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Find the *National Instruments PXIe-4112* at our website: ***Click HERE***

SPECIFICATIONS

PXIe-4112

2-Channel, 60 V, 1 A PXI Programmable Power Supply

These specifications apply to the PXIe-4112.

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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 temperature[1] of 23 °C ± 5 ºC
- Calibration interval of 2 years
- 30 minutes warm-up time
- **niDCPower Power Line Frequency** property or `NIDCPOWER_ATTR_POWER_LINE_FREQUENCY` attribute set to 1 power line cycle (PLC)
- **niDCPower Samples to Average** property or `NIDCPOWER_ATTR_SAMPLES_TO_AVERAGE` attribute set to 300 for optimal 50 Hz and 60 Hz rejection
- If the PXI Express chassis has multiple fan speed settings, fans set to the highest setting

Cleaning the Module

Clean devices and terminal blocks by brushing off light dust with a soft, nonmetallic brush. Remove other contaminants with a soft, lint-free, dampened cloth. Do not use detergent or chemical solvents. The unit must be completely dry and free from contaminants before returning to service.

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

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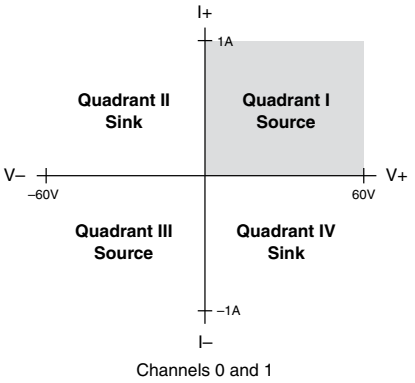
Device Capabilities

The PXIe-4112 is a single-quadrant power supply with two output channels that are capable of identical output. Channels are isolated from each other and from chassis ground.

DC voltage	
Voltage range	60 V
Minimum programmable voltage level/ limit	0.1 V
DC current	
Current range	1 A
Minimum programmable current level/limit	0.01 A
Output power	60 W/channel

The following figure illustrates the voltage and the current source capabilities of the PXIe-4112.

Figure 1. PXIe-4112 Quadrant Diagram



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Programming and Measurement Accuracy/ Resolution

Table 1. Programming and Measurement Accuracy/Resolution

Specification	Resolution	Accuracy ± (% of output + offset), T_{cal} ± 5 °C[4]	Temperature Coefficient/°C, outside T_{cal} ± 5 °C
Voltage programming	2 mV[2]	0.12% + 55 mV	0.008% + 0.3 mV
Voltage measurement	17 mV[3]	0.1% + 50 mV	0.004% + 1.5 mV
Current programming	34 µA[2]	0.15% + 10 mA	0.015% + 0.05 mA
Current measurement	274 µA[3]	0.15% + 4 mA	0.015% + 0.05 mA

Load Regulation

Voltage (per amp of output load)	12 mV
Current (per volt of output change)	32 µA

Note Voltage load regulation is measured at the output channel terminals with the device configured for local sense.

Voltage Output Speed

Rise time (measured from 10% to 90% of programmed voltage change from 0.1 V to 60 V with specified load)

Full resistive load (60 Ω)	<20 ms, typical
No load	<10 ms, typical

Fall time (measured from 10% to 90% of programmed voltage change from 60 V to 0.1 V with specified load)

Full resistive load (60 Ω)	<20 ms, typical
No load	<40 ms, typical

[2] Based on 16-bit DAC after calibration

[3] Based on 14-bit ADC with sign bit after calibration

[4] T_{cal} is the internal device temperature recorded by the PXIe-4112 at the completion of the last external calibration.

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Transient Response and Settling Time

Transient response	<200 µs to recover within 200 mV of voltage level after a load current change from 50% to 100% of current range, typical
Settling time	
Rise time (time to settle within 0.1% of final programmed voltage level from 0.1 V to 60 V with specified load)	
Full resistive load (60 Ω)	40 ms, typical
No load	40 ms, typical
Fall time (time to settle within 0.1% of final programmed voltage level from 60 V to 0.1 V with specified load)	
Full resistive load (60 Ω)	100 ms, typical
No load	100 ms, typical

Ripple and Noise

Voltage[5]	
Peak-to-peak	<24 mV, typical
RMS	<4 mV, typical
Current, RMS[6]	<2 mA, typical

Auxiliary Power Input Line Regulation

Line regulation (per volt of change in the auxiliary power input)	
Voltage	1 mV
Current	0.2 mA

Remote Sense

Maximum output lead drop	Up to 1 V drop per lead
Maximum sense lead resistance	Up to 1 Ω per lead

[5] Noise is measured from 20 Hz to 20 MHz at output voltages of 0.5 V to 60 V.
[6] Noise bandwidth is limited to 10 kHz and measured at 20 mA into a 500 Ω load.

