Pentium 4 Embedded Controllers for PXI

NI PXI-8186, NI PXI-8187

- 2.5 GHz Pentium 4-M, maximum
- 256 MB DDR RAM standard,
  1 GB maximum
- Internal PXI trigger bus routing
- Watchdog timer
- Integrated peripheral I/O
  - 100BaseTX Fast Ethernet
  - GPIB (IEEE 488.2) interface
  - Integrated hard drive
  - 2 USB 2.0 ports
  - 2 RS232 serial ports
  - IEEE 1284 ECP/EPP parallel port

Software
- OS and drivers already installed
- Hard-drive-based recovery image

PXI System Configuration
- Complete PXI system configuration
  at *ni.com/pxiadvisor*

New

Overview

The National Instruments PXI-8186 and PXI-8187 are high-performance Pentium 4 embedded controllers for use in any PXI or CompactPCI system. They are ideal for applications requiring intensive analysis or PXI system development. An NI PXI-8186 or PXI-8187 controller in a PXI chassis offers a compact, high-performance PC platform for modular instrumentation and data acquisition applications.

	NI PXI-8186	NI PXI-8187
CPU	2.2 GHz Pentium 4-M	2.5 GHz Pentium 4-M
On-die cache	512 KB	512 KB
DDR RAM	256 MB, standard 1 GB, maximum	256 MB, standard 1 GB, maximum
Hard drive	30 GB, minimum[1]	30 GB, minimum[1]
100 BaseTX[2] Ethernet	✓	✓
GPIB (IEEE 488.2) interface	✓	✓
Serial ports	2	2
Parallel port	✓	✓
USB 2.0 ports	2	2
PS/2 keyboard/mouse connector	✓	✓
PXI trigger bus input/output	✓	✓
Operating system	Windows 2000/XP, LabVIEW Real-Time[3]	Windows 2000/XP, LabVIEW Real-Time[3]

[1]20 GB hard drive for extended temperature option [2]For Gigabit Ethernet, add NI PXI-8231 Gigabit Ethernet peripheral module
[3]Contact National Instruments or visit ni.com/pxiadvisor for information on other operating systems

Table 1. NI PXI-8186 Embedded Controller Features

Hardware

With state-of-the-art packaging, the PXI-8186 and PXI-8187 embedded controllers integrate a Pentium 4 processor and all standard and extended PC peripherals into a single unit. By integrating many peripherals on the controller, all active slots in the PXI chassis remain available for measurement modules. This rugged one-piece controller design minimizes integration issues and eliminates the need for complex cabling to peripheral daughterboards. A block diagram is shown in Figure 2.

Standard and Extended I/O

In addition to standard I/O, including 10/100BaseTX Ethernet, keyboard, video, and mouse, the PXI-8186 and PXI-8187 include extended I/O for easy connectivity to instruments or other peripherals. An integrated GPIB (IEEE 488.2) interface provides connectivity to external instrumentation, saving additional cost and a slot. Use the two USB 2.0 ports for connection to a CD drive for easy software installation, or other standard PC peripherals such as USB 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, printers, and scanners. Two RS232 ports are available for connecting to serial devices.

Trigger Input/Output and Watchdog

The PXI-8186 and PXI-8187 include an external SMB connection for use as a trigger input, output, or watchdog timer. Use the external SMB to pass trigger and timing signals into and out of the PXI trigger bus in your PXI system.
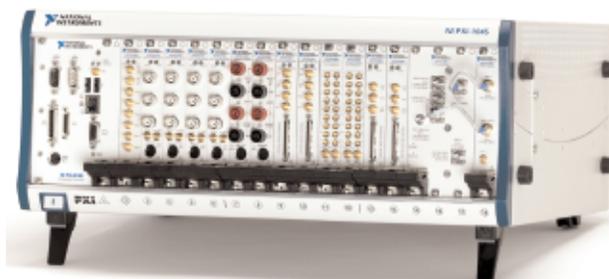
Figure 1. This PXI-8187 controls an 18-slot PXI modular instrumentation system

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Video

The PXI-8186 and PXI-8187 feature integrated Intel Extreme Graphics, a graphics core that 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.

