Last Revised: 2014-11-06 07:14:13.0

NI PCI-6624, NI PXI-6624

- 8 counter/timers with 26 channel-to-channel isolated inputs and 8 channel-to-channel isolated outputs
- 400 kHz maximum frequency with 48 VDC voltage range on inputs and outputs
- Reverse and overvoltage protection (±60 V max continuous), and transient overvoltage input protection (±400 V peak)
- Short-circuit protection on outputs with automatic recovery
- Superior features for automotive test, industrial monitoring, and control applications
- NI-DAQmx software for highest productivity and performance

Requirements and Compatibility

OS Information

- Real-Time OS
- Windows 2000/XP
- Windows 7
- Windows Vista

Driver Information

- NI-DAQmx

Software Compatibility

- ANSI C
- LabVIEW
- LabWindows/CVI
- Measurement Studio
- SignalExpress

Back to Top

Comparison Tables

Product	Bus	Counter/Timers	Size	Isolation	Max Source Frequency	Compatibility	Pulse Generation	Buffered Operations	Oscillator Stability
NI 6624	PCI, PXI	8	32 bits	Channel-to-channel	20 MHz	5 V logic thresholds	Yes	Yes	50 ppm

Back to Top

Application and Technology

Overview

NI PCI-6624 and PXI-6624 devices are industrial isolated timing interfaces for PCI and PXI/Compact PCI bus systems. You can use the eight 32-bit channel-to-channel optically isolated counter/timers of an NI 6624 device to perform a wide variety of buffered measurements or other counter/timer tasks, including position or quadrature encoder measurement, edge counting, period measurement, pulse-width measurement, frequency measurement, semiperiod measurement, two-edge separation measurement, pulse-width-modulation (PWM) generation, pulse, and pulse-train generation. NI 6624 devices offer superior features and high value for automotive test, industrial monitoring, and manufacturing test applications such as factory automation, embedded machine control, and production line verification. They incorporate the latest hardware technologies and provide innovative features for applications requiring ease of use, high reliability, and performance. NI 6624 devices take advantage of NI-DAQmx software (Version 7.2 or later), which speeds up application development with many helpful features such as the NI DAQ Assistant, automatic code generation, and high-performance multithreaded streaming technology.

Connect Sensors Directly with Channel-to-Channel Isolation

Isolation is a form of built-in signal conditioning that provides several advantages including an extended voltage range for direct connection to industrial sensors and actuators. It also improves signal quality and protects computer circuitry. NI 6624 devices offer channel-to-channel isolation, where every channel is physically and electrically separated from the others, which breaks ground loops, improves common-mode voltage and noise rejection, and permits the two parts of the circuit to be at different voltage levels. Many industrial applications require isolation to protect the electronics from transient voltage spikes and provide greater common-mode noise rejection in electrically noisy environments containing machinery and inductive loads.

Counter/Timers Based on NI-TIO ASIC

NI 6624 devices are equipped with the NI-TIO ASIC, a National Instruments counter and digital I/O ASIC for advanced timing and counting applications. Each NI 6624 features two NI-TIO ASICs to provide a total of eight counter/timers. Each counter has a gate, auxiliary, and source input, which you can control with external or internal signals. Each

counter also has one output that you can route externally or to other counters on the device. 20 MHz and 100 kHz timebases are available on each device for use with each counter/timer. You can use a hardware trigger to start multiple counters simultaneously.

