For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

Last Revised: 2015-04-27 16:22:10.0

NI PXIe-4113 and NI PXIe-4112 Power Supplies

- 2 independent 60 W DC power supply channels per module
- PXIe-4112: 60 V, 1 A per channel
- PXIe-4113: 10 V, 6 A per channel
- Built-in voltage and current readback at rates up to 5 kS/s
- Output disconnect relays for high impedance output state
- 4-Wire, Remote sense corrects for losses in wiring and enables more accurate measurements
- Onboard hardware sequencing engine and PXI triggering capability
- Flexibility to combine channels for higher voltage or current, up to 120 W per module

Overview

The NI PXIe-4112 and PXIe-4113 programmable power supplies offer high power density in the PXI platform. Each module offers two 60 W power supply channels in a single PXI Express slot, and the ability to combine channels together and deliver 120 W of power. The modules include standard features such as remote sense, output disconnect relays, hardware timing, and IVI based drivers that make them ideal for automated test applications. For a robust deployment across a range of applications, these modules have built-in protection against over current, over voltage, inverse voltage, and over temperature conditions.

Back to Top

Comparison Tables

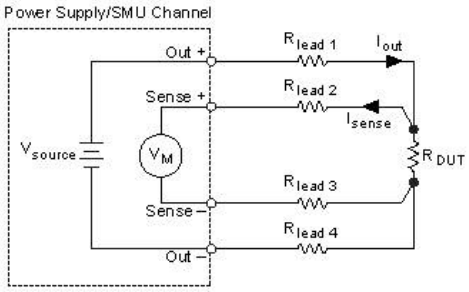
Module	Channels	Max Power	Voltage	Current
PXIe-4112	2	60 W	60 V	1 A
PXIe-4113	2	60 W	10 V	6 A

Back to Top

Application and Technology

Remote Sense

Each channel of the PXIe-4112 and PXIe-4113 has remote sense connections to enable more accurate voltage output at the DUT. In a remote sense configuration, one set of leads carries the output current, while another set of leads measures voltage directly at the DUT terminals, as illustrated in the below figure. This technique accounts for the voltage drop across the lead resistance by measuring the voltage directly at the DUT and compensating accordingly to remove the effect of lead resistance from resistance measurements.



Output disconnect relays

The PXIe-4112 and PXIe-4113 have standard output disconnect relays for situations that require you to isolate the power supply from the rest of your circuit. The software controlled relays allow you to independently disconnect either channel from the DUT and leave it in a high impedance output state.

Cascading Multiple Channels

Because both channels on the NI PXIe-4112 and NI PXIe-4113 are isolated outputs, you can cascade multiple channels in series or parallel to generate greater output voltage or current. When you cascade both channels of the NI PXIe-4112 in series, you can generate up to 120 V at 1 A. Refer to the DC Power Supplies and SMUs Help File for more information on cascading channels.

Connectivity

The NI PXIe-4112 and PXIe-4113 include a backshell connector kit and an auxiliary power supply that connect to the front of the module. The connector kit provides screw terminal connectivity for both channels, remote sense connections, and ground. The auxiliary power supply provides the necessary 48 V power input to the module. For custom solutions and additional connectivity options, see the Accessories section of the specification document.

Driver Software

NI-DCPower, an IVI-compliant instrument driver, offers complete programmatic control of the PXIe-4112. You can use an available test panel to quickly troubleshoot or debug power supply operation and take advantage of the DCPower Express VI for an intuitive, configuration based method of programming in the National Instruments LabVIEW graphical development environment. The NI-DCPower driver also provides example programs, product specifications, and help documents to assist you in getting started.

SPECIFICATIONS

NI PXIe-4112

Dual-Output Programmable DC Power Supply

このドキュメントには、日本語ページも含まれています。

This document lists specifications for the NI PXIe-4112 dual-output programmable DC power supply. Specifications are subject to change without notice. For the most current specifications, visit `ni.com/manuals`.

About These Specifications

National Instruments defines the capabilities and performance of its Test & Measurement instruments as *Specifications*, *Typical Specifications*, and *Characteristic or Supplemental Specifications*. Data provided in this document are *Specifications* unless otherwise noted.

