PXIe-3985

PXI Express Embedded Controller

User's Manual



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Revision History

Revision	Release Date	Description of Change(s)
2.00	2015/2/4	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 PXIe-3985 PXI Express™ embedded controller is based on the fourth generation Intel® Core™ i7 processor specifically designed for PXI Express-based testing systems. A rugged and stable operating environment is provided for a variety of testing and measurement applications.

Combining state-of-the-art Intel® Core™ i7-4700EQ 2.4 GHz processors and up to 16 GB of 1600 MHz DDR3L memory, the PXIe-3985 utilizes four separate computing engines on a single processor, enabling execution of four independent tasks simultaneously. With a configurable PCIe switch, the PXIe-3985 can support four links x4 or two links x16 x8 PXI Express link capability, with maximum system throughput of up to 8 GB/s.

PXI Express-based testing systems typically make up a PXI Express platform and diversified standalone instruments for complex testing tasks. The PXIe-3985 series provides ample interfaces, including two DisplayPort connectors, allowing connection to two monitors, dual USB 3.0 connections for high speed peripheral devices, dual Gigabit Ethernet ports, one for LAN connection and the other for controlling LXI instruments, four USB 2.0 ports for peripheral devices and USB instrument control, and a Micro-D GPIB connector for GPIB instrument connection, for hybrid PXI-based testing systems control.



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™-5 PXI Express Hardware Specification Rev.1.0
- Intel® Core™ i7-4700EQ 2.4 GHz processor for maximum computing power, 3.4GHz maximum in single-core, Turbo Boost mode.
- Dual Channel DDR3L SODIMM
  - Up to 16 GB 1600 MHz
- Maximum System Throughput 8 GB/s
- PXI Express Link Capability
  - 4 Four Links Configuration: x4 x4 x4 x4
  - 2 Two Links Configuration: x16 x8
- Pre-integrated SATA hard drive at 500GB,
  - Supports 2.5” HDD or SSD
  - SATA 6.0 Gb/s
  - Supports AHCI
- Integrated I/O
  - Dual Gigabit Ethernet ports
  - Two USB3.0 Ports
  - Four USB 2.0 Ports
  - Built-in GPIB (IEEE488) controller
  - Dual DisplayPort connector
  - One COM port (D-sub9 serial)
  - Trigger I/O for advanced PXITM trigger functions

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1.2 Specifications

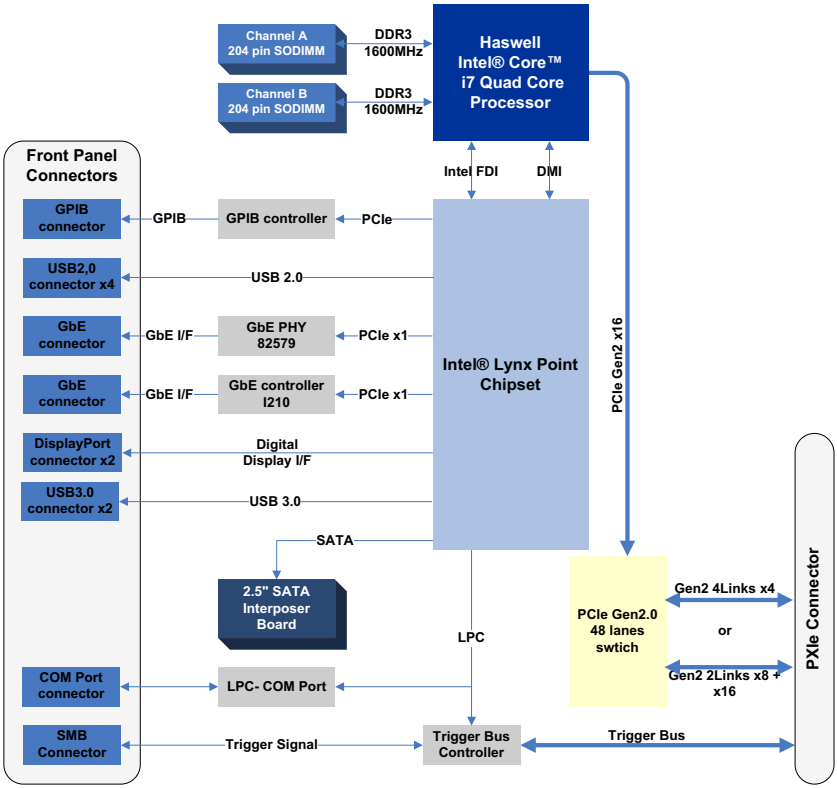


Figure 1-1: PXIe-3985 Functional Block Diagram

Processor

- Intel® Core™ i7-4700EQ 2.4GHz processor
- DMI (Direct Media Interface) with 5 GT/s bandwidth in each direction

