PXI-3980

PXI Embedded Controller

User's Manual



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Revision History

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2.00	2013/5/31	Initial Release

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Preface

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Conventions

Take note of the following conventions used throughout this manual to make sure that users perform certain tasks and instructions properly.



Additional information, aids, and tips that help users perform tasks.



Information to prevent ***minor*** physical injury, component damage, data loss, and/or program corruption when trying to complete a task.



Information to prevent ***serious*** physical injury, component damage, data loss, and/or program corruption when trying to complete a specific task.

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1 Introduction

The ADLINK PXI-3980 PXI™ embedded controller, based on the Intel® Core™ i7 processor, is specifically designed for PXI-based testing systems, providing a rugged and stable operating environment for a wide variety of testing and measurement applications.

Combining state-of-the-art Intel® Core™ i7-2715QE 2.1 GHz processors, and up to 16 GB of 1333 MHz DDR3 memory, the PXI-3980 utilizes four separate computing engines on a single processor, enabling execution of four independent tasks simultaneously in a multitasking environment.

PXI-based testing systems typically make up a PXI platform and diversified standalone instruments for complex testing tasks. The PXI-3980 provides ample interface choices, including GPIB, USB2.0, and USB3.0, for connecting and controlling instruments. The PXI-3980 also provides dual Gigabit Ethernet ports, one for LAN connection and the other for controlling LXI instruments. With flexible instrument control interfaces and mechanical and electronic reliability, the ADLINK PXI-3980 is more than equal to the challenges of the most demanding PXI-based testing systems.



NOTE:

Memory addressing over 4GB is OS-dependent, such that a 32-bit operating system may be unable to address memory space over 4GB. To fully utilize memory, 64-bit operating systems are required.

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1.1 Features

- PXI™-1 PXI Hardware Specification Rev.2.2 complaint
- Intel® Core™ i7-2715QE 2.1 GHz processor for maximum computing power, 3.0GHz maximum in single-core, Turbo Boost mode.
- Dual Channel DDR3 SODIMM
- Up to 16 GB 1333 MHz
- Maximum system throughput 132 MB/s
- Pre-installed 500 GB SATA hard drive
- Supports 2.5" HDD or SSD
- SATA 3.0 Gb/s
- Supports AHCI
- Integrated I/O
  - Dual Gigabit Ethernet ports
  - Four USB 2.0 Ports
  - Built-in GPIB (IEEE488) controller
  - DVI-I video connector
  - Two USB 3.0 Ports
  - Trigger I/O for advanced PXI™ trigger functions
- Programmable watchdog timer

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1.2 Specifications

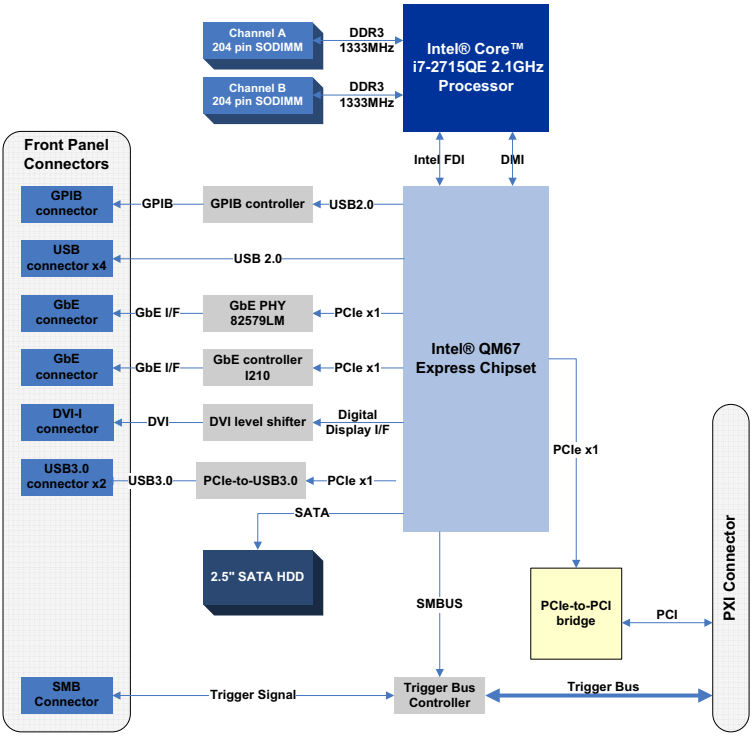


Figure 1-1: PXI-3980 Functional Block Diagram

Processor

- Intel® Core™ i7-2715QE 2.1GHz processor, 3.0GHz maximum in single-core, Turbo Boost mode
- DMI (Direct Media Interface) with 5 GT/s of bandwidth in each direction

Chipset

Mobile Intel® QM67 Express

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Memory

- Two standard 204-pin DDR3 SODIMM sockets
- Support for +1.5 V DDR3, 1066/1333 MHz RAM up to 16 GB total
- Support for non-ECC unbuffered memory


NOTE:

The externally accessible SODIMM socket can accept replacement DDR3 DRAM DIMM modules.
PXI-3980 specifications and stability guarantees are only supported when ADLINK-provided DDR3 DRAM DIMM modules are used.

Video

- DVI output supporting up to 1920x 1200 @ 60 Hz resolution
- VGA output for analog CRT route to DVI-I connector on the faceplate, supporting up to 2048 x 1536 bpp at 75Hz
- DVI-I connector for dual digital and analog video signal output via the included ADLINK Y-cable

Hard Drive

Built-in 2.5” 500 GB 7200 RPM SATA hard drive or 120GB SATA solid state driver

I/O Connectivity

Dual Gigabit Ethernet controllers through two RJ-45 connectors with speed/link/active LED on the faceplate, with upper connector supporting Wake on LAN.

USB

Four USB 2.0 and two USB 3.0 ports on the faceplate.

GPIB

Onboard IEEE488 GPIB controller through Micro-D 25-pin connector on the faceplate.

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Trigger I/O

One SMB connector on the faceplate to route an external trigger signal to/from PXI trigger bus

Dimensions (3-slot 3U PXI module)

3U/3-slot PXI standard

60.5 W x 128.7 H x 213.2 D mm (2.38 x 5.07 x 8.39 in.)

Slot Requirements

System slot (5V VIO PCI bus) and 2 controller expansion slots on chassis/backplane.

32-bit and 5V VIO PCI bus of system slot.



Do not remove the blue key from the PXI-3980 system connector, only the 5V VIO PCI bus is compatible.
3.3V VIO PCI bus is not.
SEVERE system damage may result.

