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

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2.3 GHz Quad-Core Embedded Controller for PXI Express

NI PXIe-8135



- Intel Core i7-3610QE quad-core processor (2.3 GHz (base), 3.3 (single-core Turbo Boost))
- Up to 8 GB/s system, up to 4 GB/s slot bandwidth
- 4 GB (1 x 4 GB DIMM) dual-channel 1600 MHz DDR3 standard, 16 GB (2 x 8 GB DIMM) maximum
- High-performance 7200 rpm integrated hard drive with standard option
- Six USB ports - 2 SuperSpeed USB, 4 Hi-Speed USB
- Two 10/100/1000BASE-TX Ethernet ports
- Other peripherals (GPIB (IEEE 488) controller, RS232 serial port, and IEEE 1284 ECP/EPP parallel port)
- In-ROM memory and hard drive diagnostics
- Software - already installed OS and drivers and hard-drive-based recovery image
- Complete PXI system configuration at ni.com/pxiadvisor

Overview

The NI PXIe-8135 is a high-performance Intel Core i7-3610QE processor-based embedded controller for PXI Express systems. With the 2.3 GHz base frequency, 3.3 GHz (single-core Turbo Boost) quad-core processor, and dual-channel 1600 MHz DDR3 memory, the NI PXIe-8135 is ideal for processor-intensive, modular instrumentation, and data acquisition applications.

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Requirements and Compatibility

OS Information

- Windows 7
- Windows XP

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Application and Technology

NI PXIe-8135 Features

CPU	Intel Core i7-3610QE, 2.3 GHz (base), 3.3 GHz (single-core Turbo Boost mode), 3.2 GHz (dual-core Turbo Boost mode), 3.1 GHz (quad-core Turbo Boost mode)[1]
L3 cache	6 MB shared Intel smart cache
System bandwidth	Up to 8 GB/s
Slot bandwidth	Up to 4 GB/s
PXI Express 4-link configuration	Four x4 links or two x8 links
Dual-channel 1600 MHz DDR3 RAM, standard	4 GB (1 x 4 GB)
Dual-channel 1600 MHz DDR3 RAM, maximum	16 GB (2 x 8 GB)

Hard drive (standard option), minimum	250 GB SATA (7200 rpm)
Hard drive (extended temperature and 24/7 option), minimum	80 GB SATA (5400 rpm)
10/100/1000BASE-TX (Gigabit) Ethernet ports	2
SuperSpeed USB ports	2
Hi-Speed USB ports	4
GPIB (IEEE 488) controller	
Serial port (RS232)	
Parallel port	
Watchdog/trigger SMB	
Installed OS[2]	Windows 7 Professional, Windows XP Professional SP3 for Embedded Systems[3]

[1] Processor should not throttle CPU frequency under reasonable, worst-case processor workloads in high operating temperature.

[2] Contact National Instruments or visit ni.com/pxiadvisor for information on other available operating systems.

[3] Windows XP Pro for Embedded Systems contains the same software bits and operates identically to Windows XP Pro. The main difference is the licensing that is used for Windows XP Pro for Embedded Systems.

Due to the Microsoft support life cycle for Windows XP, National Instruments will be unable to provide PXI embedded controllers with Windows XP preinstalled after 2015. View the Microsoft support life cycle for full details about Windows XP end of life for OEM partners.

Table 1. NI PXIe-8135 Features

Quad-Core Processor

The NI PXIe-8135 includes the quad-core Intel Core i7-3610QE processor. Quad-core processors contain four cores, or computing engines, in one physical package. To increase the number of threads that you can process, the NI PXIe-8135 incorporates Intel Hyper-Threading technology that takes each of the four physical cores and splits them into two virtual cores, for a total of eight virtual cores. These eight virtual cores can execute eight 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-8135 by automatically separating their tasks into independent threads. Figure 1 compares the SYSmark 2012 overall performance of the NI PXIe-8135 controller with other PXI embedded controllers.