Chipset

Mobile Intel® QM87 Express

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Memory

- Two standard 204-pin DDR3L SODIMM sockets
- Supports 1333/1600MHz RAM up to 16 GB total
- Supports non-ECC, unbuffered memory



NOTE:

The externally accessible SODIMM socket can accept replacement DDR3L DRAM DIMM modules.
PXIe-3985 specifications and stability guarantees are only supported when ADLINK-provided DDR3L DRAM DIMM modules are used.

Video

- DisplayPort supports up to 3840x 2160 @ 60 Hz resolution
- DVI (with passive DisplayPort-to-DVI adapter) supports resolution up to 1920 x 1200 @ 60 Hz



NOTE:

DisplayPort adapters for other standards are available, with maximum available resolution dependent on the adapter chosen

Hard Drive

Built-in 2.5” 500GB SATA hard drive or 240GB SATA solid state hard drive.

I/O Connectivity

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

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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.

Trigger I/O

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

Dimensions (3U PXI module)

3U/4-slot PXI standard

Weight

1.0 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 PXIe-3985 meets the essential requirements of applicable European Directives.

Power Requirements

Voltage Rail	5V standby	3.3V	5V	12V
Maximum power consumption	0.13A	3.0A	3.9A	5.3A
Typical power consumption	0.13A	3.0A	2.1A	1.6A

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1.3 I/O and Indicators

1.3.1 Front Panel

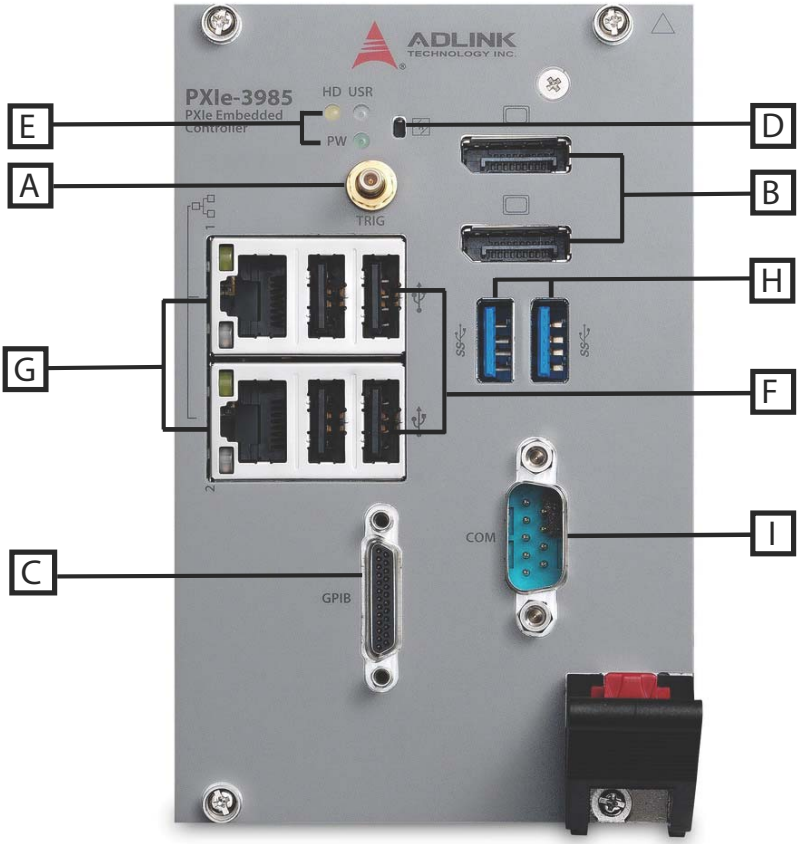


Figure 1-2: PXIe-3985 Front Panel

A	PXI Trigger Connector (SMB jack)	F	4X Type-A USB 2.0 connectors
B	2X DisplayPort Connectors	G	2X Gigabit Ethernet
C	GPIB Connector (Micro D-Sub 25P)	H	2X USB 3.0
D	Reset Button	I	1X COM port (D-sub9 serial)
E	LED indicators		