Extended Temperature Option

The PXI-8186 and PXI-8187 controllers are available in two versions to address different environmental conditions. The basic version has an operating temperature of 5 to 40 °C and a storage temperature of -20 to 60 °C. The extended-temperature version has an operating temperature of 0 to 55 °C and storage temperature of -40 to 85 °C. The primary difference is that the extended-temperature option uses a hard drive designed for reliability in the low and high temperature extremes. This extended-temperature hard drive has a capacity of 20 GB (minimum), versus 30 GB (minimum) on the standard controller. Please see the specifications for all details, including chassis-specific temperature specifications.
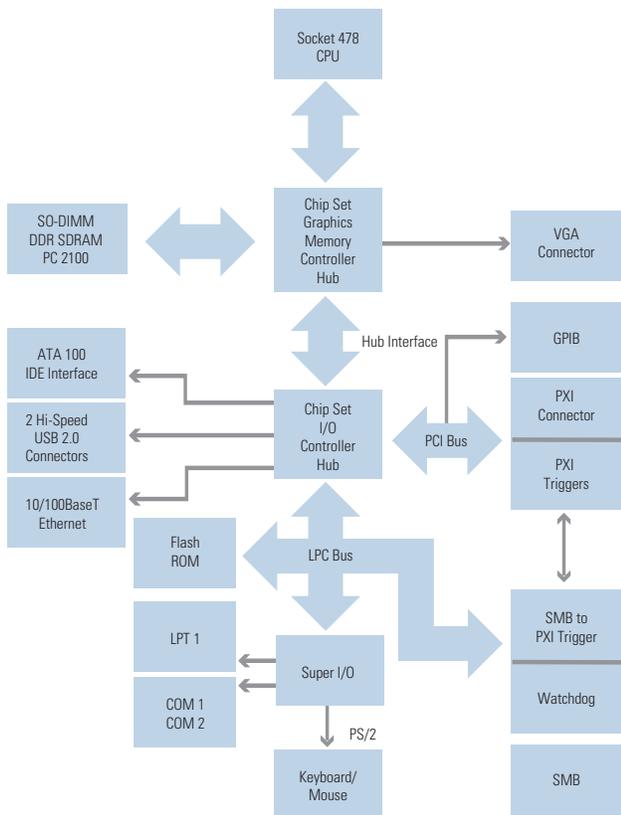
Memory

The PXI-8186 and PXI-8187 use double-data-rate SDRAM (DDR-SDRAM), which doubles memory bandwidth by transferring data twice per cycle (on both the rising and falling edges of the clock signal). This feature makes the controllers ideal for data-intensive applications requiring significant analysis. The PXI-8186 and PXI-8187 each have a single SO-DIMM socket for the DDR-SDRAM. 256 MB of RAM is standard, with upgrade options to either 512 MB or 1 GB.

Software

PXI-8186 and PXI-8187 embedded controllers come with the following minimum set of software already installed:
• Microsoft Windows XP Professional or Windows 2000 operating system (contact National Instruments or visit *ni.com/pxiadvisor* for localized OSs)
• Hard-drive-based recovery image
• NI-VISA, and NI-488 drivers
• Drivers for all built-in peripherals (Table I)

With Factory Installation Services (FIS) added to a PXI system order, your embedded controller will be shipped already configured with all software and drivers applicable for your PXI system. For example, assume you order a PXI system that includes LabVIEW and TestStand software, as well as data acquisition modules, a digitizer, an arbitrary waveform generator, and a DMM. With FIS, your PXI system will not only be assembled and shipped, but also the embedded controller will be fully configured with the appropriate NI-DAQmx, NI-SCOPE, NI-FGEN, and NI-DMM drivers, as well as LabVIEW and TestStand. Additionally, your embedded controller will be configured with hard-drive-based recovery, so you can restore your controller to the as-shipped configuration at any time in the future. This combination of software configuration and recovery tools provides both a productive and reliable development experience with the PXI system out of the box. To configure a complete PXI system with FIS, contact National Instruments or visit *ni.com/pxiadvisor.*

USB Peripherals

National Instruments offers external USB CD and USB floppy drives for use with your embedded controller. Using the USB interface, connect these drives to your embedded controller for easy software installation and upgrades. Both are completely powered through the USB port, 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.

Figure 2. NI PXI-8186 Block Diagram

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Additional Peripheral Ports

National Instruments offers numerous plug-in modules to add additional peripherals and ports to your PXI system. With the wide variety of PXI peripheral devices available, you can choose modules that add communication with Gigabit Ethernet, SCSI, and Serial. Modules are also available for controlling other PXI or VXI/VME systems. Visit ni.com/pxiadvisor to configure a system with additional peripheral modules.

Ordering Information

For online configuration of a complete PXI system, including Factory Installation Services, visit *ni.com/pxiadvisor*.

Step 1. Controller Model – select one of the following configurations.
NI PXI-8186
   Base 778755-xx
   Extended Temperature 778842-xx
NI PXI-8187
   Base 779755-xx
   Extended Temperature 779842-xx

Step 2. Replace "xx" with the following to select Installed Operating System.
01 ....Windows XP (English)
02 ....Windows 2000 (English)
33 ....LabVIEW Real-Time embedded software
00 ....Localized OS[1]
[1]Contact National Instruments or visit ni.com/pxiadvisor for the latest operating systems.

