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## 8-Slot PXI Express Chassis for PXI and PXI Express Modules

### NI PXIe-1082



- Accepts 3U PXI, PXI Express, CompactPCI, and CompactPCI Express modules
- 1 PXI Express system slot
- 7 peripheral slots: 7 PXI Express compatible, 4 PXI compatible and 1 PXI Express system timing compatible
- Up to 1 GB/s per-slot dedicated bandwidth (x4 PCI Express), 4 GB/s total system bandwidth
- Low-jitter internal 10 MHz reference clock for PXI slots with 25 ppm stability
- Low-jitter internal 100 MHz reference clock for PXI Express slots with 25 ppm stability
- Variable speed fan controller optimizes cooling and acoustic emissions
- Quiet operation for 0 to 30 °C at 43.6 dBA
- Remote power-inhibit control

### Overview

The NI PXIe-1082 eight-slot chassis features a high-bandwidth backplane with PXI Express capability in every slot to meet a wide variety of high-performance test and measurement and control application needs. It is ideal for high-speed measurements, data streaming, and high-channel-density system solutions. Its compact form factor and optional portable LCD monitor and keyboard accessory make the NI PXIe-1082 ideal for portable applications. The chassis provides the full power of 507 W across the entire 0 to 55 °C extended temperature range, a feature National Instruments offers on all NI high-performance chassis. The NI PXIe-1082 is compatible with both PXI Express and CompactPCI Express modules. In addition, this chassis features four hybrid slots, which provide the added compatibility with standard PXI and CompactPCI modules. The chassis also incorporates all of the timing and synchronization features defined by the latest PXI specification, including a built-in 10 MHz reference clock, PXI trigger bus, and PXI star trigger as well as a built-in 100 MHz reference clock, SYNC 100, and PXI differential star triggers for PXI Express modules.

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### Application and Technology

#### High Reliability

0 to 55 °C extended temperature range  
507 W from 0 to 55 °C without derating  
NI PXI System Monitor API for power supply, temperature, and fan monitoring  
HALT- tested for increased reliability  
Field-replaceable power supply shuttle

#### Multichassis Synchronization

Numerous synchronization options: CLK10 sharing, GPS, IEEE 1588, IRIG-B, and so on  
PXI Express system timing slot for tight synchronization across chassis  
Switchless CLK10 routing

#### Optional Features

Portable LCD monitor and keyboard accessory  
Front and rear rack-mount kits  
System assurance program

Slot	PXI Express System	PXI Express Peripheral	Hybrid (PXI)
Bus Signaling	PCI Express (4 x4 links) and PCI (32/33)	PCI Express (x4)	PCI (32/33) and PCI Express (x4)
Bandwidth	4 GB/s dedicated for PXI Express 132 MB/s shared for PXI	Up to 1 GB/s dedicated <sup>1</sup>	132 MB/s shared (PXI) or up to 1 GB/s dedicated <sup>1</sup> (PXI Express)
Number of Slots	1	3 <sup>2</sup>	4

<sup>1</sup> Each slot can have up to 1 GB/s dedicated bandwidth; however, if more than one slot connected to the same switch is used, 1 GB/s is shared among those slots.

<sup>2</sup> Includes one system timing slot.

### Slot Types Accept PXI and PXI Express Modules

This chassis enables higher- bandwidth systems and provides the flexibility you need to work with both PXI and PXI Express modules. There are a total of nine PXI Express slots and eight PXI hybrid- compatible slots.

The PXI Express system slot offers four x4 PCI Express links (1 GB/s single direction per link): one x4 link is connected directly to slot 2 and the other three x4 links are connected to three switches. Each switch provides a x4 PCI Express link to two peripheral slots. Each slot is capable of 1 GB/s per- direction dedicated bandwidth; however, if you use another slot connected to the same switch, the slots share the 1 GB/s total bandwidth to the switch. The total system bandwidth is also dependent on the PXI Express controller selected.

There is one x1 PCI Express link to a PCI Express- to-PCI translation bridge on the backplane. The four PXI Express hybrid slots deliver connectivity to either a x4 PCI Express link or to the 32-bit, 33 MHz PCI bus on the backplane. The PXI Express system timing slot accepts a PXI Express module or a PXI Express system timing controller for advanced timing and synchronization.

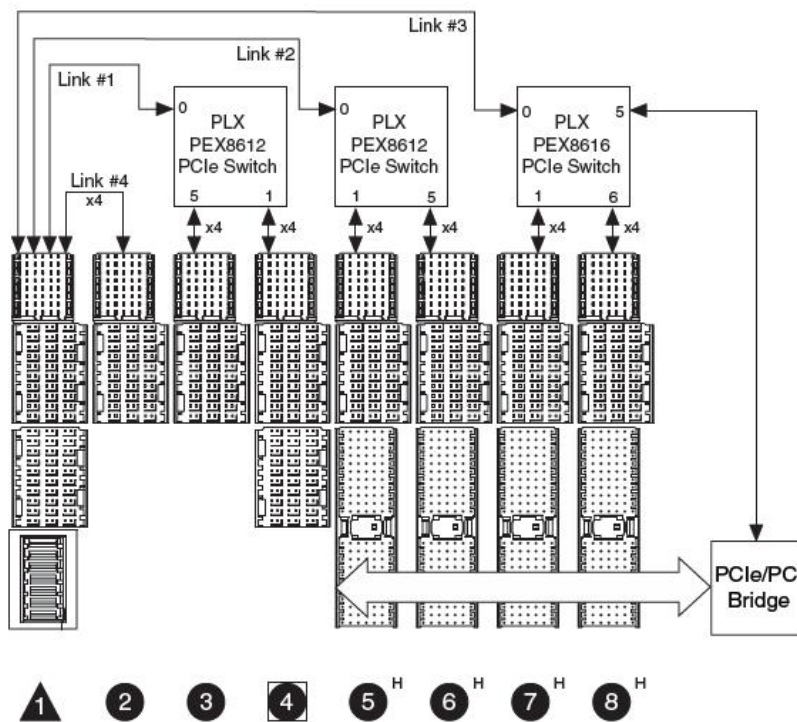


Figure 1. NI PXIe- 1082 Chassis Backplane

### Optimized Cooling and Acoustic Emissions

The NI PXIe- 1082 chassis integrates two pulse- width modulation (PWM) system fans to provide filtered, forced- air cooling that exceeds the cooling demands of PXI Express and CompactPCI Express as well as PXI and CompactPCI modules. The NI PXIe- 1082 offers a HIGH fan setting to maximize cooling and an AUTO fan setting to minimize acoustic emissions when operating the chassis in ambient environments less than 55 ° C. The chassis monitors air intake temperature and adjusts fan speed accordingly while the AUTO setting is selected. With this technology, the NI PXIe- 1082 achieves acoustic noise levels as low as 43.6 dBA (sound pressure level measured at operator position according to ISO 7779).

### PXI Timing and Synchronization

For PXI modules, the NI PXIe- 1082 backplane is fully compliant with PXI timing and synchronization standards. The chassis includes a 10 MHz reference clock with an accuracy of  $\pm 25$  parts per million (ppm), less than 5 ps jitter, and a maximum slot-to- slot skew of 300 ps. For triggering and handshaking needs, the NI PXIe- 1082 offers the PXI trigger bus and PXI star trigger.