Table 1-1: Front Panel Legend

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PXI Trigger Connector

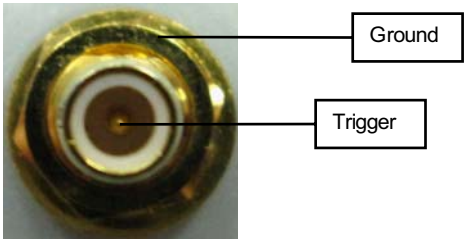


Figure 1-3: PXI Trigger SMB Jack

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 PXIe-3985 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.

DisplayPort Connectors

Provide monitor connection, with, if connecting to VGA/DVI/HDMI monitors, installation of requisite adapters required. Dual display function is also supported.

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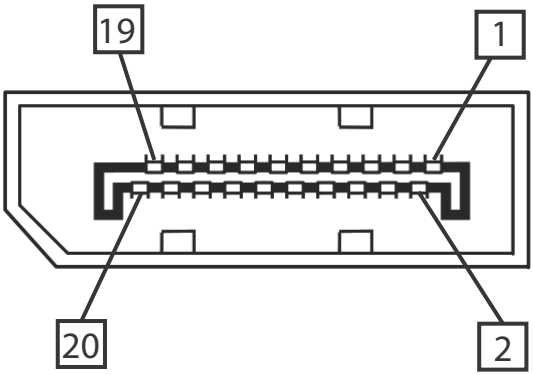


Figure 1-4: DisplayPort Connector

Pin	Signal	Pin	Signal
1	CN_DDPx0+	11	GND
2	GND	12	CN_DDPx3-
3	CN_DDPx0-	13	CN_DDPx_AUX_SEL
4	CN_DDPx1+	14	CN_DDPx_CONFIG2
5	GND	15	CN_DDPx_AUX+
6	CN_DDPx1-	16	GND
7	CN_DDPx2+	17	CN_DDPx_AUX-
8	GND	18	CN_DDPx_HPD
9	CN_DDPx2-	19	GND
10	CN_DDPx3+	20	+V3.3_DDPx_PWR

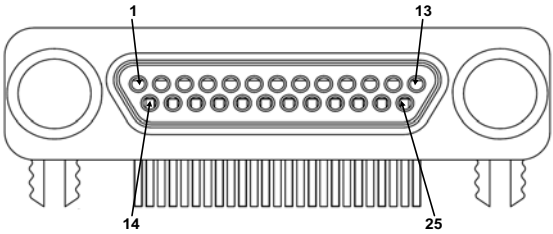
Table 1-2: DisplayPort Pin Assignment

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1.3.2 GPIB Connector

The GPIB connector on PXIe-3985 is a micro D-sub 25P connector, controlling external bench-top instruments. Connection to other instruments requires the optional 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 are 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
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 1-3: GPIB Pin Description

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1.3.3 Reset Button

The reset button, activated by insertion of any pin-like implement, executes a hard reset for the PXIe-3985.

1.3.4 LED Indicators

Four LED indicators on the faceplate indicate operational status of the PXIe-3985, as follows.



Figure 1-5: PXIe-3985 LED Indicators

LED	Color	Description
PW	Green	Indicates system power, remaining lit when the system boots normally and main power supply is functioning
HD	Yellow	Indicates operating state of the HDD or SSD, flashing during access to or activity on the SATA HDD.
USR	Blue	User-programmable LED indicator

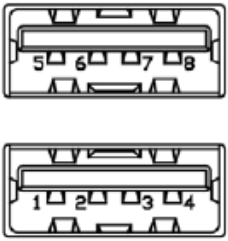
Table 1-4: LED Indicator Legend

1.3.5 USB 2.0 Ports

The PXIe-3985 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 pri-

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ority and device settings configurable configured in BIOS. Please see Section B.4: Boot Setup for more information.



