NATIONAL INSTRUMENTS PXIe-4163 Precision PXI Source Measure Unit Owner's Manual

SPECIFICATIONS
PXIe-4163
PXIe, 24-Channel, ±24 V, 50 mA Precision PXI Source Measure Unit

Contents

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 Nominal unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

- Ambient temperature of 23 °C ± 5 ºC 1
- Chassis with slot cooling capacity ≥38 W 2
  – For chassis with slot cooling capacity = 38 W, fan speed set to HIGH
- 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)

Instrument Capabilities

Channels	0 through 23
DC voltage range	±24 V

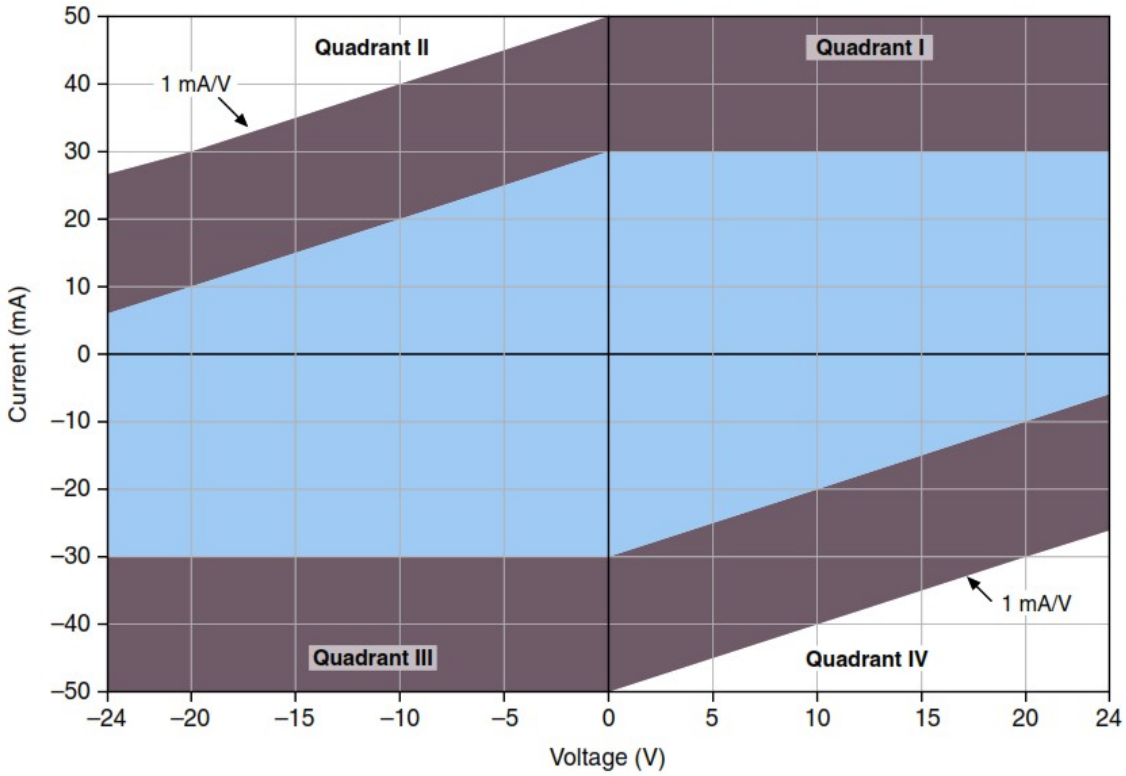
The following table and figure illustrate the voltage and the current source and sink ranges of the PXIe-4163.

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

Chassis Slot Cooling Capacity	
≥58 W	**38 W**
10 µA	
100 µA	
1 mA	
10 mA	
50 mA	30 mA

1 The ambient temperature of a PXI system is defined as the temperature at the chassis fan inlet (air intake).
2 For increased capability, NI recommends installing the PXIe-4163 in a chassis with slot cooling capacity ≥58 W.

Figure 1. PXIe-4163 Quadrant Diagram, Any Channel



Valid on any channel in chassis with slot cooling capacity ≥ 58 W.

Valid on any channel in all other compatible chassis. 1

1 Maximum 480 mA per module.

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)	Tempco3 a (% of Voltage + Offsety°C, 0 °C to 55 °C
		Tad ± 5 °C	
24 V	200µV	0.05%+ 5 mV	0.0005%+ 1µV

3 Temperature coefficient applies beyond 23 °C ± 5 °C within 5 °C of Tcal.

Current

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

Range	Resolution and Noise (0 .1 Hz to 10 Hz)	Accuracy (23 °C t 5 °C) ± (% of Current + Offset)	Tempco4 s (% of Current + Of fset)/°C, 0 °C to 55 °C
		Teal ± 5 °C	
10µA	100 pA	0.10%+ 5 nA	0.004% + 10 pA
100 RA	1 nA	0.10% + 50 nA	0.004% + 100 pA
I mA	10 nA	0.10% + 500 nA	0.004% + 1 nA
10 mA	100 nA	0.10%+ 5µA	0.004%+ 10 nA
30 mA or 50 mA5	500 nA	0.10%+ 25 RA	0.004% + 50 nA

