Industrial Digital Input/Output – 60 V, Channel-to-Channel Isolated

NI 6528, NI PXI-6529 *NEW!*

- 24 or 48 channel-to-channel optically isolated inputs and solid-state relay outputs
- High-reliability industrial feature set – isolation, programmable power-up states, digital I/O watchdogs, change detection, and programmable input filters
- High-voltage input to PXI trigger bus or RTSI bus
- Superior features for automotive, aerospace, industrial monitoring, and control applications
- NI-DAQmx driver software for highest productivity and performance

Operating Systems

- Windows Vista/XP/2000
- LabVIEW Real-Time

Recommended Software

- LabVIEW
- LabWindows™/CVI
- Measurement Studio

Other Compatible Software

- LabVIEW SignalExpress
- Visual Studio .NET
- C/C++/C#

Measurement Services Software (included)

- NI-DAQmx driver software
- Measurement & Automation Explorer configuration utility
- LabVIEW SignalExpress LE data-logging software

Family	Bus	Input Lines	Output Lines	Isolation	Max Range	Low Threshold	High Threshold	Output Current	Industrial Feature Set
NI 6528	PCI, PXI	24	24	Channel-to-channel	±60 VDC	1 VDC	3.2 VDC	150 mA	✓
NI 6529	PXI	48	–	Channel-to-channel	±60 VDC	1 VDC	3.2 VDC	–	✓

Table 1. NI 6528 and PXI-6529 Specifications Overview

Overview and Applications

National Instruments 6528 and PXI-6529 devices are industrial channel-to-channel isolated digital I/O interfaces for PCI and PXI. You can use the optically isolated inputs of NI 6528 and PXI-6529 devices to read the status of sensors, actuators, and logic devices. NI 6528 devices have 24 solid-state relay outputs to switch external devices with input currents up to 150 mA. With high current drive and isolation, NI 6528 and PXI-6529 devices are ideal for a variety of applications from automotive design, industrial factory automation, and machine control to aerospace, laboratory research, and biomedical applications. Industrial digital I/O devices are designed to incorporate the latest hardware technologies for applications requiring ease of use, high reliability, and performance. NI 6528 and PXI-6529 devices are jumper-free and take advantage of NI-DAQmx measurement services software to speed up application development with features such as DAQ Assistant, automatic code generation, and high-performance multithreaded streaming technology.

Hardware

Industrial Feature Set

NI industrial digital I/O devices provide a set of high-reliability features designed to automate even the most demanding applications.

- Isolation offers an extended voltage range for direct connection to industrial sensors and actuators
- Programmable power-up states provide safe operation when connected to pumps/valves/motors/relays
- Digital I/O watchdog timers detect computer or application crashes and ensure safe recovery
- Change detection triggers your application and performs a read operation after a digital event with minimal processor usage
- Programmable input filters eliminate glitches/spikes and remove noise
- Industrial certifications from CE, FCC, C-Tick, UL, and VDE ensure EMI compliance in most regions of the world and certify that the system is safe to operate

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Connect Sensors Directly with Isolation

Isolation is a form of built-in signal conditioning that provides an extended voltage range for direct connection to industrial sensors and actuators. NI 6528 and PXI-6529 devices provide channel-to-channel isolation where every channel is physically and electrically separated from the others and earth ground. Optical isolators separate the high-voltage front end from the low-voltage back end, breaking ground loops, improving common-mode voltage rejection, and protecting computer circuitry from hazardous voltages. Industrial environments containing machinery and inductive loads require isolation to protect the electronics from transient voltage spikes and provide greater common-mode noise rejection.

Achieve Glitch-Free Startup with Programmable Power-Up States

Using programmable power-up states, you can configure the initial NI 6528 output states in software to ensure glitch-free operation when connected to industrial actuators such as pumps, valves, motors, and relays. An NI 6528 holds these output states after receiving power, so your computer can boot and your software application can begin running. Programmable power-up states are glitch-free, meaning the outputs never go through an incorrect state during power up.

You can configure each individual digital line as high-output or low-output. An NI 6528 stores the settings in onboard nonvolatile memory and implements the power-up states instantaneously after power is applied to the device.

Detect Faults and Recover with Digital I/O Watchdogs

Digital I/O watchdog timers are an innovative technology that can detect a variety of fault conditions, such as an application crash, and automatically respond by setting the outputs to a user-configured safe state. Watchdogs are important whenever the module is connected to actuators such as pumps, valves, motors, and relays. An NI 6528 monitors the software application; if the application fails to respond within a preset time limit, an NI 6528 automatically sets the output lines to a user-defined safe state. An NI 6528 remains in the watchdog state until the watchdog timer is disarmed, an NI 6528 is reset, or the computer is restarted.