For PXI Express modules, in addition to PXI timing and synchronization features, the NI PXIe- 1082 backplane offers a differential 100 MHz reference clock with an accuracy of  $\pm 25$  ppm, less than 3 ps jitter, and a maximum slot-to- slot skew of 100 ps. The chassis also provides a differential star trigger to the PXI Express slots to deliver less than 200 ps intermodule skew. With the SYNC 100, a peripheral module installed in the NI PXIe- 1082 can generate its own CLK10 signal, deriving it from the 100 MHz reference clock.

### Software System Configuration

The NI PXIe- 1082 chassis is configured with NI Measurement & Automation Explorer (MAX). With this software configuration tool, you can easily configure NI PXIe- 1065 systems without time- consuming manual installation of initialization files. MAX creates the pxisys. ini file that defines the layout and parameters of your PXI system including chassis, controller, and plug- in modules.

### Replaceable Power Supply Shuttle

This chassis include a removable high- performance universal AC power supply with built-in overcurrent protection. An isolated 12 VDC line provides power to the cooling fans, significantly reducing electrical noise on the chassis backplane. The NI PXIe- 1082 incorporates the power supply and fans into a single modular unit that you can replace quickly, resulting in a mean time to repair (MTTR) of less than five minutes.

### External 10 MHz Reference Clock I/O Connectors

An NI PXIe-1082 chassis includes IN/OUT BNC connectors for the 10 MHz reference clock on the rear of the chassis. When the backplane detects a 10 MHz signal on the IN connector, it phase locks to the external clock. The OUT connector provides a buffered, non-TTL version of the 10 MHz reference clock.

The 10 MHz clock may also be driven by an optional system timing controller populated in slot 4. These system timing controllers provide a higher-stability clock source such as an oven controlled crystal oscillator (OCXO) and the ability to drive the PXI star and PXI Express differential star triggers as well as import or export the various trigger lines on the backplane.

### Remote Power Inhibit and Monitoring

The NI PXIe-1082 chassis features remote power inhibit and voltage monitoring through a DB-9 connector on the rear of the chassis. Use this connector to switch off power or monitor the power remotely in the chassis.

### Power Supply, Temperature, and Fan Monitoring

This chassis continuously monitors power supply voltages, air intake temperature, and fan speeds to ensure safe system operation in the event of an unexpected system event. It provides feedback to the user via a bicolor LED in the power switch on the front of the chassis, and the chassis makes necessary adjustments to continue operation such as increase fan speeds if the temperature rises. You can also monitor the status of the NI PXIe-1082 with the included NI PXI System Monitor API.

### NI PXIe-1082 Accessories

The NI PXIe-1082 has several optional accessories for complete system integration and optimized chassis functionality. An optional, attachable, and portable LCD monitor and keyboard accessory and a rugged portable carrying case provide effective portable solutions. Front and rear rack-mount kits are available for 19 in. rack-mounted systems. You can easily replace spare power supplies with little system downtime because of the modular nature of the NI PXIe-1082 power supply and fan shuttle. You can use slot blockers to improve the overall cooling performance of the chassis.

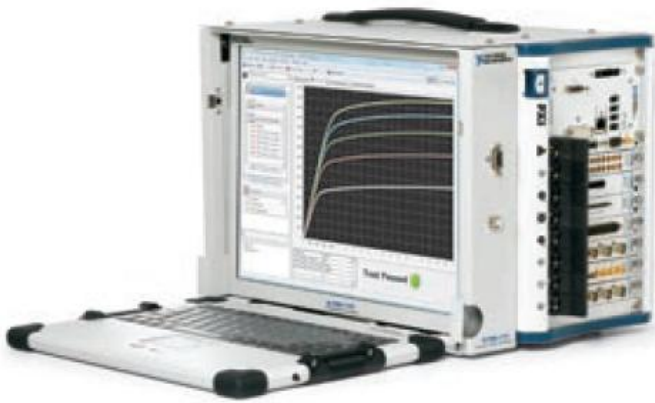


Figure 2. NI PMA-1115 Portable Touch Screen LCD Monitor, Keyboard and Touchpad Accessory Attached to National Instruments Eight-Slot Chassis



Figure 3. NI PXI Carrying Case Accessory

### PXI System Assurance Program

With an NI system assurance program, you receive complete system-level assembly and functional testing of the PXI chassis, controller, and all peripheral devices, as well as installation of all device drivers and software programs (such as NI LabVIEW). For online configuration of a complete PXI system, including information about NI system assurance programs, visit the PXI Advisor at [ni.com/pxiadvisor](http://ni.com/pxiadvisor).

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### Ordering Information

For a complete list of accessories, visit the product page on [ni.com](http://ni.com).

Products	Part Number	Recommended Accessories	Part Number
<b>Related Accessories</b>			
NI PMA-1115: Portable PXI Monitor and English Keyboard Accessory	780215-01	No accessories required.	
NI PXI Slot Blocker, Set of 5	199198-01	No accessories required.	
NI PXI Carrying Case	780398-01	No accessories required.	
PXI Chassis Filler Panel Kit, 3 Double- & 3 Single-Slot Panels	778679-01	No accessories required.	
NI PXI 8-Slot Front Rack Mount Kit	778643-01	No accessories required.	
NI PXI 8-Slot Rear Rack Mount Kit	778643-02	No accessories required.	
PXI EMC Filler Panel Kit	778700-01	No accessories required.	
Replacement Power Supply and Fan Shuttle for NI PXIe-1082	780322-01	No accessories required.	
<b>PXIe-1082</b>			
PXIe-1082, 8-Slot 3U PXI Express Chassis Requires: 1 Cable	780321-01	<b>Cable:</b> Shielded - Power Cord, AC, U. S., 120 VAC, 2.3 meters	763000-01

## 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](http://ni.com/advisor) to find a system assurance program to meet your needs.

### Technical Support

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

**Support** - Visit [ni.com/support](http://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](http://forums.ni.com) for a diverse set of discussion boards on topics you care about.

**Online Community** - Visit [community.ni.com](http://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](http://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](http://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](http://ni.com/warranty).

### OEM

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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](http://ni.com/alliance).

## Detailed Specifications

This appendix contains specifications for the NI PXIe-1082 chassis.



**Caution** Specifications are subject to change without notice.

### Electrical

#### AC Input

Input voltage rating 100 to 240 VAC

Operating voltage range <sup>1</sup> 90 to 264 VAC

Input frequency 50/60 Hz

Operating frequency range 47 to 63 Hz

Input current rating 8-4A

Over- current protection	10 A circuit breaker
Line regulation	
3.3 V	<±0.2%
5 V	<±0.1%
±12 V	<±0.1%
Efficiency	70% typical
Power disconnect	The AC power cable provides main power disconnect. The front- panel power switch causes the internal chassis power supply to provide DC power to the CompactPCI/PXI Express backplane. You also can use the rear- panel D- SUB 9- pin connector and power mode switch to control the internal chassis power supply.

