IEI Integration Corp.

MODEL:

PCIE-Q870-i2

Full-Size PICMG 1.3 CPU Card Supports LGA1150 Intel® Core™ i7/i5/i3, Pentium® or Celeron® CPU, Intel® Q87 Chipset, DDR3, VGA, iDP, Dual Intel® PCIe GbE, SATA 6Gb/s, PCIe Mini, mSATA, RS-232, HD Audio, iRIS-2400 and RoHS

User Manual

Rev. 1.02 – 24 April, 2014

RoHS Lead Free

Revision

Date	Version	Changes
24 April, 2014	1.02	Modified LAN pinouts Updated Chapter 2: Packing List
24 March, 2014	1.01	Deleted I^{2}C information Updated Section 2.4: Optional Items
14 January, 2014	1.00	Initial release

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Introduction

1.1 Introduction
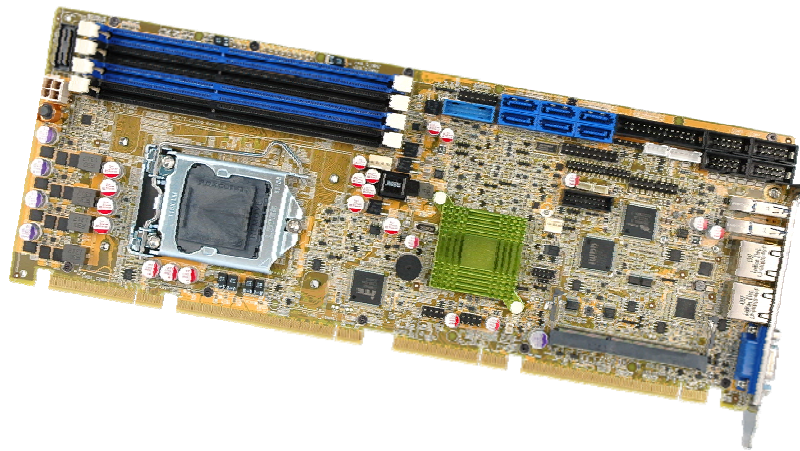
Figure 1-1: PCIE-Q870-i2

The PCIE-Q870-i2 is a PICMG 1.3 CPU card. It accepts a Socket LGA1150 Intel® Core™ i7/i5/i3, Pentium® or Celeron® processor and supports four 240-pin 1600/1333 MHz dual-channel DDR3 DIMM modules up to 32 GB.

The PCIE-Q870-i2 provides two GbE interfaces through the Intel® I217LM (with Intel® AMT 9.0 support) and the Intel® I210 PCIe controllers. The integrated Intel® Q87 chipset supports six SATA 6Gb/s drives. In addition, the PCIE-Q870-i2 includes VGA and iDP interfaces for dual independent display.

Two USB 3.0 on the rear panel, two USB 3.0 by pin header, four USB 2.0 by pin headers, four USB 2.0 by pin headers on backplane, four RS-232 and one PCIe Mini interface with mSATA support provide flexible expansion options. High Definition Audio (HDA) support ensures HDA devices can be easily implemented on the PCIE-Q870-i2.

1.2 Features

Some of the PCIE-Q870-i2 motherboard features are listed below:

- PICMG 1.3 full-size solution
- LGA1150 Intel® Core™ i7/i5/i3, Pentium® or Celeron® processor supported
- Intel® Q87 chipset
- Four 240-pin 1600/1333 MHz dual-channel DDR3 DIMMs support up to 32 GB
- Dual independent display by VGA and iDP interfaces
- Supports IPMI 2.0 via iRIS-2400 module
- One PCIe Mini slot with mSATA support
- Two Intel® PCIe GbE connectors (LAN1 with Intel® AMT 9.0 support)
- Six SATA 6Gb/s connectors support RAID 0, 1, 5, 10
- Stiffener bars prevent the PCB bending and damage of components on the solder side
- TPM V1.2 hardware security function supported by TPM module
- High Definition Audio
- RoHS compliant

1.3 Connectors

The connectors on the PCIE-Q870-i2 are shown in the figure below.

Figure 1-2: Connectors

1.4 Dimensions

The main dimensions of the PCIE-Q870-i2 are shown in the diagram below.

Figure 1-3: PCIE-Q870-i2 Dimensions (mm)
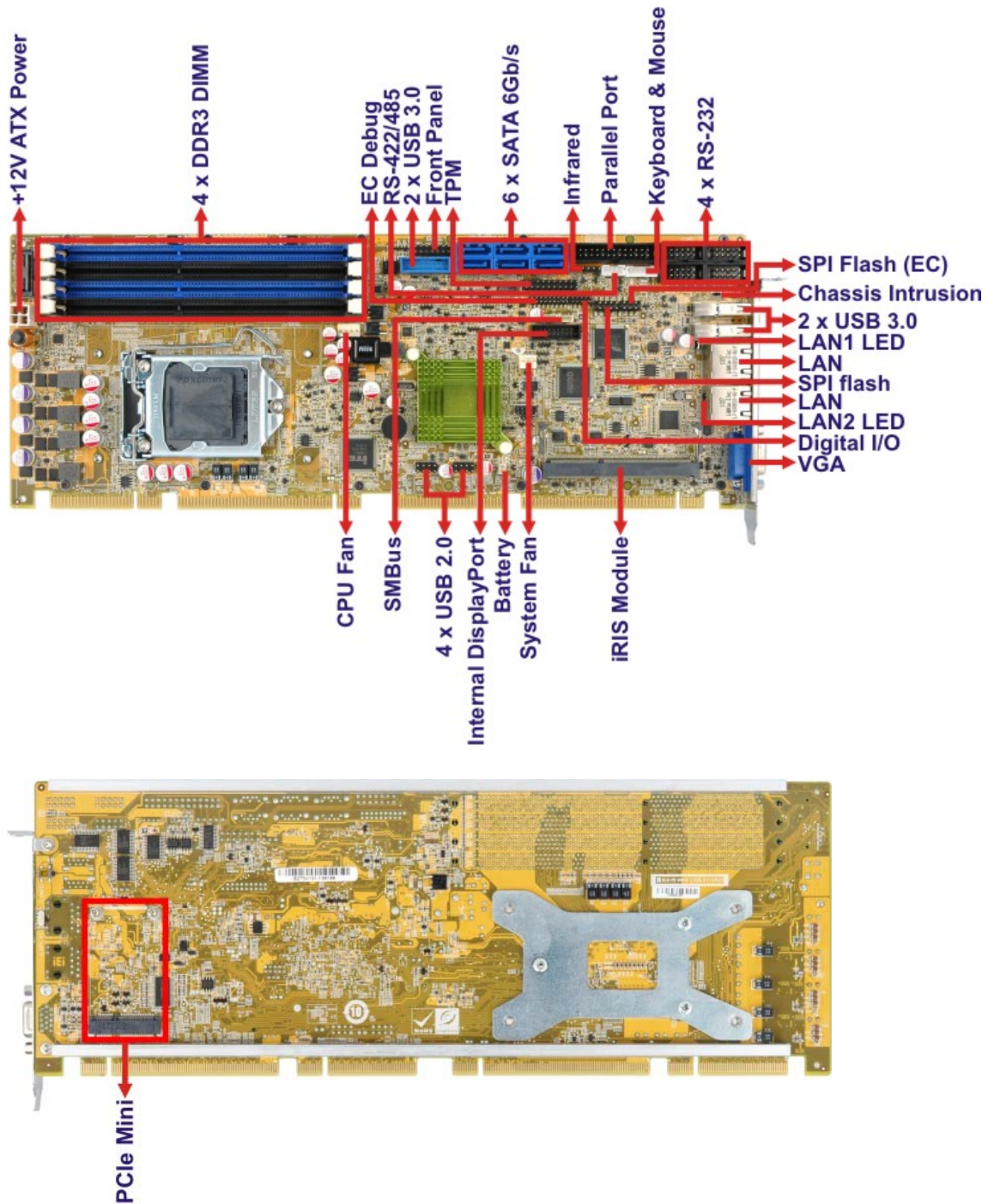
1.5 Data Flow

Figure 1-4 shows the data flow between the system chipset, the CPU and other components installed on the motherboard.
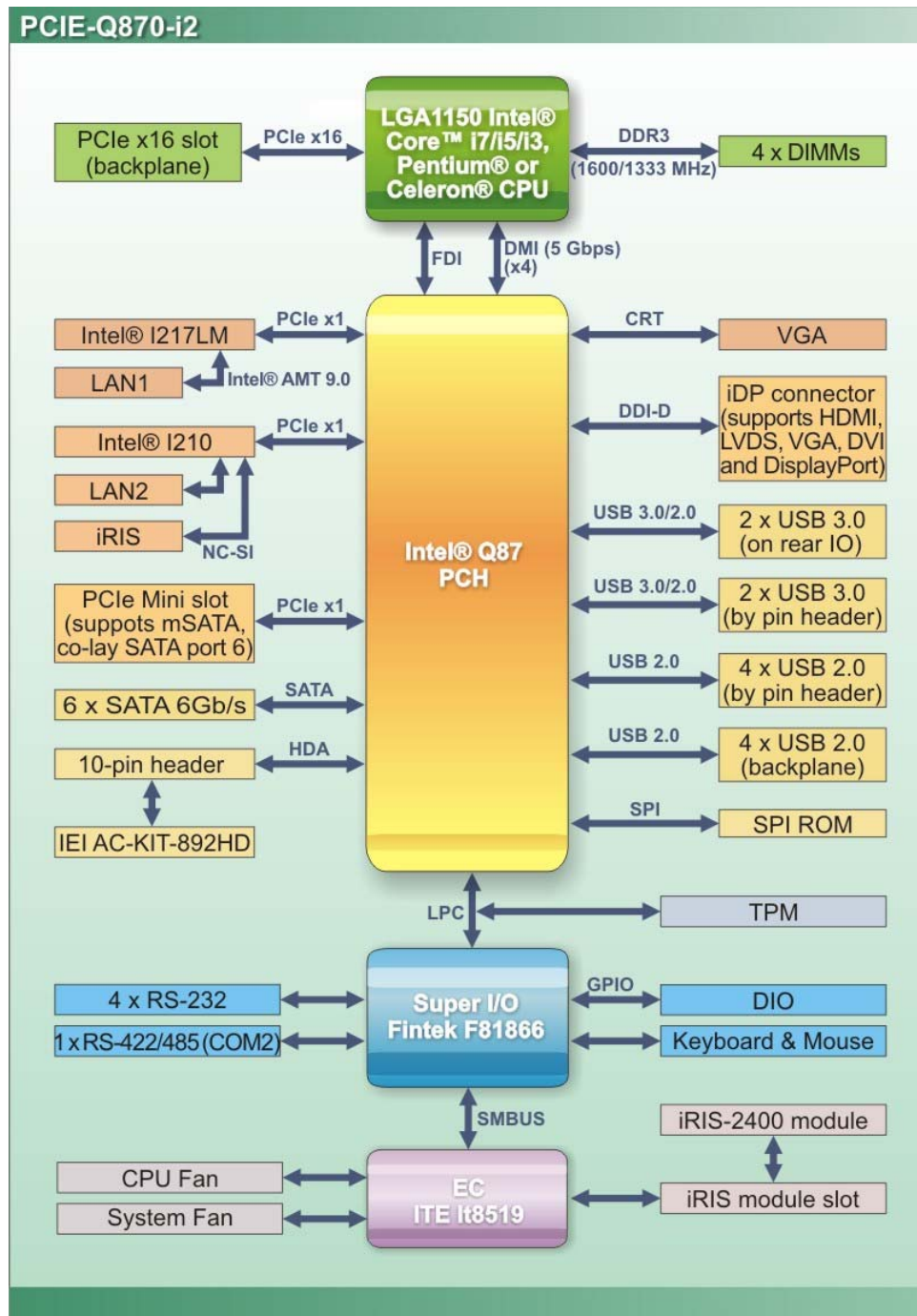
Figure 1-4: Data Flow Diagram

1.6 Technical Specifications

The PCIE-Q870-i2 technical specifications are listed below.

Specification/Model	PCIE-Q870-i2
Form Factor	PICMG 1.3
CPU Supported	LGA1150 Intel® Core™ i7/i5/i3, Pentium® or Celeron® CPU
Chipset	Intel® Q87
Memory	Four 240-pin 1600/1333 MHz dual-channel ECC/non-ECC unbuffered DDR3/DDR3L SDRAM DIMMs support (system max. 32 GB)
Graphics Engine	Intel® HD Graphics Gen 7.5 supports DirectX 11.1, OpenCL 1.2 and OpenGL 3.2 Full MPEG2, VC1, AVC Decode
Audio	Supports by IEI AC-KIT-892HD audio kit
BIOS	UEFI BIOS
Ethernet Controllers	**LAN1**: Intel® I217LM PHY with Intel® AMT 9.0 support **LAN2**: Intel® I210 PCIe Ethernet controller with NC-SI support
Super I/O Controller	Fintek F81866
EC	IWDD
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Expansions	PCIe signal and PCI signal via golden finger PCI signal by ITE IT8892 (PCIe-to-PCI bridge) One PCIe Mini slot supports PCIe x1, USB devices and mSATA (co-lay SATA port 6)
I/O Interface Connectors	
Audio Connector	One internal audio connector (10-pin header)
Chassis Intrusion	One 2-pin header
Digital I/O	8-bit, 4-bit input/4-bit output

Specification/Model	PCIE-Q870-i2
Display Output	One VGA (up to 1920 x 1200, 60 Hz) One iDP interface for HDMI, LVDS, VGA, DVI and DisplayPort (up to 3840 x 2160, 60 Hz)
Ethernet	Two RJ-45 GbE ports
Fan	One 4-pin smart fan connector (CPU fan) One 4-pin smart fan connector (system fan)
Front Panel	One 14-pin header (power LED, HDD LED, IPMI LED, speaker, power button, reset button)
Infrared	One via 5-pin header
IPMI 2.0	One iRIS module slot
Keyboard and Mouse	One 6-pin wafer connector
LAN LEDs	Two 2-pin headers for LAN1 LED and LAN2 LED (active)
Parallel Port	One parallel port via internal 26-pin box header
Serial ATA	Six SATA 6Gb/s connectors (support RAID 0, 1, 5, 10)
Serial Ports	Four RS-232 via internal box headers One RS-422/485 via internal 4-pin wafer connector
SMBus	One 4-pin wafer connector
TPM	One via 20-pin header
USB Ports	Two external USB 3.0 ports on rear IO Two internal USB 3.0 ports by pin header Four internal USB 2.0 ports by pin headers Four internal USB 2.0 ports by pin headers on backplane
Environmental and Power Specifications	
Power Supply	5V/12V, AT/ATX power supported
Power Consumption	5V@3.55A , 12V@0.37A, Vcore_12V@7.61A, 3.3V@1.55A, 5VSB@0.13A (3.9 GHz Intel® Core™ i7-4770K CPU with four 4 GB 1333 MHz DDR3 memory)

Specification/Model	PCIE-Q870-i2
Operating Temperature	-20ºC ~ 60ºC
Storage Temperature	-30ºC ~ 70ºC
Humidity	5% ~ 95% (non-condensing)
Physical Specifications	
Dimensions	338 mm x 126 mm
Weight (GW/NW)	1200 g/420 g

Table 1-1: PCIE-Q870-i2 Specifications

Chapter

2

Packing List

2.1 Anti-static Precautions

WARNING!

Static electricity can destroy certain electronics. Make sure to follow the ESD precautions to prevent damage to the product, and injury to the user.

Make sure to adhere to the following guidelines:

- **Wear an anti-static wristband**: Wearing an anti-static wristband can prevent electrostatic discharge.
- **Self-grounding**: Touch a grounded conductor every few minutes to discharge any excess static buildup.
- **Use an anti-static pad**: When configuring any circuit board, place it on an anti-static mat.
- **Only handle the edges of the PCB**: Don't touch the surface of the motherboard. Hold the motherboard by the edges when handling.

