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Find the *National Instruments PXIe-4138* at our website: ***Click HERE***

SPECIFICATIONS

PXIe-4163

PXIe, 24-Channel, ±24 V, 50 mA Precision PXI Source Measure Unit

Contents

Definitions....1
Conditions....2
Instrument Capabilities....2
SMU Specifications....3
- Voltage....3
- Current....4
- DC Power....4

Additional Specifications....4
Supplemental Specifications....6
- Measurement and Update Timing....6
- Triggers....7

Calibration Interval....8
Physical....8
Environment....8
- Operating Environment....8
- Storage Environment....9

Shock and Vibration....9

Definitions

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

The following characteristic specifications 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 *Nominal* unless otherwise noted.

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Conditions

Specifications are valid under the following conditions unless otherwise noted.

- Ambient temperature[1] of 23 °C ± 5 ºC
- Calibration interval of 1 year
- 30 minutes warm-up time
- Self-calibration performed within the last 24 hours
- **niDCPower Aperture Time** property or `NIDCPOWER_ATTR_APERTURE_TIME` attribute set to 2 power-line cycles (PLC)
- Fans set to the highest setting if the PXI Express chassis has multiple fan speed settings

Instrument Capabilities

The following table and figure illustrate the voltage and the current source and sink ranges of the PXIe-4163.

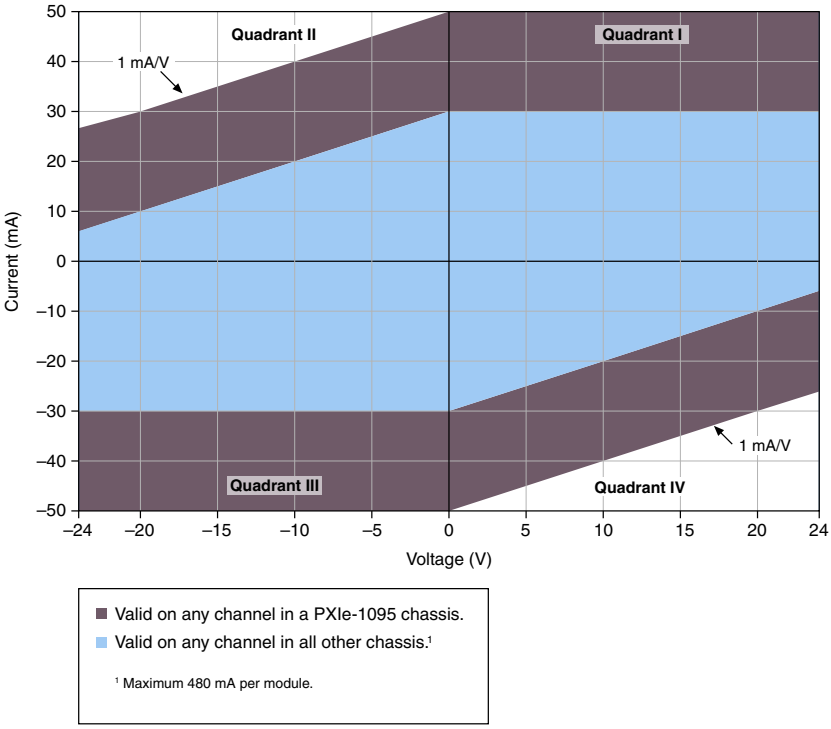
Table 1. PXIe-4163 Current Source and Sink Ranges, Warranted

Channels	DC Voltage Ranges	DC Current Source and Sink Ranges	
		With a PXIe-1095 Chassis	With All Other Chassis
0 through 23	±24 V	10 µA 100 µA 1 mA 10 mA 50 mA	10 µA 100 µA 1 mA 10 mA 30 mA

[1] The ambient temperature of a PXI system is defined as the temperature at the chassis fan inlet (air intake).

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Figure 1. PXIe-4163 Quadrant Diagram, Any Channel



SMU Specifications

Voltage

Table 2. Voltage Programming and Measurement Accuracy/Resolution, Warranted

Range	Resolution and Noise (0.1 Hz to 10 Hz)	Accuracy (23 °C ± 5 °C) ± (% of Voltage + Offset)	Tempco[2] ± (% of Voltage + Offset)/°C, 0 °C to 55 °C
		T_{cal} ± 5 °C	
24 V	200 µV	0.05% + 5 mV	0.0005% + 1 µV

[2] Temperature coefficient applies beyond 23 °C ± 5 °C within 5 °C of Tcal.