#### DC Output

DC current capacity ( $I_{MP}$ )	
Voltage	Maximum Current
+3.3 V	32 A
+5 V	27 A
+12 V	32 A
-12 V	2.0 A
5 V <sub>AUX</sub>	2.0 A



**Note** Maximum total usable power is 420W.

Backplane pin current capacity						
Slot	+5 V	V (I/O)	+3.3 V	+12 V	-12 V	5 V <sub>AUX</sub>
System Controller Slot	15 A	-	15 A	30 A	-	1 A
System Timing Slot	-	-	6 A	4 A	-	1 A
Hybrid Peripheral Slot with PXI- 1 Peripheral	6 A	5 A	6 A	1 A	1 A	-
Hybrid Peripheral Slot with PXI- 5 Peripheral	-	-	6 A	4 A	-	1 A

**Notes** Total system slot current should not exceed 45 A.

PCI V (I/O) pins in hybrid slots are connected to +5 V.

The maximum power dissipated in the system slot should not exceed 140 W.

The maximum power dissipated in a peripheral slot should not exceed 38.25 W.



Load regulation	
Voltage	Load Regulation
+3.3 V	<5%
+12 V	<5%
+5 V	<5%
-12 V	<5%

Maximum ripple and noise (20 MHz bandwidth)	
Voltage	Maximum Ripple and Noise
+3.3 V	50 mV <sub>pp</sub>
+12 V	50 mV <sub>pp</sub>
+5 V	50 mV <sub>pp</sub>
-12 V	50 mV <sub>pp</sub>

Over- current protection	All outputs protected from short circuit and overload with automatic recovery
Over- voltage protection	
3.3 V and 5 V	Clamped at 20 to 30% above nominal output voltage
Power supply shuttle MTTR	Replacement in under 5 minutes

#### Chassis Cooling

Module cooling system	Forced air circulation (positive pressurization) through three 165 cfm fans with High/Auto speed selector
Slot airflow direction	Bottom of module to top of module
Module cooling intake	Bottom rear of chassis
Module cooling exhaust	Along both sides and top of chassis
Power supply cooling system	Forced air circulation through two integrated fans
Power supply cooling intake	Right side of chassis
Power supply cooling exhaust	Left side of chassis

## Environmental

Maximum altitude	2,000 m (800 mbar) (at 25 ° C ambient)
Pollution Degree	2

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. Meets MIL-PRF- 28800F Class 3 low temperature limit and MIL- PRF- 28800F Class 2 high temperature limit.)
Relative humidity range	10 to 90%, noncondensing (Tested in accordance with IEC- 60068-2- 56.)

## Storage Environment

Ambient temperature range	-40 to 71 ° C (Tested in accordance with IEC- 60068-2- 1 and IEC- 60068-2- 2. Meets MIL-PRF- 28800F Class 3 limits.)
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. Meets MIL-PRF- 28800F Class 2 limits.)
Random Vibration	5 to 500 Hz, 0.3 g <sub>rms</sub>

## Acoustic Emissions

### Sound Pressure Level (at Operator Position)

(Tested in accordance with ISO 7779. Meets MIL-PRF- 28800F requirements.)

Auto fan (up to ~30 °C ambient)	43.6 dBA
High fan	62 dBA

### Sound Power

Auto fan (up to ~30 °C ambient)	52.8 dBA
High fan	72 dBA



**Note** Specifications are subject to change without notice.

## 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, 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 is designed to meet the requirements of the following standards of EMC for electrical equipment for measurement, control, and laboratory use:

EN 61326 EMC requirements; Minimum Immunity  
EN 55011 Emissions; Group 1, Class A  
AS/NZS CISPR 11: Group 1, Class A emissions  
FCC 47 CFR Part 15B: Class A emissions  
ICES- 001: Class A emissions



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



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

## CE Compliance

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

## 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](http://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](http://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](http://ni.com/environment/weee.htm).

### 电子信息产品污染控制管理办法（中国 RoHS）



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## Backplane

Size	3U- sized; one system slot (with three system expansion slots) and 17 peripheral slots. Compliant with IEEE 1101.10 mechanical packaging. PXI Express Specification compliant. Accepts both PXI Express and CompactPCI (PICMG 2.0 R 3.0) 3U modules.
Backplane bare- board material	UL 94 V- 0 Recognized
Backplane connectors	Conforms to IEC 917 and IEC 1076- 4-101, and are UL 94 V- 0 rated

## System Synchronization Clocks (PXI\_CLK10, PXIe\_CLK100, PXIe\_SYNC100)

### 10 MHz System Reference Clock: PXI\_CLK10

Maximum slot-to- slot skew	500 ps
Accuracy	±25 ppm max. (guaranteed over the operating temperature range)
<b>Note</b> The 10 MHz system reference clock does not require calibration.	
Maximum jitter	5 ps RMS phase- jitter (10 Hz– 1 MHz range)
Duty- factor	45%–55%
Unloaded signal swing	3.3 V ±0. 3 V

**Note** For other specifications refer to the *PXI-1 Hardware Specification*.

### 100 MHz System Reference Clock: PXIe\_CLK100 and PXIe\_SYNC100

Maximum slot-to- slot skew	100 ps
Accuracy	±25 ppm max. (guaranteed over the operating temperature range)
Maximum jitter	3 ps RMS phase- jitter (10 Hz– 12 kHz range) 2 ps RMS phase- jitter (12 kHz– 20 MHz range)
Duty- factor for PXIe_CLK100	45%–55%
Absolute single- ended voltage swing (When each line in the differential pair has 50 W termination to 1.30 V or Thévenin equivalent)	400–1000 mV

**Note** For other specifications refer to the *PXI-5 PXI Express Hardware Specification*.

### External 10 MHz Reference Out (BNC on rear panel of chassis)

Accuracy	±25 ppm max. (guaranteed over the operating temperature range)
Maximum jitter	5 ps RMS phase- jitter (10 Hz– 1 MHz range)
Output amplitude	1 V <sub>PP</sub> ±20% square- wave into 50 Ω 2 V <sub>PP</sub> unloaded
Output impedance	50 Ω ±5 Ω

## External Clock Source

Frequency	10 MHz $\pm$ 100 PPM
Input amplitude	
Rear panel BNC	200 mV <sub>pp</sub> to 5 V <sub>pp</sub> square-wave or sine-wave
System timing slot PXI_CLK10_IN	5 V or 3.3 V TTL signal
Rear panel BNC input impedance	50 $\Omega$ $\pm$ 5 $\Omega$
Maximum jitter introduced by backplane	1 ps RMS phase-jitter (10 Hz– 1 MHz range)

#### PXIe\_SYNC\_CTRL

V <sub>IH</sub>	2.0–5.5 V
V <sub>IL</sub>	0–0.8 V

#### PXI Star Trigger

Maximum slot-to- slot skew	250 ps
Backplane characteristic impedance	65 $\Omega$ $\pm$ 10%



**Note** For PXI slot to PXI Star mapping refer to the *System Timing Slot* section of the *NI PXIe- 1082 User Manual*. For other specifications refer to the *PXI-1 Hardware Specification*.