2.2 Unpacking Precautions

When the PCIE-Q870-i2 is unpacked, please do the following:

- Follow the antistatic guidelines above.
- Make sure the packing box is facing upwards when opening.
- Make sure all the packing list items are present.
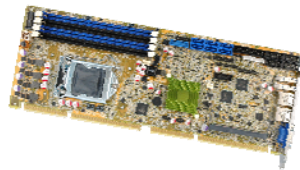
2.3 Packing List

NOTE:

> If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the PCIE-Q870-i2 was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The PCIE-Q870-i2 is shipped with the following components:

Quantity	Item and Part Number	Image
1	PCIE-Q870-i2 CPU card	
2	SATA cable (**P/N**: 32000-062800-RS)	
1	Dual RS-232 cable (**P/N**: 19800-000051-RS)	
1	Dual-port USB cable with bracket (**P/N**: 19800-003100-300-RS)	
1	One Key Recovery CD	
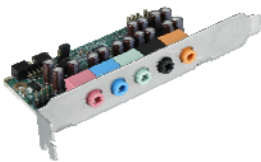
Quantity	Item and Part Number	Image
1	Utility CD	
1	Quick Installation Guide	

Table 2-1: Packing List

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
iRIS-2400 module, IPMI 2.0 adapter card with AST2400 BMC chip for DDR3 SO-DIMM socket interface (**P/N**: iRIS-2400-R10)	
RS-422/485 cable, 200 mm (**P/N**: 32205-003800-300-RS)	
Dual-port USB 3.0 cable with bracket (**P/N**: 19800-010500-200-RS)	
KB/MS cable with bracket (**P/N**: 19800-000075-RS)	
SATA power cable (**P/N**: 32102-000100-200-RS)	
LPT cable (**P/N**: 32200-015100-RS)	

Item and Part Number	Image
7.1-channel HD audio kit with Realtek ALC892 audio codec supporting dual audio stream (**P/N**: AC-KIT-892HD-R10)	
DisplayPort to HDMI converter board for IEI IDP connector (**P/N**: DP-HDMI-R10)	
DisplayPort to LVDS converter board for IEI IDP connector (**P/N**: DP-LVDS-R10)	
DisplayPort to VGA converter board for IEI IDP connector (**P/N**: DP-VGA-R10)	
DisplayPort to DVI-D converter board for IEI IDP connector (**P/N**: DP-DVI-R10)	
DisplayPort to DisplayPort converter board for IEI iDP connector (**P/N**: DP-DP-R10)	
Infineon TPM module (**P/N**: TPM-IN01-R11)	
LGA1150 cooler kit (high-performance compatible, 65W) (**P/N**: CF-1150SB-R11)	

Item and Part Number	Image
LGA1150 cooler kit (1U chassis compatible, 65W) (**P/N**: CF-1150SC-R10)	
LGA1150 cooler kit (high-performance compatible, 95W) (**P/N**: CF-1150SE-R10)	

Table 2-2: Optional Items

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the peripheral interface connectors.

3.1.1 PCIE-Q870-i2 Layout

The figures below show all the peripheral interface connectors.
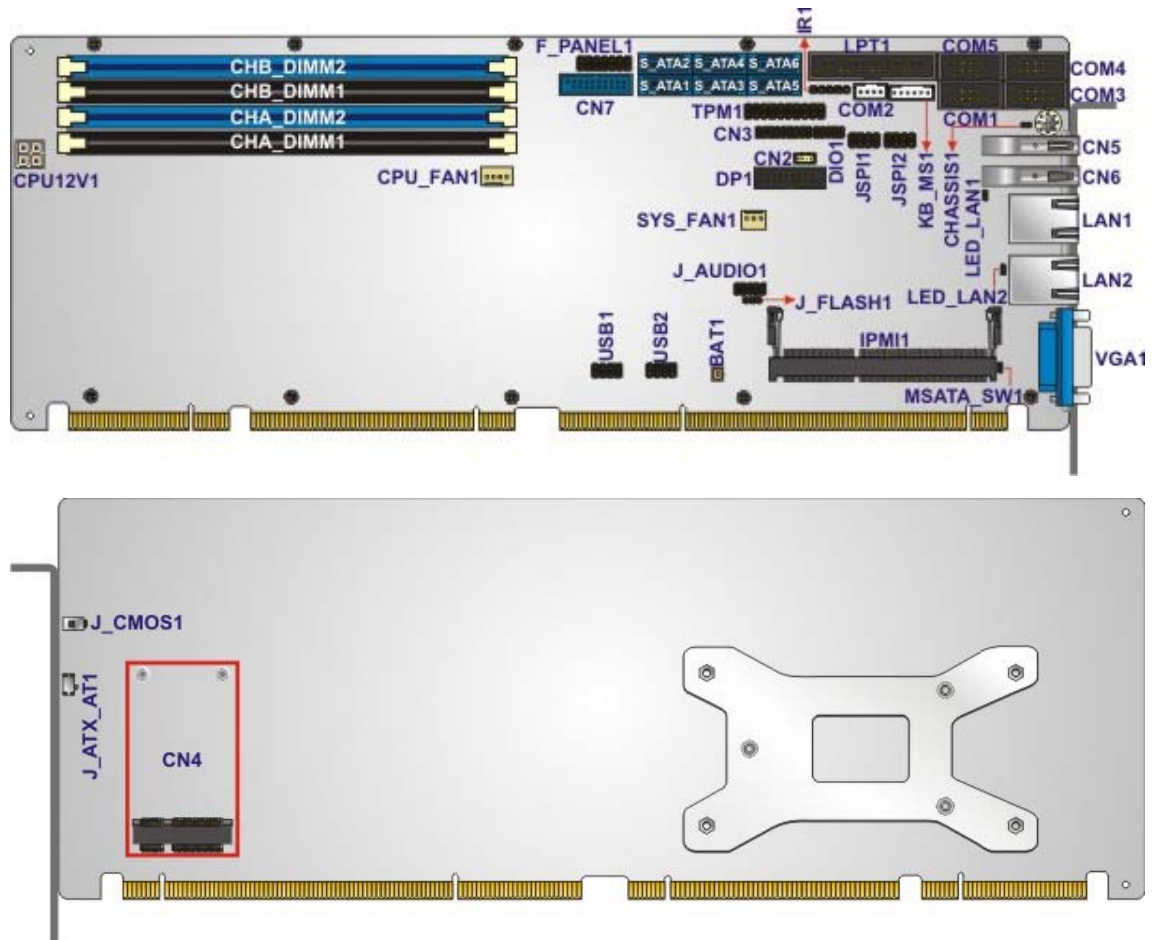
Figure 3-1: Peripheral Interface Connectors

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
+12V ATX power supply connector	4-pin Molex power connector	CPU12V1
Audio kit connector	10-pin header	J_AUDIO1
Battery connector	2-pin wafer	BAT1
Chassis intrusion connector	2-pin header	CHASSIS1
DDR3 DIMM sockets	240-pin socket	CHA_DIMM1, CHA_DIMM2, CHB_DIMM1, CHB_DIMM2
Digital I/O connector	10-pin header	DIO1
EC debug connector	18-pin header	CN3
Fan connector (CPU)	4-pin wafer	CPU_FAN1
Fan connector (system)	3-pin wafer	SYS_FAN1
Front panel connector	14-pin header	F_PANEL1
Internal DisplayPort connector	19-pin box header	DP1
Infrared connector	5-pin header	IR1
iRIS module slot	iRIS module slot	IPMI1
Keyboard and mouse connector	6-pin wafer	KB_MS1
LAN1 LED connector	2-pin header	LED_LAN1
LAN2 LED connector	2-pin header	LED_LAN2
Parallel port connector	26-pin box header	LPT1
PCIe Mini slot	PCIe Mini	CN4
SATA 6Gb/s drive connector	7-pin SATA connector	S_ATA1, S_ATA2, S_ATA3, S_ATA4, S_ATA5, S_ATA6

Connector	Type	Label
Serial port, RS-232	10-pin box header	COM1, COM3, COM4, COM5
Serial port, RS-422/485	4-pin wafer	COM2
SMBus connector	4-pin wafer	CN2
SPI flash connector	8-pin header	JSPI1
SPI flash connector, EC	8-pin header	JSPI2
TPM connector	20-pin header	TPM1
USB 2.0 connectors	8-pin header	USB1, USB2
USB 3.0 connector	19-pin box header	CN7

Table 3-1: Peripheral Interface Connectors

3.1.3 External Interface Panel Connectors

The table below lists the connectors on the external I/O panel.

Connector	Type	Label
Ethernet connectors	RJ-45	LAN1, LAN2
USB 3.0 ports	USB 3.0	CN5, CN6
VGA connector	15-pin female	VGA1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the PCIE-Q870-i2.

3.2.1 +12V ATX Power Supply Connector

CN Label:	**CPU12V1**
CN Type:	4-pin Molex power connector
CN Location:	See **Figure 3-2**
CN Pinouts:	See **Table 3-3**

This connector provides power to the CPU.
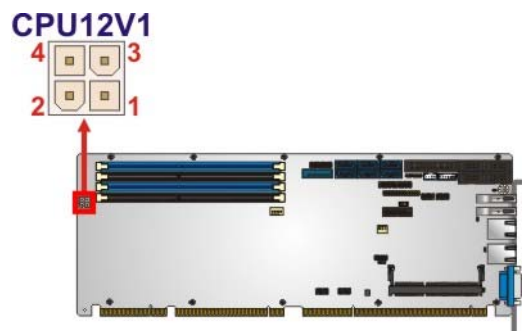
Figure 3-2: ATX Power Connector Pinout Location

Pin	Description	Pin	Description
1	GND	2	GND
3	+12V	4	+12V

Table 3-3: ATX Power Connector Pinouts

3.2.2 Audio Kit Connector

CN Label:	**J_AUDIO1**
CN Type:	10-pin header
CN Location:	See **Figure 3-3**
CN Pinouts:	See **Table 3-4**

This connector connects to an external audio kit.
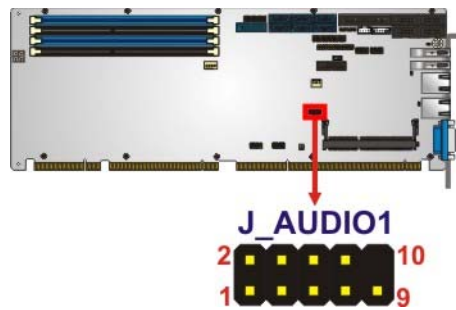
Figure 3-3: Audio Connector Location

Pin	Description	Pin	Description
1	HDA_SYNC	2	HDA_BIT_CLK
3	HDA_SDOUT	4	HDA_SPKR
5	HDA_SDIN	6	HDA_RST#
7	HDA_VCC	8	HDA_GND
9	HDA_+12V	10	HDA_GND

Table 3-4: Audio Connector Pinouts

3.2.3 Battery Connector

⚠ **CAUTION:**

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

CN Label: BAT1
CN Type: 2-pin wafer
CN Location: See **Figure 3-4**
CN Pinouts: See **Table 3-5**

This is connected to the system battery. The battery provides power to the system clock to retain the time when power is turned off.
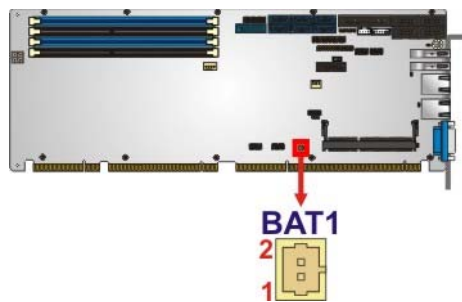
Figure 3-4: Battery Connector Location

Pin	Description
1	VBATT
2	GND

Table 3-5: Battery Connector (BAT1) Pinouts

3.2.4 Chassis Intrusion Connector

CN Label: **CHASSIS1**

CN Type: 2-pin header

CN Location: See **Figure 3-5**

CN Pinouts: See **Table 3-6**

The chassis intrusion connector is for a chassis intrusion detection sensor or switch that detects if a chassis component is removed or replaced.

Figure 3-5: Chassis Intrusion Connector Location

Pin	Description
1	+3.3VSB
2	CHASSIS OPEN

Table 3-6: Chassis Intrusion Connector Pinouts

3.2.5 DDR3 DIMM Slots

CN Label:	**CHA_DIMM1, CHA_DIMM2, CHB_DIMM1, CHB_DIMM2**
CN Type:	DDR3 DIMM slot
CN Location:	See **Figure 3-6**

The DIMM slots are for DDR3 DIMM memory modules.
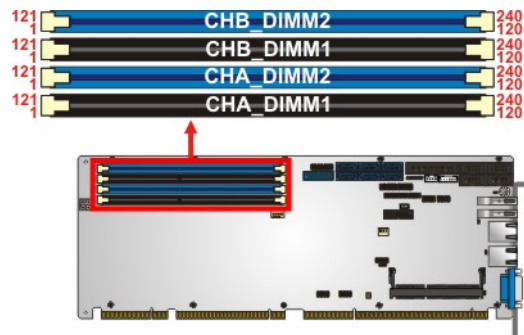
Figure 3-6: DDR3 DIMM Slot Locations

3.2.6 Digital I/O Connector

CN Label:	**DIO1**
CN Type:	10-pin header
CN Location:	See **Figure 3-7**
CN Pinouts:	See **Table 3-7**

The digital I/O connector provides programmable input and output for external devices. The digital I/O provides 4-bit output and 4-bit input.
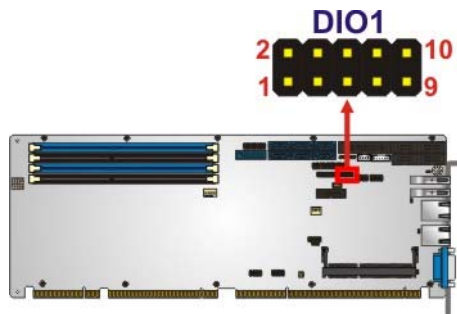
Figure 3-7: Digital I/O Connector Location

Pin	Description	Pin	Description
1	GND	2	VCC
3	Output 3	4	Output 2
5	Output 1	6	Output 0
7	Input 3	8	Input 2
9	Input 1	10	Input 0

Table 3-7: Digital I/O Connector Pinouts

3.2.7 EC Debug Connector

CN Label: **CN3**

CN Type: 18-pin header

CN Location: See **Figure 3-8**

CN Pinouts: See **Table 3-8**

The EC debug connector is used for EC debug.
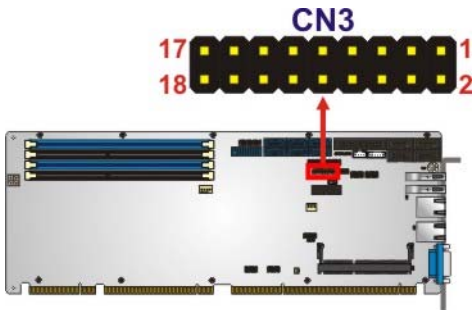
Figure 3-8: EC Debug Connector Location

Pin	Description	Pin	Description
1	EC_EPP_STB#	2	EC_EPP_AFD#
3	EC_EPP_PD0	4	NC
5	EC_EPP_PD1	6	EC_EPP_INIT#
7	EC_EPP_PD2	8	EC_EPP_SLIN#
9	EC_EPP_PD3	10	GND
11	EC_EPP_PD4	12	NC
13	EC_EPP_PD5	14	EC_EPP_BUSY

Pin	Description	Pin	Description
15	EC_EPP_PD6	16	EC_EPP_KSI5
17	EC_EPP_PD7	18	EC_EPP_KSI4

Table 3-8: EC Debug Connector Pinouts

3.2.8 Fan Connector (CPU)

> **CN Label:** CPU_FAN1
>
> **CN Type:** 4-pin wafer
>
> **CN Location:** See **Figure 3-9**
>
> **CN Pinouts:** See **Table 3-9**

The fan connector attaches to a CPU cooling fan.
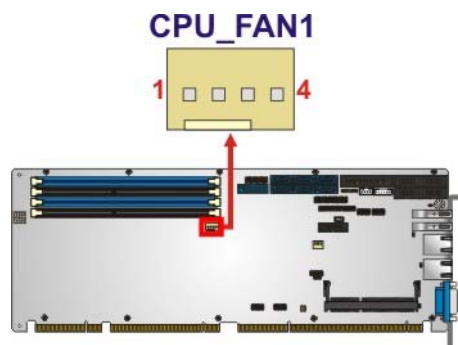
Figure 3-9: CPU Fan Connector Location

Pin	Description
1	GND
2	+12V
3	FANIO
4	PWM

Table 3-9: CPU Fan Connector Pinouts

3.2.9 Fan Connector (System)

CN Label:	**SYS_FAN1**
CN Type:	3-pin wafer
CN Location:	See **Figure 3-10**
CN Pinouts:	See **Table 3-10**

