SPECIFICATIONS

PXI-4132

±100 V, 2 W Precision PXI Source Measure Unit

These specifications apply to the PXI-4132.

Contents

Definitions

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

NATIONAL INSTRUMENTS

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 expected performance met by a majority of the models.
- *Nominal* specifications describe parameters and attributes that may be useful in operation.

Specifications are *Warranted* unless otherwise noted.

Conditions

Specifications are valid under the following conditions unless otherwise noted.

- Ambient temperature[1] of 23 °C ± 5 ºC
- 30 minutes warm-up time
- **niDCPower Auto Zero** property or `NIDCPOWER_ATTR_AUTO_ZERO` attribute set to On
- **niDCPower Aperture Time** property or `NIDCPOWER_ATTR_APERTURE_TIME` attribute set to 1 power-line cycle (PLC)
- Self-calibration performed within the last 24 hours

Device Capabilities

The following table and figure illustrate the voltage and current source and sink ranges of the PXI-4132.

Table 1. PXI-4132 Current Source and Sink Ranges

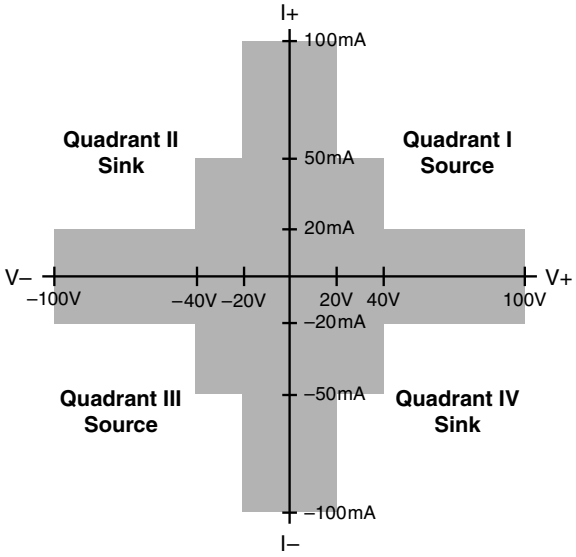
DC Voltage Ranges (CAT I)	DC Current Source and Sink Ranges
±10 V ±100 V	10 µA 100 µA 1 mA 10 mA 100 mA

Caution Shock hazards exist when voltage levels are greater than 30 VRMS, 42.4 V peak, or 60 VDC. Use extreme caution when a shock hazard is present.

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

Always ensure the test system is de-energized before connecting or disconnecting the backshell assembly or cables from the PXI-4132.

Figure 1. PXI-4132 Quadrant Diagram, Characteristic



SMU Specifications

Voltage Programming Accuracy/Resolution

Range	Resolution, Nominal	Accuracy ± (% of Output + Offset)	Peak to Peak Noise, Typical (0.1 Hz to 10 Hz)
		1 Year 23 °C ± 5 °C	
±10 V	50 µV	0.025% + 3 mV	70 µV
±100 V	500 µV	0.025% + 10 mV	300 µV

Current Programming Accuracy/Resolution[2]

Range	Resolution, Nominal	Accuracy ± (% of Output + Offset)	Peak to Peak Noise, Typical (0.1 Hz to 10 Hz)
		1 Year 23 °C ± 5 °C	
10 µA	500 pA	0.034% + 2.0 nA	90 pA
100 µA	5 nA	0.034% + 20 nA	900 pA
1 mA	50 nA	0.034% + 0.2 µA	9 nA
10 mA	500 nA	0.034% + 2.0 µA	90 nA
100 mA	5 µA	0.034% + 20 µA	900 nA

Voltage Measurement Accuracy/Resolution

Range	Resolution, Nominal	Accuracy ± (% of Reading + Offset)
		1 Year 23 °C ± 5 °C
±10 V	10 µV	0.02% + 2.0 mV
±100 V	100 µV	0.02% + 5.0 mV

Current Measurement Accuracy/Resolution

Range	Resolution, Nominal	Accuracy ± (% of Reading + Offset)
		1 Year 23 °C ± 5 °C
10 µA	10 pA	0.028% + 1.0 nA
100 µA	100 pA	0.028% + 10 nA
1 mA	1 nA	0.028% + 0.1 µA
10 mA	10 nA	0.028% + 1.0 µA
100 mA	100 nA	0.020% + 10 µA

[2] Minimum programmable current limit/level is 2% of range.

