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PXI-4132

SPECIFICATIONS

PXI-4132

±100 V, 2 W Precision PXI Source Measure Unit

These specifications apply to the PXI-4132.

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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 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 temperature¹ of 23 °C ± 5 °C
- 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 | 10 µA |
| ±100 V | 100 µA |
| | 1 mA |
| | 10 mA |
| | 100 mA |

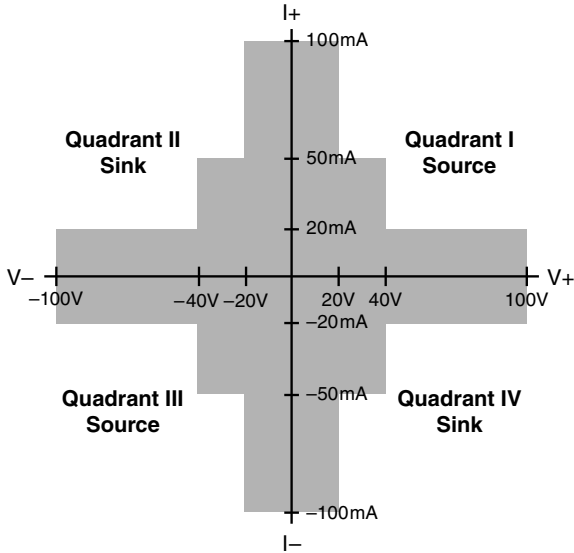


Caution Shock hazards exist when voltage levels are greater than 30 VRMS, 42.4 V peak, or 60 VDC. Use extreme caution when a shock hazard is present.

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 \pm (% of Output + Offset) | Peak to Peak Noise, Typical (0.1 Hz to 10 Hz) |
|-------------|---------------------|---------------------------------------|---|
| | | 1 Year 23 °C \pm 5 °C | |
| ± 10 V | 50 μ V | 0.025% + 3 mV | 70 μ V |
| ± 100 V | 500 μ V | 0.025% + 10 mV | 300 μ V |

Current Programming Accuracy/Resolution²

| 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

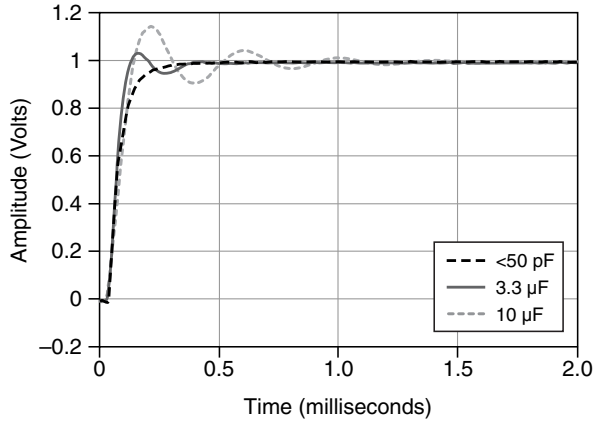


Figure 3. 10 mA Range Step Response, Typical

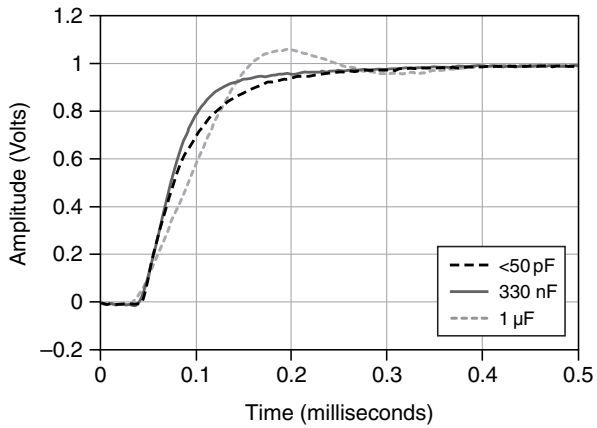
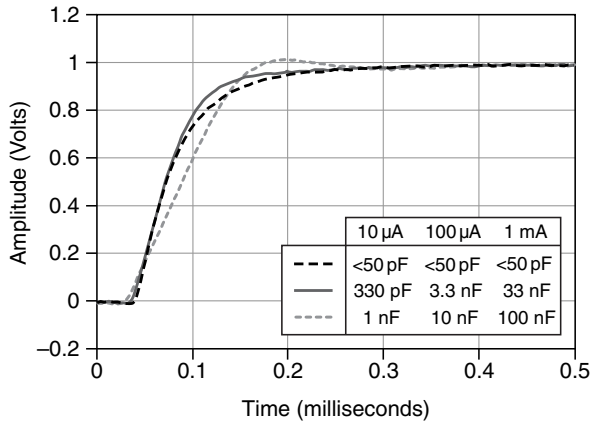
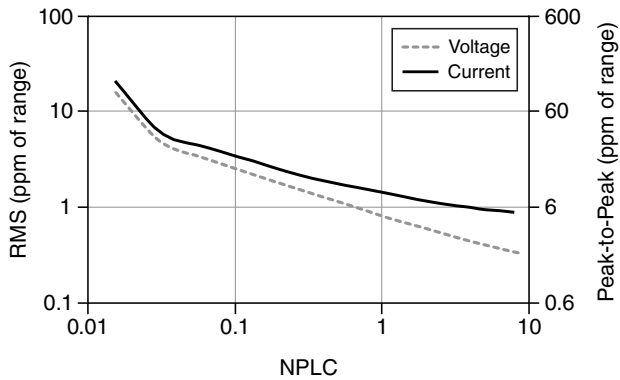


Figure 4. 1 mA, 100 μ A, and 10 μ A Range Step Response, Typical



Measurement Noise Versus Aperture Time, Typical



Supplemental Specifications

Measurement Speed⁴

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 rate⁵ 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 μ s. 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 μ s |

Calibration Interval

| | |
|----------------------------------|--------|
| Recommended calibration interval | 1 year |
|----------------------------------|--------|

Physical Characteristics

| | |
|------------------------|---|
| Dimensions | 3U, one-slot, PXI/cPXI module 2.0 cm \times 13.0 cm \times 21.6 cm (0.8 in. \times 5.1 in. \times 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

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.

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