Specifications characterize the warranted performance of the instrument within the recommended calibration interval and under the stated operating conditions.

Typical Specifications are specifications met by the majority of the instrument within the recommended calibration interval and under the stated operating conditions. The performance of the instrument is not warranted.

Characteristic or Supplemental Specifications describe basic functions and attributes of the instrument established by design or during development and not evaluated during Verification or Adjustment. They provide information that is relevant for the adequate use of the instrument that is not included in the previous definitions.

Caution Do not operate the NI PXIe-4112 in a manner not specified by the operating instructions. Product misuse can result in a hazard. You can compromise the safety protection built into this product if the product is damaged in any way. If the product is damaged, return it to National Instruments for repair.

Caution Refer to the *Read Me First: Safety and Electromagnetic Compatibility* document for important safety and electromagnetic compatibility information. To obtain a copy of this document online, visit `ni.com/manuals`, and search for the document title.

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.

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.

Unless otherwise noted, specifications are valid under the following conditions:

- Ambient temperature 23 °C ±5 °C
- After 30 minute warm-up time
- niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency for optimal 50 Hz and 60 Hz rejection

To access the NI PXIe-4112 documentation, navigate to **Start»Programs»National Instruments» NI-DCPower»Documentation**.

Note If you are running Windows 8, you may not have a Start menu. To access National Instruments programs and documentation, open the Start screen, type the name of the file or folder you want to access, and select the appropriate icon from the search results.

For example, to access the *NI DC Power Supplies and SMUs Help*, open the Start screen, type `NI DC Power Supplies and SMUs Help`, and select the appropriate icon from the results. To access device specifications, open the Start screen, type your device number (for example, `4154`), and select the specifications document for your device. Use this method any time the Start menu is referenced in this document.

Device Capabilities

DC voltage

Voltage range ..... 60 V

Minimum programmable voltage limit ..... 0.1 V

DC current

Current range ..... 1 A

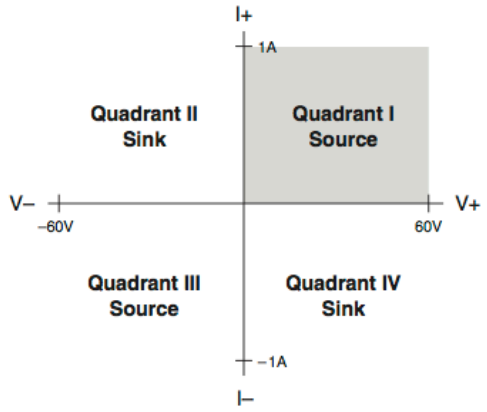
Minimum programmable current limit..... 0.01 A

Output power ..... 60 W/channel

Note The NI PXIe-4112 is a single-quadrant power supply with two output channels. Both channels are capable of delivering 60 V at 1 A current and are isolated from each other and from chassis ground.

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

Figure 1. NI PXIe-4112 Quadrant Diagram, Characteristic



Channels 0 and 1

Voltage Programming Accuracy/Resolution

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C)..... 0.12% + 55 mV

Temperature coefficient/°C
(0 °C to 55 °C)..... 0.008% + 0.3 mV

Resolution..... 2 mV based on 16 bit DAC after calibration

Current Programming Accuracy/Resolution

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C)..... 0.15% + 10 mA

Temperature coefficient/°C
(0 °C to 55 °C)..... 0.015% + 0.05 mA

Resolution..... 34 µA based on 16 bit DAC after calibration

Voltage Measurement Accuracy/Resolution

Note The following specifications are measured with the niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency.

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) ..... 0.1% + 50 mV

Temperature coefficient/°C
(0 °C to 55 °C) ..... 0.004% + 1.5 mV

Resolution ..... 17 mV based on 14 bit ADC with sign bit after calibration

Current Measurement Accuracy/Resolution

Note The following specifications are measured with the niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency.

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) ..... 0.15% + 4 mA

Temperature coefficient/°C
(0 °C to 55 °C) ..... 0.015% + 0.05 mA

Resolution ..... 274 µA based on 14 bit ADC with sign bit after calibration

Load Regulation

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.