Additional Specifications

Temperature Coefficient	15% of accuracy specification per °C
Settling time	<300 µs; Settled to 0.1% of final value (1 V step at 50% load of current range), typical
Transient response	Recovers to <0.1% of voltage range within 100 µs after a change in load current from 10% to 90% of current range, typical
Normal mode noise (source only)	8 mV_{p-p} into resistive load <1 mV RMS (20 Hz to 20 MHz bandwidth), typical
Remote sense	Add 0.5% of HI lead drop to voltage accuracy specification (Maximum lead drop) Up to 1 V drop per lead
Load Regulation	
Voltage	0.5 mV per mA of output load using local sense
Current	0.01% of range per volt of output change
Guard offset voltage	<4 mV, typical (Current ≤ 10 mA)
Isolation voltage (continuous)	
Channel-to-earth ground	150 VDC, CAT I[3], verified by dielectric withstand test, 5 s, characteristic

Caution Do not connect to MAINs. Do not connect to signals or use for measurements within CAT II, III, or IV.

Step Response

The following figures illustrate the step response of the PXI-4132 for different loads.

[3] Measurement Categories CAT I and CAT O (Other) are equivalent. These test and measurement circuits are not intended for direct connection to the MAINs building installations of Measurement Categories CAT II, III, or CAT IV.

Figure 2. 100 mA Range Step Response, Typical

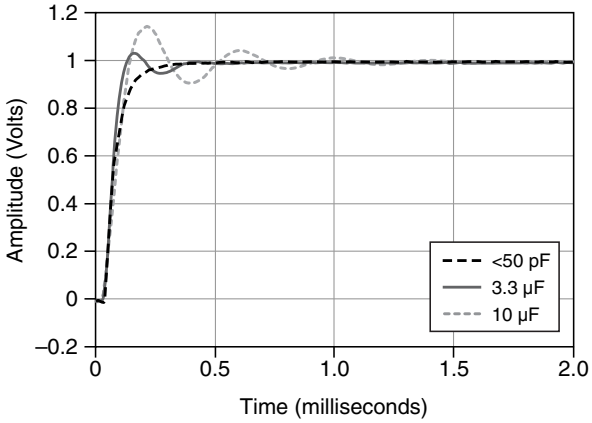


Figure 3. 10 mA Range Step Response, Typical

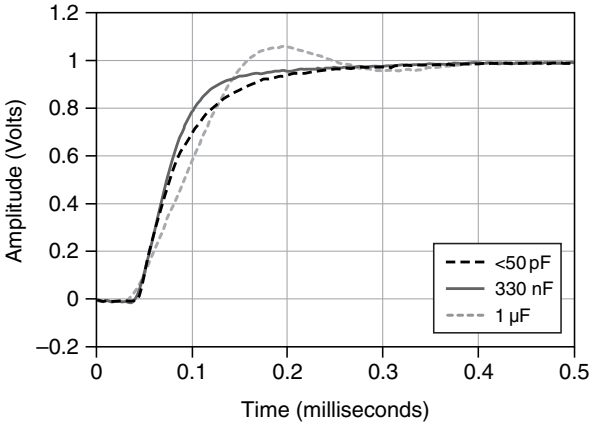
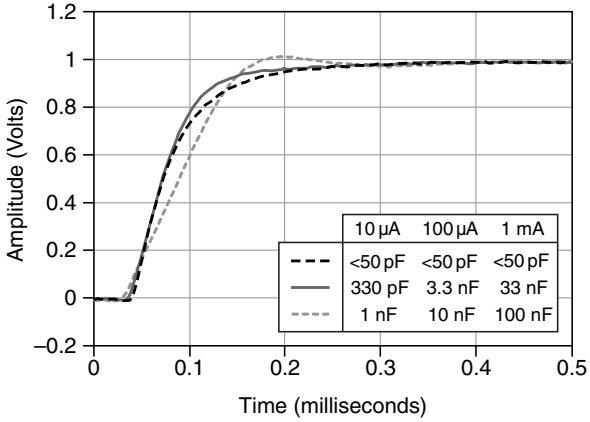
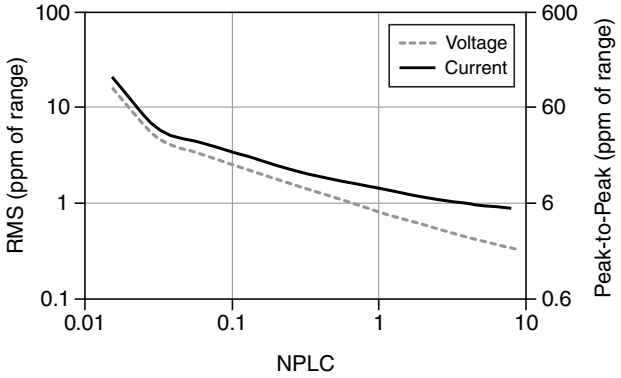