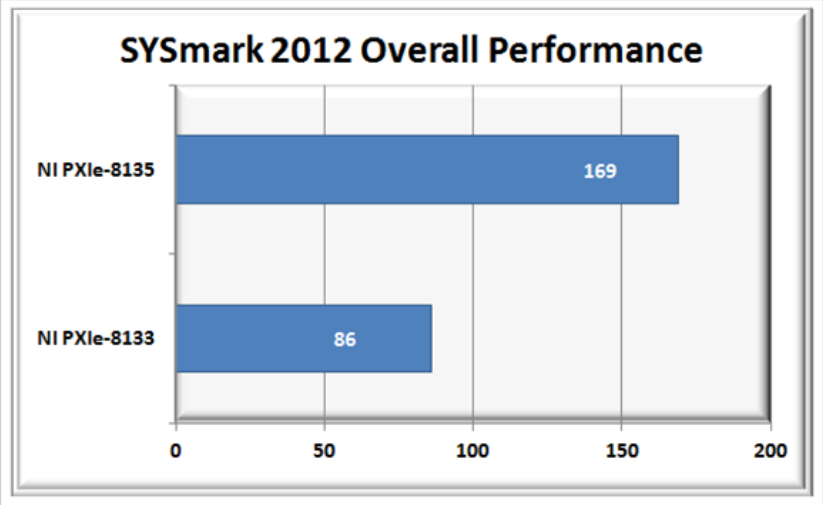


Figure 1. The NI PXIe-8135 provides up to 97 percent better performance than the NI PXIe-8133 embedded controller.

Previously, to fully exercise the four physical cores on the NI PXIe-8135, applications had to be architected to create four 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-8135 has a 2.3 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 three unused cores into an idle state and increases the active core's clock frequency from 2.3 to 3.3 GHz.[1] For applications that are processing two threads, the CPU places the two unused cores into an idle state and increases the active core's clock frequency from 2.3 to 3.2 GHz.[1] For applications using four threads, the CPU increases from 2.3 to 3.1 GHz.[1] Turbo Boost provides performance increases for all types of applications and can significantly reduce test times for applications that are processor-intensive.

[1]Processor should not throttle CPU frequency under reasonable, worst-case processor workloads in high operating temperatures.

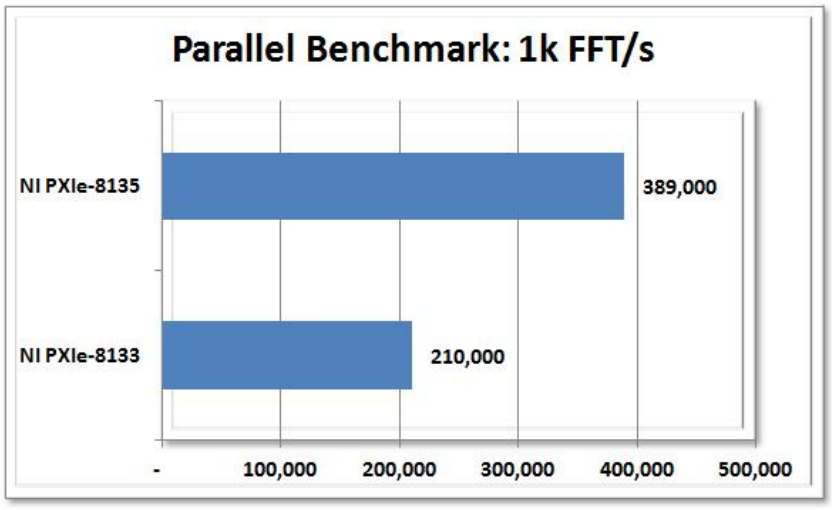


Figure 2. The NI PXIe-8135 can process 389,000 1K FFTs per second, which is up to 85 percent faster than the NI PXIe-8133 embedded controller.

High Bandwidth

This controller features the Intel Core i7-3610QE processor and takes advantage of advancements in PCI Express technology. This processor provides four x4 (“by four”) PCI Express Gen 2 lanes to the PXI chassis backplane. This generates up to 4 GB/s of dedicated slot bandwidth with the overall system bandwidth of up to 8 GB/s. Pairing the NI PXIe-8135 with a PXI Express chassis, such as the NI PXIe-1085, you can simultaneously stream a larger set of I/O channels to the controller’s system RAM, allowing for the creation of larger and more complex data record and playback applications. For example, by using an NI PXIe-1085 PXI Express chassis and an NI PXIe-8135 embedded controller, you can stream data from 32 input channels with 16-bit resolution sampled at 100 MS/s into system memory for analysis or postprocessing.

Building Hybrid Test Systems

The NI PXIe-8135 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 into 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 various technologies, and extend the life of your systems.

Hardware

With state-of-the-art packaging, the NI PXIe-8135 integrates the Intel Core i7-3610QE 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 daughter boards. The NI PXIe-8135 block diagram is shown in Figure 3.