Supplemental Specifications

Transient response, typical ..... Recovers to <±200 mV within 200 µs after a change in load current from 50% to 100% of current range.

Voltage Output Speed, typical

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
- No load..... <10 ms

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
- No load..... <40 ms

Settling Time, typical

Rise time ..... Time to settle within 0.1% of final programmed voltage change from 0.1 V to 60 V with specified load

- Full resistive load (60 Ω)..... 40 ms
- No load..... 40 ms

Fall time ..... Time to settle within 0.1% of final programmed voltage change from 60 V to 0.1 V with specified load

- Full resistive load (60 Ω)..... 100 ms
- No load..... 100 ms

Line Regulation

Note Line regulation applies to the auxiliary power input.

Line regulation (per volt of change in the auxiliary power input)

- Voltage ..... 1 mV
- Current ..... 0.2 mA

Ripple and Noise, typical

Voltage

Peak-to-peak ..... <24 mV

RMS ..... <4 mV

Note Voltage noise is measured from 20 Hz to 20 MHz at output voltages of 0.5 V to 60 V.

Current, RMS ..... <2 mA

Note Current noise bandwidth is limited to 10 kHz, and is measured at 20 mA into a 500 Ω load

Remote Sense

Maximum output lead drop ..... Up to 1 V drop per lead

Maximum sense lead resistance ..... Up to 1 Ω per lead

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 Limits

Out+/Out- Current ..... 2 A

Caution Applying voltages beyond the ratings specified in this section can result in permanent damage to the device.

Caution Connect only voltages that are within these limits.

Voltage between any two terminals on the same channel ..... 80 VDC

Voltage from auxiliary power + to earth ground ..... 60 VDC

Voltage from auxiliary power - to earth ground ..... 1 VDC

Isolation Voltage

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

Channels 0- and 1-to-earth ground, continuous ..... 150 VDC, CAT I, verified by dielectric withstand test, 5 s

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

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 Requirements

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

Measurement rate

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

Triggers

Input triggers

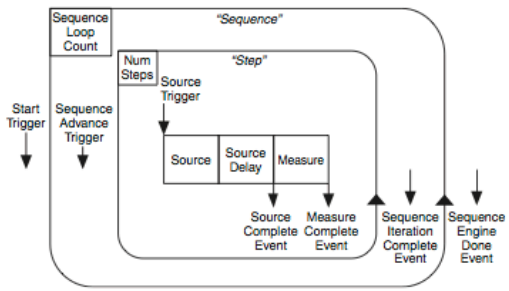
- Types ..... Start, Source, Sequence Advance, Measure
- Sources ..... PXI trigger lines 0-7[1]
  - Polarity ..... Configurable
  - Minimum pulse width ..... 100 ns
- Destinations[2] ..... PXI trigger lines 0-7[1]
  - Polarity ..... Active high (unconfigurable)
  - Minimum pulse width ..... 250 ns

Output Triggers (Events)

- Types ..... Source Complete, Sequence Iteration Complete, Sequence Engine Done, Measure Complete
- Destinations[2] ..... PXI trigger lines 0-7[1]
  - Polarity ..... Configurable
  - Minimum pulse width ..... Configurable between 250 ns and 1.6 µs

Figure 2 illustrates the programming flow in NI-DCPower using Sequence source mode with automatic measurements. For more information about programming the NI PXIe-4112, refer to the *NI DC Power Supplies and SMUs Help*.

Figure 2. NI-DCPower Programming Flow



[1] Pulse widths and logic levels compliant with PXI Express Hardware Specification, Revision 3.0.

[2] 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.

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.)

Weight ..... 443 g

User-replaceable fuse, auxiliary power input (PCB-mount) ..... F 6.3 A H 250 V (5 × 20 mm glass fuse)

Note NI recommends Littelfuse 021606.3MXP.

