Industrial, Channel-Channel Isolated, 32-Bit Counter/Timers

NI 6624

- 8 counter/timers with 26 channel-channel isolated inputs and 8 channel-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

Operating Systems
- Windows 2000/NT/XP
- Real-Time performance with LabVIEW

Recommended Software
- LabVIEW
- LabWindows/CVI
- Measurement Studio

Other Compatible Software
- C, C++
- Microsoft Visual Studio .NET 2003

Measurement Services Software (included)
- NI-DAQmx 7.1 (7.2 for PXI-6624) or higher

NEW

Family	Bus	Counter/Timers	Size	Isolation	Max Source Frequency	Compatibility	Digital I/O	Pulse Generation	Buffered Operations	Oscillator Stability	Buffered Operations	
											DMA	Interrupt
NI 6624	PCI, PXI	8	32 bits	Channel to Channel	20 MHz	5 V Logic Thresholds	–	✓	✓	50 ppm	3	No limit

Table 1. NI 6624 Specifications Overview

Overview and Applications

National Instruments 6624 devices are industrial isolated timing interfaces for PCI and PXI/Compact PCI bus systems. You can use the eight 32-bit channel-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, 2-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. NI 6624 devices have been designed from top to bottom to 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 the NI-DAQ software (version 7.2 or higher), which includes NI-DAQmx technology to speed up application development with many helpful features such as the NI DAQ Assistant, automatic code generation, and high-performance multithreaded streaming technology.

Hardware

Connect Sensors Directly with Channel-Channel Isolation

Isolation is a form of built-in signal conditioning that provides several advantages. Isolation provides an extended voltage range for direct connection to industrial sensors and actuators. Isolation also improves signal quality and protects computer circuitry. NI 6624 devices provide channel-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 can be controlled by external or internal signals. Each counter has one output that can be routed externally or to other counters on the board. 20 MHz and 100 kHz timebases are available on each device for use with each counter/timer. A hardware trigger can be used to start multiple counters simultaneously.

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. You can use interrupts for additional simultaneous buffered transfers.

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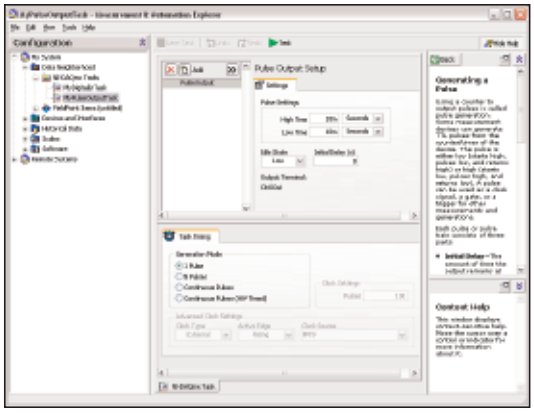


Figure 1. Write Your Application with No Programming Using NI DAQ Assistant

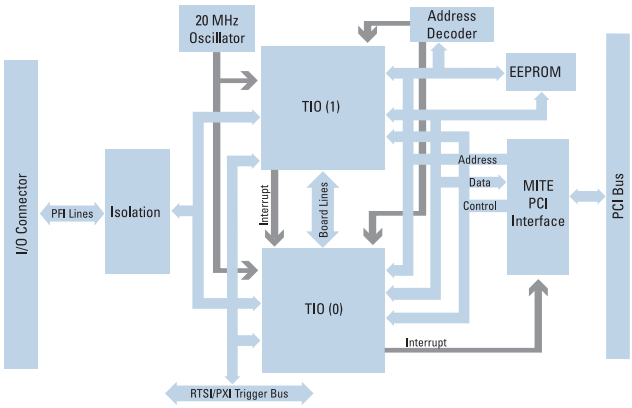


Figure 2. NI 6624 Hardware Block Diagram

I/O Connector

NI 6624 devices each have 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. Timing signals on an NI 6624 device can be routed to or from other devices in your system to perform advanced timing and synchronization.

PFI 39+/CTR 0 SRC+	1	51	PFI 23+/CTR 4 SRC+
PFI 39-/CTR 0 SRC-	2	52	PFI 23-/CTR 4 SRC-
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 SRC+	11	61	PFI 19+/CTR 5 SRC+
PFI 35-/CTR 1 SRC-	12	62	PFI 19-/CTR 5 SRC-
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 SRC+	21	71	PFI 15+/CTR 6 SRC+
PFI 31-/CTR 2 SRC-	22	72	PFI 15-/CTR 6 SRC-
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 SRC+	31	81	PFI 11+/CTR 7 SRC+
PFI 27-/CTR 3 SRC-	32	82	PFI 11-/CTR 7 SRC-
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

Figure 3. NI 6624 100-Pin I/O Connector

Software

NI-DAQmx Software Technology

NI 6624 devices require NI-DAQmx Measurement Services Software version 7.2 (or higher). NI-DAQmx software 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 7.2 (or higher), 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.

Using NI-DAQmx technology, you can access the full functionality and state-of-the-art hardware technology of your NI 6624 counter/timer devices. 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 technologies such as multithreaded streaming technology for dramatic improvements in I/O performance and ease of use.

- Use NI DAQ Assistant to guide you to fast, accurate measurements with no programming
- Use automatic code generation to create your application in NI LabVIEW, ANST 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 jumpstart 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

Ordering Information

NI PCI-6624 778834-01
NI PXI-6624 778975-01
Includes NI-DAQmx Software.

For information on extended warranty and value-added services, visit ***ni.com/services***

Recommended Configurations

Family	Accessory	Cable
NI 6624	CB-100 kit (777812-01) SCB-100 (776990-01)	R1005050 included in kit SH100-100-F (185095-02)

BUY NOW!

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

Industrial, Channel-Channel Isolated, 32-Bit Counter/Timers

Specifications

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

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-to-input, input-to-output, and input-to-PC ground isolation ..... 60 VDC, continuous
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 max continuous
Functionality with transient spikes ..... Up to 400 V peak

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
Output-to-output, output-to-input, and output-to-PC ground isolation ..... 60 VDC peak, continuous
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, then automatically recovers after removing the short)
Reverse and overvoltage (on output and V_{dd} pins) ..... ±60 VDC max continuous
Functionality with transient spikes (on V_{dd} 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 hours
  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

PXI Trigger Bus (PXI Only)

Trigger lines <0..5> 6
PXI Star 1
RTSI clock 1

Power Requirements

5 VDC 0.75A
3.3 VC 0.15A

Physical

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

Environmental

The NI 6624 is intended for indoor use only.

Operating Environment

Ambient temperature range
  PCI ..... 0 to 50 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
  PXI ..... 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)
Pollution Degree 2

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-28800-F.)
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 exceeds the requirements of MIL-PRF-28800-F, 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

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
- CAN/CSA C22.2 No. 61010.1

Note: 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

Emissions ..... EN 55011 Class A at 10 m
FCC Part 15A above 1 GHz
Immunity ..... EN 61326:1997 + A2:2001, Table 1
EMC/EMI ..... CE, C-Tick, and FCC Part 15 (Class A) compliant

Note: For EMC compliance, operate this device with shielded cabling or a ribbon cable no longer than 1 m.

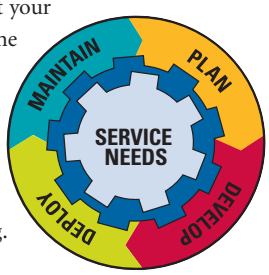
CE Compliance CE

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

Note: 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.

Professional Services

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide NI 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 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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