Available DC Output Power

Chassis Slot Cooling Capacity	Per Channel Maximum	Absolute Maximum
≥58 W	1.2 W	28.8 W
38 W	0.7 W	11.5 W

Additional Specifications

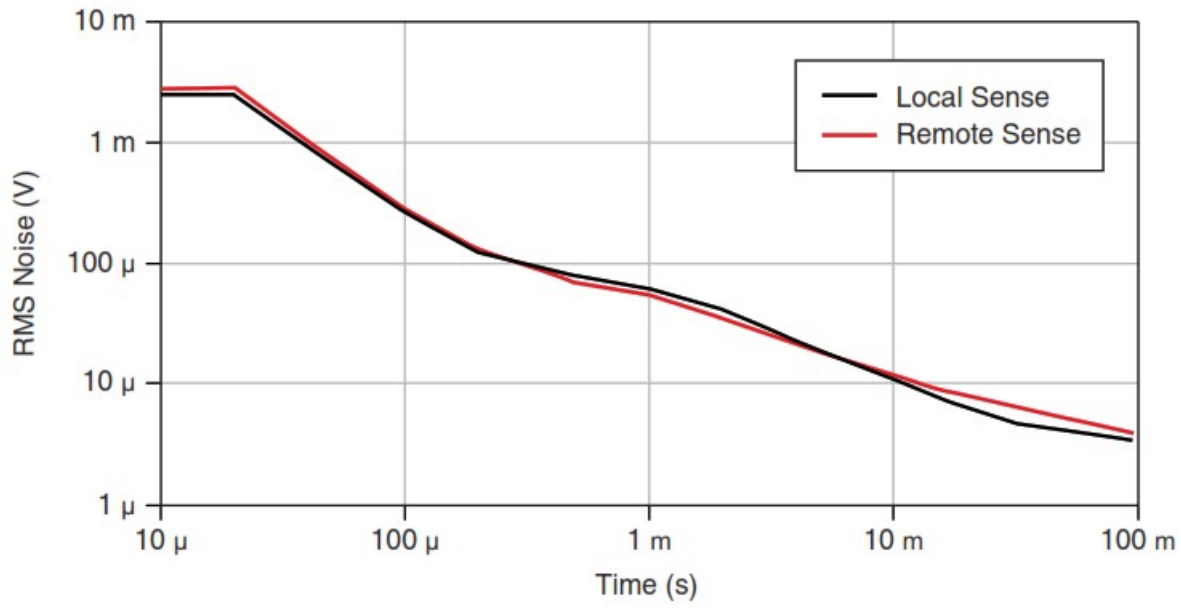
Settling time 6	<500 µs, typical 7
Transient response 8	<100 µs, typical 9
Wideband source noise 10	15 mV RMS, typical <100 mVpk-pk, typical

4 Temperature coefficient applies beyond 23 °C ± 5 °C within 5 °C of Tcal.
5 50 mA range available only when installed in chassis with slot cooling capacity ≥58 W. 30 mA range available in all other chassis.
6 Current limit set to ≥1 mA and ≥10% of the selected current limit range. PXIe-4163 configured for fast transient response.
7 To settle to 0.1% of voltage step.
8 PXIe-4163 configured for fast transient response.
9 To recover within ±20 mV after a load current change from 10% to 90% of range.
10 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.

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 11	50 µV/mA, typical
Current	(30 pA + 20 ppm of range)/volt, typical
Functional isolation voltage, any pin to earth ground	60 V DC
Absolute maximum voltage to Output LO	
From Sense HI 12	
When VOutput HI > 0 V	-0.5 V to (VOutput HI + 0.5 V)
When VOutput HI ≤ 0 V	(VOutput HI – 0.5 V) to 0.5 V
From all other pins	±25 V