Front panel connectors

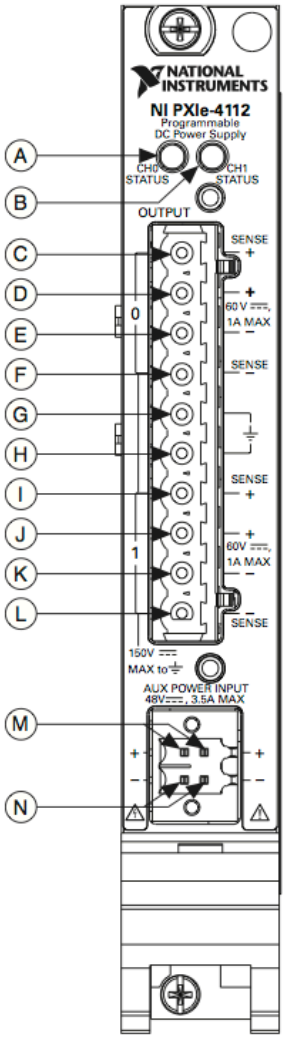
- Output channels ..... COMBICON, 5.08 mm (10 position)
- Auxiliary power input ..... OMNIMATE, 3.5 mm (2 × 2 position)

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

Note The NI PXIe-4112 ships with four sense jumpers installed on the output connector. The sense jumpers connect the sense terminals to their respective output terminals. Refer to the *NI PXIe-4112 Local and Remote Sense* topic in the *NI DC Power Supplies and SMUs Help* for more information about this configuration.

Note For information about operating multiple NI PXIe-4112 channels in series or parallel, refer to the *NI DC Power Supplies Help* at `ni.com/manuals`.

Figure 3. NI PXIe-4112 Front Panel



A	Channel 0 Status LED	H	Chassis GND
B	Channel 1 Status LED	I	Channel 1 Sense+
C	Channel 0 Sense+	J	Channel 1 Output+
D	Channel 0 Output+	K	Channel 1 Output-
E	Channel 0 Output-	L	Channel 1 Sense-
F	Channel 0 Sense-	M	Auxiliary Power Input +
G	Chassis GND	N	Auxiliary Power Input -

Calibration

Recommended calibration interval ..... 2 years

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 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.)

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

Accessories

Visit ni.com for more information about the following accessories.

Caution You *must* install mating connectors according to local safety codes and standards and according to the specifications provided by the manufacturer. You are responsible for verifying the safety compliance of third-party connectors and their usage according to the relevant standard(s), including UL and CSA in North America and IEC and VDE in Europe.

Caution For safety, always operate the NI PXIe-4112 with suitably rated cables and the backshell kit provided in the shipping kit. Operating the device without the provided backshell may expose users to high voltage.

Table 1. NI Accessories for the NI PXIe-4112

Accessory	Description	Part Number (P/N)
Additional connector kit	Replacement connectors and wiring accessories for output and auxiliary power ports	782887-01
Replacement auxiliary power supply	Replacement 48 V auxiliary power supply module	782888-01

Table 2. Third-Party Accessories for the NI PXIe-4112

Accessory	Description	Manufacturer	Part Number (P/N)
Auxiliary power input fuse	F 6.3 A H 250 V (5 × 20 mm glass fuse)	Littelfuse	021606.3MXP
Sense jumper	Insulated, 2 position insertion bridge for output connector	Phoenix Contact	1733169
Connector for third-party auxiliary power supplies	2 × 2 position auxiliary power supply connector	Weidmuller	1277860000

Compliance and Certifications

Device Symbols

The following symbols are marked on the NI PXIe-4112.

This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.

When this symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN-61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Caution The protection provided by this equipment may be impaired if it is used in a manner not described in the product documentation.

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 and 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:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; 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 products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, 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`.)

375982A-01 Apr13

SPECIFICATIONS

NI PXIe-4113

Dual-Output Programmable DC Power Supply

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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.

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.

Unless otherwise noted, specifications are valid under the following conditions:

- Ambient temperature 23 °C ±5 °C
- After 30 minute warm-up time
- niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency for optimal 50 Hz and 60 Hz rejection

To access the NI PXIe-4113 documentation, navigate to **Start»Programs»National Instruments» NI-DCPower»Documentation**.

