), 800 mbar (at 25 °C ambient, high fan mode)
Pollution Degree	2

Indoor use only.

Operating Environment

<b>Ambient temperature range</b>		
When all peripheral modules require $\leq 38$ W cooling capacity per slot		0 °C to 50 °C

When any peripheral module requires >38 W to 58 W cooling capacity per slot		0 °C to 40 °C
Relative humidity range	20% to 80%, noncondensing	

## Storage Environment

Ambient temperature range	–40 °C to 71 °C
Relative humidity range	10% to 95%, noncondensing

## Shock and Vibration

Operational shock	30 g peak, half-sine, 11 ms pulse
Operational random vibration	5 to 500 Hz, 0.3 g <sub>rms</sub>
Non-operating vibration	5 to 500 Hz, 2.4 g <sub>rms</sub>

## Acoustic Emissions

### Sound Pressure Level (at Operator Position)

<b>38 W Profile</b>		
Auto fan (up to 30 °C ambient)		32.3 dBA
High fan		44.3 dBA

<b>58 W Profile</b>		
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Auto fan (up to 30 °C ambient)	48.9 dBA
High fan	51.4 dBA

## Sound Power Level

### 38 W Profile

Auto fan (up to 30 °C ambient)	39.4 dBA
High fan	51.9 dBA

### 58 W Profile

Auto fan (up to 30 °C ambient)	58.5 dBA
High fan	60.5 dBA

## 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.

## EMC Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) stated in the product specifications. These



requirements and limits provide reasonable protection against harmful interference when the product is operated in the intended operational electromagnetic environment.

This product is intended for use in industrial locations. However, harmful interference may occur in some installations, when the product is connected to a peripheral device or test object, or if the product is used in residential areas. To minimize interference with radio and television reception and prevent unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Furthermore, any changes or modifications to the product not expressly approved by NI could void your authority to operate it under your local regulatory rules.

## EMC Notices

Refer to the following notices for cables, accessories, and prevention measures necessary to ensure the specified EMC performance.



### Notice

For EMC declarations and certifications, and additional information, refer to the [Product Certifications and Declarations](#) section.



**Notice** Changes or modifications to the product not expressly approved by NI could void your authority to operate the product under your local regulatory rules.



**Notice** Operate this product only with shielded cables and accessories.

## Electromagnetic Compatibility Standards

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



**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** In Europe, Canada, Australia, and New Zealand (per CISPR 11) Class A equipment is intended for use in nonresidential locations.

## 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)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

## 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](https://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](http://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](http://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](http://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](http://ni.com/environment/rohs_china).)

## Backplane

Size	3U-sized; 2 peripheral slots. Compliant with IEEE 1101.10 mechanical packaging. PXI Express Specification compliant. Accepts both PXI Express and CompactPCI (PICMG 2.0 R 3.0) 3U modules.
Backplane bare-board material	UL 94 V-0 Recognized

Backplane connectors	Conforms to IEC 917 and IEC 1076-4-101, UL 94 V-0 rated
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## System Synchronization Clocks

### 10 MHz System Reference Clock: PXI\_CLK10

Maximum slot-to-slot skew	250 ps
Accuracy	±25 ppm max (guaranteed over the operating temperature range)
Maximum jitter	5 ps RMS phase-jitter (10 Hz–1 MHz range)
Duty-factor	45% to 55%
Unloaded signal swing	3.3 V ±0.3 V



**Note** For other specifications, refer to the **PXI-1 Hardware Specification**.

### 100 MHz System Reference Clock: PXIe\_CLK100 and PXIe\_SYNC100

Maximum slot-to-slot skew	100 ps
Accuracy	±25 ppm max (guaranteed over the operating temperature range)
Maximum jitter	3 ps RMS phase-jitter (10 Hz to 12 kHz range), 2 ps RMS phase-jitter (12 kHz to 20 MHz range)
Duty-factor for PXIe_CLK100	45% to 55%