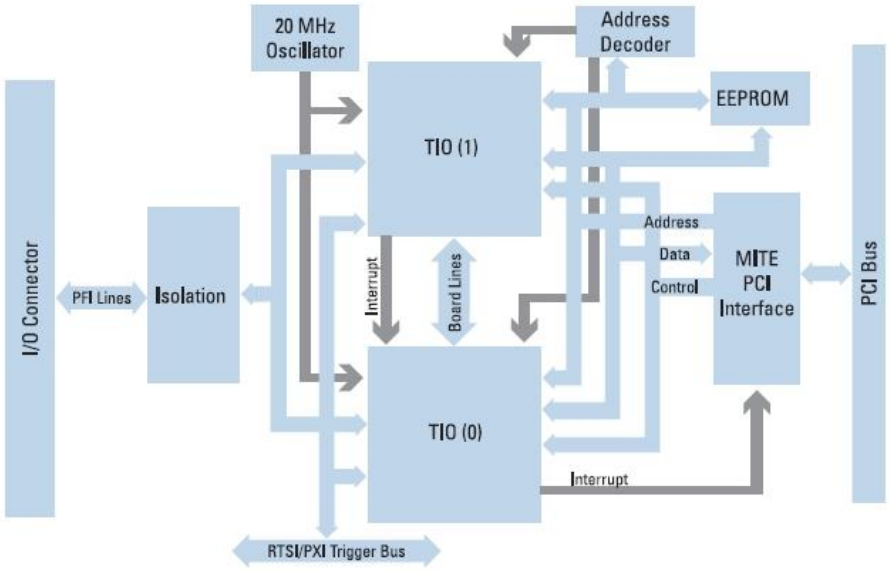


Figure 1. NI 6624 Hardware Block Diagram

Buffered Measurements

NI 6624 devices use the National Instruments MITE bus interface controller to implement bus-master DMA transfers. As a result, you can perform high-speed, continuous operations such as buffered position encoder measurement and buffered period measurement. You can perform up to three simultaneous DMA transfers on an NI 6624 and use interrupts for additional simultaneous buffered transfers.

I/O Connector

Each NI 6624 device has a 100-pin connector with a SOURCE, GATE, AUX and OUT signal for each of the counter/timers and two PFI inputs for start triggering.

RTSI

NI 6624 devices are equipped with the RTSI or PXI trigger bus for multidevice synchronization. You can route timing signals on an NI 6624 device to or from other devices in your system to perform advanced timing and synchronization.

NI-DAQmx Software Technology

NI 6624 devices require NI-DAQmx Version 7.2 (or later) measurement services software. It is included free of charge with the purchase of an NI 6624 device, and is available for download from ni.com/downloads. With NI-DAQmx, you can use your NI timing I/O device in LabVIEW, ANSI C, Microsoft Visual C++, and the Microsoft .NET languages C# and Visual Basic .NET.

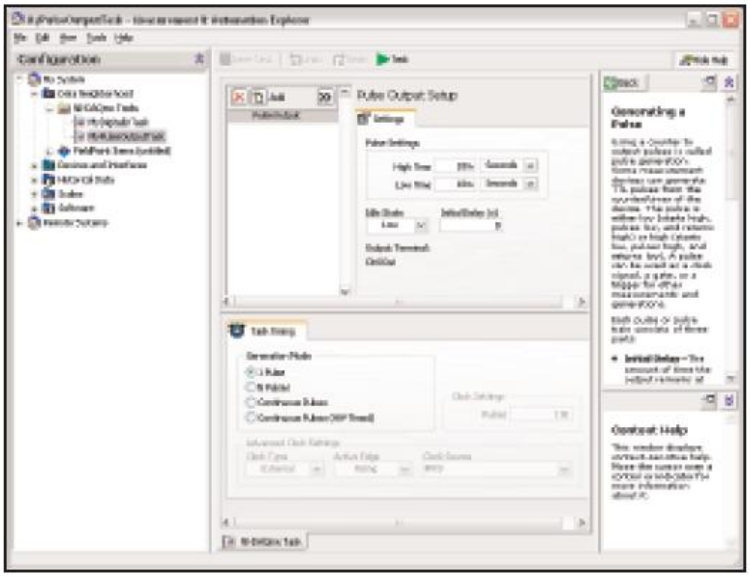


Figure 2. Write Your Application with No Programming Using NI DAQ Assistant

NI-DAQmx technology speeds up your development with many features such as automatic code generation to make configuration and programming easy. NI 6624 devices take full advantage of key NI-DAQmx software features such as multithreaded streaming technology for dramatic improvements in I/O performance and ease of use.

• Use the NI DAQ Assistant to guide you to fast, accurate measurements with no programming
• Use automatic code generation to create your application in LabVIEW, ANSI C, Visual Basic .NET, or C#
• Take advantage of multithreaded streaming technology for 1000X performance improvements
• Use automatic timing, triggering, and synchronization technology to make advanced applications easy
• Visit ni.com for more than 3,000 free software downloads to jump-start your project
• Use NI-DAQmx functions for jumper-free software configuration of all counter/timer and digital I/O features without hardware switches/jumpers
• Develop your application with easy and open programming in LabVIEW, ANSI C, Microsoft Visual C++, C#, and Visual Basic .NET

Back to Top

Ordering Information

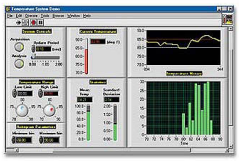
For a complete list of accessories, visit the product page on ni.com.