The fan connector attaches to a system cooling fan.
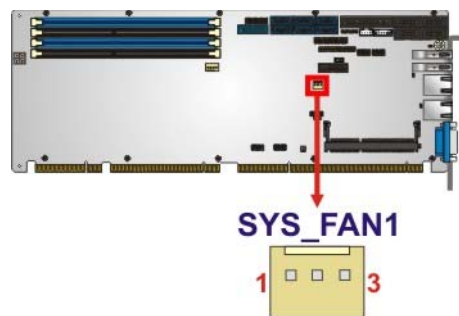
Figure 3-10: System Fan Connector Location

Pin	Description
1	FANIO
2	+12V (PWM)
3	GND

Table 3-10: System Fan Connector Pinouts

3.2.10 Front Panel Connector

CN Label:	**F_PANEL1**
CN Type:	14-pin header
CN Location:	See **Figure 3-11**
CN Pinouts:	See **Table 3-11**

The front panel connector connects to the indicator LEDs and buttons on the computer's front panel.
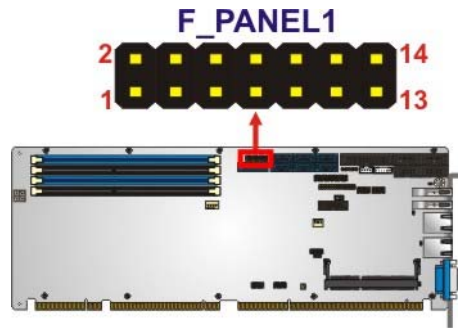
Figure 3-11: Front Panel Connector Location

Function	Pin	Description	Function	Pin	Description
Power LED	1	+5V	Speaker	2	BEEP_PWR
	3	NC	IPMI LED	4	IPMI ID_LED+
	5	GND		6	IPMI ID_LED-
Power Button	7	PWRBTN_SW#	Speaker	8	PC_BEEP
	9	GND		10	NC
HDD LED	11	+5V	Reset	12	EXTRST-
	13	SATA_LED#		14	GND

Table 3-11: Front Panel Connector Pinouts

3.2.11 Internal DisplayPort Connector

CN Label: **DP1**

CN Type: 19-pin box header

CN Location: See **Figure 3-12**

CN Pinouts: See **Table 3-12**

The DisplayPort connector supports HDMI, LVDS, VGA, DVI and DisplayPort graphics interfaces with up to 3840x2160 resolution.
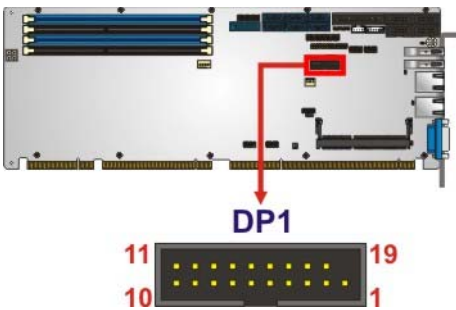
Figure 3-12: Internal DisplayPort Connector Location

Pin	Description	Pin	Description
1	+5V	11	AUXP
2	LANE1N	12	AUXN
3	LANE1P	13	GND
4	GND	14	LANE2P
5	LANE3N	15	LANE2N
6	LANE3P	16	GND
7	GND	17	LANE0P
8	AUX_CTRL_DET_D	18	LANE0N
9	GND	19	+3.3V
10	HPD		

Table 3-12: Internal DisplayPort Connector Pinouts

3.2.12 Infrared Interface Connector

CN Label: **IR1**

CN Type: 5-pin header

CN Location: See **Figure 3-13**

CN Pinouts: See **Table 3-13**

The infrared connector attaches to an infrared receiver for use with remote controls.
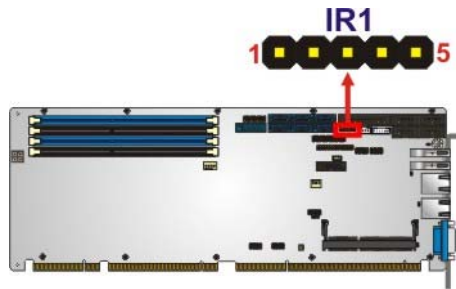
Figure 3-13: Infrared Connector Location

Pin	Description
1	+5V
2	NC
3	IRRX
4	GND
5	IRTX

Table 3-13: Infrared Connector Pinouts

3.2.13 iRIS Module Slot

    CN Label: **IPMI1**

    CN Type: iRIS module slot

    CN Location: See **Figure 3-14**

The iRIS module slot allows installation of the iRIS-2400 module.
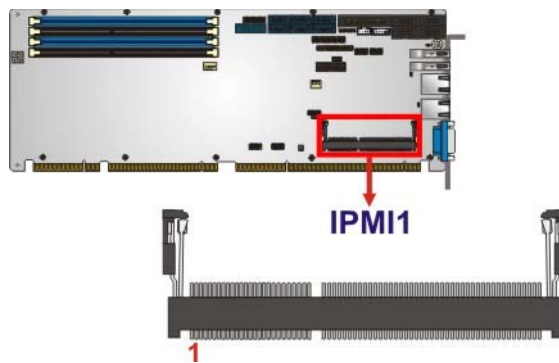
Figure 3-14: iRIS Module Slot Location

> ⚠️ **WARNING:**
>
> The iRIS module slot is designed to install the iRIS-2400 module only.
> DO NOT install other modules into the iRIS module slot. Doing so may
> cause damage to the PCIE-Q870-i2.

3.2.14 Keyboard and Mouse Connector

CN Label: **KB_MS1**

CN Type: 6-pin wafer

CN Location: See **Figure 3-15**

CN Pinouts: See **Table 3-14**

The keyboard and mouse connector connects to a PS/2 Y-cable that can be connected to
a PS/2 keyboard and mouse.
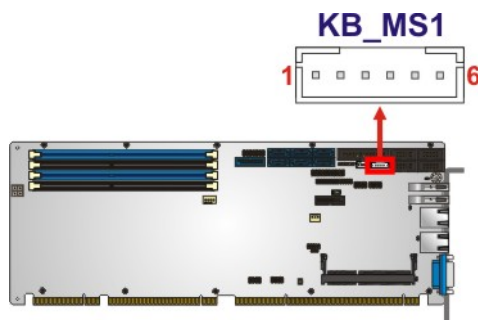
Figure 3-15: Keyboard and Mouse Connector Location

Pin	Description
1	VCC
2	Mouse Data
3	Mouse Clock
4	Keyboard Data
5	Keyboard Clock
6	GND

Table 3-14: Keyboard and Mouse Connector Pinouts

3.2.15 LAN LED Connectors

CN Label:	**LED_LAN1, LED_LAN2**
CN Type:	2-pin header
CN Location:	See **Figure 3-16**
CN Pinouts:	See **Table 3-15** and **Table 3-16**

The LAN LED connectors are used to connect to the LAN LED indicators on the chassis to indicate users the link activities of the two LAN ports.
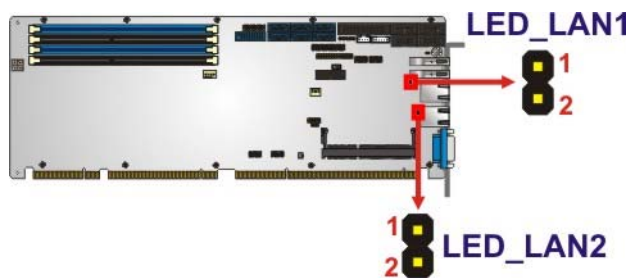
Figure 3-16: LAN LED Connector Locations

Pin	Description
1	+3.3V
2	LAN1_LED_LINK#_ACT

Table 3-15: LAN1 LED Connector (LED_LAN1) Pinouts

Pin	Description
1	+3.3V
2	LAN2_LED_LINK#_ACT

Table 3-16: LAN2 LED Connector (LED_LAN2) Pinouts

3.2.16 Parallel Port Connector

CN Label:	**LPT1**
CN Type:	26-pin box header
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-17**

The parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.
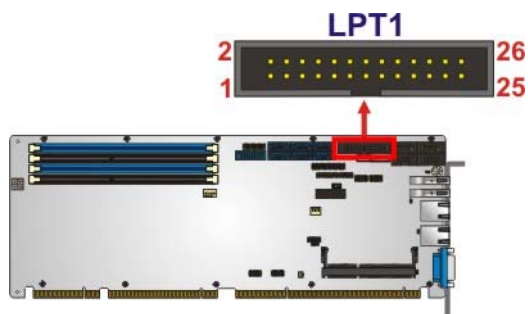
Figure 3-17: Parallel Port Connector Location

Pin	Description	Pin	Description
1	STROBE#	2	DATA0
3	DATA1	4	DATA2
5	DATA3	6	DATA4
7	DATA5	8	DATA6
9	DATA7	10	ACKNOWLEDGE#
11	BUSY	12	PAPER EMPTY
13	PRINTER SELECT	14	AUTO FORM FEED #
15	ERROR#	16	INITIALIZE#
17	PRINTER SELECT LN#	18	GND
19	GND	20	GND
21	GND	22	GND
23	GND	24	GND
25	GND		

Table 3-17: Parallel Port Connector Pinouts

3.2.17 PCIe Mini Card Slot

CN Label:	**CN4**	
CN Type:	PCIe Mini card slot	
CN Location:	See **Figure 3-18**	
CN Pinouts:	See **Table 3-18**	

The PCIe Mini card slot is for installing a PCIe Mini expansion card.
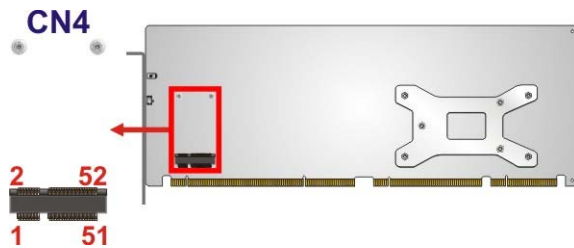
Figure 3-18: PCIe Mini Card Slot Location

Pin	Description	Pin	Description
1	PCIE_WAKE#	2	+3.3V
3	N/C	4	GND
5	N/C	6	1.5V
7	N/C	8	N/C
9	GND	10	N/C
11	MSATA_CLK#	12	N/C
13	MSATA _CLK	14	N/C
15	GND	16	N/C
17	PLTRST_N	18	GND
19	N/C	20	+3.3V
21	GND	22	PLTRST_N
23	SATA_RX+	24	+3.3V
25	SATA_RX-	26	GND
27	GND	28	1.5V
29	GND	30	SMB_CLK
31	SATA_TX-	32	SMB_DATA
33	SATA_TX+	34	GND

Pin	Description	Pin	Description
35	GND	36	USB_DATA-
37	GND	38	USB_DATA+
39	+3.3V	40	GND
41	+3.3V	42	N/C
43	+3.3V	44	N/C
45	CLINK_CLK	46	N/C
47	CLINK_DATA	48	1.5V
49	CLINK_RST#	50	GND
51	MSATA_DET	52	+3.3V

Table 3-18: PCIe Mini Card Slot Pinouts

3.2.18 SATA 6Gb/s Drive Connector

CN Label: **S_ATA1, S_ATA2, S_ATA3, S_ATA4, S_ATA5, S_ATA6**

CN Type: 7-pin SATA drive connector

CN Location: See **Figure 3-19**

CN Pinouts: See **Table 3-19**

The SATA drive connectors can be connected to SATA drives and support up to 6Gb/s data transfer rate.
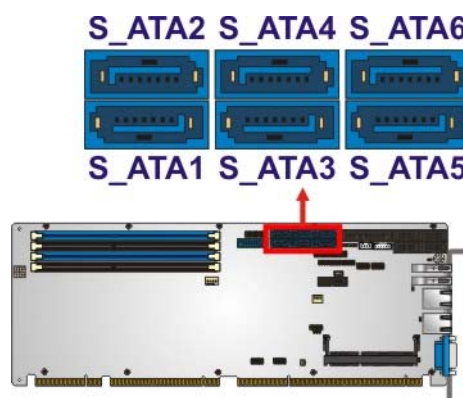
Figure 3-19: SATA 6Gb/s Drive Connector Location

Pin	Description
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA RX+
7	GND

Table 3-19: SATA 6Gb/s Drive Connector Pinouts

3.2.19 Serial Port Connectors, RS-232

CN Label: **COM1, COM3, COM4, COM5**

CN Type: 10-pin box header

CN Location: See **Figure 3-20**

CN Pinouts: See **Table 3-20**

Each of these connectors provides RS-232 connections.
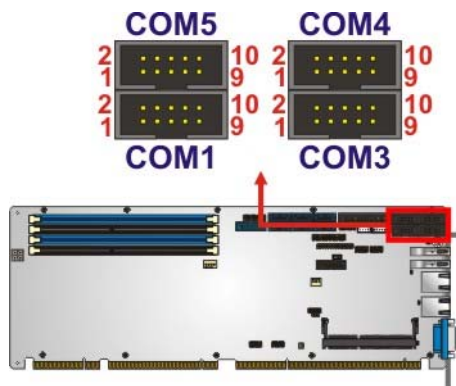
Figure 3-20: Serial Port Connector Location

Pin	Description	Pin	Description
1	DCD	2	DSR
3	RXD	4	RST
5	TXD	6	CTS
7	DTR	8	RI
9	GND	10	GND

Table 3-20: RS-232 Serial Port Connector Pinouts

3.2.20 Serial Port Connector, RS-422/485

CN Label: **COM2**

CN Type: 4-pin wafer

CN Location: See **Figure 3-21**

CN Pinouts: See **Table 3-21**

This connector provides RS-422 or RS-485 communications.
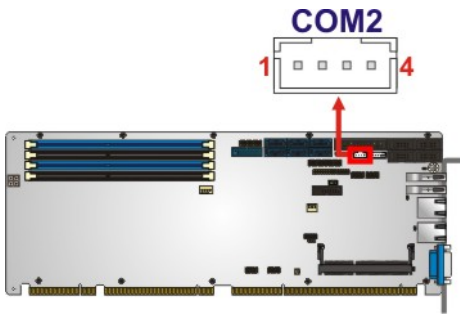
Figure 3-21: RS-422/485 Connector Location

Pin	Description	Pin	Description
1	RXD422-	3	TXD422+/TXD485+
2	RXD422+	4	TXD422-/TXD485-

Table 3-21: RS-422/485 Connector Pinouts

Use the optional RS-422/485 cable to connect to a serial device. The pinouts of the DB-9 connector are listed below.
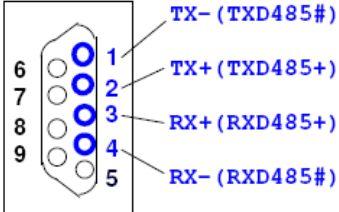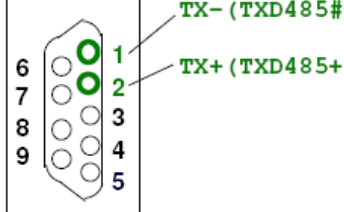
RS-422 Pinouts	RS-485 Pinouts

Table 3-22: DB-9 RS-422/485 Pinouts

3.2.21 SMBus Connector

CN Label:	**CN2**
CN Type:	4-pin wafer
CN Location:	See **Figure 3-22**
CN Pinouts:	See **Table 3-23**

The SMBus (System Management Bus) connector provides low-speed system management communications.
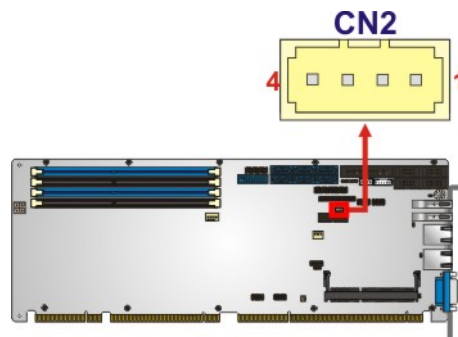
Figure 3-22: SMBus Connector Location

Pin	Description
1	GND
2	SMB_DATA
3	SMB_CLK
4	+5V

Table 3-23: SMBus Connector Pinouts

3.2.22 SPI Flash Connector

CN Label: **JSPI1**

CN Type: 8-pin header

CN Location: See **Figure 3-23**

CN Pinouts: See **Table 3-24**

The SPI flash connector is used to flash the SPI ROM.
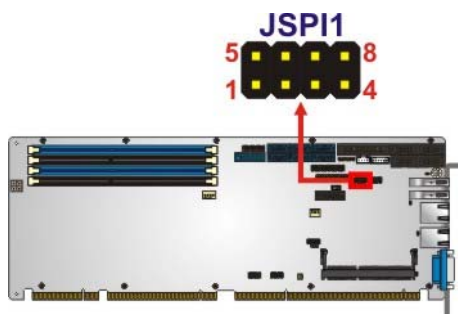
Figure 3-23: SPI Flash Connector Location