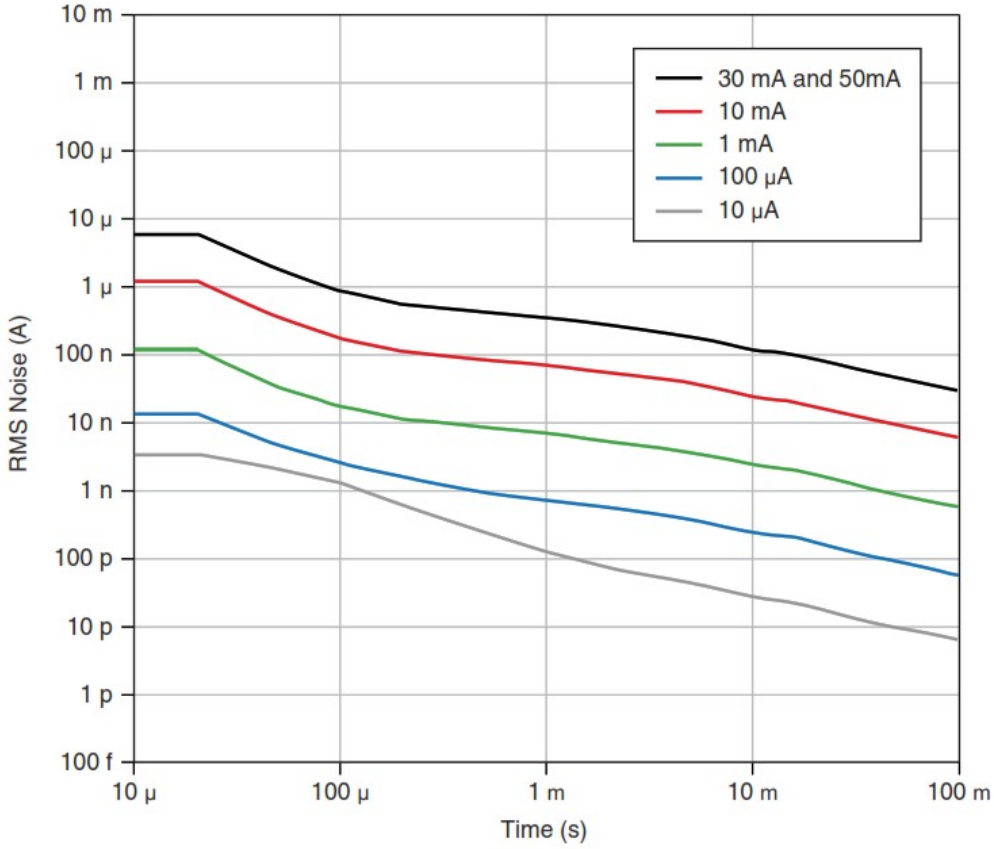
The following figures illustrate noise as a function of measurement aperture for the PXIe-4163.

Figure 2. Voltage RMS Noise Versus Aperture Time,13 Typical



11 At connector pins when using local sense.
12 Where VOutput HI is the voltage at the Output HI pin in the same channel as a Sense HI pin.
13 All channels averaged. Channels 9 and 22 have degraded performance.

Figure 3. Current RMS Noise Versus Aperture Time, 14 Typical



14 All channels averaged. Channels 7, 9, and 11 have degraded performance.

Supplemental Specifications

Measurement and Update Timing

Available sample rates 15	(600 kS/s)/N
where N = 6, 7, 8, … 2 20 S is samples Sample rate accuracy	±50 ppm
Maximum measure rate to host 16	100,000 S/s per channel, continuous
Maximum source update rate 17	
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) 18	
Polarity	Active high (not configurable)
Minimum pulse width	100 ns

15 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.
16 Load dependent settling time is not included. Normal DC noise rejection is used.
17 As the source delay is adjusted or if advanced sequencing is used, maximum source update rates may vary.
18 Pulse widths and logic levels are compliant with PXI Express Hardware Specification Revision 1.0 ECN 1.

19 Destinations (PXI trigger lines 0 to 7) 18	
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) 18	
Polarity	Active high (not configurable)
Pulse width	230 ns

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

Power Requirements

Chassis Slot Cooling Capacity	+3.3 V Current Draw, Typical		+12 V Current Draw, Typical	
	Idle	Full Output Load	Idle	Full Output Load
38W	1A	1 A	1.5 A	3A
>58W		1A		4.5 A

19 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.

Environmental Characteristics

Temperature and Humidity	
Temperature	
Operating	
Chassis with slot cooling capacity ≥58 W 20	0 °C to 55 °C
All other compatible chassis	0 °C to 40 °C
Storage	-40 °C to 71 °C
Humidity	
Operating	10% to 90%, noncondensing
Storage	5% to 95%, noncondensing
Pollution Degree	2
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Shock and Vibration	
Random vibration	
Operating	5 Hz to 500 Hz, 0.3 g RMS
Non-operating	5 Hz to 500 Hz, 2.4 g RMS
Operating shock	30 g, half-sine, 11 ms pulse

20 Not all chassis with slot cooling capacity ≥58 W can achieve this ambient temperature range. Refer to PXI chassis specifications to determine the ambient temperature ranges your chassis can achieve.

14, DFAR 252.227-7014, and DFAR 252.227-7015.

376735B-01 December 13, 2018

Documents / Resources

	NATIONAL INSTRUMENTS PXIe-4163 Precision PXI Source Measure Unit [pdf] Owner's Manual PXIe-4163, PXIe-4163 Precision PXI Source Measure Unit, PXIe-4163 PXI Source Measure Unit, Precision PXI Source Measure Unit, PXI Source Measure Unit, Precision Measure Unit, Measure Unit

References

- Engineer Ambitiously - NI
- Trade Compliance - NI
- National Instruments Patents - NI
- NI Trademarks and Logo Guidelines - NI
- PXIe-4163 National Instruments PXI Source Measure Unit | Apex Waves