Weight

0.9 kg (exclusive of packaging)

Environmental

Operating temperature with SSD	0 to 55°C
Operating temperature with HDD	0 to 50°C
Storage temperature	-20 to 70°C
Relative humidity , non-condensing	5 to 95%

Shock and Vibration

Functional shock 30 G, half-sine, 11 ms pulse duration

Random vibration:

- Operating 5 to 500 Hz, 0.21 Grms, 3 axes
- Non-operating 5 to 500 Hz, 2.46 Grms, 3 axes

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NOTE:

Environmental & Shock and Vibration values are only guaranteed with use of an ADLINK-provided SSD/HDD

Certification

Electromagnetic compatibility:

- EMC/EMI: CE, FCC Class A
- CE Compliance EN 61326-1

The PXI-3980 meets the essential requirements of applicable European Directives.

Power Requirements

Voltage Rail	+3.3V	+5V	+12V	Total (W)
Maximum power consumption	1.8	16.5	0.4	115.74
Idle power consumption	1.4	5.8	0	22.12

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2 Getting Started

This chapter describes procedures for installing the PXI-3980 and making preparations for its operation, including hardware and software setup. Please note that the PXI-3980 is shipped with RAM and HDD or SSD preinstalled. Please contact ADLINK or authorized dealer if there are any problems during the installation.



Diagrams and illustrated equipment are for reference only. Actual system configuration and specifications may vary.

2.1 Package Contents

Before beginning, check the package contents for any damage and ensure that the following items are included:

- PXI-3980 Controller (equipped with RAM and HDD or SSD)
- Dual display Y-cable
- PXI-3980 Quick Start Guide
- ADLINK All-In-One CD

If any of these items are missing or damaged, contact the dealer from whom you purchased the product. Save the shipping materials and carton in case you want to ship or store the product in the future.



Do not install or apply power to equipment that is damaged or missing components. Retain the shipping carton and packing materials for inspection. Please contact your ADLINK dealer/vendor immediately for assistance and obtain authorization before returning any product.

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2.2 Operating System Installation

For more detailed information about the operating system, refer to the documentation provided by the operating system manufacturer. Preferred/supported operating systems for PXI-3980 are:

- Windows XP
- Windows 7 32/64-bit
- For other OS support, please contact ADLINK

Most operating systems require initial installation from a hard drive, floppy drive, or CD-ROM drive. The PXI-3980 controller supports USB CD-ROM drive, USB flash disk, USB external hard drive, or a USB floppy drive as the first boot device. Please see Section 4.5: Boot Setup for information about setting the boot devices. These devices should be configured, installed, and tested with the supplied drivers before attempting to load the new operating system.


NOTE:

Read the release notes and installation documentation provided by the operating system vendor. Be sure to read all the README files or documents provided on the distribution disks, as these typically note documentation discrepancies or compatibility problems.

1. Select the appropriate boot device order from the BIOS Boot Setup Menu based on the OS installation media used. For example, if the OS is distributed on a bootable installation CD, select USB CD-ROM as the first boot device and reboot the system with the installation CD in the USB CD-ROM drive
2. Proceed with the OS installation as directed and be sure to select appropriate device types if prompted. Refer to the appropriate hardware manuals for specific device types and compatibility modes of ADLINK PXI products.
3. When installation is complete, reboot the system and set the boot device order in the SETUP boot menu accordingly.

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2.3 Hardware Instructions

2.3.1 Faceplate Connectors & Indicators

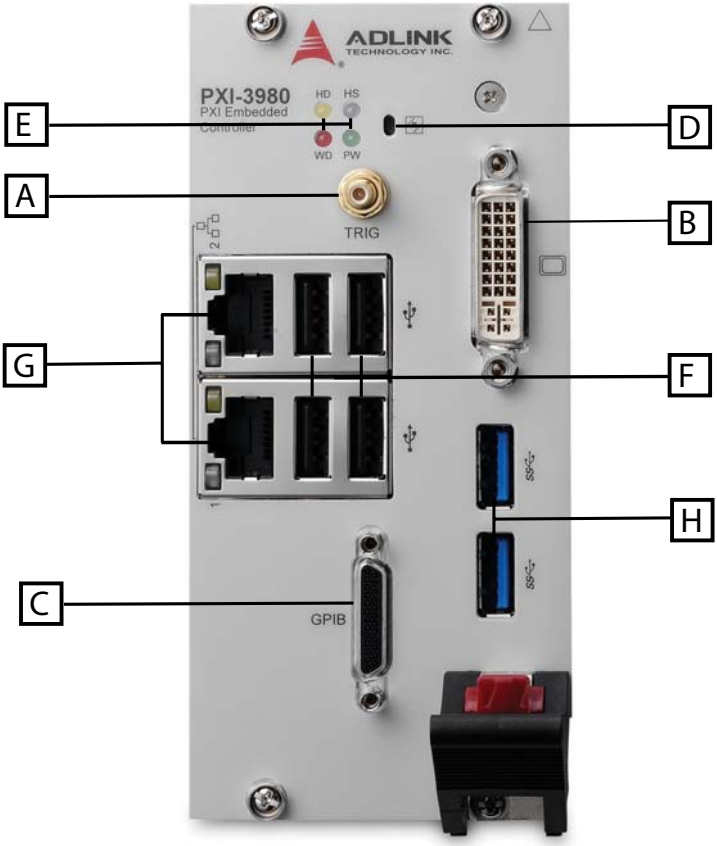


Figure 2-1: PXI-3980 Faceplate

A	PXI Trigger Connector (SMB jack)	E	LED indicators
B	DVI-I Connector	F	4X Type-A USB 2.0 connectors
C	GPIB Connector (Micro D-Sub 25P)	G	2X Gigabit Ethernet
D	Reset Button	H	2X USB 3.0

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2.3.2 PXI Trigger Connector

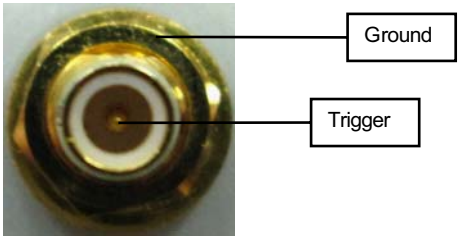


Figure 2-2: PXI Trigger SMB Jack

The PXI trigger connector is a SMB jack, used to route external trigger signals to or from the PXI backplane. Trigger signals are TTL-compatible and edge sensitive. The PXI-3980 provides four trigger routing modes from/to the PXI trigger connector to synchronize PXI modules, including

- From a selected trigger bus line to PXI trigger connector
- From the PXI trigger connector to a selected trigger bus line
- From software trigger to a selected trigger bus line
- From software trigger to PXI trigger connector

All trigger modes are programmable by the provided driver. Please refer to Section A: PXI Trigger I/O Function Reference for further information.