Absolute differential voltage (When terminated with a 50 $\Omega$ load to 1.30 V or Thévenin equivalent)	400 mV to 1000 mV
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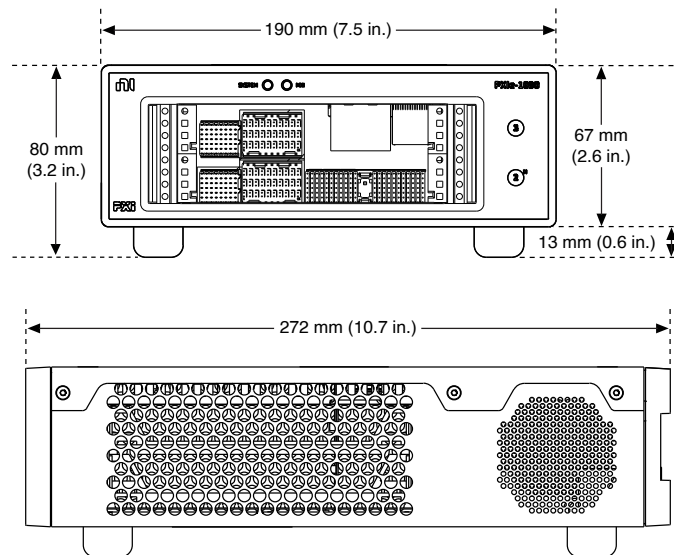
**Note** For other specifications, refer to the **PXI-5 PXI Express Hardware Specification**

## Mechanical

<b>Dimensions (with removeable feet)</b>	
Height	80 mm (3.2 in.)
Width	190 mm (7.5 in.)
Depth	272 mm (10.7 in.)
<b>Dimensions (without removeable feet)</b>	
Height	67 mm (2.6 in.)
Width	190 mm (7.5 in.)
Depth	272 mm (10.7 in.)
Weight	3.24 kg (7.15 lb)
Chassis materials	Extruded Aluminum (6063-T5, 6060-T6), Cold Rolled Steel/Stainless Steel, Santoprene, Urethane Foam, PC-ABS, PC, Polyethylene
Finish	Conductive Clear Iridite on Aluminum, Electroplated Zinc on Cold Rolled Steel

The following figure shows the PXle-1090 chassis dimensions. You can remove the rubber feet with a Philips screwdriver. This exposes screw threads in the exterior of the product chassis, which you can use with a mounting accessory. Consult the **PXle-1090 Dimensional Drawings** for more detailed dimensional information.

Figure 2. PXle-1090 Dimensions



<sup>1</sup> The operating range is guaranteed by design.

<sup>2</sup> Optional cooling direction applies when using the PXle-1090 in a vertical orientation.

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# PXle-6341

# Specifications

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# PXle-6341 Specifications

## 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 25 °C unless otherwise noted.

## Analog Input

Number of channels	16 single ended or 8 differential
ADC resolution	16 bits
DNL	No missing codes guaranteed
INL	Refer to AI Absolute Accuracy.
<b>Sample rate</b>	

Single channel maximum	500 kSample/s
Multichannel maximum (aggregate)	500 kSample/s
Minimum	No minimum
Timing resolution	10 ns
Timing accuracy	50 ppm of sample rate
Input coupling	DC
Input range	$\pm 0.2$ V, $\pm 1$ V, $\pm 5$ V, $\pm 10$ V
Maximum working voltage for analog inputs (signal + common mode)	$\pm 11$ V of AI GND
CMRR (DC to 60 Hz)	100 dB
<b>Input impedance</b>	
<b>Device on</b>	
AI+ to AI GND	$>10$ G $\Omega$ in parallel with 100 pF
AI- to AI GND	$>10$ G $\Omega$ in parallel with 100 pF
<b>Device off</b>	
AI+ to AI GND	1,200 $\Omega$
AI- to AI GND	1,200 $\Omega$