Pin	Description	Pin	Description
1	+3.3V	2	SPI_CS#
3	SPI_SO	4	NC
5	GND	6	SPI_CLK
7	SPI_SI	8	NC

Table 3-24: SPI Flash Connector Pinouts

3.2.23 SPI Flash Connector, EC

CN Label: **JSPI2**

CN Type: 8-pin header

CN Location: See **Figure 3-24**

CN Pinouts: See **Table 3-25**

The SPI flash connector is used to flash the EC ROM.
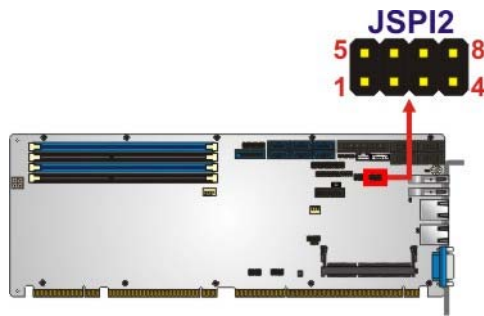
Figure 3-24: SPI EC Flash Connector Location

Pin	Description	Pin	Description
1	+3.3V	2	SPI_CS#
3	SPI_SO	4	NC
5	GND	6	SPI_CLK
7	SPI_SI	8	NC

Table 3-25: SPI EC Flash Connector Pinouts

3.2.24 TPM Connector

CN Label: TPM1

CN Type: 20-pin header

CN Location: See **Figure 3-25**

CN Pinouts: See **Table 3-26**

The TPM connector connects to a TPM module.
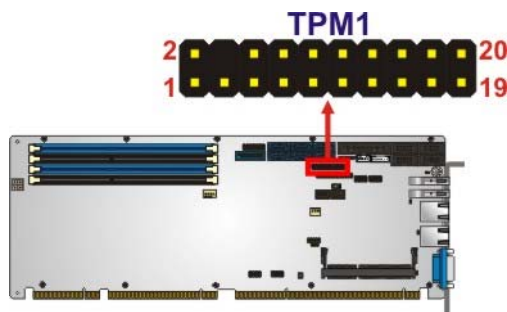
Figure 3-25: TPM Connector Location

Pin	Description	Pin	Description
1	LCLK	2	GND
3	LFRAME#	4	KEY
5	LRERST#	6	+5V
7	LAD3	8	LAD2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SCL	14	SDA
15	SB3V	16	SERIRQ
17	GND	18	GLKRUN#
19	LPCPD#	20	LDRQ#

Table 3-26: TPM Connector Pinouts

3.2.25 USB 2.0 Connectors

CN Label: **USB1, USB2**

CN Type: 8-pin header

CN Location: See **Figure 3-26**

CN Pinouts: See **Table 3-27**

The USB 2.0 connectors connect to USB 2.0 devices. Each pin header provides two USB 2.0 ports.
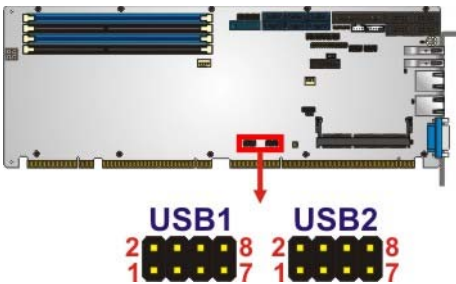
Figure 3-26: USB 2.0 Connector Pinout Locations

Pin	Description	Pin	Description
1	VCC	2	GND
3	USB_DATA-	4	USB_DATA+

Pin	Description	Pin	Description
5	USB_DATA+	6	USB_DATA-
7	GND	8	VCC

Table 3-27: USB 2.0 Connector Pinouts

3.2.26 USB 3.0 Connector

CN Label: **CN7**

CN Type: 19-pin box header

CN Location: See **Figure 3-27**

CN Pinouts: See **Table 3-28**

The USB 3.0 connector connects to USB 3.0 devices. This connector provides two USB 3.0 ports.
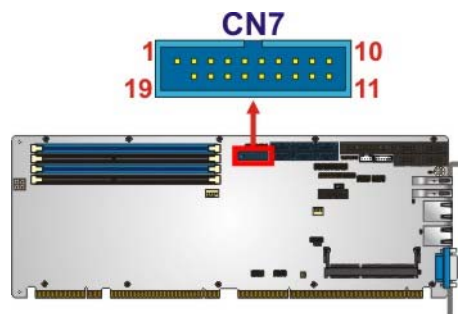
Figure 3-27: USB 3.0 Connector Location

Pin	Description	Pin	Description
1	VCC	11	USB_DATA+
2	USB3_RX-	12	USB_DATA-
3	USB3_RX+	13	GND
4	GND	14	USB3_TX+
5	USB3_TX-	15	USB3_TX-
6	USB3_TX+	16	GND
7	GND	17	USB3_RX+
8	USB_DATA-	18	USB3_RX-
9	USB_DATA+	19	VCC
10	NC		

Table 3-28: USB 3.0 Connector Pinouts

3.3 External Peripheral Interface Connector Panel

The figure below shows the external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:
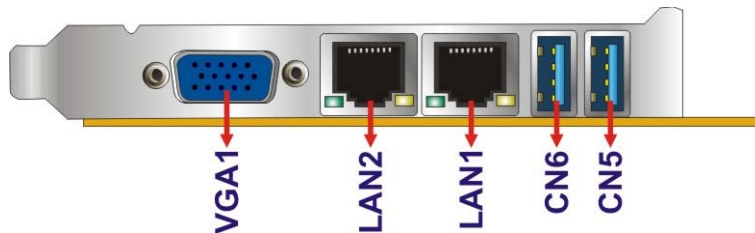
Figure 3-28: External Peripheral Interface Connector

3.3.1 Ethernet Connectors

CN Label:	**LAN1, LAN2**
CN Type:	RJ-45
CN Location:	See **Figure 3-28**
CN Pinouts:	See **Figure 3-29** and **Table 3-29**

The PCIE-Q870-i2 is equipped with two built-in RJ-45 Ethernet controllers. Each controller can connect to the LAN through one RJ-45 LAN connector.

Pin	Description	Pin	Description
1	MDIA3-	5	MDIA2+
2	MDIA3+	6	MDIA1+
3	MDIA1-	7	MDIA0-
4	MDIA2-	8	MDIA0+

Table 3-29: LAN Pinouts
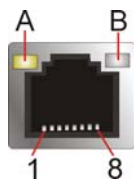
Figure 3-29: Ethernet Connector

LED	Description	LED	Description
A	on: linked blinking: data is being sent/received	B	off: 10 Mb/s green: 100 Mb/s orange: 1000 Mb/s

Table 3-30: Connector LEDs

3.3.2 USB 3.0 Connectors

CN Label: **CN5, CN6**

CN Type: USB port

CN Location: See **Figure 3-28**

CN Pinouts: See **Table 3-31**

The PCIE-Q870-i2 has two external USB 3.0 ports.

Pin	Description	Pin	Description
1	VBUS	2	D-
3	D+	4	GND
5	STDA_SSRX_N	6	STDA_SSRX_P
7	GND_DRAIN	8	STDA_SSTX_N
9	STDA_SSTX_P		

Table 3-31: USB 3.0 Port Pinouts

3.3.3 VGA Connector

CN Label: **VGA1**

CN Type: 15-pin Female

CN Location: See **Figure 3-28**

CN Pinouts: See **Figure 3-30** and **Table 3-32**

The VGA connector connects to a monitor that accepts a standard VGA input.

Pin	Description	Pin	Description
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDCDA
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-32: VGA Connector Pinouts
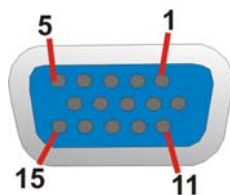
Figure 3-30: VGA Connector

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the PCIE-Q870-i2 may result in permanent damage to the PCIE-Q870-i2 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PCIE-Q870-i2. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PCIE-Q870-i2 or any other electrical component is handled, the following anti-static precautions are strictly adhered to.

- *Wear an anti-static wristband*: - Wearing a simple anti-static wristband can help to prevent ESD from damaging the board.
- *Self-grounding*:- Before handling the board touch any grounded conducting material. During the time the board is handled, frequently touch any conducting materials that are connected to the ground.
- *Use an anti-static pad*: When configuring the PCIE-Q870-i2, place it on an antic-static pad. This reduces the possibility of ESD damaging the PCIE-Q870-i2.
- *Only handle the edges of the PCB*:-: When handling the PCB, hold the PCB by the edges.

4.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before installation. All installation notices must be strictly adhered to. Failing to adhere to these precautions may lead to severe damage and injury to the person performing the installation.

⚠ **WARNING:**

The installation instructions described in this manual should be carefully followed in order to prevent damage to the components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
  - The user manual provides a complete description of the PCIE-Q870-i2 installation instructions and configuration options.
- Wear an electrostatic discharge cuff (ESD):
  - Electronic components are easily damaged by ESD. Wearing an ESD cuff removes ESD from the body and helps prevent ESD damage.
- Place the PCIE-Q870-i2 on an antistatic pad:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the PCIE-Q870-i2 off:
  - When working with the PCIE-Q870-i2, make sure that it is disconnected from all power supplies and that no electricity is being fed into the system.

Before and during the installation of the PCIE-Q870-i2, **DO NOT:**

- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

4.2.1 Socket LGA1150 CPU Installation

> ![warning icon] **WARNING:**
>
> CPUs are expensive and sensitive components. When installing the
> CPU please be careful not to damage it in anyway. Make sure the CPU
> is installed properly and ensure the correct cooling kit is properly
> installed.
>
> DO NOT touch the pins at the bottom of the CPU. When handling the
> CPU, only hold it on the sides.

To install the CPU, follow the steps below.

Step 1: **Disengage the load lever** by pressing the lever down and slightly outward to
clear the retention tab. Fully open the lever. See **Figure 4-1**.
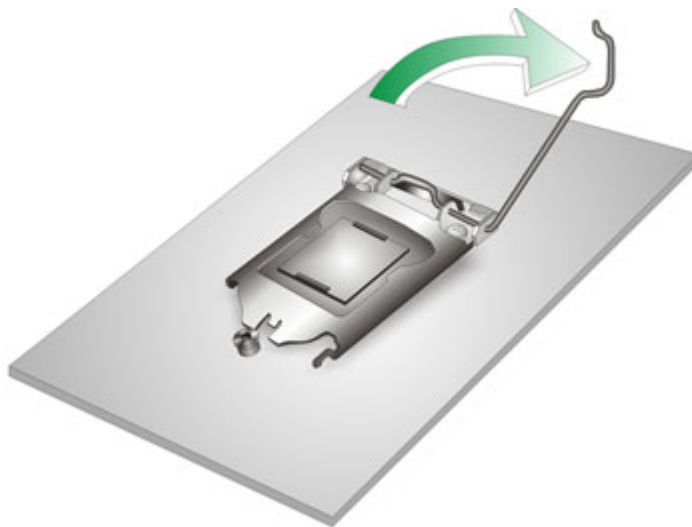
Figure 4-1: Disengage the CPU Socket Load Lever

Step 2: **Open the socket and remove the protective cover.** The black protective
cover can be removed by pulling up on the tab labeled "Remove". See
Figure 4-2.
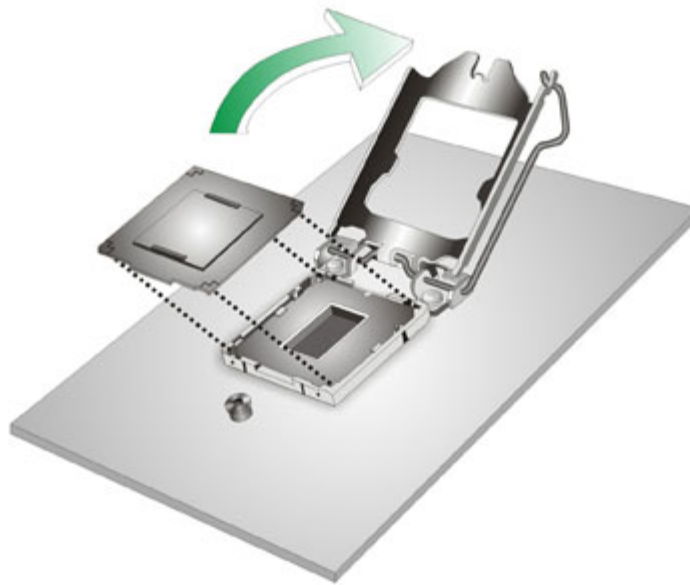
Figure 4-2: Remove Protective Cover

Step 3:   **Inspect the CPU socket.** Make sure there are no bent pins and make sure the

socket contacts are free of foreign material. If any debris is found, remove it with

compressed air.

Step 4:   **Orientate the CPU properly.** The contact array should be facing the CPU

socket.

![Warning icon] **WARNING:**

DO NOT touch the pins at the bottom of the CPU. When handling the
CPU, only hold it on the sides.

Step 5:   **Correctly position the CPU.** Match the Pin 1 mark with the cut edge on the

CPU socket.

Step 6:   **Align the CPU pins.** Locate pin 1 and the two orientation notches on the CPU.

Carefully match the two orientation notches on the CPU with the socket

alignment keys.

Step 7: **Insert the CPU.** Gently insert the CPU into the socket. If the CPU pins are properly aligned, the CPU should slide into the CPU socket smoothly. See **Figure 4-3**.
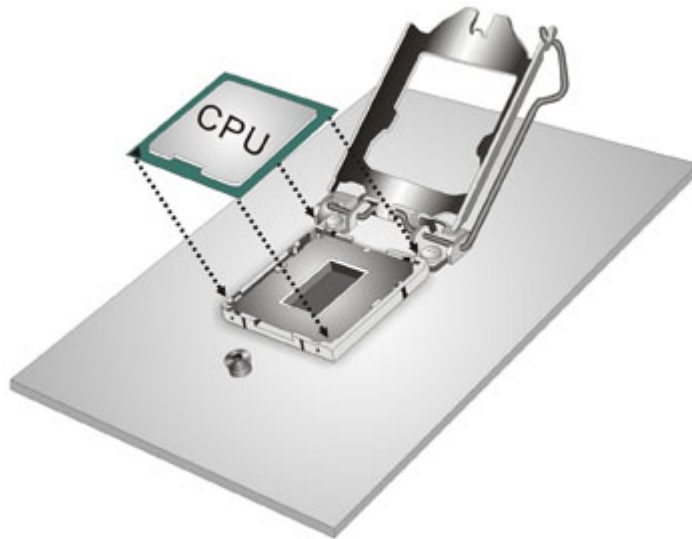
Figure 4-3: Insert the Socket LGA1150 CPU

Step 8: **Close the CPU socket.** Close the load plate and pull the load lever back a little to have the load plate be able to secure to the knob. Engage the load lever by pushing it back to its original position (**Figure 4-4**). There will be some resistance, but will not require extreme pressure.
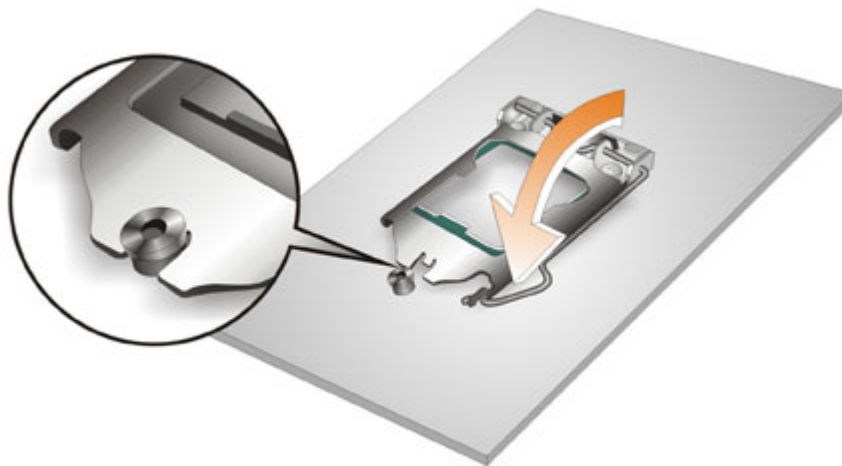
Figure 4-4: Close the Socket LGA1150

Step 9: **Connect the 12 V power to the board.** Connect the 12 V power from the power supply to the board.