Trigger Your Application with Change Detection

With change detection, you can automatically trigger your software application to perform a digital read operation upon a digital change of state. A digital change of state is defined as the rising edge (0 to 1 transition) or falling edge (1 to 0 transition) on one or more digital lines. Using change detection, you can monitor for digital events with minimal processor usage. No polling is necessary because the digital I/O module generates an interrupt to automatically wake up your application.

Using NI-DAQmx software technology, NI 6528 and PXI-6529 devices notify the software application when an event is detected, causing the application to automatically perform a read operation. To minimize the effects of noisy input lines, use programmable input filters in combination with change detection to eliminate spurious change-detection events caused by noise or glitches.

Eliminate Noise with Programmable Input Filters

Programmable input filters remove noise, glitches, and spikes on inputs as well as provide debouncing for digital switches and relays. These features are important for applications in industrial environments to prevent false readings caused by noise. You can configure the programmable input filter for each digital line by setting the filter time. NI 6528 and PXI-6529 devices block any digital noise, glitch, or spike that is shorter than half of the specified filter time, preventing invalid readings and false triggers for change-detection events.

Use High-Voltage Triggering

With NI 6528 and PXI-6529 devices, you can route isolated high-voltage (±60 VDC) signals to the PXI trigger bus or RTSI (Real-Time System Integration) bus, so you can synchronize between multiple high-voltage devices without additional circuitry. This feature benefits automotive, aerospace, and industrial monitoring and control applications needing high-voltage triggers.

Recommended Software

National Instruments measurement services software, built around NI-DAQmx driver software, includes intuitive application programming interfaces, configuration tools, I/O assistants, and other tools designed to reduce system setup, configuration, and development time. National Instruments recommends using the latest version of NI-DAQmx driver software for application development in National Instruments LabVIEW, LabWindows/CVI, and Measurement Studio. To obtain the latest version of NI-DAQmx, visit **ni.com/support/daq/versions**. NI measurement services software speeds up your development with features including:

- A guide to create fast and accurate measurements with no programming using the DAQ Assistant
- Free LabVIEW SignalExpress LE data-logging software
- Automatic code generation to create your application in NI LabVIEW, LabWindows/CVI, and LabVIEW SignalExpress as well as Microsoft Visual Studio .NET, C/C++/C#, or Visual Basic using NI Measurement Studio

- Multithreaded technology for 1,000 times performance improvements
- Automatic timing, triggering, and synchronization routing to make advanced applications easy
- More than 3,000 free software downloads to jump-start your project available at **ni.com/zone**
- Software configuration of all digital I/O features without hardware switches/jumpers

NI 6528 and PXI-6529 devices are compatible with the following versions (or later) of NI application software: LabVIEW, LabWindows/CVI, or Measurement Studio versions 7.x; LabVIEW SignalExpress 1.x; or LabVIEW with the LabVIEW Real-Time Module 7.1. NI 6528 and PXI-6529 devices are not compatible with the Traditional NI-DAQ (Legacy) driver.

Digital I/O Cables and Accessories

The 100-pin high-density SCSI connector on NI 6528 and PXI-6529 devices interfaces to 100-pin ribbon cables or shielded cables. For low-cost unshielded connectivity, use the R1005050 ribbon cable with two CB-50LP or CB-50 connector blocks (a CB-100 kit). For shielded connectivity, use the SH100-100-F shielded digital I/O cable with the SCB-100 connector block.

SH100-100-F – Shielded 100-conductor cable that terminates with a 100-pin 0.050 series D-type connector that attaches to 100-pin accessories.
1 m cable 185095-01
2 m cable 185095-02

R1005050 – Unshielded ribbon cable that terminates with two 50-pin IDC connectors.
0.5 m cable 182762-0R5
1 m cable 182762-01
2 m cable 182762-02

SCB-100 – Shielded I/O connector block with screw terminals and a general breadboard area for 100-pin digital I/O devices.
SCB-100 776990-01

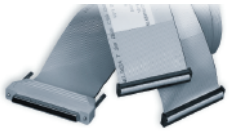
CB-50 – Unshielded I/O connector block with DIN-rail mounting and screw terminals. Includes 50-pin header for direct connection to 50-pin cables.
CB-50 776164-90

CB-50LP – Unshielded termination board with 50 screw terminals. Includes a 50-pin header for direct connection to 50-pin cables.
CB-50LP 777101-01

CB-100 Connector Kit – Includes two CB-50 I/O connector blocks and a 1 m R1005050 ribbon cable.
CB-100 with 1 m R1005050 cable 777812-01

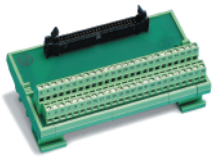
PCB Mounting Connectors – PCB connectors for use in building custom accessories that connect to 100-conductor shielded and ribbon cables.
100-pin, female, right-angle mounting 777778-01
100-pin, female, vertical mounting 777779-01

SH100-100-F

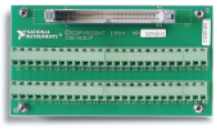


R1005050

SCB-100



CB-50



CB-50LP

CB-100

PCB Mounting Connectors

Ordering Information

NI PCI-6528 778833-01
NI PXI-6528 778543-01
NI PXI-6529 779949-01

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/dataacquisition**.