Input bias current	±100 pA
<b>Crosstalk (at 100 kHz)</b>	
Adjacent channels	-75 dB
Non-adjacent channels	-90 dB
Small signal bandwidth (-3 dB)	1.2 MHz
Input FIFO size	2,047 samples
Scan list memory	4,095 entries
Data transfers	DMA (scatter-gather), programmed I/O
<b>Overvoltage protection for all analog input and sense channels</b>	
Device on	±25 V for up to two AI pins
Device off	±15 V for up to two AI pins
Input current during overvoltage condition	±20 mA maximum/AI pin

## Settling Time for Multichannel Measurements

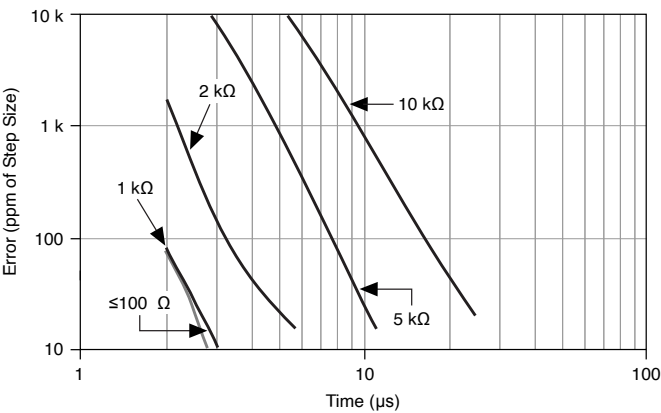
<b>Settling time for multichannel measurements, accuracy, full-scale step, all ranges</b>	
±90 ppm of step (±6 LSB)	2 µs convert interval
±30 ppm of step (±2 LSB)	3 µs convert interval

±15 ppm of step (±1 LSB)

5 μs convert interval

## Typical Performance Graph

Figure 1. Settling Error versus Time for Different Source Impedances



## AI Absolute Accuracy (Warranted)

Nominal Range Positive Full Scale (V)	Nominal Range Negative Full Scale (V)	Residual Gain Error (ppm of Reading)	Residual Offset Error (ppm of Range)	Offset Tempco (ppm of Range/°C)	Random Noise, $\sigma$ ( $\mu\text{Vrms}$ )	Absolute Accuracy at Full Scale ( $\mu\text{V}$ )
10	-10	65	13	23	270	2,190
5	-5	72	13	23	135	1,130
1	-1	78	17	26	28	240
0.2	-0.2	105	27	39	9	60

Table 1. AI Absolute Accuracy



**Note** Absolute accuracy at full scale on the analog input channels is determined using the following assumptions:

- **TempChangeFromLastExternalCal** = 10 °C
- **TempChangeFromLastInternalCal** = 1 °C
- **number\_of\_readings** = 10,000

- **CoverageFactor** =  $3 \sigma$

For more information about absolute accuracy at full scale, refer to the [AI Absolute Accuracy Example](#) section.



**Note** Accuracies listed are valid for up to two years from the device external calibration.

Gain tempco	7.3 ppm/°C
Reference tempco	5 ppm/°C
INL error	60 ppm of range

### AI Absolute Accuracy Equation

**AbsoluteAccuracy** = **Reading** · (**GainError**) + **Range** · (**OffsetError**) + **NoiseUncertainty**

- **GainError** = **ResidualGainError** + **GainTempco** · (**TempChangeFromLastInternalCal**) + **ReferenceTempco** · (**TempChangeFromLastExternalCal**)

- **OffsetError** = **ResidualOffsetError** + **OffsetTempco** · (**TempChangeFromLastInternalCal**) + **INLError**

- **NoiseUncertainty** =

$$\frac{\text{Random Noise}}{\sqrt{10,000}} \cdot 3$$

for a coverage factor of  $3 \sigma$  and averaging 10,000 points.