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Device Capabilities

DC voltage

Voltage range ..... 10 V

Minimum programmable voltage limit..... 0.03 V

DC current

Current range ..... 6 A

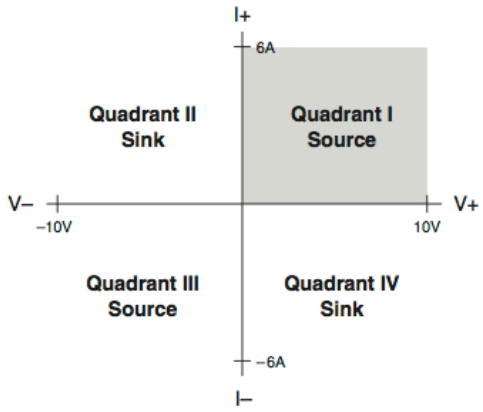
Minimum programmable current limit ..... 0.02 A

Output power ..... 60 W/channel

Note The NI PXIe-4113 is a single-quadrant power supply with two output channels. Both channels are capable of delivering 10 V at 6 A current and are isolated from each other and from chassis ground.

The following figure illustrates the voltage and the current source capabilities of the NI PXIe-4113.

Figure 1. NI PXIe-4113 Quadrant Diagram, Characteristic



Channels 0 and 1

Voltage Programming Accuracy/Resolution

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C)..... 0.1% + 15 mV

Temperature coefficient/°C
(0 °C to 55 °C)..... 0.004% + 0.1 mV

Resolution..... 0.32 mV based on 16 bit DAC after calibration

Current Programming Accuracy/Resolution

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C)..... 0.15% + 20 mA

Temperature coefficient/°C
(0 °C to 55 °C)..... 0.015% + 0.14 mA

Resolution..... 0.19 mA based on 16 bit DAC after calibration

Voltage Measurement Accuracy/Resolution

Note The following specifications are measured with the niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency.

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) ..... 0.1% + 15 mV

Temperature coefficient/°C
(0 °C to 55 °C) ..... 0.004% + 0.25 mV

Resolution ..... 3 mV based on 14 bit ADC with sign bit after calibration

Current Measurement Accuracy/Resolution

Note The following specifications are measured with the niDCPower **Aperture Time** property/attribute set to 1 PLC and the niDCPower **Power Line Frequency** property/attribute set to the local line power frequency.

Accuracy ± (% of output + offset)

2 year (23 °C ±5 °C) ..... 0.15% + 20 mA

Temperature coefficient/°C
(0 °C to 55 °C) ..... 0.015% + 0.21 mA

Resolution ..... 2 mA based on 14 bit ADC with sign bit after calibration

Load Regulation

Load regulation

Voltage (per amp of output load) ..... 0.5 mV

Current (per volt of output change) ..... 0.25 mA

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

Supplemental Specifications

Transient response (typical)..... Recovers to <±100 mV within 200 µs after a change in load current from 50% to 100% of current range.

Voltage Output Speed, typical

Rise time..... Measured from 10% to 90% of programmed voltage change from 0.03 V to 10 V with specified load

- Full resistive load (1.67 Ω)..... <10 ms
- No load ..... <10 ms

Fall time..... Measured from 90% to 10% of programmed voltage change from 10 V to 0.03 V with specified load

- Full resistive load (1.67 Ω)..... <10 ms
- No load ..... <10 ms

Settling Time, typical

Rise time..... Time to settle within 0.1% of final programmed voltage change from 0.03 V to 10 V with specified load

- Full resistive load (1.67 Ω)..... 25 ms
- No load ..... 25 ms

Fall time..... Time to settle within 0.1% of final programmed voltage change from 10 V to 0.03 V with specified load

- Full resistive load (1.67 Ω)..... 25 ms
- No load ..... 25 ms

Line Regulation

Note Line regulation applies to the auxiliary power input.

Line regulation (per volt of change in the auxiliary power input)

- Voltage .....0.2 mV
- Current .....0.5 mA

Ripple and Noise, typical

Voltage

Peak-to-peak.....<18 mV

RMS.....<3 mV

Note Voltage noise is measured from 20 Hz to 20 MHz at output voltages of 0.2 V to 10 V.