#### PXI Differential Star Triggers (PXIe- DSTARA, PXIe- DSTARB, PXIe- DSTARC)

Maximum slot-to- slot skew	150 ps
Maximum differential skew	25 ps
Backplane differential impedance	100 $\Omega$ $\pm$ 10%



**Note** For PXIe slot to PXI\_DSTAR mapping refer to the *System Timing Slot* section of the *NI PXIe- 1082 User Manual*. For other specifications, the NI PXIe- 1082 complies with the *PXI-5 PXI Express Hardware Specification*.

### Mechanical

#### Overall dimensions

Standard chassis	
Height	6.97 in. (177.1 mm)
Width	10.68 in. (271.4 mm)
Depth	18.40 in. (396.5 mm)



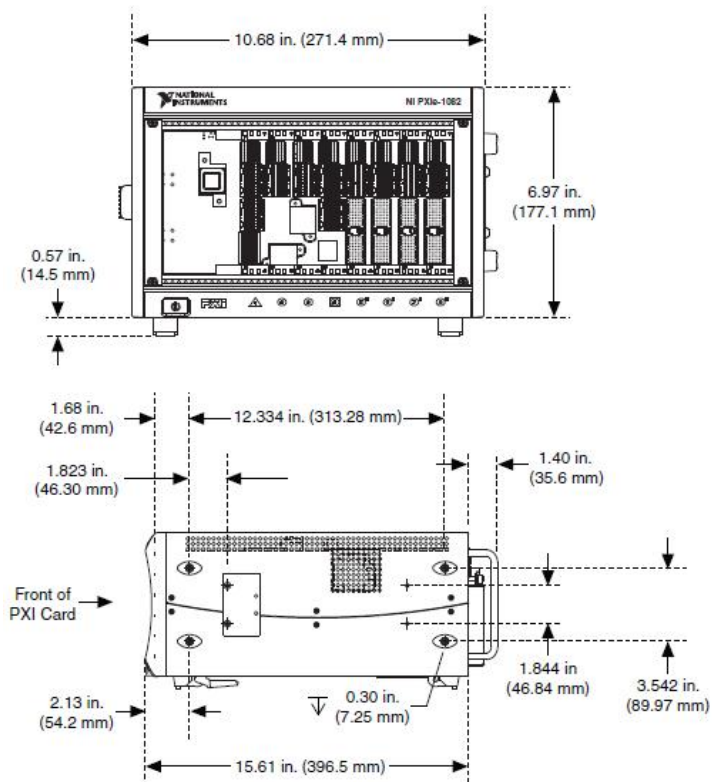
**Note** 0.57 in. (14.5 mm) is added to height when feet are installed. When tilted with front feet extended on table top, height is increased approximately 2.08 in. (52.8 mm) in front and 0.583 in. (14.8 mm) in rear.

Weight	8.8 kg ( 19.4 lb)
Chassis materials	Sheet Aluminum (5052- H32, 3003- H14, and 6061- T6), Extruded Aluminum (6060- T6), and Cold Rolled Steel, PC-ABS, Santoprene, Nylon
Finish	Conductive Clear Iridite on Aluminum, Electroplated Nickel on Cold Rolled Steel, Polyurethane Enamel

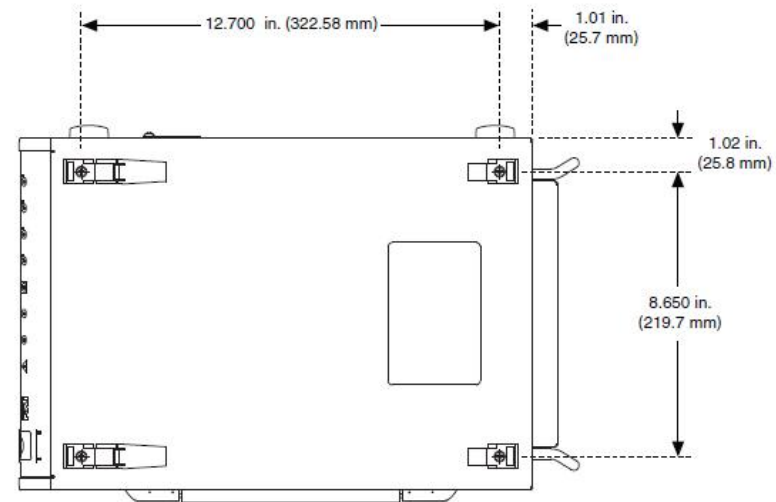
The following two figures show the NI PXIe- 1082 chassis dimensions. The holes shown are for the installation of the optional rack mount kits. You can install those kits on the front or rear of the chassis, depending on which end of the chassis you want to face toward the front of the instrument cabinet. Notice that the front and rear chassis mounting holes (size M4) are symmetrical.

#### NI PXIe- 1082 Chassis Dimensions (Front and Side)

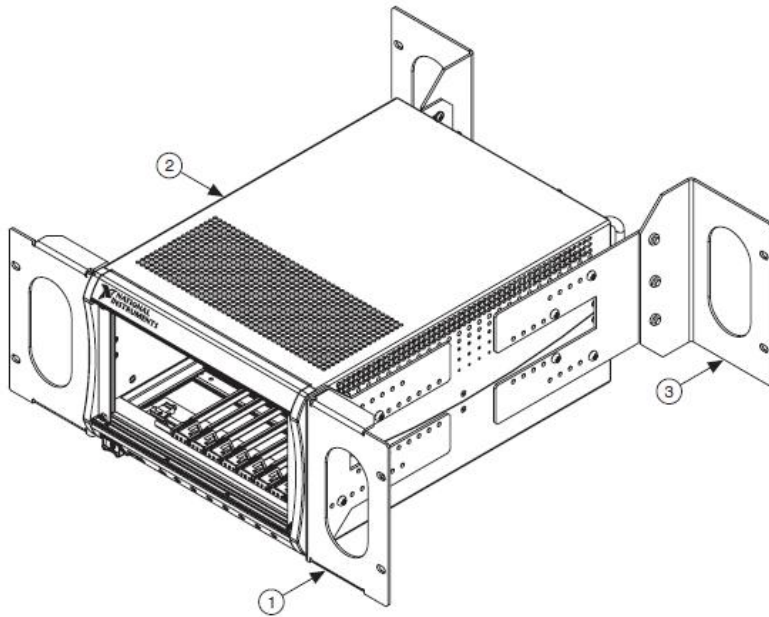




NI PXIe- 1082 Chassis Dimensions (Bottom)



NI Chassis Rack Mount Kit Components



1 Front Rack Mount Kit	2 NI Chassis	3 Optional Rear Rack Mount Kit
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**Note** The chassis shown in the previous figure is representative of the NI PXI- 1044/1045 and NI PXIe- 1082 product line. For more information on rack mounting the NI PXIe- 1082 chassis, refer to the printed installation guide included with your rack mount kit.

<sup>1</sup> The operating range is guaranteed by design.