Specifications

These specifications are typical at 25 °C, unless otherwise noted.

Digital Inputs

NI 6528 ..... 24, ch-ch isolated
NI PXI-6529 ..... 48, ch-ch isolated
I/O connector ..... 100-pin keyed female SCSI connector
Input voltage range ..... -60 to 60 VDC
Digital logic levels

Level	Min	Max
Input low voltage	-60 VDC	1 VDC
Input high voltage	3.2 VDC	60 VDC

Input current
- 5 V inputs ..... 1.5 mA/channel max
- 60 V inputs ..... 3 mA/channel max

Isolation ..... 60 VDC channel-to-channel and channel-to-earth

Digital Output (NI 6528 Only)

Number of channels ..... 24, ch-ch isolated
Relay type ..... Normally open form A solid-state relays

Max Switching Voltage
- AC ..... 30 V_{rms} (42 V peak)
- DC ..... 60 VDC

Max switching capacity ..... 150 mA
Common-mode isolation ..... 60 VDC
30 V_{rms} (42 V peak) (ch-ch and ch-earth)
On-resistance ..... 18 Ω, max
Output capacitance ..... 50 pF at 50 V
Off-leakage current (max) ..... 1 µA
Relay set time (max) ..... 5.0 ms
Relay reset time (max) ..... 5.0 ms
Default power-on state ..... Relays open

Power Requirements

+5 VDC (±5%) ..... 300 mA, typical (excluding the power consumed through the I/O connector)
+3.3 VDC (±5%) ..... 600 mA, typical
Power available at I/O connector ..... +4.5 to +5.25 VDC, fused at 1 A

Physical

Dimensions
- PCI-6528 (w/o connectors) ..... 17.5 by 10.7 cm (6.9 by 4.2 in.)
- PXI-6528 (w/o connectors) ..... 16 by 10 cm (6.3 by 3.9 in.)
- PXI-6529 (w/o connectors) ..... 16 by 10 cm (6.3 by 3.9 in.)

Environment

NI 6528 and PXI-6529 devices are intended for indoor use only.

Operating Environment

Ambient temperature ..... 0 to 55 °C
Relative humidity ..... 10 to 90%, noncondensing
Altitude ..... 2,000 m at 25 °C ambient temperature

(tested in accordance with IEC-60068-2-1, IEC-60068-2-2, and IEC-60068-2-56)

Storage Environment

Ambient temperature ..... -20 to 70 °C
Relative humidity ..... 5% to 95%, noncondensing

(tested in accordance with IEC-60068-2-1, IEC-60068-2-2, and IEC-60068-2-56)

Shock and Vibration (PXI-6528 and PXI-6529 only)

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 to 500 Hz, 0.3 g_{rms}
- Nonoperating ..... 5 to 500 Hz, 2.4 g_{rms}

(tested in accordance with IEC-60068-2-64; nonoperating test profile developed in accordance with MIL-PRF-28800F, Class 3)

Safety

NI 6528 and PXI-6529 devices are designed to meet 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

For UL and other safety certifications, refer to the product label, or visit **ni.com/certification**, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

- EN 55011 Emissions; Group 1, Class A
- EN 61326 EMC requirements; Minimum Immunity
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A Compliant

For EMC compliance, operate this device according to product documentation.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:
- 73/23/EEC; Low-Voltage Directive (safety)
- 89/336/EEC; Electromagnetic Compatibility Directive (EMC)

Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain 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.

NI Services and Support

NI has the services and support to meet your needs around the globe and through the application life cycle – from planning and development through deployment and ongoing maintenance. We offer services and service levels to meet customer requirements in research, design, validation, and manufacturing. Visit **ni.com/services**.

Training and Certification

NI training is the fastest, most certain route to productivity with our products. NI training can shorten your learning curve, save development time, and reduce maintenance costs over the application life cycle. We schedule instructor-led courses in cities worldwide, or we can hold a course at your facility. We also offer a professional certification program that identifies individuals who have high levels of skill and knowledge on using NI products. Visit **ni.com/training**.

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Our NI Professional Services team is composed of NI applications and systems engineers and a worldwide National Instruments Alliance Partner program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit **ni.com/alliance**.

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We offer design-in consulting and product integration assistance if you want to use our products for OEM applications. For information about special pricing and services for OEM customers, visit **ni.com/oem**.

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We also offer service programs that provide automatic upgrades to your application development environment and higher levels of technical support. Visit **ni.com/ssp**.

Hardware Services

NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

Repair and Extended Warranty

NI provides complete repair services for our products. Express repair and advance replacement services are also available. We offer extended warranties to help you meet project life-cycle requirements. Visit **ni.com/services**.

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