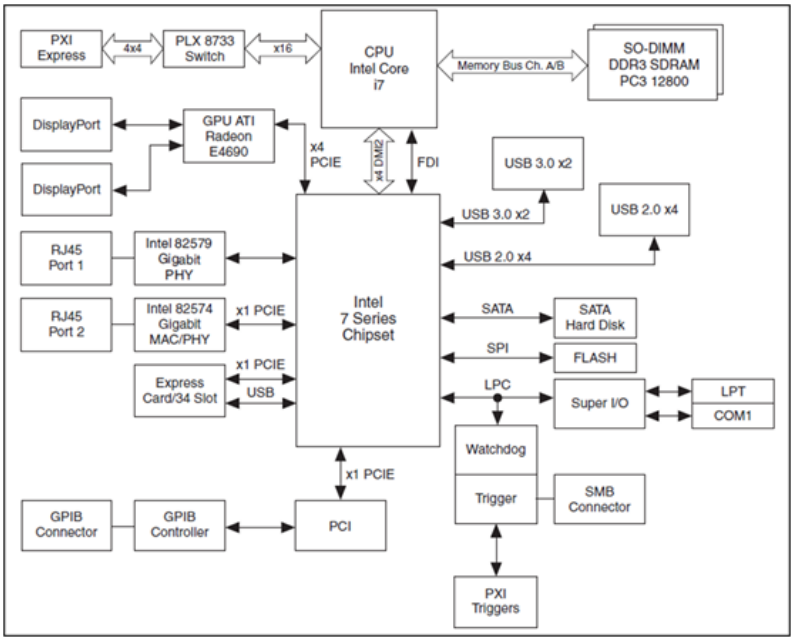


Figure 3. NI PXIe-8135 Block Diagram

Peripheral I/O

This module includes high-performance peripheral I/O such as two 10/100/1000BASE-TX (Gigabit) Ethernet ports, two SuperSpeed USB ports, and four Hi-Speed USB 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. Use the IEEE 1284 ECP/EPP parallel port to connect to a wide variety of devices, including tape backup drives and printers. An RS232 port is available for connecting to serial devices. Additionally, the NI PXIe-8135 controller includes an integrated GPIB (IEEE 488) controller, which provides control of external instrumentation, saving additional cost and a slot.

Video

The NI PXIe-8135 includes an integrated ATI Radeon E4690 graphics processing unit, which delivers intense, realistic 3D graphics with sharp images, fast rendering, smooth motion, and high detail, 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-8135 features two Display Port video connectors. A Display Port to VGA adapter is included with the controller for use with VGA monitors. For information on approved Display Port to DVI adapters, reference this KnowledgeBase.

Dual Monitor Support

The dual Display Port video ports on the NI PXIe-8135 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-8135 uses dual-channel 1600 MHz DDR3 SDRAM, which makes the controller ideal for data-intensive applications requiring significant analysis. It has two SO-DIMM sockets for the DDR3 SDRAM. 4 GB (1 x 4 GB DIMM) of RAM is standard with upgrade options to 16 GB.

Memory Options	Configuration	Part Number	
		Included in Kit	Additional P/N Required
Standard - 4 GB	1 x 4 GB DIMM	1 x 4 GB DIMM	N/A
8 GB	2 x 4 GB DIMM	1 x 4 GB DIMM	Add 1 x 782341-4096
12 GB	1 x 4 GB DIMM and 1 x 8 GB DIMM	1 x 4 GB DIMM	Add 1 x 782341-8192
16 GB	2 x 8 GB DIMM	N/A	2 x 782341-8192

Table 2. Memory Upgrade Options

Extended Temperature and 24/7 Operation Option

You can choose from two versions of the NI PXIe-8135 embedded controller to address different environmental and usage conditions. The primary difference between the versions is that the version for extended temperature and 24/7 operation uses a different hard 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 to 50 °C and a storage temperature of -40 to 65 °C. The extended temperature and 24/7 operation version has an operating temperature of 0 to 55 °C and a storage temperature of -40 to 70 °C.

You can also use the extended temperature and 24/7 operation version 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 controllers 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

National Instruments 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 offers external USB CD-ROM/DVD-ROM and USB floppy drives for use with your embedded controller. Connect these drives to your embedded controller for easy software installation and upgrades. Both are completely 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 widely available from PC peripheral manufacturers.

In-ROM Memory and Hard-Drive Diagnostics

To improve the serviceability of the NI PXIe-8135, 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-8135. The combination of this and the in-ROM diagnostics significantly improves NI PXIe-8135 serviceability.

Hard-Drive-Based Recovery Image

The NI PXIe-8135 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-8135 controller or replicate the installation on other NI PXIe-8135 controllers. For more information on this tool, refer to KnowledgeBase 2ZKC02OK.

Software

The NI PXIe-8135 comes with the following minimum set of software already installed:

- Microsoft Windows 7 Professional OS (contact National Instruments or visit ni.com/pxiadvisor for localized versions of Windows XP 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 data acquisition 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.

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.