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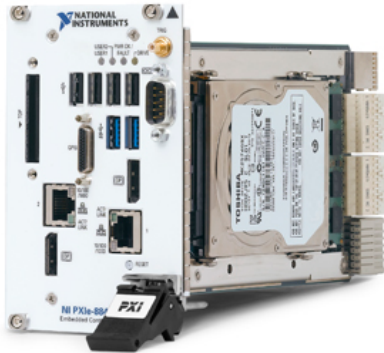
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For user manuals and dimensional drawings, visit the product page resources tab on ni.com.

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## 2.7 GHz Dual-Core Embedded Controller for PXI Express

### NI PXIe-8840



- Intel Core i5-4400E dual-core processor (2.7 GHz (base), 3.3 GHz (single-core Turbo Boost))
- Up to 2 GB of slot and system bandwidth
- 4 GB (1 x 4 GB DIMM) single-channel 1600 MHz DDR3 standard, 8 GB (1 x 8 GB DIMM) maximum
- 2 USB 3.0 ports and 4 USB 2.0 ports
- Two 10/100/1000BASE-TX Ethernet ports
- Other peripherals (ExpressCard/34 slot, 2 display port video connectors, GPIB (IEEE 488) controller, and RS232 serial port)
- Complete PXI system configuration at ni.com/pxiadvisor
- Software - OS and drivers already installed and hard-drive-based recovery image
- Compatible with Windows 7 64- or 32-bit OS

### Overview

The NI PXIe-8840 is a high-performance Intel Core i5-4400E processor-based embedded controller for PXI Express systems. With the 2.7 GHz base frequency, 3.3 GHz (single-core Turbo Boost) dual-core processor, and single-channel 1600 MHz DDR3 memory, the NI PXIe-8840 is ideal for processor-intensive, modular instrumentation, and DAQ applications.

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## Application and Technology

### NI PXIe-8840 Features

CPU	Intel Core i5-4400E, 2.7 GHz (base), 3.3 GHz (single-core Turbo Boost)
L2 cache	3 MB
System bandwidth	2 GB of slot and system bandwidth
PXI Express 4-link configuration	Four x4 links
PXI Express 2-link configuration	Two x8 links
Single-channel 1600 MHz DDR3L RAM, standard	4 GB (1 x 4 GB)
Single-channel 1600 MHz DDR3L RAM, maximum	8 GB (1 x 8 GB)
Hard drive (standard option), minimum	250 GB SATA (5400 rpm)
Hard drive (extended temperature and 24/7 option), minimum	80 GB SATA
10/100/1000BASE-TX (Gigabit) Ethernet ports	2
USB 3.0 ports	2
USB 2.0 ports	4
GPIB (IEEE 488) controller	
Serial port (RS232)	
ExpressCard/34 slot	
Watchdog/trigger SMB	
Installed OS	Windows 7 Professional 64-bit (Recommended) Windows 7 Professional 32-bit

### Dual-Core Processor

The NI PXIe-8840 includes the dual-core Intel Core i5-4400E processor. Dual-core processors contain two cores, or computing engines, in one physical package. To increase the number of threads that you can process, the NI PXIe-8840 takes advantage of Intel Hyper-Threading technology that takes each of the two physical cores and splits them into two virtual cores, for a total of four virtual cores. These four virtual cores can execute four computing tasks, which is advantageous in multitasking environments such as Windows 7. Multithreaded system development environments, such as NI LabVIEW, can take full advantage of the processing cores on the NI PXIe-8840 by automatically separating their tasks into independent threads. Figure 1 compares the SYSmark 2012 overall performance of the NI PXIe-8840 controller with other PXI embedded controllers.

The NI PXIe-8840 offers a 20 percent improvement over the NI PXIe-8115 dual-core embedded controller.

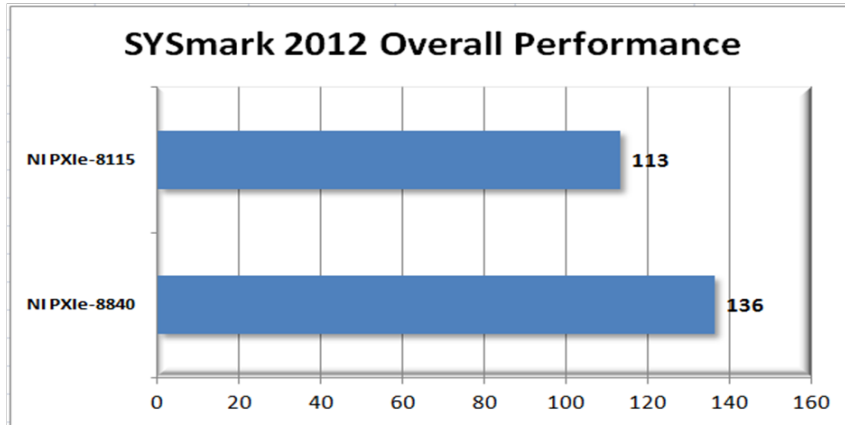


Figure 1. Embedded Controller Benchmarks (data with Windows 7 64-bit, max RAM, and SYSmark 2012)

Previously, to fully exercise the two physical cores on the NI PXIe-8840, applications had to be architected to create multiple independent execution threads by implementing programming strategies such as task parallelism, data parallelism, and pipelining. However, Intel introduced Turbo Boost technology to provide performance benefits for all types of applications without requiring the application to be optimized for multicore processors. The NI PXIe-8840 has a 2.7 GHz base clock frequency, and, with Intel Turbo Boost technology, the frequency automatically increases based on the application type. For example, when running applications that generate only a single processing thread, the CPU places the one unused core into an idle state and increases the active core's clock frequency from 2.7 GHz to 3.3 GHz.<sup>1</sup> Turbo Boost provides performance increases for all types of applications and can significantly reduce test times for processor-intensive applications.

<sup>1</sup>Processor should not throttle CPU frequency under reasonable, worst-case processor workloads in high operating temperatures.

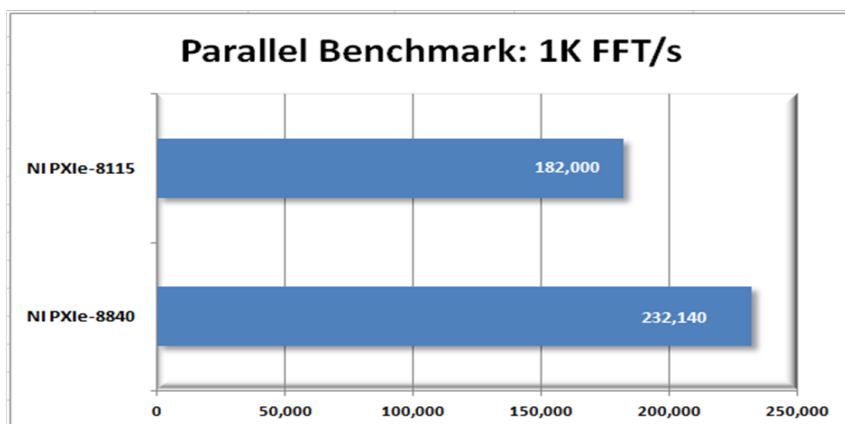


Figure 2. The NI PXIe-8840 can process 232,140 1K FFTs per second, which is 28 percent faster than the NI PXIe-8115 embedded controller.

