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

Last Revised: 2014-11-06 07:14:06.0

2.26 GHz Intel Core 2 Duo Quad-Core Real-Time Embedded Controller for PXI

NI PXI-8110 RT

- Intel Core 2 Quad Q9100 processor (2.26 GHz quad core)
- 2 GB (1 x 2 GB DIMM) dual-channel 800 MHz DDR2 RAM standard
- Execution target for NI LabVIEW Real-Time Version 8.6.1 or later applications
- Execution target for NI LabWindows/CVI Real-Time 9.0 or later applications
- 129 kHz single PID loop rate, maximum

- 10/100/1000BASE-TX Ethernet port and four Hi-Speed USB ports
- Other peripherals (ExpressCard/34 slot, DVI-I video connector, IEEE 1284 ECP/EPP parallel port, GPIB (IEEE 488) controller, and RS232 serial port)
- Reliable and deterministic operation
- Complete PXI system configuration at ni.com/pxiadvisor

Overview

National Instruments RT Series PXI embedded controllers deliver a flexible, rugged platform for your deterministic, real-time measurement and control applications. The NI PXI-8110 RT controller features a 2.26 GHz quad-core processor, 2 GB 800 MHz DDR2 standard memory, and a high-performance 7200 rpm hard drive, which are ideal for demanding real-time test and control applications. You develop your LabVIEW application with the NI LabVIEW Real-Time Module on Windows and download the program to your PXI-8110 RT controller via Ethernet. The embedded code executes on a real-time OS. Thus, you use the powerful and flexible development tools of LabVIEW to build reliable, real-time solutions.

LabVIEW Real-Time applications running on PXI systems achieve millisecond loop rates with only 3 to 4 µs of system jitter. These real-time measurement and control systems take advantage of Intel processors coupled with the advanced timing, triggering, and I/O synchronization benefits of PXI. Furthermore, NI measurement services software extends the timing capabilities of PXI to deliver tight integration with LabVIEW Real-Time applications through operations such as hardware-timed software loops.

Back to Top

Requirements and Compatibility

OS Information

- Real-Time OS

Software Compatibility

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

Back to Top

Application and Technology

CPU	Intel Core 2 Quad Q9100 processor (2.26 GHz quad core)
Dual-channel 800 MHz DDR2 RAM, standard	2 GB (1 x 2 GB)
Hard drive (standard option), minimum	120 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	1

Hi-Speed USB ports	4
GPIB (IEEE 488) controller	
Serial port (RS232)	
Parallel port	
ExpressCard/34 slot	
Watchdog/trigger SMB	

Table 1. NI PXI-8110 RT Features

Run Parallel Tasks on Separate Processor Cores

The LabVIEW Real-Time Module takes advantage of the available four cores on the Intel Q9100 processor to increase performance and determinism for large real-time test and control applications. You can either explicitly assign certain tasks to run on specific cores of the processor or let the real-time OS manage this assignment for you.

To fully exercise the available four cores on the PXI-8110 RT, you must architect applications to create four independent execution threads by implementing programming strategies such as task parallelism, data parallelism, and pipelining. As an example of its high performance, the PXI-8110 RT can process up to 167,000 1K fast Fourier transforms (FFTs) per second, which is about 45 percent faster than the NI PXI-8108 dual-core embedded controller. For in-depth multicore programming resources, visit ni.com/multicore.

Connect to Any I/O

The modularity of PXI and open development environment of LabVIEW make it easy to integrate a variety of I/O within your application. Create a custom real-time embedded solution using a PXI-8110 RT embedded controller with any number and combination of PXI/CompactPCI plug-in modules.

Built-in LabVIEW libraries help you create applications with data acquisition, dynamic signal acquisition, motion control, image acquisition, reconfigurable I/O, and instrumentation. Communicate with peripheral devices through CAN, GPIB, Ethernet, or serial protocols. Use NI-VISA to integrate third-party PXI/CompactPCI modules in your application.