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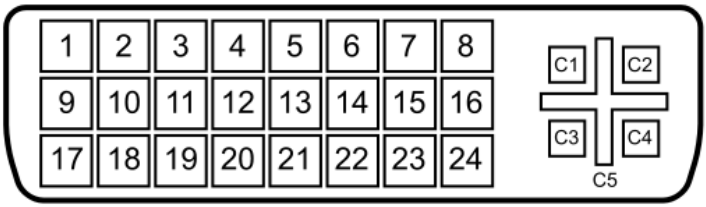
2.3.3 DVI-I Connector

The DVI-I connector connects the PXI-3980 to a monitor, of which both digital (DVI) and analog (VGA) are supported. If connecting to an analog (VGA) monitor, the included Y-cable must be installed on the DVI-I connector.

Dual display function, providing simultaneous DVI & VGA display, is available, also with the addition of the included ADLINK Y-cable.

NOTE:

The PXI-3980 supports native monitor hot-plugging in DVI-D monitors, under Windows 7 with Intel Media Accelerator graphics driver installed, and in VGA monitors with the included ADLINK Y-cable.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	TMDS Data2-	9	TMDS Data1-	17	TMDS Data0-	C1	Analog Red
2	TMDS Data2+	10	TMDS Data1+	18	TMDS Data0+	C2	Analog Green
3	Shield Ground	11	Shield Ground	19	Shield Ground	C3	Analog Blue
4	Reserved	12	Reserved	20	Reserved	C4	Analog HSYNC
5	Reserved	13	Reserved	21	Reserved	C5	Analog Ground
6	DDC Clock	14	+5V Power	22	Ground		
7	DDC Data	15	Ground	23	TMDS Clock+		

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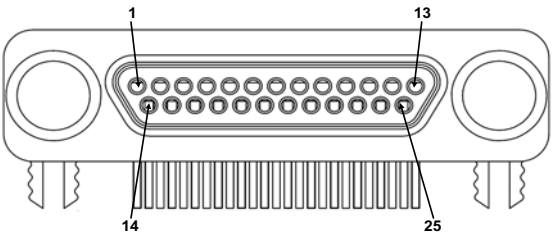
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
8	Analog VSYNC	16	Hot Plug Detect	24	TMDS Clock-		

Table 2-1: DVI-I Pin Assignment

2.3.4 GPIB Connector

The GPIB connector on PXI-3980 is a micro D-sub 25P connector, controlling external bench-top instruments. Connection to other instruments requires the ACL-IEEE488-MD1-A cable. The on-board GPIB controller provides:

- Full compatibility with IEEE 488 standard
- Up to 1.5MB/s data transfer rates
- Onboard 2 KB FIFO for read/write operations
- Driver APIs compatible with NI-488.2 driver software
- Connection with up to 14 instruments



Pin	Signal	Description	Pin	Signal	Description
1	DIO1#	GPIB Data 1	14	DIO5#	GPIB Data 5
2	DIO2#	GPIB Data 2	15	DIO6#	GPIB Data 6
3	DIO3#	GPIB Data 3	16	DIO7#	GPIB Data 7
4	DIO4#	GPIB Data 4	17	DIO8#	GPIB Data 8
5	EOI	End Or Identify	18	REN	Remote Enable
6	DAV	Data Valid	19	Ground	Signal Ground
7	NRFD	Not Ready For Data	20	Ground	Signal Ground
8	NDAC	No Data Accepted	21	Ground	Signal Ground
9	IFC	Interface Clear	22	Ground	Signal Ground

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Pin	Signal	Description	Pin	Signal	Description
10	SRQ	Service Request	23	Ground	Signal Ground
11	ATN	Attention	24	Ground	Signal Ground
12	Chassis Ground	Chassis Ground	25	Ground	Signal Ground
13	Ground	Signal Ground			

Table 2-2: GPIB Pin Description

2.3.5 Reset Button

The reset button, activated by insertion of any pin-like implement, executes a hard reset for the PXI-3980.

2.3.6 LED Indicators

Four LED indicators on the faceplate indicate operational status of the PXI-3980, as follows.

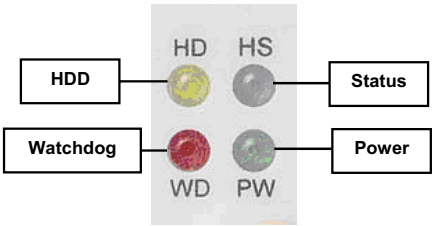


Figure 2-3: PXI-3980 LED Indicators

LED indicator	Color	Description
Power LED	Green	Indicates system power. Remains lit when the system boots normally and main power supply is functioning.
HDD LED	Yellow	Indicates operating state of the HDD or SSD. Flashes during access to or activity on the SATA HDD.

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LED indicator	Color	Description
Watchdog	Red	Indicates status of the watchdog timer, lighting when watchdog timer has expired. Please refer to Appendix B for watchdog timer programming information.
HS LED	Blue	Indicates system status, blinking on and off once during boot when system status is good, and continuously blinking or remaining lit when the system malfunctions.

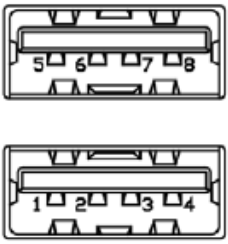
Table 2-3: LED Indicator Legend

NOTE:

In the event of malfunction, clear the CMOS (please see Section 2.3.15: Clearing CMOS) and reboot the system. If the system fails to respond properly, please contact ADLINK for assistance.

2.3.7 USB 2.0 Ports

The PXI-3980 provides four USB 2.0 ports via USB Type A connectors on the faceplate, all compatible with hi-speed, full-speed and low-speed USB devices. Supported boot devices include USB flash drive, USB floppy, USB CD-ROM, and others, with boot priority and device settings configurable configured in BIOS. Please see Section 4.5: Boot Setup for more information.



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Pin	Signal
1/5	Power 5V
2/6	USB Data-
3/7	USB Data +
4/8	Ground

Table 2-4: USB 2.0 Port Pin Assignment

2.3.8 Gigabit Ethernet Ports

Dual Gigabit Ethernet connection is provided on the PXI-3980 front panel.

Pin	1000Base-T Signal	100/10Base-T Signal
1	MDI0+	TX+
2	MDI0-	TX-
3	MDI1+	RX+
4	MDI2+	Reserved
5	MDI2-	Reserved
6	MDI1-	RX-
7	MDI3+	Reserved
8	MDI3-	Reserved

Table 2-5: PXI-3980 Ethernet Port Pin Assignments

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The Ethernet ports each include two LED indicators, one Active/Link indicator and one Speed indicator, functioning as follows.