## Hardware

With state-of-the-art packaging, the NI PXIe-8840 integrates the Intel Core i5-4400E processor and all standard and extended PC I/O ports into a single unit. Because many of the I/O ports on the controller are integrated, all active slots in the chassis remain available for measurement and control modules. This rugged controller design minimizes integration issues and eliminates the need for complex cabling to daughterboards. The NI PXIe-8840 block diagram is shown in Figure 3.

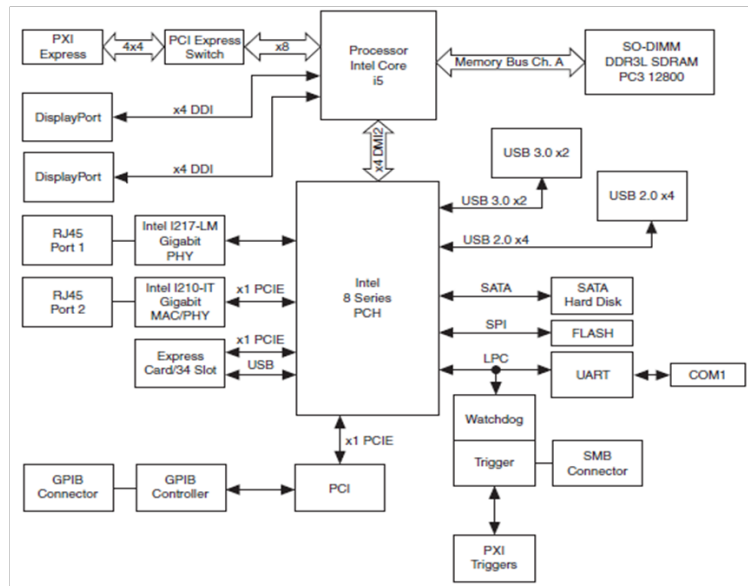


Figure 3. NI PXIe-8840 Block Diagram

## In-ROM Memory and Hard-Drive Diagnostics

To improve the serviceability of the NI PXIe-8840, In-ROM diagnostics for the hard drive and memory can be quickly accessed without requiring external third-party tools. By running these diagnostics, the results of analysis can determine if replacement of the hard drive or memory is required. The design of the controller allows for quick field replacement of critical components such as the hard drive and the memory without affecting the warranty. To ease the process of buying spare components, you can purchase hard drive and memory upgrades with the NI PXIe-8840. The combination of this and the In-ROM diagnostics significantly improves NI PXIe-8840 serviceability.

## Peripheral I/O

This module includes high-performance peripheral I/O such as two 10/100/1000BASE-TX (Gigabit) Ethernet ports, two USB 3.0 ports, and four USB 2.0 ports for connection to a keyboard, mouse, CD-ROM/DVD-ROM drive for software installation, or other standard PC peripherals such as speakers, printers, or memory sticks. You can use an RS232 port to connect to serial devices. Additionally, the NI PXIe-8840 controller includes an integrated GPIB (IEEE 488) controller, which controls external instrumentation, saving additional cost and a slot.

## Building Hybrid Test Systems

The NI PXIe-8840 has two Ethernet ports, which enable the development of a hybrid test system. With the ability to use the second Ethernet port, you can combine multiple buses in your test systems. By taking advantage of hybrid test systems that combine components from multiple platforms, you can integrate new buses into existing test systems to help balance design considerations, take advantage of a variety of technologies, and extend the life of your systems.

## ExpressCard

This embedded controller features an ExpressCard/34 slot. ExpressCard uses the PCI Express and Hi-Speed USB serial interfaces to provide up to 2.5 Gbit/s of bidirectional throughput. Use the ExpressCard/34 slot to add a third Gigabit Ethernet port to your system or additional peripheral I/O such as external hard drives, RAID arrays, 802.11 wireless LAN, IEEE 1394, Bluetooth, or various memory adapters.

## Video

The NI PXIe-8840 delivers intense, realistic 3D graphics with sharp images, fast rendering, smooth motion, and high detail but without the need for an additional video card or peripheral. This unique architecture provides balanced memory usage between graphics and the system for optimal performance.

Additionally, the NI PXIe-8840 features two DisplayPort 1.2 video connectors. A DisplayPort to VGA adapter is included with the controller for use with VGA monitors. For information on approved DisplayPort to DVI adapters, refer to this [KnowledgeBase](#).

For more information, refer to the NI website at [ni.com/info](http://ni.com/info) and enter the Info Code *displayport*.

## Dual Monitor Support

The dual DisplayPort video ports on the NI PXIe-8840 support simultaneous output. With this built-in capability, you can connect two monitors to your PXI system at the same time with independent displays. This negates the need for a separate PXI or CompactPCI video module to connect two monitors to your PXI system.

## Memory

The NI PXIe-8840 uses single-channel 1600 MHz DDR3L RAM, which makes the controller ideal for data-intensive applications requiring significant analysis. It has a single SO-DIMM socket for the DDR3L RAM. 4 GB (1 x 4 GB DIMM) of RAM is standard with an 8 GB upgrade option.

Memory Option	Configuration	Part Number
4 GB	1 x 4 GB DIMM	Standard, no additional part number required
8 GB	1 x 8 GB DIMM	Add 1 x 783001-8192

Table 2. Memory Upgrade Options

## Extended Temperature and 24/7 Operation Option

By using solid-state disks (SSDs), the NI PXIe-8840 can address different environmental and usage conditions. These SSD upgrades use a drive that is designed for both reliability in low- and high-temperature extremes and 24/7 operation. The standard version of the controllers has an operating temperature of 5 °C to 50 °C and a storage temperature of -40 °C to 65 °C. With an extended temperature SSD, the operating temperature is 0 °C to 55 °C and the storage temperature is -40 °C to 70 °C.

You can also use controllers with an SSD upgrade for applications that require continuous operation for up to 24 hours/day, seven days/week because the hard drive is rated for 24/7 operation. The hard drive in the standard version of the controller is designed to be powered on for eight hours/day, five days/week. Additionally, 24/7 operation applications may subject the hard drive to a high-duty cycle (the percentage of the maximum sustained throughput of the hard drive). The hard drive in the extended temperature and 24/7 operation version has a capacity of 80 GB (minimum). See specifications for further details.

## USB Peripherals

NI offers a USB-to-dual-PS/2 keyboard/mouse adapter cable to connect a legacy PS/2 keyboard and mouse to a single USB port on your embedded controller. Additionally, NI provides external USB CD-ROM/DVD-ROM for use with your embedded controller. Connect these drives to your embedded controller for easy software installation and upgrades.

Both are powered through the USB ports, so no external power connections are required. Additional USB peripherals, such as USB speakers to add audio or USB memory sticks to add easily removable memory, are available from PC peripheral manufacturers.