4.2.2 Socket LGA1150 Cooling Kit Installation

> **WARNING:**
>
> **DO NOT attempt to install a push-pin cooling fan.**
>
> **The pre-installed support bracket prevents the board from bending and is ONLY compatible with captive screw type cooling fans.**

The cooling kit can be bought from IEI. The cooling kit has a heat sink and fan.

> **WARNING:**
>
> Do not wipe off (accidentally or otherwise) the pre-sprayed layer of thermal paste on the bottom of the heat sink. The thermal paste between the CPU and the heat sink is important for optimum heat dissipation.

To install the cooling kit, follow the instructions below.

Step 1: A cooling kit bracket is pre-installed on the rear of the motherboard. See **Figure 4-5.**

Cooling Kit Support Bracket
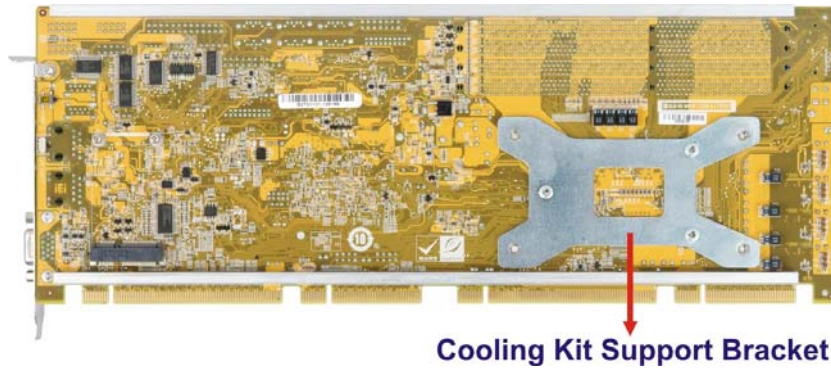
Figure 4-5: Cooling Kit Support Bracket

Step 2: **Place the cooling kit onto the socket LGA1150 CPU**. Make sure the CPU cable can be properly routed when the cooling kit is installed.

Step 3: **Mount the cooling kit**. Gently place the cooling kit on top of the CPU. Make sure the four threaded screws on the corners of the cooling kit properly pass through the holes of the cooling kit bracket.

Step 4: **Secure the cooling kit** by fastening the four retention screws of the cooling kit.

Step 5: **Connect the fan cable**. Connect the cooling kit fan cable to the CPU fan connector on the PCIE-Q870-i2. Carefully route the cable and avoid heat generating chips and fan blades.

4.2.3 DIMM Installation

To install a DIMM, please follow the steps below and refer to **Figure 4-6**.
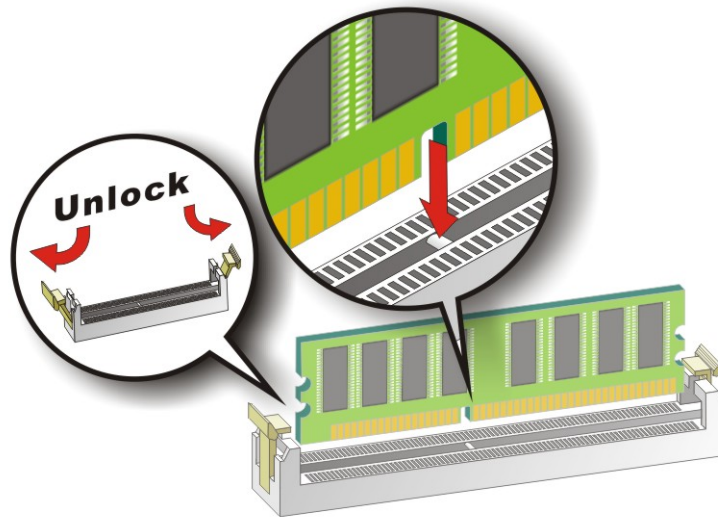
Figure 4-6: DIMM Installation

Step 1: **Open the DIMM socket handles**. Open the two handles outwards as far as they can. See **Figure 4-6**.

Step 2: **Align the DIMM with the socket**. Align the DIMM so the notch on the memory lines up with the notch on the memory socket. See **Figure 4-6**.

Step 3: **Insert the DIMM**. Once aligned, press down until the DIMM is properly seated. Clip the two handles into place. See **Figure 4-6**.

Step 4: **Removing a DIMM**. To remove a DIMM, push both handles outward. The memory module is ejected by a mechanism in the socket.

4.3 System Configuration

The system configuration should be performed before installation.

4.3.1 AT/ATX Power Mode Setting

The AT and ATX power mode selection is made through the AT/ATX power mode switch which is shown in **Figure 4-7**.
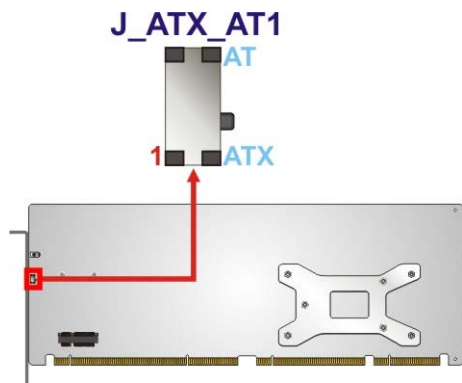
Figure 4-7: AT/ATX Power Mode Switch Location

Setting	Description
1-2 (down)	ATX power mode (default)
2-3 (up)	AT power mode

Table 4-1: AT/ATX Power Mode Switch Settings

4.3.2 Clear CMOS Button

To reset the BIOS, remove the on-board battery and press the clear CMOS button for three seconds or more. The clear CMOS button location is shown in **Figure 4-8**.
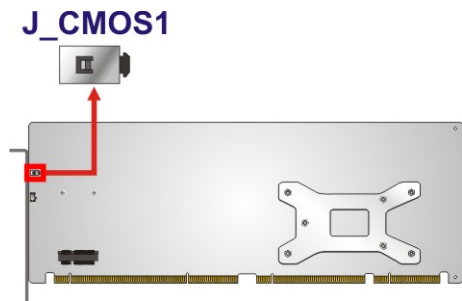
Figure 4-8: Clear CMOS Button Location

4.3.3 Flash Descriptor Security Override

The Flash Descriptor Security Override jumper specifies whether to override the flash descriptor.

Setting	Description
Short 1-2	No override (default)
Short 2-3	Override

Table 4-2: Flash Descriptor Security Override Jumper Settings
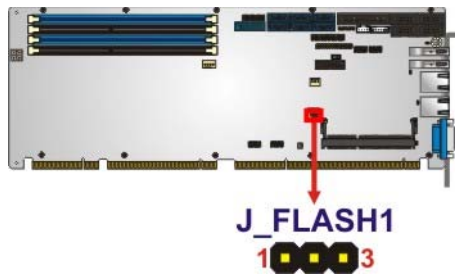
Figure 4-9: Flash Descriptor Security Override Jumper Location

4.3.4 mSATA Mode Selection

The jumper configures the PCIe Mini slot (CN4) to automatically detect mSATA device or to force mSATA to be enabled.

Setting	Description
Open	Auto-detect mSATA device (default)
Short 1-2	Enable mSATA

Table 4-3: mSATA Mode Selection Jumper Settings
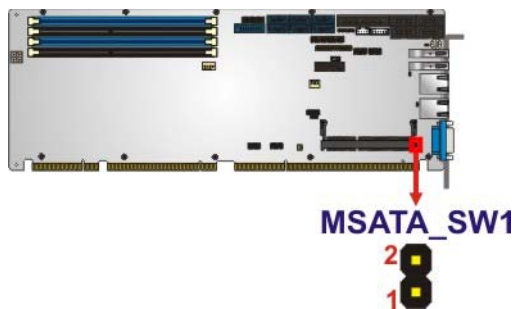
Figure 4-10: mSATA Mode Selection Jumper Location

4.3.5 PCIe x16 Interface Setup

The PCIE-Q870-i2 supports one PCIe x16 interface on the backplane. The PCIe x16 interface setup is made through the BIOS menu in "Chipset → PCH-IO Configuration". Use the **PCIEX16 Power** BIOS option to configure the PCIe x16 channel mode.

Options	Description
1 x16 PCIE	Sets the PCIe x16 slot as one PCIe x16. (default)
2 x8 PCIE	Sets the PCIe x16 slot as two PCIe x8
1 x8, 2 x4 PCIE	Sets the PCIe x16 slot as one PCIe x8 or two PCIe x4

Table 4-4: PCIe x16 Interface Setup

Please refer to **Section 5.4.1** for detailed information.

4.3.6 USB Power Selection

The USB power selection is made through the BIOS menu in "Chipset → PCH-IO Configuration". Use the **USB SW1 Power** and the **USB SW2 Power** BIOS options to configure the correspondent USB ports (see **Table 4-5**) and refer to **Table 4-6** to select the USB power source.

BIOS Options	Configured USB Ports
USB SW1 Power	CN5 (external USB 3.0 port)
	CN6 (external USB 3.0 port)
USB SW2 Power	USB1 (internal USB 2.0 ports)
	USB2 (internal USB 2.0 ports)
	CN7 (internal USB 3.0 ports)

Table 4-5: BIOS Options and Configured USB Ports

Options	Description
+5V DUAL	+5V dual (default)
+5V	+5V

Table 4-6: USB Power Source Setup

Please refer to **Section 5.4.1** for detailed information.

4.4 Chassis Installation

4.4.1 Airflow

WARNING:

Airflow is critical to the cooling of the CPU and other onboard components. The chassis in which the PCIE-Q870-i2 must have air vents to allow cool air to move into the system and hot air to move out.

The PCIE-Q870-i2 must be installed in a chassis with ventilation holes on the sides allowing airflow to travel through the heat sink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

4.4.2 CPU Card Installation

To install the CPU card onto the backplane, carefully align the CPU card edge connector with the CPU card socket on the backplane. To do this, please refer to the reference material that came with the backplane. Next, secure the CPU card to the chassis. To do this, please refer to the reference material that came with the chassis.

4.5 Internal Peripheral Device Connections

This section outlines the installation of peripheral devices to the onboard connectors.

4.5.1 Dual RS-232 Cable with Slot Bracket

The dual RS-232 cable slot connector consists of two connectors attached to two independent cables. Each cable is then attached to a D-sub 9 male connector that is mounted onto a slot. To install the dual RS-232 cable, please follow the steps below.

Step 1:   **Locate the connectors**. The locations of the RS-232 connectors are shown in

Chapter 3.

Step 2: **Insert the cable connectors**. Insert one connector into each serial port box headers (**Figure 4-11**). A key on the front of the cable connectors ensures the connector can only be installed in one direction.
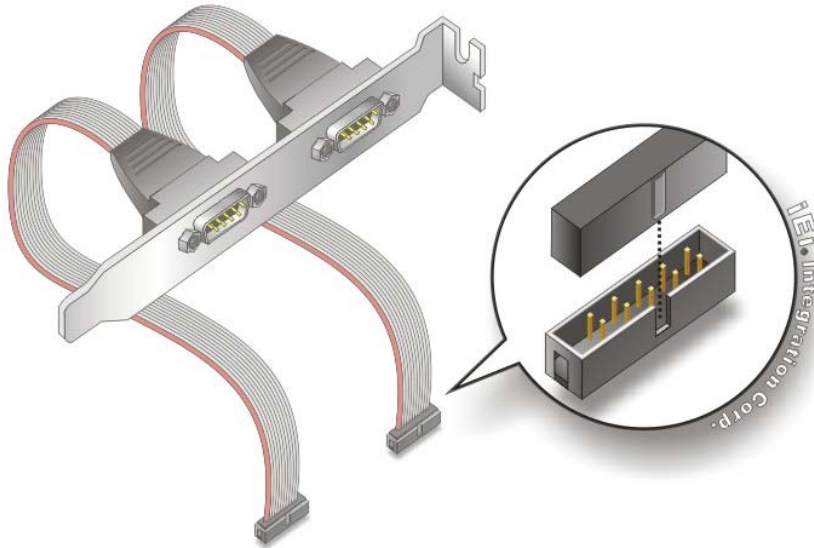
Figure 4-11: Dual RS-232 Cable Installation

Step 3: **Secure the bracket**. The dual RS-232 connector has two D-sub 9 male connectors secured on a bracket. To secure the bracket to the chassis please refer to the reference material that came with the chassis.

4.5.2 iRIS Module Installation

> ⚠️ **WARNING:**
>
> The iRIS module slot is designed to install the iRIS-2400 module only.
> DO NOT install other modules into the iRIS module slot. Doing so may
> cause damage to the PCIE-Q870-i2.

To install the iRIS-2400 module, please follow the steps below and refer to **Figure 4-12**.
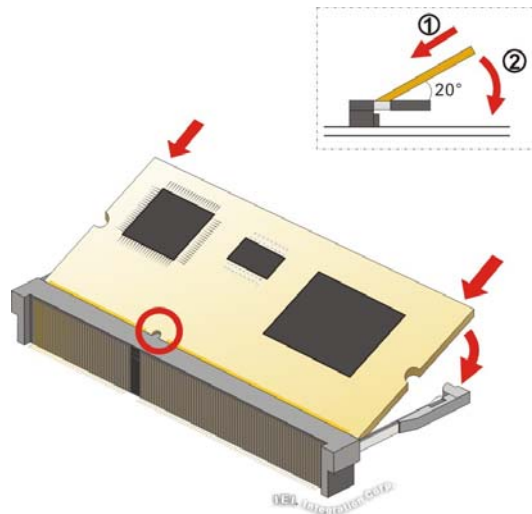
Figure 4-12: iRIS Module Installation

Step 1: **Locate the iRIS module slot**. Place the PCIE-Q870-i2 on an anti-static pad.

Step 2: **Align the iRIS-2400 module with the iRIS module slot**. Align the notch on the module with the notch on the iRIS module slot.

Step 3: **Insert the iRIS-2400 module**. Push the module in at a 20º angle (**Figure 4-12**).

Step 4: **Seat the iRIS-2400 module**. Gently push downwards and the arms clip into place (**Figure 4-12**).

NOTE:

After installing the iRIS-2400 module, use **LAN2** port to establish a network connection. Please refer to **Section 4.8** for IPMI setup procedures.

4.5.3 SATA Drive Connection

The PCIE-Q870-i2 is shipped with two SATA drive cables. To connect the SATA drives to the connectors, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the SATA drive connectors are shown in **Chapter 3**.

Step 2: **Insert the cable connector**. Insert the cable connector into the on-board SATA drive connector until it clips into place. See **Figure 4-13**.
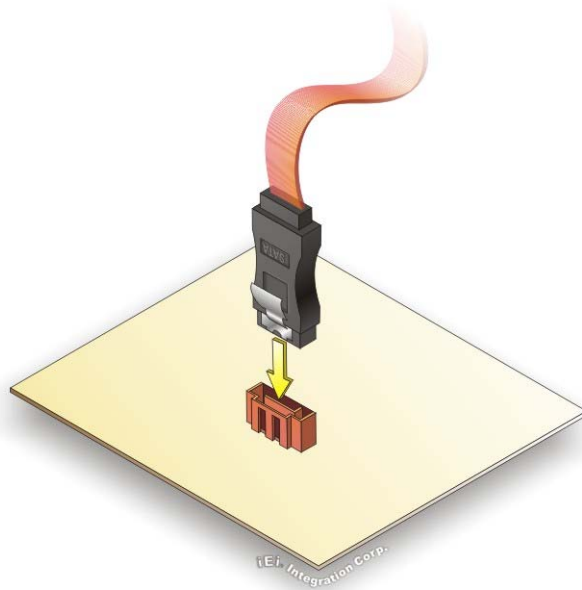
Figure 4-13: SATA Drive Cable Connection

Step 3: **Connect the cable to the SATA disk**. Connect the connector on the other end of the cable to the connector at the back of the SATA drive. See **Figure 4-14**.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 4-14**.
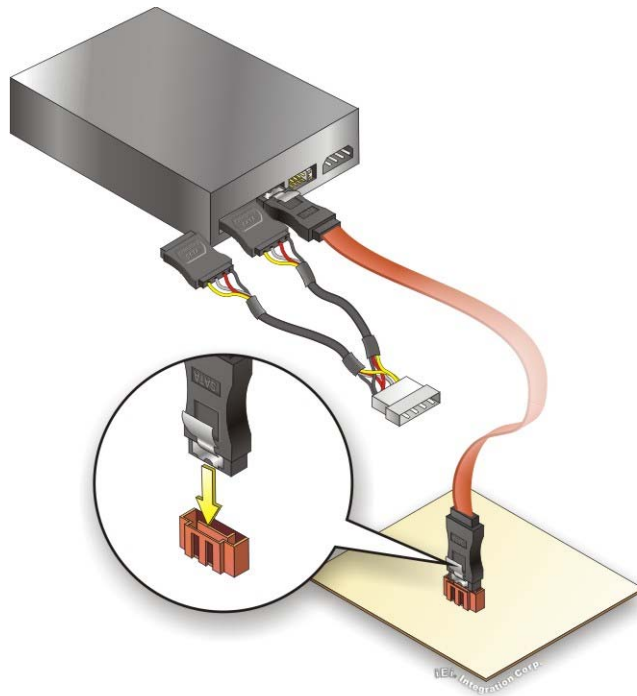
Figure 4-14: SATA Power Drive Connection

4.5.4 USB Cable (Dual Port) with Slot Bracket

The PCIE-Q870-i2 is shipped with a dual port USB 2.0 cable. To connect the USB cable connector, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the USB connectors are shown in

Chapter 3.