Figure 4. 1 mA, 100 µA, and 10 µA Range Step Response, Typical



Measurement Noise Versus Aperture Time, Typical



Supplemental Specifications

Measurement Speed[4]

Table 2. Maximum Operation Rates Per Second for 60 Hz (50 Hz)

ADC Aperture Time	Measure to Host	Source-measure to Host[5]
1/64 PLC	3490 (2900)	1900 (1700)
1/8 PLC	470 (390)	425 (360)
1 PLC	59.9 (49.9)	59.0 (49.3)

Maximum source update rate[5]	4,200 updates/s
Trigger in to source delay	500 ns, nominal

Triggers

Input triggers	
Types	Start, Source, Sequence Advance, Measure
Sources	PXI Trigger lines <0...7>[6]
Polarity, sources	Configurable
Minimum pulse width, sources	100 ns
Destinations[7]	PXI Trigger Lines <0...7>[6]
Polarity, destinations	Active high (unconfigurable)
Pulse width, destinations	150 ns, nominal
Output Triggers (Events)	
Types	Source Complete, Sequence Iteration Complete, Sequence Engine Done, Measure Complete
Destinations	PXI Trigger Lines <0...7>[6]

[4] Does not include load dependent settling time; **niDCPower Auto Zero** property or `NIDCPOWER_ATTR_AUTO_ZERO` attribute set to Off.

[5] Source-measure to Host and Maximum Source Update Rate are performed with the source delay set to 200 µs. This is sufficient for the output to settle within 1% of the requested level with a simple resistive load. As you adjust the source delay for your application's requirements, maximum rates vary.

[6] Pulse widths and logic levels compliant with PXI Hardware Specification Revision 2.2.

[7] Input triggers can be re-exported.

Polarity, destinations	Configurable
Pulse width, destinations	Configurable between 150 ns and 1.6 µs

Calibration Interval

Recommended calibration interval	1 year

Physical Characteristics

Dimensions	3U, one-slot, PXI/cPXI module 2.0 cm × 13.0 cm × 21.6 cm (0.8 in. × 5.1 in. × 8.5 in.), nominal
Weight	295 g (10.4 oz), typical
Front panel connectors	COMBICON, 5.08 mm (8 position), nominal

Note Front panel connectors can accept wire gauges from 12 AWG to 28 AWG.

Power Requirements

PXI power requirement	10 W at 5 V 1 W at 3.3 V 2 W at 12 V, typical

Environment

Maximum altitude	2,000 m (at 25 °C ambient temperature)
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.)
Relative humidity range	10% to 70%, noncondensing; derate 1.3% per °C above 40 °C (Tested in accordance with IEC 60068-2-56.)

Storage Environment

Ambient temperature range	-40 °C to 70 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)
Relative humidity range	5% to 95%, noncondensing (Tested in accordance with IEC 60068-2-56.)

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.)
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.)

Compliance and Certifications

Caution You can impair the protection provided by the PXI-4132 if you use it in a manner not described in this document.

Safety

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 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
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity

- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: 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, certifications, and additional information, refer to the *Online Product Certification* section.

CE Compliance CE

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)

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 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*.

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.)

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