	LED	Status	Description
 	Active/Link (Yellow)	Off	Ethernet port is disconnected
		On	Ethernet port is connected with no data transmission
		Flashing	Ethernet port is connected with data transmitted/received
	Speed (Green/ Orange)	Off	10 Mbps
		Green	100 Mbps
		Orange	1000 Mbps

2.3.9 USB 3.0 Ports

NOTE:

When operating in DOS mode, the PXI-3980 does NOT support:

- KVM switches connected to the USB 3.0 ports
- USB keyboards connected through a USB hub connected to the USB 3.0 ports

The PXI-3980 provides two Type A USB 3.0 ports on the front panel, supporting SuperSpeed, Hi-Speed, full-speed, and low-speed transmission for downstream. Multiple boot devices, including USB flash, USB external HD, and USB CD-ROM drives are supported, with boot priority configured in BIOS.

NOTE:

While the USB 3.0 ports allow boot from CD-ROM, OS installation via CD-ROM is not supported

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2.3.10 Onboard Connections and Settings

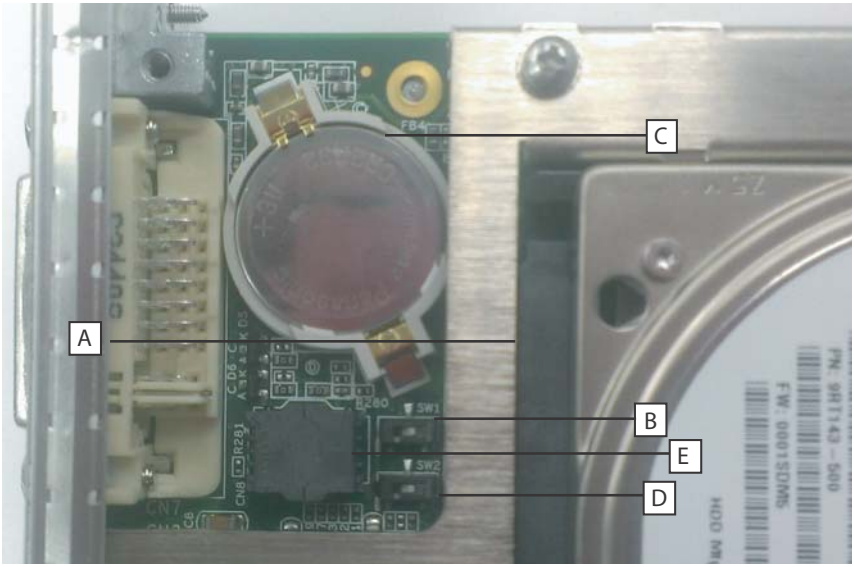


Figure 2-4: PXI-3980 Onboard Configuration

A	SATA Connector
B	Clear CMOS switch
C	System Battery
D	BIOS flash backup switch
E	BIOS flash socket

2.3.11 Installation Environment

When preparing to install any equipment described in this manual, please refer to Chapter C: Important Safety Instructions.

Only install equipment in well lit areas on flat, sturdy surfaces with access to basic tools such as flat- and cross-head screwdrivers, preferably with magnetic heads as screws and standoffs are small and easily misplaced.

Recommended Installation Tools

Phillips (cross-head) screwdriver

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Flat-head screwdriver

Anti-static wrist strap

Anti-static mat

ADLINK PXI-3980 system controllers are electrostatically sensitive and can be easily damaged by static electricity. The equipment must be handled on a grounded anti-static mat, and operators must wear an anti-static wristband, grounded at the same point as the anti-static mat.

Inspect the carton and packaging for damage. Shipping and handling may cause damage to the contents. Ensure that all contents are undamaged before installing.



All equipment must be protected from static discharge and physical shock. Never remove any of the socketed parts except at a static-free workstation. Use the anti-static bag shipped with the product to handle the equipment and wear a grounded wrist strap when servicing or installing.

2.3.12 Installing the PXI-3980

1. Locate the system controller slot (Slot 1)
2. Depress the red locking lever and release the latch
3. Align the controller's top and bottom edges with the card guides, and carefully slide the PXI-3980 into the chassis, as shown

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4. Elevate the latch until the PXI-3980 is fully seated in the chassis backplane.
5. Fasten the four mounting screws on the faceplate of PXI-3980, and connect all peripheral devices.

2.3.13 Replacing the Hard Drive or Solid State Drive

The PXI-3980 provides a SATA 2.0 port with a pre-installed 2.5" SATA hard drive or solid state drive. Replacing the HDD or SSD is accomplished as follows.

1. Locate the four screws attaching the drive to the bracket on the side of the PXI-3980.
2. Remove the screws, as shown.

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3. Gently lift and remove the SATA HDD or SSD
4. To install a HDD or SSD or other compatible SATA hard drive, reverse the steps and reinstall the PXI-3980 into the PXI system.

2.3.14 Replacing the Battery Backup

The PXI-3980 is provided with a 3.0 V “coin cell” lithium battery, replacement of which is as follows.

1. Turn off the PXI chassis.
2. Remove the PXI-3980 embedded controller from the chassis. Observe all anti-static precautions.
3. To remove the battery, gently insert a small (approx. 5 mm) flathead screwdriver under the battery at the negative retaining clip. Gently pry up and the battery should easily pop out.
4. Place a fresh identical battery (CR2032 or equivalent) in the socket, ensuring that the positive pole (+) is facing upwards. The battery is most easily seated by first being

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inserted under the positive retaining clip, and then pushed downward at the negative retaining clip. The battery should easily snap into position.

5. Reinstall the embedded controller into the PXI chassis and restore power.

2.3.15 Clearing CMOS

In the event of a system malfunction causing the PXI-3980 to halt or fail to boot, clear the CMOS and restore the controller BIOS to its default settings. To clear the CMOS:

1. Shut down the controller operating system and turn off the PXI Chassis.
2. Remove the PXI-3980 from the chassis. Observe all anti-static precautions.
3. Locate the CMOS clear switch (SW1) on the board (see Section 2.3.10 Onboard Connections and Settings). Move the switch from Normal position



to Clear position



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and wait for 5 seconds, then return the switch to Normal position.

4. Remount the controller into the PXI chassis.
5. Press "Delete" or "F2" to enter the BIOS setup when the splash logo appears.
6. Press "F3" to load Optimized defaults in BIOS setup
7. Modify the system date and time
8. Press "F4" to save configuration and exit

2.3.16 Initiating Backup BIOS Flash

BIOS flash on the PXI-3980 is divided into Backup and Normal sections.

In the event of a system malfunction causing the PXI-3980 to halt or fail to boot, and clearing the CMOS fails to resolve the issue, the BIOS flash backup switch (see Section 2.3.10 Onboard Connections and Settings) can enable the backup BIOS flash. To initiate BIOS flash backup, move the switch from Normal position



to Backup



NOTE: Please contact technical support to resolve halting or failure to boot issues caused by corrupted BIOS.