![Warning icon] **WARNING:**

If the USB pins are not properly aligned, the USB device can burn out.

Step 2: **Align the connectors**. The cable has two connectors. Correctly align pin 1on

each cable connector with pin 1 on the PCIE-Q870-i2 USB connector.

Step 3: **Insert the cable connectors**. Once the cable connectors are properly aligned with the USB connectors on the PCIE-Q870-i2, connect the cable connectors to the on-board connectors. See **Figure 4-15**.
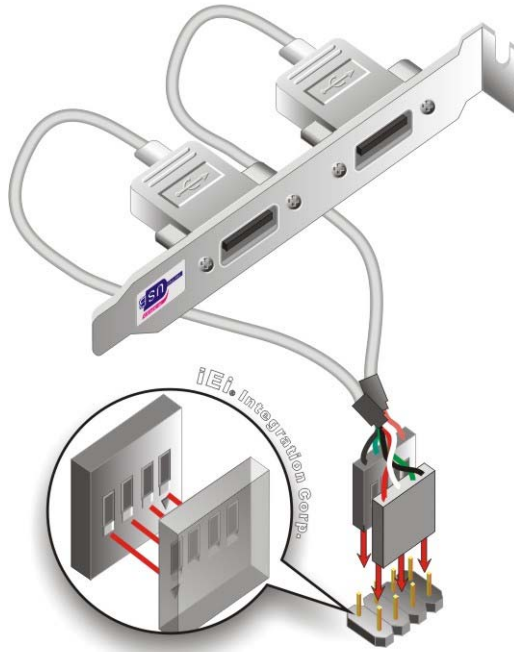
Figure 4-15: Dual USB Cable Connection

Step 4: **Attach the bracket to the chassis**. The USB 2.0 connectors are attached to a bracket. To secure the bracket to the chassis please refer to the installation instructions that came with the chassis.

4.5.5 PCIe Mini Card Installation

To install a PCIe Mini card, please follow the steps below.

Step 1: **Locate the PCIe Mini card slot**. The location of the PCIe Mini card slot is shown in **Chapter 3**.

Step 2: **Remove the retention screws**. Remove the two retention screws secured on the motherboard as shown in **Figure 4-16**.
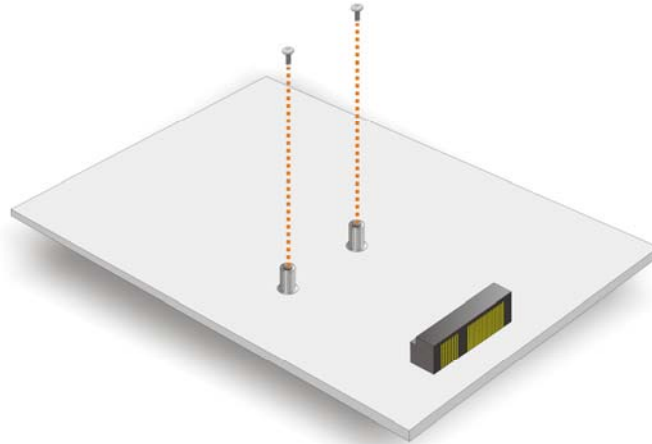
Figure 4-16: Remove the Retention Screws for the PCIe Mini Card

Step 3: **Insert into the socket at an angle**. Line up the notch on the card with the notch

on the connector. Slide the PCIe Mini card into the socket at an angle of about

20º (**Figure 4-17**).
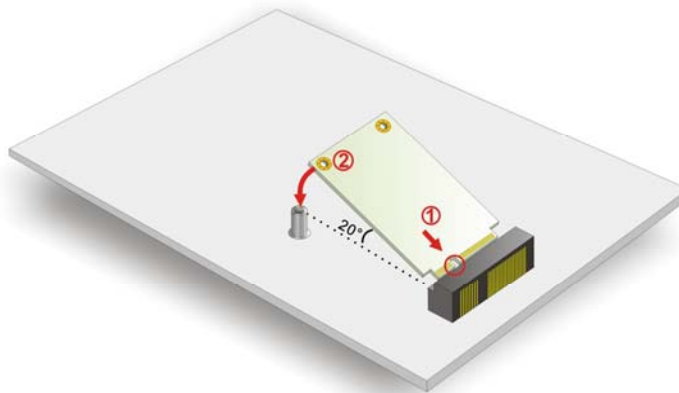
Figure 4-17: Insert the PCIe Mini Card into the Socket at an Angle

Step 4: **Secure the PCIe Mini card**. Secure the PCIe Mini card with the retention

screws previously removed (**Figure 4-18**).
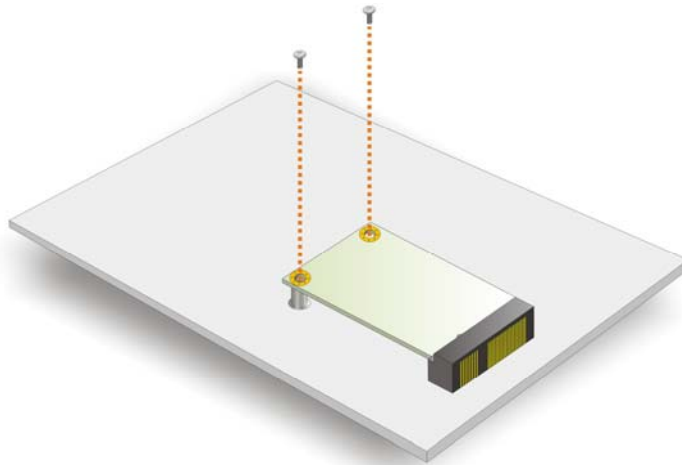
Figure 4-18: Secure the PCIe Mini Card

4.6 External Peripheral Interface Connection

This section describes connecting devices to the external connectors on the PCIE-Q870-i2.

4.6.1 LAN Connection

There are two external RJ-45 LAN connectors. The RJ-45 connectors enable connection to an external network. To connect a LAN cable with an RJ-45 connector, please follow the instructions below.

Step 1: **Locate the RJ-45 connectors**. The locations of the USB connectors are shown in **Chapter 3**.

Step 2: **Align the connectors.** Align the RJ-45 connector on the LAN cable with one of the RJ-45 connectors on the PCIE-Q870-i2. See **Figure 4-19**.
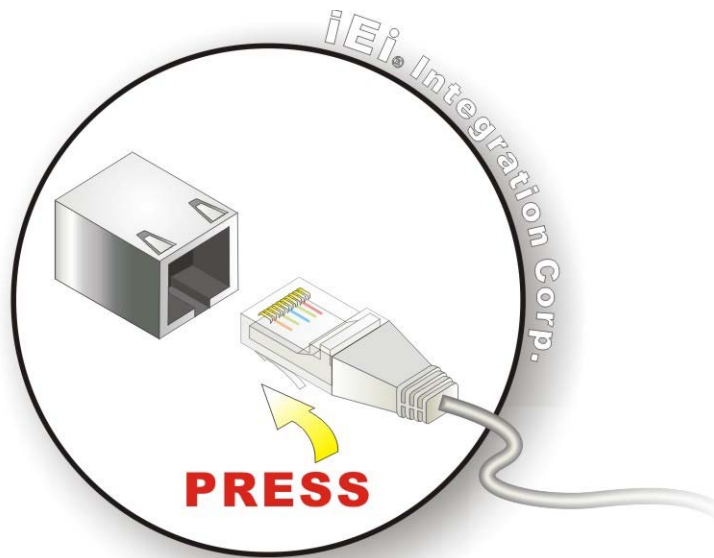
Figure 4-19: LAN Connection

Step 3: **Insert the LAN cable RJ-45 connector.** Once aligned, gently insert the LAN

cable RJ-45 connector into the on-board RJ-45 connector.

4.6.2 USB Device Connection (Single Connector)

There are two external USB 3.0 connectors. Both connectors are perpendicular to the
PCIE-Q870-i2. To connect a USB device, please follow the instructions below.

Step 1: **Located the USB connectors.** The locations of the USB connectors are shown

in **Chapter 3**.

Step 2: **Align the connectors.** Align the USB device connector with one of the

connectors on the PCIE-Q870-i2. See **Figure 4-20**.
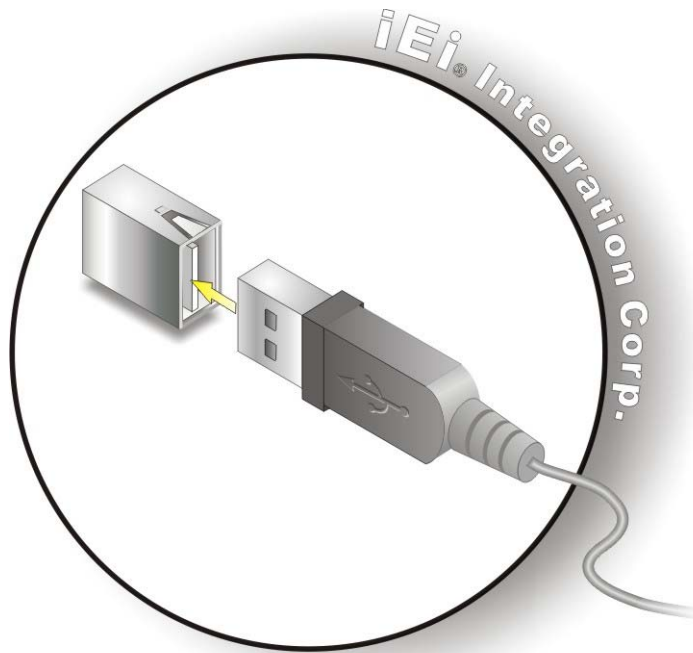
Figure 4-20: USB Device Connection

Step 3: **Insert the device connector.** Once aligned, gently insert the USB device connector into the on-board connector.

4.6.3 VGA Monitor Connection

The PCIE-Q870-i2 has a single female DB-15 connector on the external peripheral interface panel. The DB-15 connector is connected to a CRT or VGA monitor. To connect a monitor to the PCIE-Q870-i2, please follow the instructions below.

Step 1: **Locate the female DB-15 connector**. The location of the female DB-15 connector is shown in **Chapter 3**.

Step 2: **Align the VGA connector**. Align the male DB-15 connector on the VGA screen cable with the female DB-15 connector on the external peripheral interface.

Step 3: **Insert the VGA connector** Once the connectors are properly aligned with the insert the male connector from the VGA screen into the female connector on the PCIE-Q870-i2. See **Figure 4-21**.
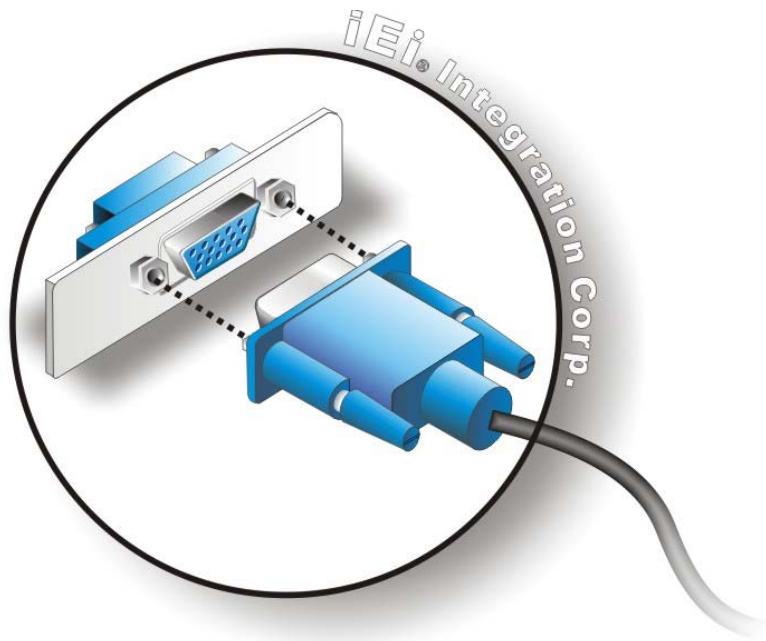
Figure 4-21: VGA Connector

Step 4: **Secure the connector**. Secure the DB-15 VGA connector from the VGA

monitor to the external interface by tightening the two retention screws on either

side of the connector.

4.7 Intel® AMT Setup Procedure

The PCIE-Q870-i2 is featured with the Intel® Active Management Technology (AMT). To enable the Intel® AMT function, follow the steps below.

Step 1: Make sure the DIMM socket is installed with one DDR3 memory.

Step 2: Connect an Ethernet cable to the RJ-45 connector labeled **LAN1**.

Step 3: The AMI BIOS options regarding the Intel® ME or Intel® AMT must be enabled,

Step 4: Properly install the Intel® Management Engine Components drivers from the

iAMT Driver & Utility directory in the driver CD. See **Section 6.8**.

Step 5: Configure the Intel® Management Engine BIOS extension (MEBx). To get into

the Intel® MEBx settings, press <Ctrl+P> after a single beep during boot-up

process. Enter the Intel® current ME password as it requires (the Intel® default

password is **admin**).

![NOTE icon] **NOTE:**

To change the password, enter a new password following the strong

password rule (containing at least one upper case letter, one lower

case letter, one digit and one special character, and be at least eight

characters).

4.8 IPMI Setup Procedure

The PCIE-Q870-i2 features Intelligent Platform Management Interface (IPMI) that helps lower the overall costs of server management by enabling users to maximize IT resources, save time and manage multiple systems. The PCIE-Q870-i2 supports IPMI 2.0 through the optional iRIS-2400 module. Follow the steps below to setup IPMI.

4.8.1 Managed System Hardware Setup

The hardware configuration of the managed system (PCIE-Q870-i2) is described below.

Step 1:   Install an iRIS-2400 module to the IPMI module socket (refer to **Section 4.5.2**).

Step 2:   Make sure at least one DDR3 DIMM is installed in one of the DIMM sockets. If

multiple DIMMs are installed, all of the DIMMs must be same size, same speed

and same brand to get the best performance.

Step 3:   Connect an Ethernet cable to the RJ-45 connector labeled **LAN2** (**Figure 3-28**).

4.8.2 Using the IEI iMAN Web GUI

To manage a client system from a remote console using IEI iMAN Web GUI, follow the steps below.

Step 1:   Obtain the IP address of the managed system. It is recommended to use the

IPMI Tool on the managed system to obtain the IP address. To use IPMI Tool to

obtain IP address, follow the steps below:

a. Copy the **Ipmitool.exe** file to a bootable USB flash drive.

b. Insert the USB flash drive to the PCIE-Q870-i2

c. The PCIE-Q870-i2 boots from the USB flash drive

d. Enter the following command: **ipmitool 20 30 02 01 03 00 00**

   (there is a space between each two-digit number)

e. A serial of number shows. The last four two-digit hexadecimal numbers are

the IP address. Convert the hexadecimal numbers to decimal numbers.

Step 2: On the remote management console, open a web browser. Enter the managed

system IP address in the web browser (**Figure 4-22**).
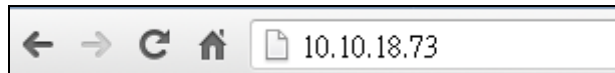
Figure 4-22: IEI iMAN Web Address

Step 3: The login page appears in the web browser.