Current, RMS.....<2 mA

Note Current noise bandwidth is limited to 10 kHz, and is measured at 20 mA into a 500 Ω load.

Remote Sense

Maximum output lead drop.....Up to 1 V drop per lead

Maximum sense lead resistance.....Up to 1 Ω per lead

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 Limits

Out+/Out- Current.....8 A

Caution Applying voltages beyond the ratings specified in this section can result in permanent damage to the device.

Caution Connect only voltages that are within these limits.

Voltage between any two terminals on the same channel.....20 VDC

Voltage from auxiliary power + to earth ground.....60 VDC

Voltage from auxiliary power - to earth ground.....1 VDC

Isolation Voltage

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

Channels 0- and 1-to-earth ground, continuous ..... 150 VDC, CAT I, verified by dielectric withstand test, 5 s

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

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 Requirements

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

Measurement rate

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

Triggers

Input triggers

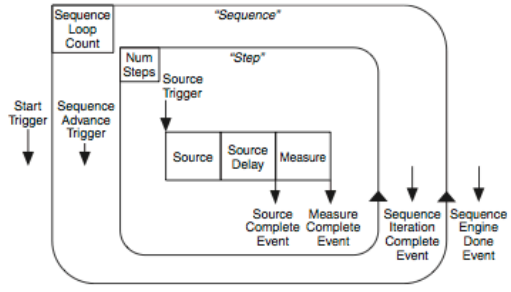
- Types ..... Start, Source, Sequence Advance, Measure
- Sources ..... PXI trigger lines 0-7[1]
  - Polarity ..... Configurable
  - Minimum pulse width ..... 100 ns
- Destinations[2] ..... PXI trigger lines 0-7[1]
  - Polarity ..... Active high (unconfigurable)
  - Minimum pulse width ..... 250 ns

Output triggers (events)

- Types ..... Source Complete, Sequence Iteration Complete, Sequence Engine Done, Measure Complete
- Destinations[2] ..... PXI trigger lines 0-7[1]
  - Polarity ..... Configurable
  - Minimum pulse width ..... Configurable between 250 ns and 1.6 µs

Figure 2 illustrates the programming flow in NI-DCPower using Sequence source mode with automatic measurements. For more information about programming the NI PXIe-4113, refer to the *NI DC Power Supplies and SMUs Help*.

Figure 2. NI-DCPower Programming Flow



[1] Pulse widths and logic levels compliant with PXI Express Hardware Specification, Revision 3.0.

[2] 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.

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.)

Weight ..... 458 g

User-replaceable fuse, auxiliary
power input (PCB-mount) ..... F 6.3 A H 250 V (5 × 20 mm glass fuse)

Note NI recommends Littelfuse 021606.3MXP.

Front panel connectors

Output channels ..... COMBICON, 5.08 mm (10 position)

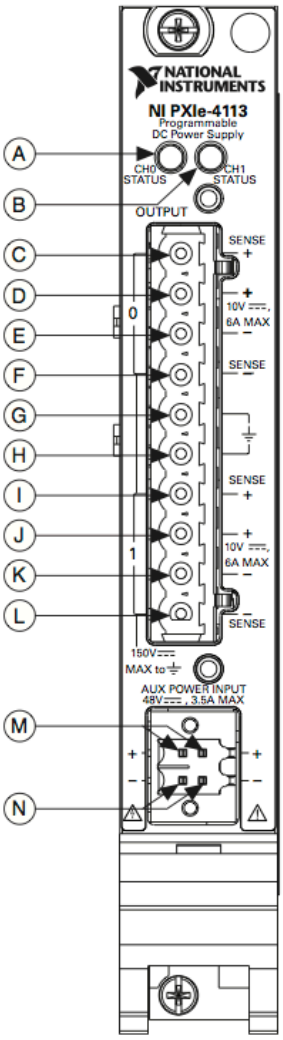
Auxiliary power input ..... OMNIMATE, 3.5 mm (2 × 2 position)

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

Note The NI PXIe-4113 ships with four sense jumpers installed on the output connector. The sense jumpers connect the sense terminals to their respective output terminals. Refer to the *NI PXIe-4113 Local and Remote Sense* topic in the *NI DC Power Supplies and SMUs Help* for more information about this configuration.