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

Table 1-5: USB 2.0 Port Pin Assignment

1.3.6 Gigabit Ethernet Ports

Dual Gigabit Ethernet connection is provided on the PXIe-3985 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 1-6: PXIe-3985 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

1.3.7 USB 3.0 Ports

The PXIe-3985 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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1.3.8 COM Port

A COM port on the front panel with D-sub 9P connectors supports RS-232/RS-422/RS-485 by BIOS selection.

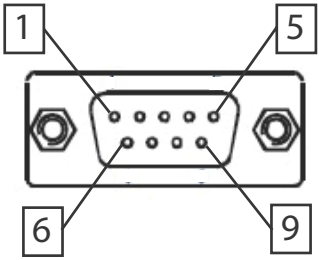


Figure 1-6: COM Port

Pin	Signal Name		
	RS-232	RS-422	RS-485
1	DCD#	TXD422-	485DATA-
2	RXD	TXD422+	485DATA+
3	TXD	RXD422+	N/S
4	DTR#	RXD422-	N/S
5	GND	N/S	N/S
6	DSR#	N/S	N/S
7	RTS#	N/S	N/S
8	CTS#	N/S	N/S
9	RI#	N/S	N/S

Table 1-7: D-Sub 9p COM Port Signal Functions

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1.3.9 Onboard Connections and Settings

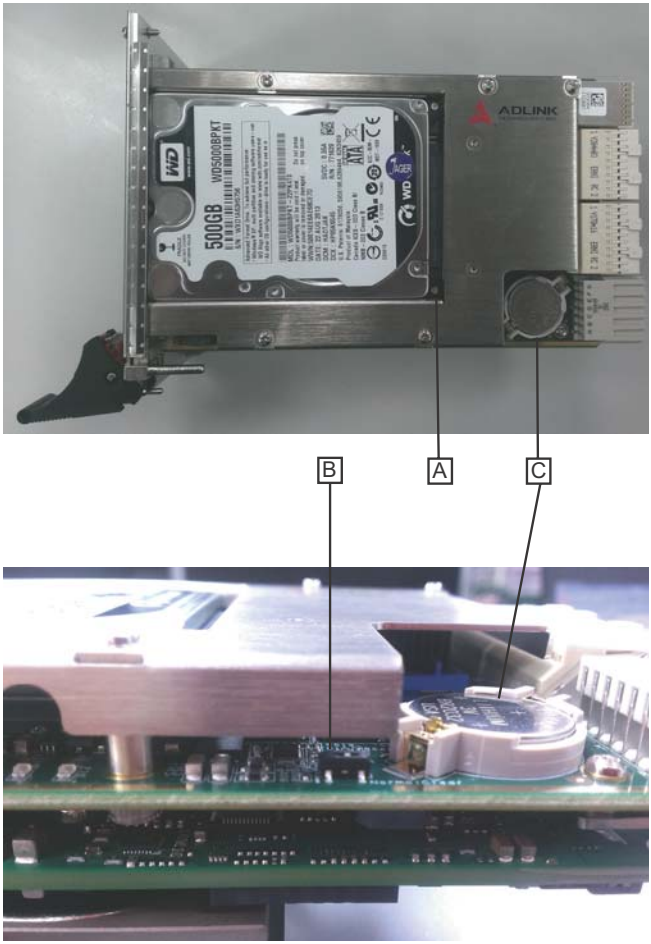


Figure 1-7: PXIe-3985 Onboard Configuration

A	SATA Connector
B	Clear CMOS switch
C	System Battery

Table 1-8: Onboard Configuration Legend

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2 Getting Started

This chapter describes procedures for installing the PXIe-3985 and making preparations for its operation, including hardware and software setup. Please note that the PXIe-3985 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:

- PXIe-3985 Controller (equipped with RAM and HDD or SSD)
- DisplayPort-to-VGA adapter
- PXIe-3985 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 PXIe-3985 are:

- 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 PXIe-3985 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 B.4: 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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2.2.1 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

Flat-head screwdriver

Anti-static wrist strap

Anti-static mat

ADLINK PXIe-3985 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.

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2.2.2 Installing the PXIe-3985

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 PXIe-3985 into the chassis, as shown



4. Elevate the latch until the PXIe-3985 is fully seated in the chassis backplane. The alignment pin on the rear of the latch can be threaded into the best fit alignment port in the chassis rail.
5. Fasten the four mounting screws on the faceplate of PXIe-3985, and connect all peripheral devices.