Step 4: Enter the user name and password to login the system. The default login

username and password are:

-Username: **admin**

-Password: **admin**

Step 5: Press the login button to login the system.

Step 6: The IEI iMAN Web Interface appears.
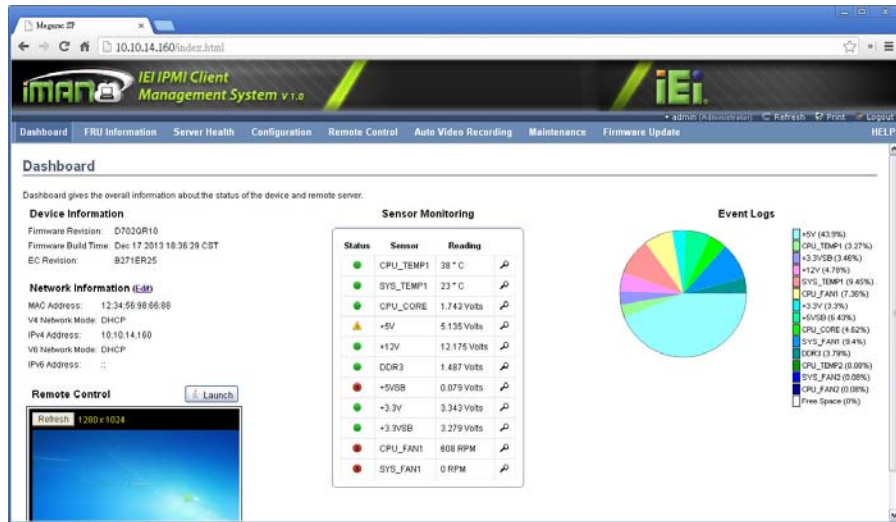
Figure 4-23: IEI iMAN Web GUI

![NOTE icon] **NOTE:**

To understand how to use the IEI iMAN Web GUI, please refer to the iRIS-2400 Web GUI user manual in the utility CD came with the PCIE-Q870-i2. The user manual describes each function in detail.

Chapter

5

BIOS

5.1 Introduction

The BIOS is programmed onto the BIOS chip. The BIOS setup program allows changes to certain system settings. This chapter outlines the options that can be changed.

![NOTE icon] **NOTE:**

> Some of the BIOS options may vary throughout the life cycle of the product and are subject to change without prior notice.

5.1.1 Starting Setup

The UEFI BIOS is activated when the computer is turned on. The setup program can be activated in one of two ways.

1. Press the **DEL** or **F2** key as soon as the system is turned on or
2. Press the **DEL** or **F2** key when the "**Press DEL or F2 to enter SETUP**" message appears on the screen.

If the message disappears before the **DEL or F2** key is pressed, restart the computer and try again.

5.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **ESC** to quit. Navigation keys are shown in **Table 5-1**.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+	Increase the numeric value or make changes

Key	Function
-	Decrease the numeric value or make changes
Page Up	Move to the previous page
Page Dn	Move to the next page
Esc	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2	Load previous values
F3	Load optimized defaults
F4	Save changes and Exit BIOS

Table 5-1: BIOS Navigation Keys

5.1.3 Getting Help

When **F1** is pressed a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

5.1.4 Unable to Reboot after Configuration Changes

If the computer cannot boot after changes to the system configuration is made, CMOS defaults. Use the clear CMOS button described in Chapter **4**.

5.1.5 BIOS Menu Bar

The **menu bar** on top of the BIOS screen has the following main items:

- ▪ Main – Changes the basic system configuration.
- ▪ Advanced – Changes the advanced system settings.
- ▪ Chipset – Changes the chipset settings.
- ▪ Boot – Changes the system boot configuration.

- Security – Sets User and Supervisor Passwords.
- Save & Exit – Selects exit options and loads default settings

The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

5.2 Main

The **Main** BIOS menu (**BIOS Menu 1**) appears when the **BIOS Setup** program is entered.

The **Main** menu gives an overview of the basic system information.

```
        Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
   Main    Advanced   Chipset     Boot    Security  Save & Exit

 BIOS Information                                            Set the Date. Use Tab to
 BIOS Vendor                       American Megatrends       switch between Data
 Core Version                      4.6.5.4                   elements.
 Compliancy                        UEFI 2.3.1; PI 1.2
 Project Version                   B273AR10.ROM
 Build Date and Time               11/25/2013 11:53:40

 iWDD Vendor                       ICP
 iWDD Version                      B273ER12.bin

 Processor Information
 Name                              Haswell
 Brand String                      Intel(R)Core(TM)i7-477
 Frequency                         3500 MHz
 Processor ID                      306c3
 Stepping                          C0                       ----------------------
 Number of Processors              4Core(s) / 8Thread(s)
 Microcode Revision                7
 GT Info                           GT3 (700 MHz)

 IGFX VBIOS Version                2178
 Memory RC Version                 1.6.2.1
 Total Memory                      4096 MB (DDR3)
 Memory Frequency                  1333 MHz

 PCH Information
 Name                              LynxPoint
 PCH SKU                           Q87
 Stepping                          05/C2                    →←: Select Screen
 LAN PHY Revision                  A3                       ↑↓: Select Item
                                                            Enter: Select
 ME FW Version                     9.0.22.1467              +/-:  Change Opt.
 ME Firmware SKU                   5MB                      F1:  General Help
                                                            F2:  Previous Values
 SPI Clock Frequency                                        F3:  Optimized Defaults
 DOFR Support                      Supported                F4:  Save & Exit
 Read Status Clock Frequnecy       50 MHz                   ESC: Exit
 Write Status Clock Frequnecy      50 MHz
 Fast Read Status Clock Frequnecy 50 MHz

 System Date                       [Thu 12/05/2013]
 System Time                       [15:10:27]

 Access Level                      Administrator
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 1: Main

➔ **System Overview**

The system overview lists a brief summary of the BIOS. The fields in system overview cannot be changed. The items shown in the system overview include:

- BIOS Information
- Processor Information
- Memory Information
- PCH Information
- SPI Clock Frequency

The **Main** menu has two user configurable fields:

➔ **System Date [xx/xx/xx]**

Use the **System Date** option to set the system date. Manually enter the day, month and year.

➔ **System Time [xx:xx:xx]**

Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

Use the **Advanced** menu (**BIOS Menu 2**) to configure the CPU and peripheral devices through the following sub-menus:

 WARNING!

Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

```
       Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
   Main   Advanced   Chipset    Boot    Security  Save & Exit

> ACPI Settings                                       System ACPI Parameters
> RTC Wake Settings
> Trusted Computing
> CPU Configuration
> SATA Configuration                                  ----------------------
> Intel(R) Rapid Start Technology
> AMT Configuration                                   →←: Select Screen
> USB Configuration                                   ↑ ↓: Select Item
> F81866 Super IO Configuration                       Enter: Select
> F81866 H/M Monitor                                  +/-:  Change Opt.
> Serial Port Console Redirection                     F1:   General Help
> iEi Feature                                         F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC:  Exit
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```
BIOS Menu 2: Advanced

5.3.1 ACPI Settings

The **ACPI Settings** menu (**BIOS Menu 3**) configures the Advanced Configuration and Power Interface (ACPI) options.

```
       Aptio Setup Utility – Copyright (C) 2010 American Megatrends, Inc.
        Advanced

ACPI Settings                                         Select ACPI sleep state
                                                      the system will enter
ACPI Sleep State                [S1 only(CPU Stop C...]  when the SUSPEND button
                                                      is pressed.


                                                      ----------------------

                                                      →←: Select Screen
                                                      ↑ ↓: Select Item
                                                      Enter: Select
                                                      +/-:  Change Opt.
                                                      F1:   General Help
                                                      F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC:  Exit
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```
BIOS Menu 3: ACPI Configuration

➔ **ACPI Sleep State [S1 only (CPU Stop Clock)]**

Use the **ACPI Sleep State** option to specify the sleep state the system enters when it is not being used.

➔ **Suspend Disabled**

➔ **S1 only (CPU Stop Clock)** DEFAULT — The system enters S1(POS) sleep state. The system appears off. The CPU is stopped; RAM is refreshed; the system is running in a low power mode.

➔ **S3 only (Suspend to RAM)** — The caches are flushed and the CPU is powered off. Power to the RAM is maintained. The computer returns slower to a working state, but more power is saved.

5.3.2 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 4**) enables the system to wake at the specified time.
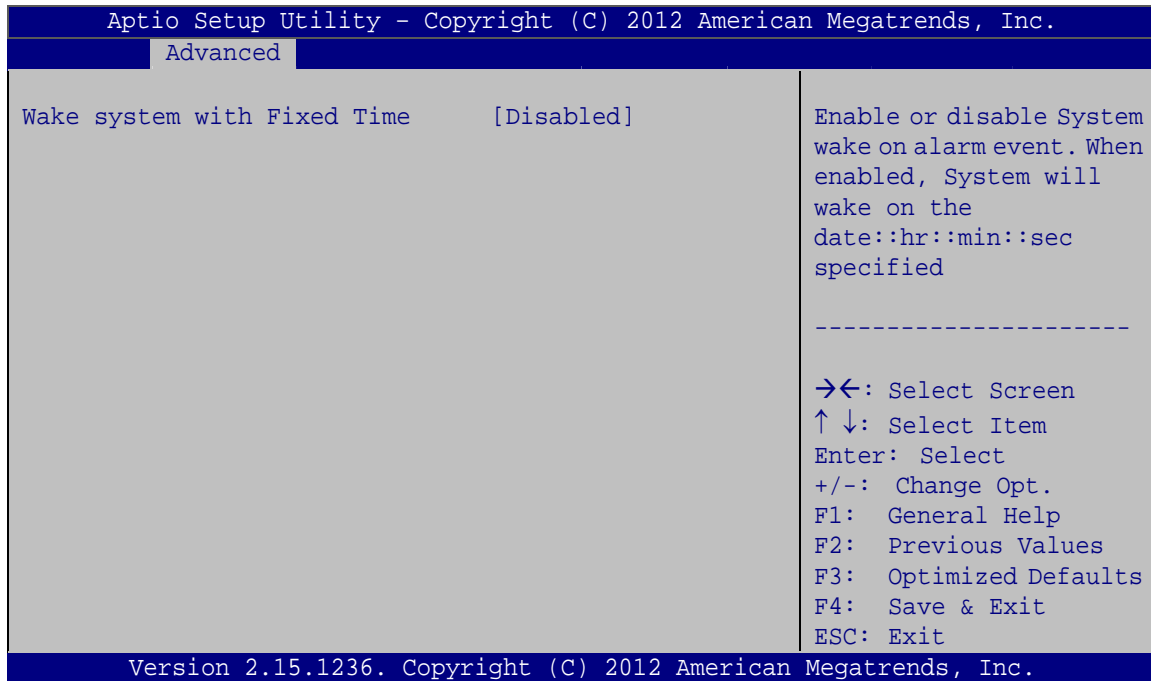
```
      Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
          Advanced

Wake system with Fixed Time     [Disabled]            Enable or disable System
                                                      wake on alarm event. When
                                                      enabled, System will
                                                      wake on the
                                                      date::hr::min::sec
                                                      specified

                                                      ----------------------

                                                      →←: Select Screen
                                                      ↑ ↓: Select Item
                                                      Enter:  Select
                                                      +/-:  Change Opt.
                                                      F1:   General Help
                                                      F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC:  Exit
      Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```
BIOS Menu 4: RTC Wake Settings

➔ **Wake system with Fixed Time [Disabled]**

Use the **Wake system with Fixed Time** option to enable or disable the system wake on alarm event.

➔ **Disabled**   DEFAULT   The real time clock (RTC) cannot generate a wake event

➔ **Enabled**   If selected, the **Wake up every day** option appears allowing you to enable to disable the system to wake every day at the specified time. Besides, the following options appear with values that can be selected:

Wake up date

Wake up hour

Wake up minute

Wake up second

After setting the alarm, the computer turns itself on from a suspend state when the alarm goes off.

5.3.3 Trusted Computing

Use the **Trusted Computing** menu (**BIOS Menu 5**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
          Advanced

Configuration                                        Enables or Disables BIOS
  Security Device Support        [Disable]           support for security
                                                     device. O.S. will not
                                                     show Security Device.
Current Status Information                           TCG EFI protocol and
  NO Security Device Found                           INT1A interface will not
                                                     be available.

                                                     ----------------------

                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-:  Change Opt.
                                                     F1:   General Help
                                                     F2:   Previous Values
                                                     F3:   Optimized Defaults
                                                     F4:   Save & Exit
                                                     ESC: Exit
          Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 5: Trusted Computing

➔ **Security Device Support [Disable]**

Use the **Security Device Support** option to configure support for the TPM.

➔ **Disable** DEFAULT TPM support is disabled.

➔ **Enable** TPM support is enabled.

5.3.4 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 6**) to view detailed CPU specifications or enable the Intel Virtualization Technology.

```
           Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
              Advanced


CPU Configuration                                               When enabled, a VMM can
                                                               utilize the additional
Intel(R) Core(TM) i7-4770S CPU @ 3.10GHz                       hardware capabilities
CPU Signature                       306c2                      provided by Vanderpool
Processor Family                    6                          Technology
Microcode Patch                     7
Max CPU Speed                       3100 MHz
Min CPU Speed                       800 MHz                     ---------------------
CPU Speed                           3500 MHz
Processor Cores                     4
Intel HT Technology                 Supported                  →←: Select Screen
Intel VT-x Technology               Supported                  ↑↓: Select Item
Intel SMX Technology                Supported                  Enter: Select
64-bit                              Supported                  +/-:  Change Opt.
EIST Technology                     Supported                  F1:  General Help
CPU C3 state                        Supported                  F2:  Previous Values
CPU C6 state                        Supported                  F3:  Optimized Defaults
CPU C7 state                        Supported                  F4:  Save & Exit
                                                               ESC: Exit
L1 Data Cache                       32 kB x 4
L1 Code Cache                       32 kB x 4
L2 Cache                            256 kB x 4
L3 Cache                            8192 kB

Hyper-Threading                     [Enabled]
Intel Virtualization Technology  [Disabled]
Intel TXT(LT) Support               [Disabled]

           Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 6: CPU Configuration

➔   **Hyper-threading [Enabled]**

Use the **Hyper-threading** BIOS option to enable or disable the Intel Hyper-Threading Technology.

➔   **Disabled**   Disables the Intel Hyper-Threading Technology.

➔   **Enabled**   DEFAULT   Enables the Intel Hyper-Threading Technology.

➔   **Intel Virtualization Technology [Disabled]**

Use the **Intel Virtualization Technology** option to enable or disable virtualization on the system. When combined with third party software, Intel® Virtualization technology allows several OSs to run on the same system at the same time.

→ **Disabled**   DEFAULT   Disables Intel Virtualization Technology.

→ **Enabled**   Enables Intel Virtualization Technology.

5.3.5 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 7**) to change and/or set the configuration of the SATA devices installed in the system.

```
          Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
             Advanced

SATA Controller(s)               [Enabled]          Enable or disable SATA
SATA Mode Selection              [IDE]              Device.

SATA1 Port                       Empty             ---------------------
SATA2 Port                       Empty             →←: Select Screen
SATA3 Port                       Empty             ↑ ↓: Select Item
SATA4 Port                       Empty             Enter: Select
SATA5 Port                       Empty             +/-:  Change Opt.
SATA6 Port                       Empty             F1:  General Help
                                                   F2:  Previous Values
                                                   F3:  Optimized Defaults
                                                   F4:  Save & Exit
                                                   ESC: Exit

         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 7: SATA Configuration

→ **SATA Controller(s) [Enabled]**

Use the **SATA Controller(s)** option to configure the serial ATA controller.

→ **Enabled**   DEFAULT   Enables the on-board SATA controller.

→ **Disabled**   Disables the on-board SATA controller.

→ **SATA Mode Selection [IDE]**

Use the **SATA Mode Selection** option to configure SATA devices as normal IDE devices.

→ **IDE**   DEFAULT   Configures SATA devices as normal IDE device.

→ **AHCI**   Configures SATA devices as AHCI device.

→ **RAID**   Configures SATA devices as RAID device.