In addition, the PXI-8110 RT controller includes an external SMB connection for use as a trigger input, output, or watchdog timer. Use the external SMB to pass trigger and timing signals in and out of the PXI trigger bus in your system.

Create Reliable Stand-Alone Systems

To ensure reliable operation, embedded LabVIEW Real-Time applications continue to run even if the host PC is interrupted or rebooted. Because the PXI-8110 RT embedded controller runs in a separate chassis with a dedicated power supply, the operator can shut down the host computer entirely without disrupting the real-time program.

For stand-alone operation, you can embed code in the system so that it starts automatically when the system boots, requiring no human interaction. Use the LabVIEW Professional Development System and LabVIEW Real-Time Module to compile your LabVIEW application into an executable and download it to your PXI-8110 RT controller.

Dual-Boot Option

You can configure NI PXI embedded controllers to boot into Windows or the real-time OS. NI Measurement & Automation Explorer (MAX) includes features for installing and configuring PXI embedded controllers as LabVIEW Real-Time targets. The controllers use a hardware switch or BIOS setting to boot into the desired OS.

The result is a PXI embedded controller that can run embedded LabVIEW Real-Time or Windows applications. When the controller is in real-time mode, you need another Windows computer to develop and debug the LabVIEW Real-Time code for the PXI controller. To enable a Windows PXI embedded controller to dual-boot with the real-time OS, you must purchase the LabVIEW Real-Time embedded deployment software for the controller.

Extended Temperature and 24/7 Operation Option

The PXI-8110 RT embedded controller is available in two versions to address different environmental and usage conditions. The primary difference is that the version for extended temperature and 24/7 operation uses a different hard drive designed for reliability in both 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 71 °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 standard version of the controllers is designed for a 20 percent duty cycle. The hard drives in the extended temperature and 24/7 operation version and the standard version have a capacity of 80 GB (minimum) with a SATA interface.

Real-Time Performance Benchmarks

Table 2 contains the PID loop rate benchmark numbers for the PXI-8110 RT. For a direct comparison, the benchmarks for the PXI-8110 RT embedded controller were artificially restricted to exercise only the first two CPU cores on the Intel Q9100 quad-core processor. You must architect real-time applications to create four independent execution threads by implementing programming strategies such as task parallelism, data parallelism, and pipelining to fully exercise the four cores on the PXI-8110 RT embedded controller. For in-depth real-time multicore programming resources, visit ni.com/multicore.

				Loop Rate (kHz)		
Benchmark	Processing	Channels	DAQ I/O Mode	PXI-8106 RT	PXI-8108 RT	NI PXI-8110 RT
Analog I/O	PID	1	Polling	86	136	129
Analog I/O	PID	1	Interrupt	35	50	54
Analog I/O	PID	4	Polling	51	77	75
Analog I/O	PID	4	Interrupt	33	40	41
Analog I/O	PID	16	Polling	26	31	31
Analog I/O	PID	16	Interrupt	16	24	24

Table 2. Maximum loop rates for LabVIEW Real-Time PXI systems are shown. All benchmarks use the LabVIEW Real-Time Module 8.6.1 with NI-DAQmx 8.6. Benchmarks were revised to adhere to the architecture recommended by NI for symmetric multiprocessing-enabled systems. Benchmarks that do not test network performance run on a headless target without a direct Ethernet connection for maximum performance. Benchmarks that do test network performance use interrupt-mode Ethernet via a direct connection between the host PC and real-time target with a crossover cable. Visit ni.com or contact National Instruments for additional benchmarks.

Memory

The PXI-8110 uses dual-channel 800 MHz DDR2 SDRAM, which makes the controller ideal for data-intensive applications requiring significant analysis. It has a single SO-DIMM socket for the DDR2 SDRAM. 2 GB (1 x 2 GB DIMM) of RAM is standard with upgrade options to 4 GB.