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3 Driver Installation

After installing the operating system, all related drivers must be installed for correct system operation. This section describes drivers needed for Windows operating systems and the procedures to install them. For other OS support, please contact ADLINK.

3.1 Installing Windows Drivers

1. Fully install Windows, which contains most standard I/O device drivers
2. Install the chipset driver
3. Install the graphic driver
4. Install the Ethernet driver
5. Install the GPIB driver
6. Install the management engine driver
7. Install the PXI trigger driver
8. Install the WDT (watchdog timer) driver
9. Install the USB 3.0 driver

3.2 Installing the Chipset Driver

This section describes installation of the chipset driver for PXI-3980. The chipset driver directs the operating system to configure the Intel® QM67 chipset components to ensure operation of:

- Core PCI and ISAPNP Services
- PCIe Support
- SATA Storage Support
- USB Support
- Identification of Intel® Chipset Components in the Device Manager

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To install the chipset driver:

1. Close any running applications
2. Insert the ADLINK All-in-One CD (x: denotes the CD-ROM drive)
   - ▷ The WinXP chipset driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\Chipset\
   - ▷ The Win7 32-bit chipset driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\Chipset\
   - ▷ The Win7 64-bit chipset driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\Chipset\
3. Execute setup.exe and follow on-screen instructions to complete the setup
4. Reboot the system

3.3 Installing the Graphics Driver

To install the graphics driver:

1. Close any running applications
2. Insert the ADLINK All-in-One CD (x: denotes the CD-ROM drive)
   - ▷ The WinXP graphics driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\Graphics\
   - ▷ The Win7 32-bit graphics driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\Graphics\
   - ▷ The Win7 64-bit graphics driver is located in the directory:

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x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\Graphics\

3. Execute setup.exe and follow on-screen instructions to complete the setup
4. Reboot the system

3.4 Installing the Ethernet Driver

To install the Ethernet driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD-ROM drive)
   - ▷ The WinXP Ethernet driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\LAN\
   - ▷ The Win7 32-bit Ethernet driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\LAN\
   - ▷ The Win7 64-bit Ethernet driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\LAN\
3. Execute PROWin32.exe or PROWin64x.exe and follow on-screen instructions to complete the setup.
4. Reboot the system

3.5 Installing the GPIB Driver

The PXI-3975 controller features an onboard GPIB controller, providing connectivity between PXI and GPIB instruments. The GPIB driver package also contains function libraries and a utility to interact with GPIB instruments.

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To install the GPIB driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD-ROM drive)
   - ▷ The WinXP GPIB driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\GPIB\
   - ▷ The Win7 32-bit GPIB driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\GPIB\
   - ▷ The Win7 64-bit GPIB driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\GPIB\
3. Execute setup.exe and follow on-screen instructions to complete the setup
4. Reboot the system

3.6 Installing the Management Engine Driver

To install the management engine driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD-ROM drive)
   - ▷ The WinXP management engine driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\ME\
   - ▷ The Win7 32-bit management engine driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\ME\
   - ▷ The Win7 64-bit management engine driver is located in the directory:

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x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\ME\

3. Execute MEI_ALLOS_6.1.0.1042_PV.exe or setup.exe and follow on-screen instructions to complete the setup.
4. Reboot the system

3.7 Installing the PXI Trigger Driver

The PXI-3980 controller provides a trigger I/O on the faceplate to route the trigger signal to and from the PXI trigger bus. Please see Appendix A: PXI Trigger I/O Function Reference for programming information.

To install the PXI trigger driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD-ROM drive)
   - ▷ The WinXP PXI trigger driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\TriggerIO\
   - ▷ The Win7 32-bit PXI trigger driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\TriggerIO\
   - ▷ The Win7 64-bit PXI trigger driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\TriggerIO\
3. Execute **PXI Trigger IO setup v330.exe** and follow on-screen instructions to complete the setup
4. Reboot the system

3.8 Installing the WDT Driver

The WDT (watchdog timer) resets the system when the operating system or application is halted. The WDT typically starts and periodically resets the timer, and when the timer is expired, the system

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resets. Please refer to Appendix B: Watchdog Timer for programming information.

To install the WDT driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD-ROM drive)
   - ▷ The WinXP WDT driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\WDT\
   - ▷ The Win7 32-bit WDT driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\WDT\
   - ▷ The Win7 64-bit WDT driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\WDT\
3. Execute **PXI WDT Setup v330.exe** and follow on-screen instructions to complete the setup
4. Reboot the system

3.9 Installing the USB 3.0 Driver

The PXI-3980 controller provides two USB 3.0 ports on the faceplate. To install the USB 3.0 drivers:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD- ROM drive)
   - ▷ The WinXP USB 3.0 driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\WinXP_32bit\USB30\
   - ▷ The Win7 32-bit USB 3.0 driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_32bit\USB30\
   - ▷ The Win7 64-bit USB 3.0 driver is located in the directory:

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x:\Driver Installation\PXI Platform\PXI controller\PXI-3980\Win7_64bit\USB30\

3. Execute setup.exe and follow on- screen instructions to complete the setup
4. Reboot the system

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4 BIOS Setup

The Basic Input/Output System (BIOS) provides a basic level of communication between the processor and peripherals. In addition, the BIOS also contains code for various advanced features applied to the PXI-3980 controller. The BIOS setup program includes menus for configuring settings and enabling PXI-3980 controller features.



Changing BIOS settings may result in incorrect operation and possibly an inability to boot. If this occurs, follow the instructions in Section 2.3.15: Clearing CMOS to clear CMOS and restore default settings. In general, do not change a BIOS setting unless you are absolutely certain of the consequences.

4.1 Starting the BIOS

1. Power on or reboot the PXI-3980 controller.
2. Press the <Delete> key when the controller beeps. This should be concurrent with the main startup screen. The BIOS setup program loads after a short delay.
3. The Main menu is displayed when you first enter the BIOS setup program.



In most cases, the < Delete > key is used to invoke the setup screen. There are several cases that use other keys, such as < F1 >, < F2 >, and so on.

The main BIOS setup menu is the first screen that you can navigate. Each main BIOS setup menu option is described in this user's guide.

The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. "Grayed" options cannot be configured, "Blue" options can be.

The right frame displays the key legend. Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

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Navigation

The BIOS setup/utility uses a key-based navigation system called hot keys. Most BIOS setup utility hot keys can be used at any time during setup navigation, as follows.