## Hard-Drive-Based Recovery Image

The NI PXIe-8840 embedded controller is shipped with a factory image of the software installation stored on a separate partition of the hard drive. In the case of software corruption, you can invoke a recovery tool during the controller's boot-up process that can use this backup image to restore the controller to its shipping software configuration. You also can use this recovery tool to create custom images that you can store on external mass storage devices such as a USB memory stick, USB hard drives, and USB CD/DVD drives. With this ability, you can create custom backup images that you can use to either recover an NI PXIe-8840 controller or replicate the installation on other NI PXIe-8840 controllers. For more information on this tool, refer to [KnowledgeBase 2ZKC02OK](#).

## Software

The NI PXIe-8840 comes with the following minimum set of software already installed:

- Microsoft Windows 7 Professional OS (contact NI or visit [ni.com/pxiadvisor](http://ni.com/pxiadvisor) for localized versions of Windows 7 and for other available OSs)
- Hard-drive-based recovery image
- NI-VISA and NI-488.2 drivers
- Drivers for all built-in I/O ports

With an NI system assurance program (Base or Standard) added to your PXI system order, your embedded controller is shipped already configured with all software and drivers applicable for your system. For example, assume you order a PXI system that includes NI LabVIEW and NI TestStand software as well as DAQ modules, a digitizer, an arbitrary waveform generator, and a digital multimeter (DMM). With an NI system assurance program, NI not only assembles and tests your system but also fully configures the embedded controller with the appropriate NI-DAQmx, NI-SCOPE, NI-FGEN, and NI-DMM drivers as well as LabVIEW and NI TestStand software.

Additionally, your embedded controller is configured with a customized hard-drive-based recovery image, so you can restore your controller to the as-shipped configuration at any time. This combination of software configuration and recovery tools provides both a productive and reliable development experience with your PXI system out of the box. To configure a complete PXI system with an NI system assurance program, contact National Instruments or visit [ni.com/pxiadvisor](http://ni.com/pxiadvisor).

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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](http://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](http://ni.com/calibration).

### Technical Support

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

- **Support** - Visit [ni.com/support](http://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](http://forums.ni.com) for a diverse set of discussion boards on topics you care about.
- **Online Community** - Visit [community.ni.com](http://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](http://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](http://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](http://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](http://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](http://ni.com/alliance).

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Česká Republika  
800 142 669  
ni.czech@ni.com

## NI PXI-6251

### 16-Bit, 1 MS/s (Multichannel), 1.25 MS/s (1-Channel), 16 Analog Inputs

- 16 analog inputs, 1.25 MS/s 1-channel, 1 MS/s multichannel; 16-bit resolution,  $\pm 10$  V
- Correlated DIO (8 clocked lines, 10 MHz); analog and digital triggering
- NIST-traceable calibration certificate and more than 70 signal conditioning options
- NI-MCal calibration technology for increased measurement accuracy
- Get improved measurement accuracy, resolution, and sensitivity by choosing high-accuracy M Series.
- NI-DAQmx driver software and NI LabVIEW SignalExpress interactive data-logging software



## Overview

The National Instruments PXI-6251 is a high-speed multifunction M Series data acquisition (DAQ) board optimized for superior accuracy at fast sampling rates. For increased measurement accuracy, consider the high-accuracy M Series devices with an 18-bit analog-to-digital converter providing a 4X resolution increase.

High-speed M Series devices incorporate advanced features such as the NI-STC 2 system controller, NI-PGIA 2 programmable amplifier, and NI-MCal calibration technology to increase performance and accuracy. High-speed M Series devices have an onboard NI-PGIA 2 amplifier designed for fast settling time at high scanning rates, ensuring 16-bit accuracy even when measuring all channels at maximum speeds. To learn more about M Series technologies, device specifications, and information on recommended cables and accessories, please refer to the data sheet and specifications.

#### Driver Software

M Series devices work with multiple operating systems using three driver software options including NI-DAQmx, NI-DAQmx Base, and the Measurement Hardware DDK. Browse the information in the Resources tab to learn more about driver software or download a driver. M Series devices are not compatible with the Traditional NI-DAQ (Legacy) driver.

#### Application Software

With NI LabVIEW, you can create custom data acquisition applications with the ease of graphical programming and power of more than 500 analysis functions and advanced programming tools. LabVIEW Full and Professional Development Systems include LabVIEW SignalExpress for interactive data logging. M Series data acquisition devices are compatible with the following versions (or later) of NI application software – LabVIEW 7.x, LabWindows™/CVI 7.x, or Measurement Studio 7.x; LabVIEW SignalExpress 1.x; or LabVIEW with the LabVIEW Real-Time Module 7.1. M Series data acquisition devices are also compatible with Visual Studio .NET, C/C++, and Visual Basic 6.

## Specifications

### Specifications Documents

- Specifications
- Data Sheet

### Specifications Summary

General

Product Name	PXI-6251
Product Family	Multifunction Data Acquisition
Form Factor	PXI Platform
PXI Bus Type	PXI Hybrid Compatible
Part Number	779117-01
Operating System/Target	Windows , Real-Time , Linux , Mac OS
LabVIEW RT Support	Yes
Power Requirement for +3.3V Rail	1.2 A
Power Requirement for +5V Rail	0.03 A
Power Requirement for +12V Rail	0.38 A
Power Requirement for -12V Rail	0 A
Slot Two Module	No
Module Width	1
MXI Compatible	Yes
DAQ Product Family	M Series
Measurement Type	Quadrature encoder , Digital , Voltage , Frequency
RoHS Compliant	Yes
<b>Analog Input</b>	
Channels	16 , 8
Single-Ended Channels	16
Differential Channels	8
Resolution	16 bits
Sample Rate	1.25 MS/s
Max Voltage	10 V
Maximum Voltage Range	-10 V , 10 V
Maximum Voltage Range Accuracy	1920 $\mu$ V
Maximum Voltage Range Sensitivity	112 $\mu$ V
Minimum Voltage Range	-100 mV , 100 mV
Minimum Voltage Range Accuracy	52 $\mu$ V

Minimum Voltage Range Sensitivity	6 $\mu$ V
Number of Ranges	7
Simultaneous Sampling	No
On-Board Memory	4095 samples
Analog Output	
Channels	2
Resolution	16 bits
Max Voltage	10 V
Maximum Voltage Range	-10 V , 10 V
Maximum Voltage Range Accuracy	2080 $\mu$ V
Minimum Voltage Range	-5 V , 5 V
Minimum Voltage Range Accuracy	1045 $\mu$ V
Update Rate	2.86 MS/s
Current Drive Single	5 mA
Digital I/O	
Bidirectional Channels	24
Input-Only Channels	0
Output-Only Channels	0
Number of Channels	24 , 0
Timing	Software , Hardware
Max Clock Rate	10 MHz
Logic Levels	TTL
Input Current Flow	Sinking , Sourcing
Output Current Flow	Sinking , Sourcing
Programmable Input Filters	Yes
Supports Programmable Power-Up States?	Yes
Current Drive Single	24 mA
Current Drive All	448 mA
Watchdog Timer	No

Supports Handshaking I/O?	No
Supports Pattern I/O?	Yes
Maximum Input Range	0 V , 5 V
Maximum Output Range	0 V , 5 V
<b>Counter/Timers</b>	
Counters	2
Number of DMA Channels	2
Buffered Operations	Yes
Debouncing/Glitch Removal	Yes
GPS Synchronization	No
Maximum Range	0 V , 5 V
Max Source Frequency	80 MHz
Pulse Generation	Yes
Resolution	32 bits
Timebase Stability	50 ppm
Logic Levels	TTL
<b>Physical Specifications</b>	
Length	16 cm
Width	10 cm
I/O Connector	68-pin VHDCI female
<b>Timing/Triggering/Synchronization</b>	
Triggering	Digital , Analog
Synchronization Bus (RTSI)	Yes

## Pricing

### NI PXI-6251 Packages

To use the NI PXI-6251 , you need all items in the diagram below. Select Option 1 if you already own a PXI System, or Option 2 if you do not already own a chassis, controller, or software.