### AI Absolute Accuracy Example

For example, on the 10 V range, the absolute accuracy at full scale is as follows:

- **GainError:** 65 ppm + 7.3 ppm · 1 + 5 ppm · 10 = 122 ppm

- **OffsetError:**  $13 \text{ ppm} + 23 \text{ ppm} \cdot 1 + 60 \text{ ppm} = 96 \text{ ppm}$
- **NoiseUncertainty:**  

$$\frac{270 \mu\text{V}}{\sqrt{10,000}} \cdot 3$$

$$= 8.1 \mu\text{V}$$
- **AbsoluteAccuracy:**  $10 \text{ V} \cdot (\text{GainError}) + 10 \text{ V} \cdot (\text{OffsetError}) + \text{NoiseUncertainty} = 2,190 \mu\text{V}$

## Analog Output

Number of channels	2
DAC resolution	16 bits
DNL	$\pm 1$ LSB
Monotonicity	16 bit guaranteed
<b>Maximum update rate (simultaneous)</b> 1 channel                      900 kSample/s  2 channels                      840 kSample/s per channel	
Timing accuracy	50 ppm of sample rate
Timing resolution	10 ns
Output range	$\pm 10 \text{ V}$
Output coupling	DC
Output impedance	$0.2 \Omega$

Output current drive	$\pm 5$ mA
Overdrive protection	$\pm 15$ V
Overdrive current	15 mA
Power-on state	$\pm 20$ mV
Power-on/off glitch	2 V for 500 ms
Output FIFO size	8,191 samples shared among channels used
Data transfers	DMA (scatter-gather), programmed I/O
AO waveform modes	Non-periodic waveform, periodic waveform regeneration mode from onboard FIFO, periodic waveform regeneration from host buffer including dynamic update
Settling time, full-scale step, 15 ppm (1 LSB)	6 $\mu$ s
Slew rate	15 V/ $\mu$ s
<b>Glitch energy</b>	
Magnitude	100 mV
Duration	2.6 $\mu$ s

## AO Absolute Accuracy

Nominal Range Positive Full Scale (V)	Nominal Range Negative Full Scale (V)	Residual Gain Error (ppm of Reading)	Gain Tempco (ppm/°C)	Reference Tempco (ppm/°C)	Residual Offset Error (ppm of Range)	Offset Tempco (ppm of Range/°C)	INL Error (ppm of Range)	Absolute Accuracy at Full Scale (μV)
10	-10	80	11.3	5	53	4.8	128	3,271

Table 2. AO Absolute Accuracy



**Note Absolute Accuracy at Full Scale** numbers are valid immediately following self calibration and assumes the device is operating within 10 °C of the last external calibration.



**Note** Accuracies listed are valid for up to two years from the device external calibration.

## AO Absolute Accuracy Equation

$$\text{AbsoluteAccuracy} = \text{OutputValue} \cdot (\text{GainError}) + \text{Range} \cdot (\text{OffsetError})$$

- **GainError** = **ResidualGainError** + **GainTempco** · **(TempChangeFromLastInternalCal)** + **ReferenceTempco** · **(TempChangeFromLastExternalCal)**
- **OffsetError** = **ResidualOffsetError** + **OffsetTempco** · **(TempChangeFromLastInternalCal)** + **INLError**

## Digital I/O/PFI

### Static Characteristics

Number of channels	24 total, 8 (P0.<0..7>), 16 (PFI <0..7>/P1, PFI <8..15>/P2)
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Ground reference	D GND
Direction control	Each terminal individually programmable as input or output
Pull-down resistor	50 k $\Omega$ typical, 20 k $\Omega$ minimum
Input voltage protection	$\pm 20$ V on up to two pins



**Caution** Stresses beyond those listed under the **Input voltage protection** specification may cause permanent damage to the device.