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2.2.3 Replacing the Hard Drive or Solid State Drive

The PXIe-3985 provides a SATA 3.0 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 five screws attaching the hard drive housing to the PXIe-3985 controller, as shown.



2. Remove the screws.
3. Gently lift and remove the housing with the installed HDD or SSD.
4. Locate the four screws (two on each side, as shown) fixing the hard drive, and remove.



5. To install a HDD or SSD or other compatible SATA hard drive, reverse the steps and reinstall the PXIe-3985 into the PXI system.

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2.2.4 Replacing the Battery Backup

The PXIe-3985 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 PXIe-3985 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 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.

2.2.5 Clearing CMOS

In the event of a system malfunction causing the PXIe-3985 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 PXIe-3985 from the chassis. Observe all anti-static precautions.
3. Locate the CMOS clear switch (SW1) on the board (see Section 1.3.9: Onboard Connections and Settings). Move the switch from Normal position



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to Clear position



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

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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 USB 3.0 driver
9. Install the SMBus driver
10. Install the RST driver

3.2 Installing the Chipset Driver

This section describes installation of the chipset driver for PXIe-3985. The chipset driver directs the operating system to configure the Intel® QM87 chipset components.

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 Win7 32-bit chipset driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_32bit\Chipset\

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- ▷ The Win7 64-bit chipset driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\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 Win7 32-bit graphics driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_32bit\Graphics\
   - ▷ The Win7 64-bit graphics driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\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 Win7 32-bit Ethernet driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_32bit\LAN\
   - ▷ The Win7 64-bit Ethernet driver is located in the directory:

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x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\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 PXIe-3985 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.

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 Win7 32-bit GPIB driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_32bit\GPIB\
   - ▷ The Win7 64-bit GPIB driver is located in the directory: x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\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 Win7 32-bit management engine driver is located in the directory:

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x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_32bit\ME\

- ▷ The Win7 64-bit management engine driver is located in the directory:
  x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\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 PXIe-3985 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 Win7 32-bit PXI trigger driver is located in the directory:
     x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_32bit\TriggerIO\
   - ▷ The Win7 64-bit PXI trigger driver is located in the directory:
     x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_64bit\TriggerIO\
3. Execute **PXI Trigger IO setup v330.exe** and follow on-screen instructions to complete the setup
4. Reboot the system

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3.8 Installing the USB 3.0 Driver

The PXIe-3985 controller provides two USB 3.0 ports on the face-plate. 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 Win7 32-bit USB 3.0 driver is located in the directory:
     x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_32bit\USB30\
   - ▷ The Win7 64-bit USB 3.0 driver is located in the directory:
     x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\Win7_64bit\USB30\
3. Execute setup.exe and follow on- screen instructions to complete the setup
4. Reboot the system

3.9 Installing the SMBus Driver

To install the SMBus driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD- ROM drive)
   - ▷ The 32bit Win7 SMBus driver is located in the directory x:\ Driver Installation\PXI Platform\PXI controller\PXIe-3985\SMBus\Win7\32Bits\
   - ▷ The 64bit Win7 SMBus driver is located in the directory x:\ Driver Installation\PXI Platform\PXI controller\PXIe-3985\SMBus\Win7\64Bits\
3. Execute setup.exe and follow on- screen instructions to complete the setup
4. Reboot the system

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3.10 Installing the RST Driver

To install the RST driver:

1. Close any running applications.
2. Insert the ADLINK All-in-One CD (x: denotes the CD- ROM drive)
   - ▷ The 32bit Win7 RST driver is located in the directory x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\RST\Win7\32Bits\
   - ▷ The 64bit Win7 RST driver is located in the directory x:\Driver Installation\PXI Platform\PXI controller\PXIe-3985\RST\Win7\64Bits\
3. Execute setup.exe and follow on- screen instructions to complete the setup
4. Reboot the system

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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 PXIe-3985 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. API files are located in the installation directory of the PXI Trigger I/O driver.

A.1 Data Types

The PXIe-3985 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 PXIe-3985 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 PXIe-3985 controller. TRIG_Init must be called before the invocation of any other trigger I/O function.