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Support and Services

System Assurance Programs

NI system assurance programs are designed to make it even easier for you to own an NI system. These programs include configuration and deployment services for your NI PXI, CompactRIO, or Compact FieldPoint system. The NI Basic System Assurance Program provides a simple integration test and ensures that your system is delivered completely assembled in one box. When you configure your system with the NI Standard System Assurance Program, you can select from available NI system driver sets and application development environments to create customized, reorderable software configurations. Your system arrives fully assembled and tested in one box with your software preinstalled. When you order your system with the standard program, you also receive system-specific documentation including a bill of materials, an integration test report, a recommended maintenance plan, and frequently asked question documents. Finally, the standard program reduces the total cost of owning an NI system by providing three years of warranty coverage and calibration service. Use the online product advisors at ni.com/advisor to find a system assurance program to meet your needs.

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.
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- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

NI offers options for extending the standard product warranty to meet the life-cycle requirements of your project. In addition, because NI understands that your requirements may change, the extended warranty is flexible in length and easily renewed. For more information, visit ni.com/warranty.

OEM

NI offers design-in consulting and product integration assistance if you need NI products for OEM applications. For information about special pricing and services for OEM customers, visit ni.com/oem.

Alliance

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide National Instruments Alliance Partner program of more than 700 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit ni.com/alliance.

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Detailed Specifications

This appendix lists the electrical, mechanical, and environmental specifications of the NI PXIe-8135 embedded controller.

Features

	NI PXIe-8135
CPU	Intel Core i7 3610 QE
CPU Frequency	2.3 GHz (base), 3.3 GHz (single-core Turbo mode)
On-die L2 cache	256 KB x4 (256 KB per core)
Dual-Channel DDR3 RAM, PC3 12800	4 GB Standard 16 GB Maximum
Hard Drive	250 GB or larger Serial ATA*
Ethernet	10/100/1000 BaseTX, 2 ports
PXI Express 4 Link Configuration	x4, x4, x4, x4
PXI Express 2 Link Configuration	x8, x8
GPIB (IEEE 488 Controller)	Yes
Serial Ports (RS-232)	Yes (1)
Parallel Port	Yes (1)
Hi-Speed USB (2.0) Ports	Yes (4)
Hi-Speed USB (3.0) Ports	Yes (2)
ExpressCard/34 Slot	Yes
PS/2 Keyboard/Mouse Connector	No

PXI Express Trigger Bus Input/Output	Yes

NI PXIe-8135	
Installed Operating System	Windows 7 Professional, Windows XP Professional SP3 for Embedded Systems
* Extended-temperature 24/7 option provides 80 GB minimum hard drive. Controllers configured for LabVIEW RT provide a 80 GB (minimum) SATA hard drive.	

Electrical

Voltage (V)	Current (Amps)	
	Typical	Maximum
+3.3 V	3.75 A	5.4 A
+5 V	1.5 A	2.0 A
+12 V	3.5 A	5.0 A
–12 V	0.00 A	0.00 A
+5 V Aux	0.3 A	0.4 A

Physical

Board dimensions	Four-wide 3U PXI Express module
Slot requirements	One system slot plus three controller expansion slots
Compatibility	Fully compatible with PXI Express Specification 1.0
Weight	1.30 kg (2.87 lb) typical
Environmental	
Maximum altitude	2,000 m (800 mbar) (at 25 °C ambient temperature)
Pollution Degree	2
Indoor use only.	

Caution Clean the NI PXIe-8135 with a soft nonmetallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

NI PXIe-8135

Ambient temperature range	
Standard	5 to 50 °C1 (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 high temperature limit.)
Extended Temperature	
Option	0 to 55 °C1 (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.)

Caution The operating temperature must not be exceeded, even when used in a chassis with a higher temperature range.

Storage Environment

NI PXIe-8135

Ambient temperature range	
Standard	–40 to 65 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2. Meets MIL-PRF-28800F Class 3 low temperature limit.)
Extended Temperature	
Option	–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

Operating 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		
Operating		5 to 500 Hz, 0.3 g_{rms} (with solid-state hard drive)
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-28800F, Class 3.)

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.

Caution Using the NI PXIe-8135 in a manner not described in this document may impair the protection the NI PXIe-8135 provides.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

• EN 61326-1 (IEC 61326-1): 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 In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generates radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations and certifications, and additional information, refer to the Online Product Certification section.

CE Compliance

This product meets the essential requirements of applicable European Directives as follows:

• 2006/95/EC; Low-Voltage Directive (safety)

• 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

To obtain product certifications and the Declaration of Conformity (DoC) for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the NI and the Environment Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers At the end of the product life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste and Electronic Equipment, visit ni.com/environment/weee.

Battery Replacement and Disposal

This device contains a long-life coin cell battery. If you need to replace it, use the Return Material Authorization (RMA) process or contact an authorized National Instruments service representative. For more information about compliance with the EU Battery Directive 2006/66/EC about Batteries and Accumulators and Waste Batteries and Accumulators, visit ni.com/environment/batterydirective.

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