## Waveform Characteristics (Port 0 Only)

Terminals used	Port 0 (P0.<0..7>)
Port/sample size	Up to 8 bits
Waveform generation (DO) FIFO	2,047 samples
Waveform acquisition (DI) FIFO	255 samples
DO or DI Sample Clock frequency	0 to 1 MHz, system and bus activity dependent
Data transfers	DMA (scatter-gather), programmed I/O
Digital line filter settings	160 ns, 10.24 $\mu$ s, 5.12 ms, disable

## PFI/Port 1/Port 2 Functionality

Functionality	Static digital input, static digital output, timing input, timing output
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Timing output sources	Many AI, AO, counter, DI, DO timing signals
Debounce filter settings	90 ns, 5.12 $\mu$ s, 2.56 ms, custom interval, disable; programmable high and low transitions; selectable per input

## Recommended Operating Conditions

<b>Input high voltage (<math>V_{IH}</math>)</b>	
Minimum	2.2 V
Maximum	5.25 V
<b>Input low voltage (<math>V_{IL}</math>)</b>	
Minimum	0 V
Maximum	0.8 V
<b>Output high current (<math>I_{OH}</math>)</b>	
P0.<0..7>	-24 mA maximum
PFI <0..15>/P1/P2	-16 mA maximum
<b>Output low current (<math>I_{OL}</math>)</b>	
P0.<0..7>	24 mA maximum
PFI <0..15>/P1/P2	16 mA maximum

## Digital I/O Characteristics

Positive-going threshold ( $V_{T+}$ )	2.2 V maximum
Negative-going threshold ( $V_{T-}$ )	0.8 V minimum
Delta VT hysteresis ( $V_{T+} - V_{T-}$ )	0.2 V minimum
$I_{IL}$ input low current ( $V_{IN} = 0$ V)	-10 $\mu$ A maximum
$I_{IH}$ input high current ( $V_{IN} = 5$ V)	250 $\mu$ A maximum