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Current

Table 3. Current Programming and Measurement Accuracy/Resolution, Warranted

Range	Resolution and Noise (0.1 Hz to 10 Hz)	Accuracy (23 °C ± 5 °C) ± (% of Current + Offset)	Tempco[3] ± (% of Current + Offset)/°C, 0 °C to 55 °C
		T_{cal} ± 5 °C	
10 µA	100 pA	0.10% + 5 nA	0.004% + 10 pA
100 µA	1 nA	0.10% + 50 nA	0.004% + 100 pA
1 mA	10 nA	0.10% + 500 nA	0.004% + 1 nA
10 mA	100 nA	0.10% + 5 µA	0.004% + 10 nA
30 mA	500 nA	0.10% + 25 µA	0.004% + 50 nA
50 mA[4]	500 nA	0.10% + 25 µA	0.004% + 50 nA

DC Power

With a PXIe-1095 chassis	
Per channel	1.2 W
Total	28.8 W
With all other chassis	
Per channel	0.7 W
Total	11.5 W

Additional Specifications

Settling time[5]	<500 µs, typical[6]
Transient response[7]	<100 µs, typical[8]

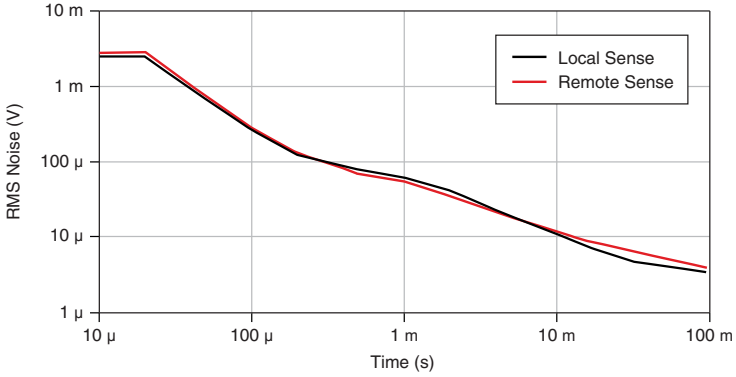
[3] Temperature coefficient applies beyond 23 °C ± 5 °C within 5 °C of Tcal.
[4] Only available when used with a PXIe-1095 chassis.
[5] Current limit set to ≥1 mA and ≥10% of the selected current limit range. PXIe-4163 configured for fast transient response.
[6] To settle to 0.1% of voltage step.
[7] PXIe-4163 configured for fast transient response.
[8] To recover within ±20 mV after a load current change from 10% to 90% of range.

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Wideband source noise[9]	15 mV_{RMS}, typical <100 mV_{pk-pk}, typical
Remote sense	
Voltage	No additional error due to lead drop
Current	No additional error due to lead drop
Maximum lead drop	1 V drop/lead
Load regulation	
Voltage[10]	50 µV/mA, typical
Current	(30 pA + 20 ppm of range)/volt, typical
Functional isolation voltage, any pin to earth ground	60 VDC
Absolute maximum voltage to Output LO	
From Sense HI[11]	
When $V_{Output\ HI} > 0$ V	-0.5 V to ($V_{Output\ HI}$ + 0.5 V)
When $V_{Output\ HI} \leq 0$ V	($V_{Output\ HI}$ - 0.5 V) to 0.5 V
From all other pins	±25 V

The following figures illustrate noise as a function of measurement aperture for the PXIe-4163.

Figure 2. Voltage RMS Noise Versus Aperture Time[12], Typical



[9] 20 Hz to 20 MHz bandwidth. PXIe-4163 configured for normal transient response. Measured at the end of the 1 m SHDB62M-DB62M-LL cable.