Step 3. Memory Upgrades – select the amount of upgrade memory (256 MB standard).
1 GB DDR RAM 778763-1024
512 MB DDR RAM 778763-512

Step 4. Accessories[2]
External USB CD-ROM 778492-01
External USB Floppy Drive...778492-02
Spare PS2 to Keyboard/Mouse Adapter Cable.................778713-01
Parallel Port Adapter Cable (6 in.) 777169-01
Micro-GPIB to GPIB Adapter Cable (0.2 m)................183285-0R2
Micro-GPIB to GPIB Cable (1 m)...................................183285-01
Micro-GPIB to GPIB Cable (2 m)...................................183285-02
PXI Gigabit Ethernet Module..778657-01
[2]For additional peripheral modules, including SCSI and serial modules, please visit *ni.com/pxiadvisor*

Step 5. Dual-Boot Option for Windows and LabVIEW Real-Time
To add LabVIEW Real-Time for a Windows PXI-8186 or PXI-8187 controllers, purchase the LabVIEW Real-Time embedded software to obtain the necessary Real-Time runtime license and installation tools.
LabVIEW Real-Time embedded software
   (Windows XP only)...777849-01

Specifications*

Features

Processor	
PXI-8186..	2.2 GHz Pentium 4-M
PXI-8187..	2.5 GHz Pentium 4-M
Ethernet..	10/100BaseTX, RJ-45 connector
Video...	Intel Extreme Graphics
Serial	2 (RS232)
Parallel Port...	IEEE 1284
	Type C connector (miniature)
	(adapter cable not included)
GPIB	PCI-GPIB/TNT, micro D25 connector, IEEE 488 and HS488 transfers, adapter cable not included
USB..	2 (USB 2.0)
Keyboard/mouse	1 PS/2 connector, (2-port PS/2 adapter cable included)
RAM..	1 SO-DIMM socket, 256 MB DDR RAM Standard
	512 MB, 1 GB RAM optional
Hard drive	
Base unit...	30 GB minimum, internal 2.5 in., 9.5 mm
	Fast Ultra ATA100 interface
Extended Temp. Option	20 GB minimum, internal 2.5 in., 9.5 mm
	Fast Ultra ATA100 interface

Voltage (V)	PXI-8186 Current (A)		PXI-8187 Current (A)	
	Typical	Maximum	Typical	Maximum
+3.3	4.0	5.0	4.0	5.0
+5	6.5	8.0	7.0	9.0
+12	0.15	0.20	0.15	0.2
−12	0	0	0	0

Power Requirements

Physical

Board dimensions..	PXI 3U-size module, 8.1 by 13 by 21.6 cm (3.2 by 5.1 by 8.5 in.)
Slot requirements..	One system slot plus three controller expansion slots
MTBF	170.248 hours
Weight	1.0 kg (2.2 lb) typical

Operating Environment

Ambient temperature:

Chassis	Base Unit	Extended Temp. Unit
PXI-1000B	5 to 40 °C	0 to 55 °C
PXI-1002	5 to 40 °C	0 to 50 °C
PXI-1006	5 to 45 °C	0 to 55 °C
PXI-1010	Not recommended	0 to 35 °C
PXI-1011	5 to 40 °C	0 to 55 °C
PXI-1042	5 to 40 °C	0 to 55 °C
PXI-1045	5 to 45 °C	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)
Altitude	2000 m (at 25 °C ambient temperature)

Storage Environment

Ambient temperature:

Base unit...	-20 to 65 °C (IEC-60068-2-1 and IEC-60068-2-2)
Extended temperature unit	-40 to 85 °C (IEC-60068-2-1 and IEC-60068-2-2)
Relative humidity	5 to 95% noncondensing (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.)

Safety Compliance
EN 61010-1, IEC 61010-1

Electromagnetic Compatability
Refer to the Declaration of Conformity (DoC) for regulatory compliance information. To obtain the DoC for this product, click Declaration of Conformity at *ni.com/hardref.nsf*

*Specifications subject to change without notice

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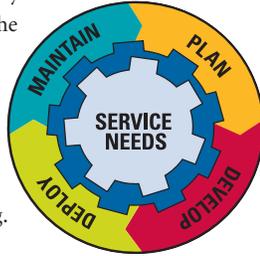
Training and Certification

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Professional Services

Our Professional Services Team is comprised of NI applications engineers, NI Consulting Services, and a worldwide NI Alliance Partner Program of more than 600 independent consultants and integrators. Services range from start-up assistance to turnkey system integration. Visit **ni.com/alliance**.

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Hardware Services
NI Factory Installation Services

NI Factory Installation Services (FIS) is the fastest and easiest way to use your PXI or PXI/SCXI™ combination systems right out of the box. Trained NI technicians install the software and hardware and configure the system to your specifications. NI extends the standard warranty by one year on hardware components (controllers, chassis, modules) purchased with FIS. To use FIS, simply configure your system online with **ni.com/pxiadvisor**.

Calibration Services

NI recognizes the need to maintain properly calibrated devices for high-accuracy measurements. We provide manual calibration procedures, services to recalibrate your products, and automated calibration software specifically designed for use by metrology laboratories. Visit **ni.com/calibration**.

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