Figure 2. P0.<0..7>:  $I_{OH}$  versus  $V_{OH}$

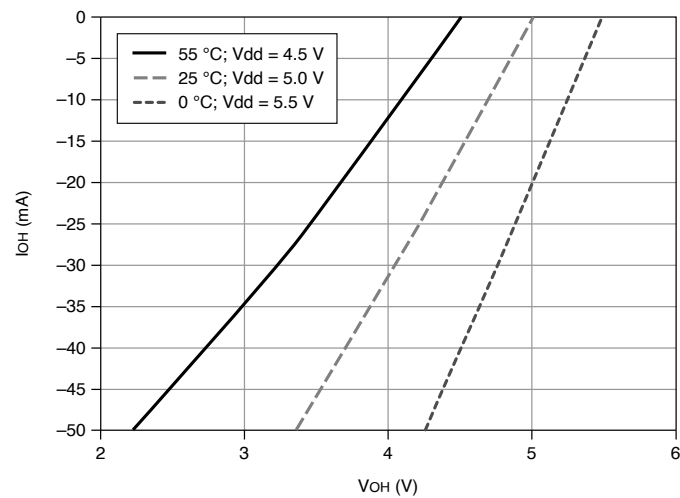


Figure 3. P0.<0..7>:  $I_{OL}$  versus  $V_{OL}$

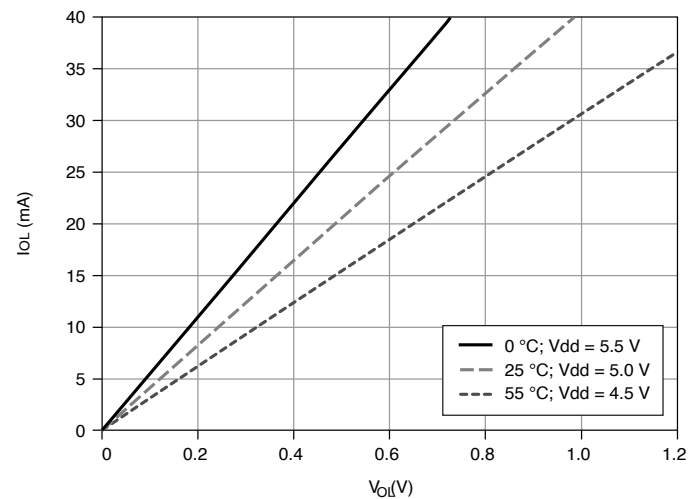


Figure 4. PFI <0..15>/P1/P2:  $I_{OH}$  versus  $V_{OH}$

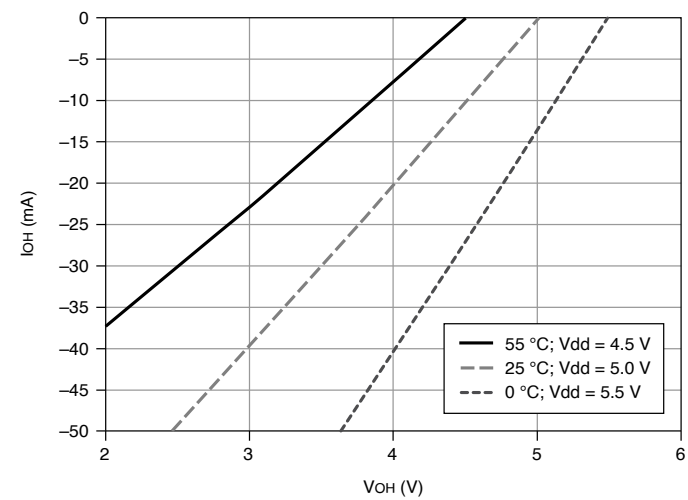
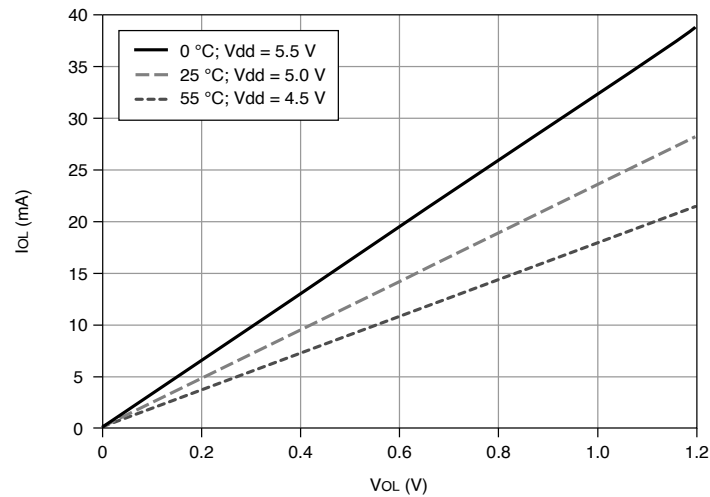


Figure 5. PFI <0..15>/P1/P2:  $I_{OL}$  versus  $V_{OL}$ 

## General-Purpose Counters

Number of counter/timers	4
Resolution	32 bits
Counter measurements	Edge counting, pulse, pulse width, semi-period, period, two-edge separation
Position measurements	X1, X2, X4 quadrature encoding with Channel Z reloading; two-pulse encoding
Output applications	Pulse, pulse train with dynamic updates, frequency division, equivalent time sampling
Internal base clocks	100 MHz, 20 MHz, 100 kHz
External base clock frequency	0 MHz to 25 MHz; 0 MHz to 100 MHz on PXIe_DSTAR<A,B>
Base clock accuracy	50 ppm

Inputs	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down, Sample Clock
Routing options for inputs	Any PFI, PXIe_DSTAR<A,B>, PXI_TRIG, PXI_STAR, many internal signals
FIFO	127 samples per counter
Data transfers	Dedicated scatter-gather DMA controller for each counter/timer, programmed I/O

## Frequency Generator

Number of channels	1
Base clocks	20 MHz, 10 MHz, 100 kHz
Divisors	1 to 16
Base clock accuracy	50 ppm

Output can be available on any PFI or RTSI terminal.