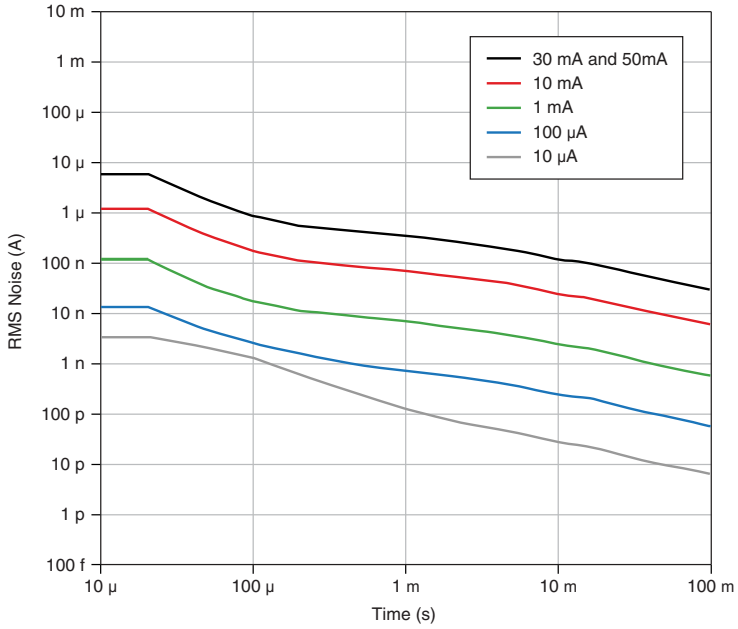
[10] At connector pins when using local sense.

[11] Where $V_{Output\ HI}$ is the voltage at the Output HI pin in the same channel as a Sense HI pin.

[12] All channels averaged. Channels 9 and 22 have degraded performance.

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Figure 3. Current RMS Noise Versus Aperture Time[13], Typical



Supplemental Specifications

Measurement and Update Timing

Available sample rates[14]	(600 kS/s)/*N*

where $N = 6, 7, 8, \ldots 2^{20}$ and S is samples.

Sample rate accuracy	±50 ppm
Maximum measure rate to host[15]	100,000 S/s per channel, continuous

[13] All channels averaged. Channels 7, 9, and 11 have degraded performance.

[14] When source-measuring, both the NI-DCPower **Source Delay** and **Aperture Time** properties affect the sampling rate. When taking a measure record, only the **Aperture Time** property affects the sampling rate.

[15] Load dependent settling time is not included. Normal DC noise rejection is used.

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Maximum source update rate[16]	
Single channel	100,000 updates/s
All channels simultaneously	40,000 updates/s per channel
Input trigger to	
Source event delay	8.5 µs
Source event jitter	1.7 µs
Measure event jitter	1.7 µs

Triggers

Input triggers	
Types	Start Source Sequence Advance Measure
Sources (PXI trigger lines 0 to 7)[17]	
Polarity	Active high (not configurable)
Minimum pulse width	100 ns
Destinations[18] (PXI trigger lines 0 to 7)[17]	
Polarity	Active high (not configurable)
Minimum pulse width	>200 ns
Output triggers (events)	
Types	Source Complete Sequence Iteration Complete Sequence Engine Done Measure Complete
Destinations (PXI trigger lines 0 to 7)[17]	
Polarity	Active high (not configurable)
Pulse width	230 ns

[16] As the source delay is adjusted or if advanced sequencing is used, maximum source update rates may vary.

[17] Pulse widths and logic levels are compliant with *PXI Express Hardware Specification Revision 1.0 ECN 1*.

[18] Input triggers can come from any source (PXI trigger or software trigger) and be exported to any PXI trigger line. This allows for easier multi-board synchronization regardless of the trigger source.

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Calibration Interval

Recommended calibration interval	1 year

Physical

Dimensions	3U, one-slot, PXI Express/CompactPCI Express module 2.0 cm × 13.0 cm × 21.6 cm (0.8 in. × 5.1 in. × 8.5 in.)
Weight	394 g (13.9 oz)
Front panel connectors	Custom 62-position D-SUB, female

Environment

Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Pollution Degree	2

Indoor use only.

Operating Environment

Ambient temperature range	
With a PXIe-1095 chassis	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.)
With all other chassis	0 °C to 45 °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.)

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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} (Tested in accordance with IEC 60068-2-64.)
Nonoperating	5 Hz to 500 Hz, 2.4 g_{rms} (Tested in accordance with IEC 60068-2-64. Test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

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