Products	Part Number	Recommended Accessories	Part Number
NI PCI-6624			
NI PCI-6624 Requires: 1 Cables , 1 Connector Blocks ;	778834-01	**Cables:** Shielded - SH100-100-F Cable (2m) ***Also Available: [Unshielded]*	185095-02
		Connector Blocks: Spring-Screw_Terminals - SCB-100	776990-01
NI PXI-6624			
NI PXI-6624 Requires: 1 Cable , 1 Connector Block ;	778975-01	**Cable:** Shielded - SH100-100-F Cable (2m) ***Also Available: [Unshielded]*	185095-02
		Connector Block: Spring-Screw_Terminals - SCB-100	776990-01

Back to Top

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
- 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

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
- 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.

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

Detailed Specifications

This document lists the specifications for the NI PCI/PXI-6624 device. These specifications are typical at 25 °C unless otherwise noted. Refer to the *NI 6624 User Manual* for more information about NI 6624 devices.

Power	
Power requirement	0.75 A from +5 V rail; 0.15 A from +3.3 V rail
Isolated Inputs	
Number of input channels	26 (3 per counter and 2 extra PFIs)
Input type	Driven reference to either supply or ground (two terminals per input)
Maximum input frequency	400 kHz
Minimum input pulse width	1 µs
Input waveform types	Any
Voltage	
Voltage range	Up to 48 VDC
Typical ON voltage	2.5 V
Guaranteed ON voltage	4 V
Guaranteed OFF voltage	0.8 V
Current	
ON state current	2.2 mA min, 6 mA typ, 10 mA max
OFF state current	0.1 mA max
Protection	
Current limit	10 mA max (over operating temperature range)
Reverse and overvoltage	±60 VDC
Isolation voltage (verified by a dielectric withstand test, 1 min max)	

Input channels to backplane (bus)	400 Vrms
Input channels to ground	400 Vrms
Input channel to channel	330 Vrms
Propagation Delays (for a 5 V Input Signal)	
LOW to HIGH	350 ns typ
HIGH to LOW	220 ns typ
Isolated Outputs	
Number of output channels	8
Output type	Sinking (low-side switch)
Output power requirement	5 to 48 VDC (10 mA per channel, typical at 400 KHz)
Load voltage range	5 to 48 VDC
Switching current	100 mA per channel, max
Inrush current	600 mA per channel, max
Maximum output frequency	400 kHz
Minimum output pulse width	1 µs
Typical switching times (with a 5 V, 100 Ω load)	
Turn on	500 ns
Turn off	150 ns
Output low maximum voltage (with SH100-100-S2 cable)	0.47 V at 10 mA; 0.75 V at 100 mA
Output leakage current when OFF	60 µA max
Protection	
Short circuit (on output pins)	0.6 A min, 1.1 A max (stays off after detecting a short circuit and retries to operate every 250 ms, and then automatically recovers after removing the short)
Reverse and overvoltage (on output and Vdd pins)	±60 VDC
Functionality with transient spikes (on Vdd pins)	Up to 80 V peak
Timing I/O	
Number of counters	8 up/down
Resolution	32 bits
Maximum count	4,294,967,295
Rollover times	
100 kHz timebase	11.93 h
20 MHz timebase	214.74 s
Base clocks available	100 kHz and 20 MHz
Base clock accuracy	50 ppm (±0.005%) over temperature
Maximum source frequency	20 MHz
Data transfer	DMA (up to 3 channels), interrupts
RTSI Trigger Lines (PCI Only)	
Trigger lines <0..6>	7
RTSI clock	1
Minimum pulse width for trigger and clock	50 ns

PXI Trigger Bus (PXI Only)	
Trigger lines <0..5>	6
Star trigger	1
Clock	1

Physical	
Dimensions	
PCI	17.5 cm × 10.7 cm (6.9 in. × 4.2 in.)
PXI	16.0 cm × 10.0 cm (6.3 in. × 3.9 in.)
I/O connector	100-pin female, SCSI-II type

Maximum Working Voltage	
Maximum working voltage refers to the signal voltage plus the common-mode voltage.	
Channel-to-earth	±11 V, Measurement Category I
Channel-to-channel	±22 V, Measurement Category I

Caution Do not use this module for connection to signals or for measurements within Categories II, III, or IV.

Environment	
NI 6624 devices are intended for indoor use only.	
Maximum altitude	2,000 meters (at 25 °C ambient temperature)
Pollution Degree	2
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.)
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 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 (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Note Clean the device with a soft, non-metallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

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)

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.

