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Find the *National Instruments PCI-6528* at our website: *Click HERE*

Technical Sales

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Requirements and Compatibility | Ordering Information | Detailed Specifications
For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

Last Revised: 2014-11-06 07:14:21.0

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





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

Overview

NI PXI-6528, PCI-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 the DAQ Assistant, automatic code generation, and high-performance multithreaded streaming technology.

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Requirements and Compatibility

OS Information

- Windows 2000/XP
- Windows NT
- Windows Vista x64/x86

Driver Information

- NI-DAQmx

Software Compatibility

- LabVIEW
- LabVIEW Real-Time Module
- LabWindows/CVI

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Comparison Tables

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	Yes
NI 6529	PXI	48	-	Channel-to-channel	±60 VDC	1 VDC	3.2 VDC	-	Yes

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Application and 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

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 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 NI 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 the following:

- 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 LabVIEW, LabWindows™/CVI, and LabVIEW SignalExpress as well as Microsoft Visual Studio .NET, C/C++/C#, or Visual Basic using 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

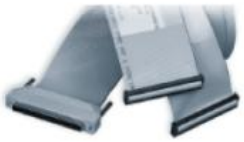
CB-50 – Unshielded I/O connector block with DIN-rail mounting and screw terminals. Includes 50-pin header for direct connection to 50-pin cables.
CB-50 776164-90

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

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Ordering Information

For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
NI PCI-6528			
NI PCI-6528 Requires: 1 Cables , 1 Connector Blocks ;	778833-01	**Cables:** Shielded - SH100-100-F Cable (2m) ***Also Available: [Unshielded]*	185095-02
		Connector Blocks: Spring-Screw_Terminals - SCB-100	776990-01
NI PXI-6528			
NI PXI-6528 Requires: 1 Cable , 1 Connector Block ;	778543-01	**Cable:** Shielded - SH100-100-F Cable (2m) ***Also Available: [Unshielded]*	185095-02
		Connector Block: Spring-Screw_Terminals - SCB-100	776990-01
NI PXI-6529			
NI PXI-6529 Requires: 1 Cable , 1 Connector Block ;	779949-01	**Cable:** Shielded - SH100-100-F Cable (2m) ***Also Available: [Unshielded]*	185095-02
		Connector Block: Spring-Screw_Terminals - SCB-100	776990-01

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Software Recommendations

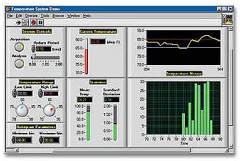
LabVIEW Professional Development System for Windows

- Advanced software tools for large project development
- Automatic code generation using DAQ Assistant and Instrument I/O Assistant

NI LabWindows™/CVI for Windows

- Real-time advanced 2D graphs and charts
- Complete hardware compatibility with IVI, VISA, DAQ, GPIB, and serial
- Analysis tools for array manipulation, signal processing statistics, and curve fitting

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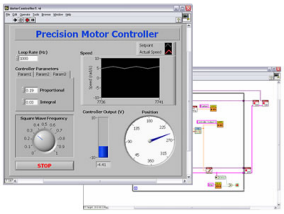
- Tight integration with a wide range of hardware
- Advanced measurement analysis and digital signal processing
- Open connectivity with DLLs, ActiveX, and .NET objects
- Capability to build DLLs, executables, and MSI installers



Simplified cross-platform communication with network variables

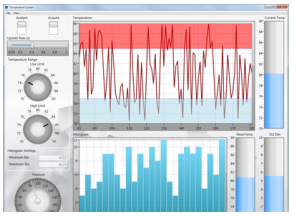
- Measurement Studio .NET tools (included in LabWindows/CVI Full only)
- The mark LabWindows is used under a license from Microsoft Corporation.

NI LabVIEW Real-Time Module



- Design deterministic real-time applications with LabVIEW graphical programming
- Download to dedicated NI or third-party hardware for reliable execution and a wide selection of I/O
- Take advantage of built-in PID control, signal processing, and analysis functions
- Automatically take advantage of multicore CPUs or set processor affinity manually
- Includes real-time OS, development and debugging support, and board support
- Purchase individually or as part of a LabVIEW suite

NI Measurement Studio Professional Edition



- Customizable graphs and charts for WPF, Windows Forms, and ASP.NET Web Forms UI design
- Analysis libraries for array operations, signal generation, windowing, filters, signal processing
- Hardware integration support with native .NET data acquisition and instrument control libraries
- Automatic code generation for all NI-DAQmx data acquisition hardware
- Intelligent and efficient data-logging libraries for streaming measurement data to disk
- Support for Microsoft Visual Studio .NET 2012/2010/2008

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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.

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Detailed Specifications

This section lists the specifications for the NI 6528/6529 device. These specifications are typical at 25 °C, unless otherwise noted.

Power Requirement	
+5 VDC (±5%)	250 mA, typical (excluding the power consumed through the I/O connector)
+3.3 VDC (±5%)	
NI 6528	400 mA, typical
NI 6529	150 mA, typical
Power available at I/O connector [1]	+4.0 to +5.25 VDC, 1 A max
Digital I/O	
Number of channels	
NI 6528	24 optically isolated digital input channels and 24 solid-state relay output channels
NI 6529	48 optically isolated digital input channels
I/O connector	100-pin keyed female SCSI connector
Isolated Inputs	
Number of input channels	
NI 6528	24, each with its own ground reference isolated from other channels
NI 6529	48, each with its own ground reference isolated from other channels
Input voltage range	–60 VDC 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	3.0 mA/channel, max
Minimum pulse-width for change detection	100 µs, typical
Propagation delay	65 µs, typical
Solid-State Relay Outputs (NI 6528 Only)	
Number of channels	24, each with two terminals that are isolated from other channels
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 [2]
Common-mode isolation	60 VDC 30 V_{rms} (42 V_{peak}) (channel-to-channel and channel-to-computer)
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
Programmable power-up states response time	400 ms

Physical Characteristics

Dimensions	
PCI-6528	17.5 cm × 10.7 cm (6.9 in. × 4.2 in.)
PXI-6528/6529	16 cm × 10 cm (6.3 in. × 3.9 in.)
Weight	
PCI-6528	107.7 g (3.8 oz)
PXI-6528/6529	130.4 g (4.6 oz)

Environmental

The NI 6528/6529 device is intended for indoor use only.

Operating Environment	
Ambient temperature range	0 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)
Altitude	2,000 m (at 25 °C ambient temperature)
Storage Environment	
Ambient temperature range	–20 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 (PXI-6528/6529 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 grms
Nonoperating	5 to 500 Hz, 2.4 grms

Random vibration is tested in accordance with IEC-60068-2-64. The nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.

Safety Standards

This product is 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

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 (IEC 61326): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note For the standards applied to assess the EMC of this product, refer to the *Online Product Certification* section.

Note For EMC compliance, operate this device with shielded cables.

CE Compliance CE

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

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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 module number or product line, and click the appropriate link in the Certification column.

Environmental Management

National Instruments is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial not only to the environment but also to NI customers.

For additional environmental information, refer to the *NI and the Environment* 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 Electrical and Electronic Equipment, visit ni.com/environment/weee.htm.

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.)

[1] The I/O connector power has a fuse for overcurrent protection. This fuse is not customer replaceable. If the fuse is blown, return the device to NI for repair.

[2] With all relays carrying 150 mA and all inputs driven to 60 V, the total power dissipation can approach 20 W. The maximum switching capacity in PCI and CompactPCI systems must be derated according to the ambient temperature and cooling capacity of your system to prevent the device from overheating. (The PXI chassis has built-in fans to handle 25 W per slot.)

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