Roll over the icons below to learn why you need each item in the system

PXI System

1	1 Cable	NI	Chassis	Controller	Software
Connector		PXI-6251			
Block					

NI PXI-6251 and Accessories Only

- Option 1: NI PXI-6251 and Accessories Only
- Option 2: PXI System

NI PXI-6251

Standard Board	Qty		Kč 29 900 each
779631-01			

Board for SCXI Control in PXI/SCXI Combination Chassis	Qty	0	Kč 29 900 each
779117-01			

Required Accessories

Connector Block - Screw Terminal	Qty		Kč 7 590 each
SCB-68 - 776844-01			

Cable - Shielded	Qty		Kč 3 390 each
SHC68-68-EPM Cable (2m) - 192061-02			

Select length:

- 1m
- 2m
- 5m
- 10m
- 0.5m

Change Accessories

Learn about all compatible accessories and get recommendations based on your application needs.

Optional Accessories Show

Estimated Shipping Days: 5 - 10

Package Price: Kč 40 880

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[Save for Later](#)

Get Started with PXI

Choose from hundreds of specialized instruments to create a PXI System that suits your measurement needs and can scale for future applications. Then, we'll help you choose the right hardware and software to complete your configuration.

### Add More Measurements and I/O Modules

Use the PXI Advisor to choose from a variety of modules including analog I/O, digital I/O, switching and more. Then, complete and price the PXI System.

### Add Modules

### Preview a Complete System

View and price a complete PXI configuration including the NI PXI-6251, chassis, and controller. Starting from the default configuration, you can add modules, accessories, and software and customize your system.

### View and Price a Configured System

Since your device does not have direct signal connectivity, you need a connector block to act as an interface between your sensors/signals and your device. A connector block provides easy access to the inputs and outputs of your hardware. You need a cable to transmit signals between your device and your signal connections on your connector block. The chassis provides rugged, modular housing for the controller and modules and contains the high-performance PXI backplane, which includes the system's data, timing, and triggering buses. The controller runs your application and interfaces with your PXI modules. You need software to interface with your hardware and to collect, analyze, present, and store your measurements. This board is compatible with a variety of programming languages, including LabVIEW, C/C++, Visual Basic, and .NET. LabVIEW provides the easiest integration with all of your NI hardware and is recommended to maximize your hardware investment. You have selected Česká Republika as the country where you will use the product(s) (change).

## Services

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### System Assurance Programs

Reduce your setup time and total cost of ownership, and get a system you can use out of the box with National Instruments system assurance programs. System assurance programs include:

- Installation and integration test of all individual hardware
- Courtesy installation of system driver sets and application development environments
- Extended warranty and calibration coverage for up to five years
- Custom documentation plus a custom restore and startup utility

This service is only available for PXI, NI CompactRIO, and NI Compact FieldPoint systems.

- Learn More about System Configuration and Deployment Services [<http://www.ni.com/services/configuration.htm>]
- Customize Your CompactRIO System [<http://ohm.ni.com/advisors/crio>]
- Customize Your Compact FieldPoint System [<http://ohm.ni.com/advisors/cfp>]
- Customize Your PXI System [<http://ohm.ni.com/advisors/pxi>]
- Talk to an Expert about Custom System Configurations [[javascript:openCallMeWindowCTA\(document.referrer,%20'US'\)](javascript:openCallMeWindowCTA(document.referrer,%20'US'))]

### Extended Warranties

National Instruments designs and manufactures all products to minimize failures, however unexpected failures can still occur. Extended warranties provide a fixed economical price at the time of system purchase, covering any repair costs for up to three years. In addition, they offer the following benefits:

- Significant cost savings compared to individual repair incidents
- Fault location, diagnostics, and repair by NI any time the system product fails
- All parts and labor costs covered as well as any adjustments needed to restore the hardware to manufacturing specifications

For more information about your warranty options:

- Learn More about Warranty Services [<http://www.ni.com/services/warranty.htm>]

- [Talk to an Expert about Extended Warranties](#) [javascript:openCallMeWindowCTA(document.referrer,%20'US')] ]
- [View Warranty Repair Policies](http://www.ni.com/services/warranty_repair_policies.htm) [http://www.ni.com/services/warranty\_repair\_policies.htm]

## Calibration

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. NI provides manual calibration procedures, services to recalibrate your products, and automated calibration software to calibrate many NI measurement products.

- [Learn More about Calibration Services](http://www.ni.com/services/calibration.htm) [http://www.ni.com/services/calibration.htm]

## Training

NI training is the fastest, most certain route to productivity with NI tools and successful application development.

- [Learn More about NI Training and Certification](http://www.ni.com/training/) [http://www.ni.com/training/]
- [Find a Course Near You and View Schedules](http://sine.ni.com/apps/utf8/nisv.custed) [http://sine.ni.com/apps/utf8/nisv.custed]

## Repair Services

Return your registered product under warranty at no additional labor and parts cost. NI offers fault location, diagnostics, and repair any time the system fails as well as any adjustments needed to restore the hardware to manufacturing specifications.

- [Learn More about Repair Services](http://www.ni.com/services/warranty.htm) [http://www.ni.com/services/warranty.htm]
- [Contact NI to Obtain a Return Material Authorization \(RMA\) Form and Shipping Instructions](http://sine.ni.com/apps/utf8/nicc.call_me) [http://sine.ni.com/apps/utf8/nicc.call\_me]
- [View Your RMA Support Request Status Online](http://www.ni.com/support/servicereq/) [http://www.ni.com/support/servicereq/]
- [Register Your Product](http://www.ni.com/register) [http://www.ni.com/register]

## Technical Support

[ni.com/support](http://www.ni.com/support) [http://www.ni.com/support/]

## Resources

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### Additional Product Information

- [Manuals \(6\)](#)
- [Dimensional Drawings](#)
- [Product Certifications](#)

### Related Information

- [Obtain superior accuracy in your measurements with 18-bit, high-accuracy M Series](#)
- [Upgrade to S Series with simultaneous sampling](#)
- [Learn about LabVIEW Graphical Programming](#)
- [Learn about Data Acquisition Driver Software](#)
- [Learn about academic pricing and product kits](#)
- [Obtain OEM pricing information](#)
- [Download NI drivers](#)
- [Read More About NI Software Maintenance and Support](#)
- [View an introductory video on getting started with NI data acquisition](#)