Key(s)	Function
Right Arrow, Left Arrow	Moves between different setup menus
Up Arrow, Down Arrow	Moves between options within a setup menu
<Enter>	Opens a submenu or displays all available settings for a highlighted configuration option
<Esc>	Returns to the previous menu and shortcuts to the Exit menu from top-level menus
<+> and <–>	Cycles between all available settings
<Tab>	Selects time and date fields
<F1>	Opens the general help window for the BIOS
<F2>	Loads previous values into the BIOS
<F3>	Restores default values into the BIOS
<F4>	Saves the current configuration and exits BIOS setup
<F9>	Loads the optimal default BIOS settings

Table 4-1: BIOS Hot Key Functions

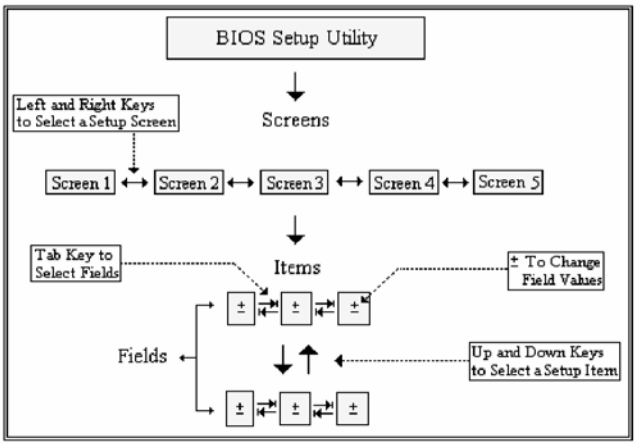


Figure 4-1: BIOS Setup Navigation

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NOTE:

A hot key legend is located in the right frame on most setup screens.

The < F8 > key on your keyboard is the Fail-Safe key. It is not displayed on the key legend by default. To set the Fail-Safe settings of the BIOS, press the < F8 > key on your keyboard. It is located on the upper row of a standard 101 keyboard. The Fail-Safe settings allow the motherboard to boot up with the least amount of options set. This can lessen the probability of conflicting settings.

4.2 Main Setup

When you first enter the Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab.

The Main Setup menu provides basic controller information and allows the system time and date to be set, as follows.

Item	Detail
BIOS Information	Includes BIOS version and the date on which the BIOS was built
System Date & Time	
System Date	Changes system date, date must be entered in MM/DD/YY format
System Time	Changes system time, time must be entered in HH:MM:SS format.
Access Level	Displays current access level, default is Administrator

Table 4-2: BIOS Main Setup Menu

4.3 Advanced Setup

Select the Advanced tab from the setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in

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the left frame of the screen, such as SuperIO Configuration, to go to the submenu for that item. Display an Advanced BIOS Setup option by highlighting it using the < Arrow > keys. The Advanced BIOS Setup options are as follows.

Item	Detail
Legacy OpROM Support	
Launch PXE OpROM	Enables or disables legacy network device (default is Disabled)
Launch Storage OpROM	Enables/disables the option for Legacy Mass Storage Devices with option ROM (default is Enabled)
WatchDog Timer	Shows whether the WatchDog Timer is enabled (default is Disabled)
CPU Configuration	Displays processor type, speed, system bus speed, etc.
LAN Port Configuration	Enables/disables LAN ports
SATA Configuration	Sets SATA mode and enables/disables SATA controller
USB Configuration	Provides USB support and lists the devices attached to the USB port (keyboard, mouse, and one hub)
H/W Monitor	Displays voltages and temperatures on the controller
Sandybridge	EIST and Turbo mode settings

Table 4-3: BIOS Advanced Setup Menu

4.4 Chipset Configuration

Item	Detail
System Agent Configuration	Graphic controller information and configuration, system memory configuration
PCH-I/O Configuration	USB and PCIe Port configuration information

Table 4-4: BIOS Chipset Configuration Menu

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4.5 Boot Setup

Item	Detail
Boot Configuration	
Quiet Boot	When disabled, allows POST messages to be viewed (default is Enabled).
Bootup NumLock State	Selects default keyboard number lock setting
CSM16 Module Version	Displays the version of the CSM16 module, e.g. 07.64
Gate A20 Active	Allows GA20 to be disabled by BIOS
Option ROM Messages	Sets display mode for Option ROM
Interrupt 19 Capture	Allows Option ROMs to trap Int 19
Set Boot Priority	
1st Boot	Allows selection of the primary boot source (default is the SATA HDD)
2nd Boot	Allows selection of the secondary boot source (default is Disabled)
Hard Drive BBS Priorities	Sets the order of legacy devices in this group

Table 4-5: BIOS Boot Setup Menu

4.6 Security Setup

The system can be configured to require all users to enter a password (either Administrator or User) every time the system boots or when Setup is executed. Administrators and User passwords activate different levels of security.

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If passwords are used, the system prompts for a three- to twenty-character password. Typed passwords are not displayed.

Item	Details
Password Description	
Administrator Password	Sets an administrative level password for the BIOS.
User Password	Sets user level passwords for the BIOS.
HDD Security Configuration	
HDDO: INTEL SSDSA2	sets HDD password

Table 4-6: BIOS Security Setup Menu



Passwords are not recoverable. Please ensure that all passwords are recorded elsewhere. If your passwords are lost, NVRAM must be erased and reconfigured.

4.7 Save & Exit Setup

The following options for saving and exiting can be chosen in this menu.

Save Changes and Exit

- Discard Changes and Exit
- Save Changes and Exit
- Discard Changes and Reset
- Save Changes and Reset

Save Option

- Save Changes
- Discard Changes
- Restore Defaults
- Save as User Defaults
- Restore User Defaults

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NOTE:

The "Restore the default values for all setup options” selection does not restore the original boot priority sequence. You must use the Boot Setup Menu (see Section 4.5: Boot Setup) to manually restore the boot priority sequence.

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Appendix A - PXI Trigger I/O Function Reference

This appendix describes use of the PXI trigger I/O function library for the PXI-3980 controller, to program routing of trigger signals between the trigger I/O SMB connector on the faceplate and the PXI trigger bus on the backplane.

A.1 Data Types

The PXI-3980 library uses these data types in pxitrigio.h in the directory X:\ADLINK\PXI Trigger IO\Include. It is recommended that you use these data types in your application programs. The table shows the data type names, ranges, and corresponding data types in C/C++, Visual Basic, and Delphi for reference.