Syntax

C/C++

```
I16 TRIG_Init()
```

Visual Basic

```
TRIG_Init As Integer
```

Parameter

None

Return Code

```
ERR_NoError
ERR_BoardBusy
ERR_OpenDriverFail
ERR_GetGPIOAddress
```

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A.2.2 TRIG_Close

Description

Closes trigger I/O function of PXIe-3985 controller, releasing resources allocated for the trigger I/O function. Users must invoke TRIG_Close before exiting the application.

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

Syntax

C/C++

```
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

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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.

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

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

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Available value	Description
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 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

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Available value	Description
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

Syntax

C/C++

```
I16 TRIG_Trigger_Clear()
```

Visual Basic

```
TRIG_Trigger_Clear() As Integer
```

Parameters

None

Return Code

```
ERR_NoError
ERR_BoardNoInit
ERR_Trigger_Clr
```

A.2.6 TRIG_GetSoftTrg

Description

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

Syntax

C/C++

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

Visual Basic

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

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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

Syntax

C/C++

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

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

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Available Definition	Defined Value
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
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

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Available Value	Description
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

Syntax

C/C++

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

Visual Basic

```
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

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Return Code

```
ERR_NoError
ERR_Query_Revision
```

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Appendix B 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 PXIe-3985 controller. The BIOS setup program includes menus for configuring settings and enabling PXIe-3985 controller features.



Changing BIOS settings may result in incorrect operation and possibly an inability to boot. If this occurs, follow the instructions in Section 2.2.5: 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.

B.1 Starting the BIOS

1. Power on or reboot the PXIe-3985 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 optimal default values into the BIOS
<F4>	Saves the current configuration and exits BIOS setup

Table B-1: BIOS Hot Key Functions

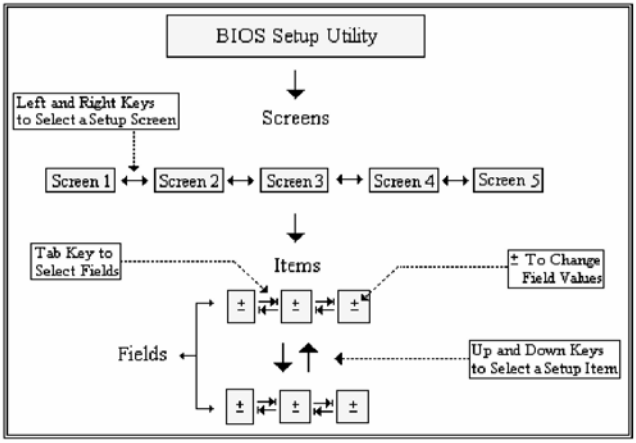


Figure B-1: BIOS Setup Navigation

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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.

B.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.
MAC Address	The MAC address of Ethernet ports
Access Level	Displays current access level, default is Administrator
LINK CAP	The PXI express link capability
Processor Information	Includes detail CPU information.
PCH Information	Includes chipset information

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Item	Detail
System Management	Includes manufacturing information and runtime statistics

Table B-2: BIOS Main Setup Menu

B.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 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
Holdoff Timer	Delay setting for PCIe discovery in seconds
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)
PCIe Performance	Enable or disable the EIST/Turbo/C-state (default is disabled)
CPU	Displays processor type, speed, system bus speed, etc.
Memory	Displays memory type, speed, voltage rail, etc.
Graphics	Displays VBIOS version, and graphic memory setting
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)
PCI and PCIe	PCI and PCIe related setting, including enable the 4G memory space supporting for peripheral module
Hardware Health Configuration	Displays voltages and temperatures on the controller
ACPI and Power Management	Power management related setting, including ACPI mode and power-up mode
Clock	Enable or disable spread spectrum clock for PCIe reference clock (default is disabled)
Thermal	Controller thermal protection setting.

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Item	Detail
Serial Port Configuration	Set COM port mode between RS232/422/485
Miscellaneous	Includes precision timer and security setting

Table B-3: BIOS Advanced Setup Menu

B.4 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 B-4: BIOS Boot Setup Menu

B.5 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
Administrator Password	Sets an administrative level password for the BIOS.
User Password	Sets user level passwords for the BIOS.

Table B-5: BIOS Security Setup Menu

CAUTION:

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

B.6 Save & Exit Setup

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

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

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 B.4: Boot Setup) to manually restore the boot priority sequence.

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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.



WARNING:

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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