## Phase-Locked Loop (PLL)

Number of PLLs	1
<b>Reference clock locking frequency</b>	
PXIe_DSTAR<A,B>	10 MHz, 20 MHz, 100 MHz
PXI_STAR	10 MHz, 20 MHz
PXIe_CLK100	100 MHz

PXI_TRIG <0..7>	10 MHz, 20 MHz
PFI <0..15>	10 MHz, 20 MHz
Output of PLL	100 MHz Timebase; other signals derived from 100 MHz Timebase including 20 MHz and 100 kHz Timebases

## External Digital Triggers

Source	Any PFI, PXIe_DSTAR<A,B>, PXI_TRIG, PXI_STAR
Polarity	Software-selectable for most signals
Analog input function	Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Convert Clock, Sample Clock Timebase
Analog output function	Start Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase
Counter/timer functions	Gate, Source, HW_Arm, Aux, A, B, Z, Up_Down, Sample Clock
Digital waveform generation (DO) function	Start Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase
Digital waveform acquisition (DI) function	Start Trigger, Reference Trigger, Pause Trigger, Sample Clock, Sample Clock Timebase

## Device-to-Device Trigger Bus

Input source	PXI_TRIG <0..7>, PXI_STAR, PXIe_DSTAR<A,B>
Output destination	PXI_TRIG <0..7>, PXIe_DSTARC

Output selections	10 MHz Clock; frequency generator output; many internal signals
Debounce filter settings	90 ns, 5.12 $\mu$ s, 2.56 ms, custom interval, disable; programmable high and low transitions; selectable per input

## Bus Interface

Form factor	x1 PXI Express peripheral module, specification rev 1.0 compliant
Slot compatibility	x1 and x4 PXI Express or PXI Express hybrid slots
DMA channels	8, can be used for analog input, analog output, digital input, digital output, counter/timer 0, counter/timer 1, counter/timer 2, counter/timer 3

## Power Requirements



**Caution** The protection provided by the device can be impaired if the device is used in a manner not described in the **X Series User Manual**.

+3.3 V	1.6 W
+12 V	19.8 W

## Current Limits



**Caution** Exceeding the current limits may cause unpredictable device behavior.

+5 V terminal (connector 0)	1 A maximum <sup>[1]</sup>
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+5 V terminal (connector 1)	1 A maximum <sup>[1]</sup>
P0/PFI/P1/P2 and +5 V terminals combined	2 A maximum

## Physical Characteristics

Printed circuit board dimensions	Standard 3U PXI
Weight	157 g (5.5 oz)
<b>I/O connectors</b> Module connector      68-Pos Right Angle Dual Stack PCB-Mount VHDCI (Receptacle)  Cable connector      68-Pos Offset IDC Cable Connector (Plug)(SHC68-*)	



**Note** For more information about the connectors used for DAQ devices, refer to the document, **NI DAQ Device Custom Cables, Replacement Connectors, and Screws**, by going to [ni.com/info](http://ni.com/info) and entering the Info Code rdspmb.

## Calibration

Recommended warm-up time	15 minutes
Calibration interval	2 years

## Maximum Working Voltage

**Maximum working voltage** refers to the signal voltage plus the common-mode voltage.

Channel to earth	11 V, Measurement Category I
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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, circuits powered by regulated low-voltage sources, and electronics.



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



**Note** Measurement Categories CAT I and CAT O are equivalent. These test and measurement circuits are for other circuits not intended for direct connection to the MAINS building installations of Measurement Categories CAT II, CAT III, or CAT IV.

## 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.)
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### Random vibration

Operating 5 to 500 Hz, 0.3 g<sub>rms</sub>

Nonoperating 5 to 500 Hz, 2.4 g<sub>rms</sub>

(Tested in accordance with IEC 60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

## Environmental

<b>Temperature</b>	
Operating	0 °C to 55 °C
Storage	-40 °C to 71 °C
<b>Humidity</b>	
Operating	10% to 90% RH, noncondensing
Storage	5% to 95% RH, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m

Indoor use only.

## 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 Standards

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** 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** 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.



**Notice** For EMC declarations and certifications, and additional information, refer to the [Product Certifications and Declarations](#) 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)
- 2011/65/EU; Restriction of Hazardous Substances (RoHS)

## 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](https://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](https://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](https://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](https://ni.com/environment/rohs_china)。(For information about China RoHS compliance, go to [ni.com/environment/rohs\\_china](https://ni.com/environment/rohs_china).)

<sup>1</sup> Has self-resetting fuse that opens when current exceeds this specification.