Note For information about operating multiple NI PXIe-4113 channels in series or parallel, refer to the *NI DC Power Supplies Help* at `ni.com/manuals`.

Figure 3. NI PXIe-4113 Front Panel



A	Channel 0 Status LED	H	Chassis GND
B	Channel 1 Status LED	I	Channel 1 Sense+
C	Channel 0 Sense+	J	Channel 1 Output+
D	Channel 0 Output+	K	Channel 1 Output-
E	Channel 0 Output-	L	Channel 1 Sense-
F	Channel 0 Sense-	M	Auxiliary Power Input +
G	Chassis GND	N	Auxiliary Power Input -

Calibration

Recommended calibration interval ..... 2 years

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 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.)

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

Accessories

Visit ni.com for more information about the following accessories.

Caution You *must* install mating connectors according to local safety codes and standards and according to the specifications provided by the manufacturer. You are responsible for verifying the safety compliance of third-party connectors and their usage according to the relevant standard(s), including UL and CSA in North America and IEC and VDE in Europe.

Caution For safety, always operate the NI PXIe-4113 with suitably rated cables and the backshell kit provided in the shipping kit. Operating the device without the provided backshell may expose users to high voltage.

Table 1. NI Accessories for the NI PXIe-4113

Accessory	Description	Part Number (P/N)
Additional connector kit	Replacement connectors and wiring accessories for output and auxiliary power ports	782887-01
Replacement auxiliary power supply	Replacement 48 V auxiliary power supply module	782888-01

Table 2. Third-Party Accessories for the NI PXIe-4113

Accessory	Description	Manufacturer	Part Number (P/N)
Auxiliary power input fuse	F 6.3 A H 250 V (5 × 20 mm glass fuse)	Littelfuse	021606.3MXP
Sense jumper	Insulated, 2 position insertion bridge for output connector	Phoenix Contact	1733169
Connector for third-party auxiliary power supplies	2 × 2 position auxiliary power supply connector	Weidmuller	1277860000

Compliance and Certifications

Device Symbols

The following symbols are marked on the NI PXIe-4113.

This icon denotes a caution, which advises you of precautions to take to avoid injury, data loss, or a system crash.

When this symbol is marked on a product, it denotes a warning advising you to take precautions to avoid electrical shock.

Safety

This product meets the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN-61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Caution The protection provided by this equipment may be impaired if it is used in a manner not described in the product documentation.

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 and 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:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; 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 products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, 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`.)

375984A-01 Apr13

Back to Top

Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

Calibration

NI measurement hardware is calibrated to ensure measurement accuracy and verify that the device meets its published specifications. To ensure the ongoing accuracy of your measurement hardware, NI offers basic or detailed recalibration service that provides ongoing ISO 9001 audit compliance and confidence in your measurements. To learn more about NI calibration services or to locate a qualified service center near you, contact your local sales office or visit ni.com/calibration.

Technical Support

Get answers to your technical questions using the following National Instruments resources.

- **Support** - Visit ni.com/support to access the NI KnowledgeBase, example programs, and tutorials or to contact our applications engineers who are located in NI sales offices around the world and speak the local language.
- **Discussion Forums** - Visit forums.ni.com for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit community.ni.com to find, contribute, or collaborate on customer-contributed technical content with users like you.

Repair

While you may never need your hardware repaired, NI understands that unexpected events may lead to necessary repairs. NI offers repair services performed by highly trained technicians who quickly return your device with the guarantee that it will perform to factory specifications. For more information, visit ni.com/repair.

Training and Certifications

The NI training and certification program delivers the fastest, most certain route to increased proficiency and productivity using NI software and hardware. Training builds the skills to more efficiently develop robust, maintainable applications, while certification validates your knowledge and ability.

- **Classroom training in cities worldwide** - the most comprehensive hands-on training taught by engineers.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

Back to Top