Memory Options	Configuration	Part Number
Standard - 2 GB	1 x 2 GB DIMM	780446-2048

Table 3. Memory Upgrade Options

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.
- **On-site training at your facility** - an excellent option to train multiple employees at the same time.
- **Online instructor-led training** - lower-cost, remote training if classroom or on-site courses are not possible.
- **Course kits** - lowest-cost, self-paced training that you can use as reference guides.
- **Training memberships** and training credits - to buy now and schedule training later.

Visit ni.com/training for more information.

Extended Warranty

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

OEM

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

Alliance

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

Detailed Specifications

This topic lists the electrical, mechanical, and environmental specifications of the NI PXI-8110 embedded computer.

Features	
NI PXI-8110	
CPU	Intel® Core™ 2 Quad processor Q9100 (2.26 GHz quad core processor), 1066 MHz FSB

NI PXI-8110	
On-die L2 cache	12 MB; 6 MB shared between cores 0 and 1 6 MB shared between cores 2 and 3
Single-Channel DDR2 RAM, PC2 6400	2 GB Standard, 4 GB Maximum
Hard Drive	120 GB 7200 RPM Serial ATA, minimum; 80 GB (or greater) SATA Ext Temp, 24/7, optional
Ethernet	10/100/1000 BaseTX
GPIB (IEEE 488 Controller)	Yes
Serial Ports (RS-232)	Yes (1)
Parallel Port	Yes (1)
Hi-Speed USB (2.0) Ports	Yes (4)
ExpressCard/34 Slot	Yes
PS/2 Keyboard/Mouse Connector	No
PXI Trigger Bus Input/Output	Yes
Installed Operating System	Windows Vista Business; Windows Vista Business downgraded to Windows XP Professional

Electrical

Voltage (V)	Current (A)	
	Typical	Maximum
+3.3	2 A	3 A
+5 (+5 V_{DC} and +5 V_{IO}) [1]	9 A	12 A
+12	.1 A	.3 A
−12	0 A	0 A

Physical

Board dimensions	PXI 3U-size module 8.1 cm × 13 cm × 21.6 cm (3.2 in. × 5.1 in. × 8.5 in.)
Slot requirements	One system slot plus three controller expansion slots
Compatibility	Fully compatible with PXI specification
Weight	0.914 kg (2.02 lb) typical

Environment

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

Indoor use only.

Operating Environment

Ambient temperature [2]	
Base	5 to 50 °C [3] (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Extended temperature	0 to 55 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	10% to 90%, noncondensing (Tested in accordance with IEC-60068-2-56.)

⚠️ **Caution** Clean the NI PXI-8110 with a soft nonmetallic brush. Make sure that the device is completely dry and free from contaminants before powering-on the controller again.

Storage Environment

Ambient temperature	
Base	−40 to 65 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Extended temperature	−40 to 70 °C (Tested in accordance with IEC-60068-2-1 and IEC-60068-2-2.)
Relative humidity	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. Test profile developed in accordance with MIL-PRF-28800F.)
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 Standards

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA 61010-1

Note For UL and other safety certifications, refer to the product label or the *Online Product Certification* section.

Electromagnetic Compatibility

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

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

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

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

CE Compliance ϵ

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

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

Online Product Certification

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

Environmental Management

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

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

Waste Electrical and Electronic Equipment (WEEE)

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

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户　National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。
关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。
(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

Battery Replacement and Disposal

Battery Directive 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.

[1] Does not include any attached USB devices or ExpressCard. Refer to the *Power Budgeting* section of the *Installation and Configuration* chapter in the *NI PXI-8110 User Manual*.
[2] For chassis that are not available in the online catalog at ni.com, contact National Instruments for supported operating temperatures.

[3] 5 to 40 °C for the PXI-1000B DC.

My Profile | RSS | Privacy | Legal | Contact NI © 2014 National Instruments Corporation. All rights reserved.

www.ni.com