Type	Description	Range	Type		
			C/C++ (for 32-bit compiler)	Visual Basic	Pascal (Delphi)
U8	8-bit ASCII character	0 to 255	unsigned char	Byte	Byte
I16	16-bit signed integer	-32768 to 32767	short	Integer	SmallInt
U16	16-bit unsigned integer	0 to 65535	unsigned short	Not supported by BASIC, use the signed integer (I16) instead	Word
I32	32-bit signed integer	-2147483648 to 2147483647	long	Long	LongInt
U32	32-bit unsigned integer	0 to 4294967295	unsigned long	Not supported by BASIC, use the signed long integer (I32) instead	Cardinal

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Type	Description	Range	Type		
			C/C++ (for 32-bit compiler)	Visual Basic	Pascal (Delphi)
F32	32-bit single-precision floating-point	-3.402823E38 to 3.402823E38	float	Single	Single
F64	64-bit double-precision floating-point	1.797683134862315E308 to 1.797683134862315E309	double	Double	Double

A.2 Function Library

This section provides detailed definitions of the functions available in the PXI-3980 function library. Each function includes a description, list of supported cards, syntax, parameter list and Return Code information.

A.2.1 TRIG_Init

Description

Initializes trigger I/O function of PXI-3980 controller. TRIG_Init must be called before the invocation of any other trigger I/O function.

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
I16 TRIG_Init()
```

Visual Basic

```
TRIG_Init As Integer
```

Parameter

None

Return Code

```
ERR_NoError
```


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```
ERR_BoardBusy
ERR_OpenDriverFail
ERR_GetGPIOAddress
```

A.2.2 TRIG_Close

Description

Closes trigger I/O function of PXI-3980 controller, releasing resources allocated for the trigger I/O function. Users must invoke TRIG_Close before exiting the application.

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
I16 TRIG_Close()
```

Visual Basic

```
TRIG_Close() As Integer
```

Parameter

None

Return Code

```
ERR_NoError
ERR_BoardNoInit
```

A.2.3 TRIG_SetSoftTrg

Description

Generates a TTL trigger signal to the trigger I/O SMB connector on the faceplate or the PXI trigger bus on the backplane by software command

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

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```
I16 TRIG_SetSoftTrg(U8 Status)
```

Visual Basic

```
TRIG_SetSoftTrg (ByVal status As Byte) As
Integer
```

Parameters

Status

Logic level of trigger signal.

Available value description:

0: Logic low

1: Logic high

Return Code

```
ERR_NoError
ERR_BoardNoInit
```

A.2.4 TRIG_Trigger_Route

Description

Routes the trigger signal between the trigger I/O SMB connector on the faceplate and the PXI trigger bus on the backplane. This function also allows routing of the software-generated trigger signal to SMB connector or trigger bus.

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
I16 TRIG_Trigger_Route (U32 source, U32 dest,
U32 halfway)
```

Visual Basic

```
TRIG_Trigger_Route (ByVal source As Long,
ByVal dest As Long, ByVal halfway As Long) As
Integer
```

Parameters

source

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Source of trigger routing. It can be one of the following values.

Available value	Description
PXI_TRIG_VAL_SMB	SMB connector on the faceplate
PXI_TRIG_VAL_SOFT	Software-generated trigger signal
PXI_TRIG_VAL_TRIG0	PXI trigger bus #0
PXI_TRIG_VAL_TRIG1	PXI trigger bus #1
PXI_TRIG_VAL_TRIG2	PXI trigger bus #2
PXI_TRIG_VAL_TRIG3	PXI trigger bus #3
PXI_TRIG_VAL_TRIG4	PXI trigger bus #4
PXI_TRIG_VAL_TRIG5	PXI trigger bus #5
PXI_TRIG_VAL_TRIG6	PXI trigger bus #6
PXI_TRIG_VAL_TRIG7	PXI trigger bus #7

dest

Destination of trigger routing. It can be one of the following values.

Available value	Description
PXI_TRIG_VAL_SMB	SMB connector on the faceplate
PXI_TRIG_VAL_TRIG0	PXI trigger bus #0
PXI_TRIG_VAL_TRIG1	PXI trigger bus #1
PXI_TRIG_VAL_TRIG2	PXI trigger bus #2
PXI_TRIG_VAL_TRIG3	PXI trigger bus #3
PXI_TRIG_VAL_TRIG4	PXI trigger bus #4
PXI_TRIG_VAL_TRIG5	PXI trigger bus #5
PXI_TRIG_VAL_TRIG6	PXI trigger bus #6
PXI_TRIG_VAL_TRIG7	PXI trigger bus #7

halfway

Halfway point of trigger routing. This parameter is used only to route the software-generated trigger signal to the SMB connector on the faceplate. In this case, the halfway should

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be set as one of the trigger bus lines, otherwise as PXI_TRIG_VAL_NONE.

Available value	Description
PXI_TRIG_VAL_NONE	No halfway point
PXI_TRIG_VAL_TRIG0	PXI trigger bus #0
PXI_TRIG_VAL_TRIG1	PXI trigger bus #1
PXI_TRIG_VAL_TRIG2	PXI trigger bus #2
PXI_TRIG_VAL_TRIG3	PXI trigger bus #3
PXI_TRIG_VAL_TRIG4	PXI trigger bus #4
PXI_TRIG_VAL_TRIG5	PXI trigger bus #5
PXI_TRIG_VAL_TRIG6	PXI trigger bus #6
PXI_TRIG_VAL_TRIG7	PXI trigger bus #7

Return Code

```
ERR_NoError
ERR_BoardNoInit
ERR_Set_Path
```

A.2.5 TRIG_Trigger_Clear

Description

Clears the trigger routing setting

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
I16 TRIG_Trigger_Clear()
```

Visual Basic

```
TRIG_Trigger_Clear() As Integer
```

Parameters

None

Return Code

```
ERR_NoError
ERR_BoardNoInit
```


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```
ERR_Trigger_Clr
```

A.2.6 TRIG_GetSoftTrg

Description

Acquires the current software trigger state, with default state after system boot of Logic Low

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
I16 TRIG_GetSoftTrg(U8 *Status)
```

Visual Basic

```
TRIG_GetSoftTrg (status As Byte) As Integer
```

Parameters

Status

Returns the logic level of software trigger signal

Returned value:

0: Logic low

1: Logic high

Return Code

```
ERR_NoError
ERR_BoardNoInit
ERR_Query_Status
```

A.2.7 TRIG_Trigger_Route_Query

Description

Acquires the current trigger signal routing path

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
I16  TRIG_Trigger_Route_Query  (U32*  source,
U32* dest, U32* halfway)
```


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Visual Basic