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Protection

Output channel protection	
Overcurrent or reverse voltage	Reverse clamp diode, protected by thermal overload circuit
Overtemperature	Automatic shutdown
Auxiliary power input protection	
Overvoltage, typical	>52.8 VDC shut-off
Overcurrent or reverse voltage	Fused

Absolute Maximum Limit

Note Applying levels beyond the ratings specified in this section can result in permanent damage to the device.

Note Connect only voltages that are within these limits.

Voltage from auxiliary power + to earth ground	60 VDC
Voltage from auxiliary power - to earth ground	1 VDC

Isolation

Isolation voltage, channels 0- and 1-to-earth ground[7]	
Continuous	150 VDC, CAT I
Withstand	1,000 V_{RMS}

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

Note 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, CAT III, or CAT IV.

Hazardous Voltage Take precautions to avoid electrical shock when operating this product at hazardous voltages.

[7] Verified with a 5-second dielectric withstand test.

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Note Isolation voltage ratings apply to the voltage measured between any channel pin and the chassis ground pins of the front panel. When operating channels in series or floating on top of external voltage references, ensure that no terminal exceeds this rating.

Power Requirement

PXI power requirement	0.5 A from 3.3 V rail, 0.25 A from 12 V rail
Auxiliary power source input requirements	45.6 VDC to 50.4 VDC, 3.5 A max

Measurement Timing Characteristics

Measurement rate	
Default	60/s (Line frequency set to 60 Hz, aperture set to 1 PLC, measure record mode), nominal
Maximum	5,250/s, nominal

Triggers

Input triggers	
Types	Start, Source, Sequence Advance, Measure
Sources (PXI trigger lines 0 to 7)[8]	
Polarity	Configurable
Minimum pulse width	100 ns, nominal
Destinations[9] (PXI trigger lines 0 to 7)[8]	
Polarity	Active high (not configurable)
Minimum pulse width	200 ns, nominal
Output triggers (events)	
Types	Source Complete, Sequence Iteration Complete, Sequence Engine Done, Measure Complete

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

[9] 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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Destinations (PXI trigger lines 0 to 7)[8]	
Polarity	Configurable
Pulse width	Configurable between 250 ns and 1.6 µs, nominal

Physical Characteristics

Dimensions	3U, one-slot, PXI Express/cPCI Express module; 2.0 cm × 13.0 cm × 21.6 cm (0.8 in. × 5.1 in. × 8.5 in.), nominal
Weight	443 g, nominal
User-replaceable fuse, auxiliary power input (PCB-mount)	F 6.3 A H 250 V (5 × 20 mm ceramic fuse)

Note NI recommends the Littelfuse 021606.3MXP fuse.

Front panel connectors	
Output channels	Phoenix Contact, 5.08 mm (10 position)
Auxiliary power input	Weidmuller, 3.5 mm (2 × 2 position)

Note I/O connectors can accept wire gauges from 12 AWG to 24 AWG. NI recommends 14 AWG or smaller.

Note The PXIe-4112 ships with four sense jumpers installed on the output connector. The sense jumpers connect the sense terminals to their respective output terminals.

Calibration Interval

Recommended calibration interval	2 years

Environment

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

Indoor use only.

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Operating Environment

Ambient temperature range	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.)
Relative humidity range	10% to 90%, noncondensing (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. 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.)

Compliance and Certifications

Caution You can impair the protection provided by the PXIe-4112 if you use it in a manner not described in this document.

Caution The auxiliary power input port is sensitive to electrostatic discharge (ESD). When subjected to ESD during normal operation, a fault might result that requires user intervention to recover to normal operation. To ensure proper operation, make all I/O connections before attempting to use the device. In addition, take care to prevent ESD to the auxiliary power input port during normal operation.

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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/*

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certification, search by model number or product line, and click the appropriate link in the Certification column.

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