Back to Top

Pinouts/Front Panel Connections

PFI 39 +/CTR 0 SOURCE +	1	51	PFI 23 +/CTR 4 SOURCE +
PFI 39 –/CTR 0 SOURCE –	2	52	PFI 23 –/CTR 4 SOURCE –
PFI 38 +/CTR 0 GATE +	3	53	PFI 22 +/CTR 4 GATE +
PFI 38 –/CTR 0 GATE –	4	54	PFI 22 –/CTR 4 GATE –
PFI 37 +/CTR 0 AUX+	5	55	PFI 21 +/CTR 4 AUX +
PFI 37 –/CTR 0 AUX–	6	56	PFI 21 –/CTR 4 AUX –
PFI 36 Vdd/CTR 0 Vdd	7	57	PFI 20 Vdd/CTR 4 Vdd
PFI 36/CTR 0 Vss	8	58	PFI 20 Vss/CTR 4 Vss
PFI 36/CTR 0 OUT	9	59	PFI 20/CTR 4 OUT
PFI 36/CTR 0 Vss	10	60	PFI 20 Vss/CTR 4 Vss
PFI 35 +/CTR 1 SOURCE +	11	61	PFI 19 +/CTR 5 SOURCE +
PFI 35 –/CTR 1 SOURCE –	12	62	PFI 19 –/CTR 5 SOURCE –
PFI 34 +/CTR 1 GATE +	13	63	PFI 18 +/CTR 5 GATE +
PFI 34 –/CTR 1 GATE –	14	64	PFI 18 –/CTR 5 GATE –
PFI 33 +/CTR 1 AUX +	15	65	PFI 17 +/CTR 5 AUX +
PFI 33 –/CTR 1 AUX –	16	66	PFI 17 –/CTR 5 AUX –
PFI 32 Vdd/CTR 1 Vdd	17	67	PFI 16 Vdd/CTR 5 Vdd
PFI 32 Vss/CTR 1 Vss	18	68	PFI 16 Vss/CTR 5 Vss
PFI 32/CTR 1 OUT	19	69	PFI 16/CTR 5 OUT
PFI 32 Vss/CTR 1 Vss	20	70	PFI 16 Vss/CTR 5 Vss
PFI 31 +/CTR 2 SOURCE +	21	71	PFI 15 +/CTR 6 SOURCE +
PFI 31 –/CTR 2 SOURCE –	22	72	PFI 15 –/CTR 6 SOURCE –
PFI 30 +/CTR 2 GATE +	23	73	PFI 14 +/CTR 6 GATE +
PFI 30 –/CTR 2 GATE –	24	74	PFI 14 –/CTR 6 GATE –
PFI 29 +/CTR 2 AUX +	25	75	PFI 13 +/CTR 6 AUX +
PFI 29 –/CTR 2 AUX –	26	76	PFI 13 –/CTR 6 AUX –
PFI 28 Vdd/CTR 2 Vdd	27	77	PFI 12 Vdd/CTR 6 Vdd
PFI 28 Vss/CTR 2 Vss	28	78	PFI 12 Vss/CTR 6 Vss
PFI 28/CTR 2 OUT	29	79	PFI 12/CTR 6 OUT
PFI 28 Vss/CTR 2 Vss	30	80	PFI 12 Vss/CTR 6 Vss
PFI 27 +/CTR 3 SOURCE +	31	81	PFI 11 +/CTR 7 SOURCE +
PFI 27 –/CTR 3 SOURCE –	32	82	PFI 11 –/CTR 7 SOURCE –
PFI 26 +/CTR 3 GATE +	33	83	PFI 10 +/CTR 7 GATE +
PFI 26 –/CTR 3 GATE –	34	84	PFI 10 –/CTR 7 GATE –
PFI 25 +/CTR 3 AUX +	35	85	PFI 9 +/CTR 7 AUX +
PFI 25 –/CTR 3 AUX –	36	86	PFI 9 –/CTR 7 AUX –
PFI 24 Vdd/CTR 3 Vdd	37	87	PFI 8 Vdd/CTR 7 Vdd
PFI 24 Vss/CTR 3 Vss	38	88	PFI 8 Vss/CTR 7 Vss
PFI 24/CTR 3 OUT	39	89	PFI 8/CTR 7 OUT
PFI 24 Vss/CTR 3 Vss	40	90	PFI 8 Vss/CTR 7 Vss
PFI 0 +	41	91	PFI 4 +
PFI 0 –	42	92	PFI 4 –
NC	43	93	NC
NC	44	94	NC
NC	45	95	NC
NC	46	96	NC
NC	47	97	NC
NC	48	98	NC
NC	49	99	NC
NC	50	100	NC

NC = No Connect

NI 6624 Pin Assignments

Back to Top