```
TRIG_Trigger_Route_Query (source As Long, dest
As Long, halfway As Long) As Integer
```

Parameters

source

Returns to the current source of trigger routing, with possible values including:

Available Definition	Defined Value
PXI_TRIG_VAL_NONE	0
PXI_TRIG_VAL_SMB	2
PXI_TRIG_VAL_SOFT	3
PXI_TRIG_VAL_TRIG0	111
PXI_TRIG_VAL_TRIG1	112
PXI_TRIG_VAL_TRIG2	113
PXI_TRIG_VAL_TRIG3	114
PXI_TRIG_VAL_TRIG4	115
PXI_TRIG_VAL_TRIG5	116
PXI_TRIG_VAL_TRIG6	117
PXI_TRIG_VAL_TRIG7	118

dest

Returns to the current destination of trigger routing, with possible values including:

Available Definition	Defined Value
PXI_TRIG_VAL_NONE	0
PXI_TRIG_VAL_SMB	2
PXI_TRIG_VAL_TRIG0	111
PXI_TRIG_VAL_TRIG1	112
PXI_TRIG_VAL_TRIG2	113
PXI_TRIG_VAL_TRIG3	114
PXI_TRIG_VAL_TRIG4	115
PXI_TRIG_VAL_TRIG5	116
PXI_TRIG_VAL_TRIG6	117

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Available Definition	Defined Value
PXI_TRIG_VAL_TRIG7	118

halfway

Returns to the current halfway point of trigger routing, with possible values including:

Available Value	Description
PXI_TRIG_VAL_NONE	0
PXI_TRIG_VAL_TRIG0	111
PXI_TRIG_VAL_TRIG1	112
PXI_TRIG_VAL_TRIG2	113
PXI_TRIG_VAL_TRIG3	114
PXI_TRIG_VAL_TRIG4	115
PXI_TRIG_VAL_TRIG5	116
PXI_TRIG_VAL_TRIG6	117
PXI_TRIG_VAL_TRIG7	118

Return Code

```
ERR_NoError
ERR_BoardNoInit
ERR_Query_Status
```

A.2.8 TRIG_GetDriverRevision

Description

Acquires the PXI Trigger software driver version; format of the version number is major.minor1.minor2

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
I16    TRIG_GetDriverRevision(unsigned    short
*major, unsigned short *minor1, unsigned short
*minor2)
```

Visual Basic

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```
TRIG_GetDriverRevision (major As Integer,
minor1 As Integer, minor2 As Integer) As Inte-
ger
```

Parameters

major

Returns the major version number of the pxi trigger software driver

minor1

Returns the first minor version number of the pxi trigger software driver

minor2

Returns the second minor version number of the pxi trigger software driver

Return Code

```
ERR_NoError
ERR_Query_Revision
```


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Appendix B - Watchdog Timer

This appendix describes use of the watchdog timer (WDT) function library for the PXI-3980 controller. The watchdog timer is a hardware mechanism resetting the system when the operating system or application halts. After starting, periodic reset of the watchdog timer in the application before expiry is required. Once the watchdog timer expires, a hardware-generated signal is sent to reset the system.

B.1 WDT Function Library

B.1.1 InitWDT

Description

Initializes watchdog timer function. InitWDT must be called before the invocation of any other WDT function.

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
BOOL InitWDT()
```

Visual Basic

```
InitWDT() As Boolean
```

Parameter

None

Return Code

`True`	If watchdog timer is successfully initialized
`False`	If watchdog timer fails to initialize

B.1.2 SetWDT

Description

Sets the timeout value for watchdog timer. The timeout value uses seconds as a unit. ResetWDT or StopWDT should be called prior to expiration of the watchdog timer, or the system will be reset.

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Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
BOOL SetWDT(unsigned long second)
```

Visual Basic

```
InitWDT(ByVal second as Long) As Boolean
```

Parameter

second

Specifies the timeout value of the watchdog timer.

Value Description

Value	Description
0 to 255	If the value of the *second* parameter is between 0 and 255, the resolution of the watchdog timer is 1 second
Over 255	If the value of the *second* parameter exceeds 255, the resolution of the watchdog timer is 1 minute, that is, if a value of 400 is given, the actual timeout value is 400/60 + 1 = 7 minutes

Return Code

`True`	If timeout value of watchdog timer is successfully set
`False`	If timeout value of watchdog timer fails to be set

B.1.3 StartWDT

Description

Starts watchdog timer function. Once invoked, the watchdog timer countdown starts, and ResetWDT or StopWDT should be called before the expiration of the watchdog timer, or the system will be reset.

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

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Syntax

C/C++

```
BOOL StartWDT()
```

Visual Basic

```
StartWDT() As Boolean
```

Parameter

None

Return Code

`True`	If watchdog timer starts successfully
`False`	If watchdog timer fails to start

B.1.4 ResetWDT

Description

Resets the watchdog timer to the initial timeout value specified in SetWDT function, and ResetWDT or StopWDT should be called before the expiration of the watchdog timer, or the system will be reset.

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
BOOL ResetWDT()
```

Visual Basic

```
ResetWDT() As Boolean
```

Parameter

None

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Return Code

`True`	If watchdog timer resets successfully
`False`	If watchdog timer fails to reset

B.1.5 StopWDT

Description

Stops the watchdog timer.

Supported Controllers

PXI-3980, PXI-3950, PXI-3920, PXI-3910

Syntax

C/C++

```
BOOL StopWDT()
```

Visual Basic

```
StopWDT() As Boolean
```

Parameter

None

Return Code

`True`	If watchdog timer stops successfully
`False`	If watchdog timer fails to stop

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Important Safety Instructions

For user safety, please read and follow all **instructions**, **WARNINGS**, **CAUTIONS,** and **NOTES** marked in this manual and on the associated equipment before handling/operating the equipment.

- Read these safety instructions carefully.
- Keep this user's manual for future reference.
- Read the specifications section of this manual for detailed information on the operating environment of this equipment.
- When installing/mounting or uninstalling/removing equipment:
  - Turn off power and unplug any power cords/cables.
- To avoid electrical shock and/or damage to equipment:
  - Keep equipment away from water or liquid sources;
  - Keep equipment away from high heat or high humidity;
  - Keep equipment properly ventilated (do not block or cover ventilation openings);
  - Make sure to use recommended voltage and power source settings;
  - Always install and operate equipment near an easily accessible electrical socket-outlet;
  - Secure the power cord (do not place any object on/over the power cord);
  - Only install/attach and operate equipment on stable surfaces and/or recommended mountings; and,
  - If the equipment will not be used for long periods of time, turn off and unplug the equipment from its power source.

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- Never attempt to fix the equipment. Equipment should only be serviced by qualified personnel.
- A Lithium-type battery may be provided for uninterrupted, backup or emergency power.



Risk of explosion if battery is replaced with an incorrect type; please dispose of used batteries appropriately.

- Equipment must be serviced by authorized technicians when:
  - The power cord or plug is damaged;
  - Liquid has penetrated the equipment;
  - It has been exposed to high humidity/moisture;
  - It is not functioning or does not function according to the user's manual;
  - It has been dropped and/or damaged; and/or,
  - It has an obvious sign of breakage.

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Getting Service

Contact us should you require any service or assistance.

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