5.3.6 Intel(R) Rapid Start Technology

Use the **Intel(R) Rapid Start Technology** (**BIOS Menu 8**) menu to configure Intel® Rapid Start Technology support.

```
Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
    Advanced

Intel(R) Rapid Start Technology     [Disabled]              Enable or disable
                                                            Intel(R) Rapid Start
                                                            Technology


                                                            ---------------------
                                                            →←: Select Screen
                                                            ↑ ↓: Select Item
                                                            Enter: Select
                                                            +/-:  Change Opt.
                                                            F1:   General Help
                                                            F2:   Previous Values
                                                            F3:   Optimized Defaults
                                                            F4:   Save & Exit
                                                            ESC: Exit
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 8: Intel(R) Rapid Start Technology

➔ **Intel(R) Rapid Start Technology [Disabled]**

Use **Intel(R) Rapid Start Technology** option to enable or disable the Intel® Rapid Start Technology function.

➔ **Disabled**   DEFAULT   Intel® Rapid Start Technology is disabled

➔ **Enabled**   Intel® Rapid Start Technology is enabled

5.3.7 AMT Configuration

The **AMT Configuration** menu (**BIOS Menu 9**) allows the Intel® AMT options to be configured.

```
           Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
      Advanced

 Intel AMT                         [Enabled]              Enable/Disable Intel (R)
 Un-Configure ME                   [Disabled]             Active Management
                                                          Technology BIOS
                                                          Extension. Note: iAMT H/W
                                                          is always enabled.
                                                          This option just controls
                                                          the BIOS extension
                                                          execution.
                                                          If enabled, this requires
                                                          additional firmware in the
                                                          SPI device.
                                                          --------------------
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-: Change Opt.
                                                          F1:  General Help
                                                          F2:  Previous Values
                                                          F3:  Optimized Defaults
                                                          F4:  Save & Exit
                                                          ESC:  Exit
           Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 9: AMT Configuration

➔ **Intel AMT [Enabled]**

Use **Intel AMT** option to enable or disable the Intel® AMT function.

➔ **Disabled**   Intel® AMT is disabled

➔ **Enabled**   **DEFAULT**   Intel® AMT is enabled

➔ **Un-Configure ME [Disabled]**

Use the **Un-Configure ME** option to perform ME unconfigure without password operation.

➔ **Disabled**   **DEFAULT**   Not perform ME unconfigure

➔ **Enabled**   To perform ME unconfigure

5.3.8 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 10**) to read USB configuration information and configure the USB settings.

```
              Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
              Advanced

USB Configuration                                     Enables Legacy USB
                                                      support. AUTO option
USB Devices:                                          disables legacy support
        1 Keyboard, 2 Hubs                            if no USB devices are
                                                      connected. DISABLE
Legacy USB Support                   [Enabled]        option will keep USB
                                                      devices available only
                                                      for EFI applications.

                                                      ---------------------
                                                      →←: Select Screen
                                                      ↑ ↓: Select Item
                                                      Enter: Select
                                                      +/-:  Change Opt.
                                                      F1:   General Help
                                                      F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC: Exit
              Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

   BIOS Menu 10: USB Configuration

➔ **USB Devices**

The **USB Devices** field lists the USB devices that are enabled on the system

➔ **Legacy USB Support [Enabled]**

Use the **Legacy USB Support** BIOS option to enable USB mouse and USB keyboard support. Normally if this option is not enabled, any attached USB mouse or USB keyboard does not become available until a USB compatible operating system is fully booted with all USB drivers loaded. When this option is enabled, any attached USB mouse or USB keyboard can control the system even when there is no USB driver loaded onto the system.

➔ **Enabled**   **DEFAULT**   Legacy USB support enabled

➔ **Disabled**   Legacy USB support disabled

➔ **Auto**   Legacy USB support disabled if no USB devices are
                                    connected

5.3.9 F81866 Super IO Configuration

Use the **F81866 Super IO Configuration** menu (**BIOS Menu 11**) to set or change the
configurations for the parallel ports and serial ports.

```
        Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
          Advanced

F81866 Super IO Configuration                          Set Parameters of Serial
                                                       Port 1 (COMA)
F81866 Super IO Chip            F81866
> Serial Port 1 Configuration
> Serial Port 2 Configuration                          ---------------------
> Serial Port 3 Configuration                          ➔←: Select Screen
> Serial Port 4 Configuration                          ↑ ↓: Select Item
> Serial Port 5 Configuration                          Enter: Select
> Parallel Port Configuration                          +/-:  Change Opt.
                                                       F1:   General Help
                                                       F2:   Previous Values
                                                       F3:   Optimized Defaults
                                                       F4:   Save & Exit
                                                       ESC: Exit
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 11: F81866 Super IO Configuration

➔ **IO=3F8h;**   Serial Port I/O port address is 3F8h and the interrupt
   IRQ=3, 4   address is IRQ3, 4

➔ **IO=2C0h;**   Serial Port I/O port address is 2C0h and the interrupt
   IRQ=3, 4   address is IRQ3, 4

➔ **IO=2C8h;**   Serial Port I/O port address is 2C8h and the interrupt
   IRQ=3, 4   address is IRQ3, 4

5.3.9.1.2 Serial Port 2 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**   Disable the serial port

➔ **Enabled**   **DEFAULT**   Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**   **DEFAULT**   The serial port IO port address and interrupt address
                are automatically detected.

➔ **IO=2F8h;**   Serial Port I/O port address is 2F8h and the interrupt
   IRQ=3   address is IRQ3

➔ **IO=3F8h;**   Serial Port I/O port address is 3F8h and the interrupt
   IRQ=3, 4   address is IRQ3, 4

➔ **IO=2F8h;**   Serial Port I/O port address is 2F8h and the interrupt
   IRQ=3, 4   address is IRQ3, 4

➔ **IO=2C0h;**   Serial Port I/O port address is 2C0h and the interrupt
   IRQ=3, 4   address is IRQ3, 4

➔ **IO=2C8h;**   Serial Port I/O port address is 2C8h and the interrupt
   IRQ=3, 4   address is IRQ3, 4

➔ **Device Mode [RS422/485]**

The serial port 2 is set to RS-422/485 mode.

5.3.9.1.3 Serial Port 3 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**   Disable the serial port

➔ **Enabled**   DEFAULT   Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto**   DEFAULT   The serial port IO port address and interrupt address are automatically detected.

➔ **IO=2D0h;**   Serial Port I/O port address is 2D0h and the interrupt
   IRQ=10   address is IRQ10

➔ **IO=2D0h;**   Serial Port I/O port address is 2D0h and the interrupt
   IRQ=10, 11   address is IRQ10, 11

➔ **IO=2E8h;**   Serial Port I/O port address is 2E8h and the interrupt
   IRQ=10, 11   address is IRQ10, 11

➔ **IO=2D8h;**   Serial Port I/O port address is 2D8h and the interrupt
   IRQ=10, 11   address is IRQ10, 11

5.3.9.1.4 Serial Port 4 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled**   Disable the serial port

➔ **Enabled**   DEFAULT   Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto** **DEFAULT** The serial port IO port address and interrupt address are automatically detected.

➔ **IO=2E8h;** Serial Port I/O port address is 2E8h and the interrupt **IRQ=10** address is IRQ10

➔ **IO=3E8h;** Serial Port I/O port address is 3E8h and the interrupt **IRQ=10, 11** address is IRQ10, 11

➔ **IO=2E8h;** Serial Port I/O port address is 2E8h and the interrupt **IRQ=10, 11** address is IRQ10, 11

➔ **IO=2D0h;** Serial Port I/O port address is 2D0h and the interrupt **IRQ=10, 11** address is IRQ10, 11

➔ **IO=2D8h;** Serial Port I/O port address is 2D8h and the interrupt **IRQ=10, 11** address is IRQ10, 11

5.3.9.1.5 Serial Port 5 Configuration

➔ **Serial Port [Enabled]**

Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled** Disable the serial port

➔ **Enabled** **DEFAULT** Enable the serial port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the serial port IO port address and interrupt address.

➔ **Auto** **DEFAULT** The serial port IO port address and interrupt address are automatically detected.

➔ **IO=2D0h;**   Serial Port I/O port address is 2D0h and the interrupt

   IRQ=10   address is IRQ10

➔ **IO=2C0h;**   Serial Port I/O port address is 2C0h and the interrupt

   IRQ=10, 11   address is IRQ10, 11

➔ **IO=2C8h;**   Serial Port I/O port address is 2C8h and the interrupt

   IRQ=10, 11   address is IRQ10, 11

➔ **IO=2D0h;**   Serial Port I/O port address is 2D0h and the interrupt

   IRQ=10, 11   address is IRQ10, 11

➔ **IO=2D8h;**   Serial Port I/O port address is 2D8h and the interrupt

   IRQ=10, 11   address is IRQ10, 11

➔ **IO=2E0h;**   Serial Port I/O port address is 2E0h and the interrupt

   IRQ=10, 11   address is IRQ10, 11

5.3.9.2 Parallel Port Configuration

Use the **Parallel Port Configuration** menu (**BIOS Menu 13**) to configure the serial port n.

```
       Aptio Setup Utility – Copyright (C) 2010 American Megatrends, Inc.
         Advanced

Parallel Port Configuration                              Enable or Disable
                                                         Parallel Port(LPT/LPTE)
Parallel Port                     [Enabled]
Device Settings                   IO=378h; IRQ=5
                                                         ---------------------
Change Settings                   [Auto]                 →←: Select Screen
Device Mode                       [STD Printer Mode]      ↑ ↓: Select Item
                                                         Enter: Select
                                                         +/-:  Change Opt.
                                                         F1:   General Help
                                                         F2:   Previous Values
                                                         F3:   Optimized Defaults
                                                         F4:   Save & Exit
                                                         ESC: Exit
         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 13: Parallel Port Configuration Menu

➔   **Parallel Port [Enabled]**

Use the **Parallel Port** option to enable or disable the parallel port.

➔ **Disabled**   Disable the parallel port

➔ **Enabled**   **DEFAULT**   Enable the parallel port

➔ **Change Settings [Auto]**

Use the **Change Settings** option to change the parallel port IO port address and interrupt address.

➔ **Auto**   **DEFAULT**   The parallel port IO port address and interrupt address are automatically detected.

➔ **IO=378h;**   Parallel Port I/O port address is 378h and the
   IRQ=5   interrupt address is IRQ5

➔ **IO=378h;**   Parallel Port I/O port address is 378h and the
   IRQ=5, 7   interrupt address is IRQ5, 7

➔ **IO=278h;**   Parallel Port I/O port address is 278h and the
   IRQ=5, 7   interrupt address is IRQ5, 7

➔ **IO=3BCh;**   Parallel Port I/O port address is 3BCh and the
   IRQ=5, 7   interrupt address is IRQ5, 7

➔ **Device Mode [STD Printer Mode]**

Use the **Device Mode** option to select the mode the parallel port operates in. Configuration options are listed below.

- STD Printer Mode   **Default**
- SPP Mode
- EPP-1.9 and SPP Mode
- EPP-1.7 and SPP Mode
- ECP Mode
- ECP and EPP 1.9 Mode
- ECP and EPP 1.7 Mode

5.3.10 F81866 H/W Monitor

The **F81866 H/W Monitor** menu (**BIOS Menu 14**) contains the fan configuration submenu, and displays the system temperature and CPU fan speed.

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
          Advanced

PC Health Status                                        Smart Fan Mode Select

> Smart Fan Mode Configuration
CPU Temperature                   :+40 C                --------------------
System Temperature                :+36 C                →←: Select Screen
CPU_FAN1 Speed                    :1664 RPM             ↑ ↓: Select Item
SYS_FAN1 Speed                    :N/A                  Enter: Select
V_CPU_CORE                        :+1.384 V             +/-:  Change Opt.
+5V                               :N/A                  F1:   General Help
+12V                              :N/A                  F2:   Previous Values
V_SM                              :N/A                  F3:   Optimized Defaults
VSB5V                             :+4.968 V             F4:   Save & Exit
VCC3V                             :+3.360 V             ESC: Exit
VSB3V                             :+3.360 V
VBAT                              :+2.992 V

          Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 14: F81866 H/W Monitor

➔ **PC Health Status**

The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
  - ○ CPU Temperature
  - ○ System Temperature

- Fan Speeds:
  - ○ CPU Fan Speed
  - ○ System Fan Speed

- Voltages:
  - ○ V_CPU_CORE
  - ○ +5V
  - ○ +12V
  - ○ V_SM

o VSB5V

o VCC3V

o VSB3V

o VBAT

5.3.10.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration submenu** (**BIOS Menu 15**) to configure fan 1 temperature and speed settings.

```
         Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
            Advanced

Smart Fan Mode Configuration                        Smart Fan Mode Select

CPU_FAN1 Smart Fan Control         [Auto Mode]
Fan start temperature              50               --------------------
Fan off temperature                40
Fan start PWM                      30               →←: Select Screen
Fan slope PWM                      1                ↑ ↓: Select Item
SYS_FAN1 Smart Fan Control         [Auto Mode]      Enter: Select
Fan start temperature              50               +/-:  Change Opt.
Fan off temperature                40               F1:   General Help
Fan start PWM                      30               F2:   Previous Values
Fan slope PWM                      1                F3:   Optimized Defaults
                                                    F4:   Save & Exit
                                                    ESC: Exit
         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 15: Smart Fan Mode Configuration

➔ **CPU_FAN1 Smart Fan Control/SYS_FAN1 Smart Fan Control [Auto Mode]**

Use the **CPU_FAN1 Smart Fan Control/SYS_FAN1 Smart Fan Control** option to configure the CPU/System Smart Fan.

➔ **Auto Mode**   DEFAULT   The fan adjusts its speed using Auto Mode settings.

➔ **Manual Mode**   The fan spins at the speed set in Manual Mode settings.

➔ **Fan start/off temperature**

Use the + or – key to change the **Fan start/off temperature** value. Enter a decimal number between 1 and 100.

➔ **Fan start PWM**

Use the + or – key to change the **Fan start PWM** value. Enter a decimal number between 1 and 128.

➔ **Fan slope PWM**

Use the + or – key to change the **Fan slope PWM** value. Enter a decimal number between 1 and 64.

5.3.11 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 16**) allows the console redirection options to be configured. Console redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.

```
     Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
          Advanced

  COM1                                               Console Redirection
  Console Redirection          [Disabled]            Enable or Disable
> Console Redirection Settings

  COM2
  Console Redirection          [Disabled]
> Console Redirection Settings

  COM3
  Console Redirection          [Disabled]            --------------------
> Console Redirection Settings

  COM4
  Console Redirection          [Disabled]
> Console Redirection Settings

  COM5
  Console Redirection          [Disabled]            →←: Select Screen
> Console Redirection Settings                       ↑↓: Select Item
                                                     Enter: Select
                                                     +/-:  Change Opt.
  iAMT SOL                                           F1:  General Help
                                                     F2:  Previous Values
  COM6(Pci Bus0,Dev22,Func3)                         F3:  Optimized Defaults
  Console Redirection          [Disabled]            F4:  Save & Exit
> Console Redirection Settings                       ESC: Exit


     Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 16: Serial Port Console Redirection

➔   **Console Redirection [Disabled]**

Use **Console Redirection** option to enable or disable the console redirection function.

➔   **Disabled**   DEFAULT   Disabled the console redirection function

➔   **Enabled**   Enabled the console redirection function

➔   **Terminal Type [ANSI]**

Use the **Terminal Type** option to specify the remote terminal type.

➔   **VT100**   The target terminal type is VT100

➔   **VT100+**   The target terminal type is VT100+

➔ **VT-UTF8** The target terminal type is VT-UTF8

➔ **ANSI** **DEFAULT** The target terminal type is ANSI

➔ **Bits per second [115200]**

Use the **Bits per second** option to specify the serial port transmission speed. The speed must match the other side. Long or noisy lines may require lower speeds.

➔ **9600** Sets the serial port transmission speed at 9600.

➔ **19200** Sets the serial port transmission speed at 19200.

➔ **57600** Sets the serial port transmission speed at 57600.

➔ **115200** **DEFAULT** Sets the serial port transmission speed at 115200.

➔ **Data Bits [8]**

Use the **Data Bits** option to specify the number of data bits.

➔ **7** Sets the data bits at 7.

➔ **8** **DEFAULT** Sets the data bits at 8.

➔ **Parity [None]**

Use the **Parity** option to specify the parity bit that can be sent with the data bits for detecting the transmission errors.

➔ **None** **DEFAULT** No parity bit is sent with the data bits.

➔ **Even** The parity bit is 0 if the number of ones in the data bits is even.

➔ **Odd** The parity bit is 0 if the number of ones in the data bits is odd.

➔ **Mark** The parity bit is always 1. This option does not provide error detection.

➔ **Space** The parity bit is always 0. This option does not provide error detection.
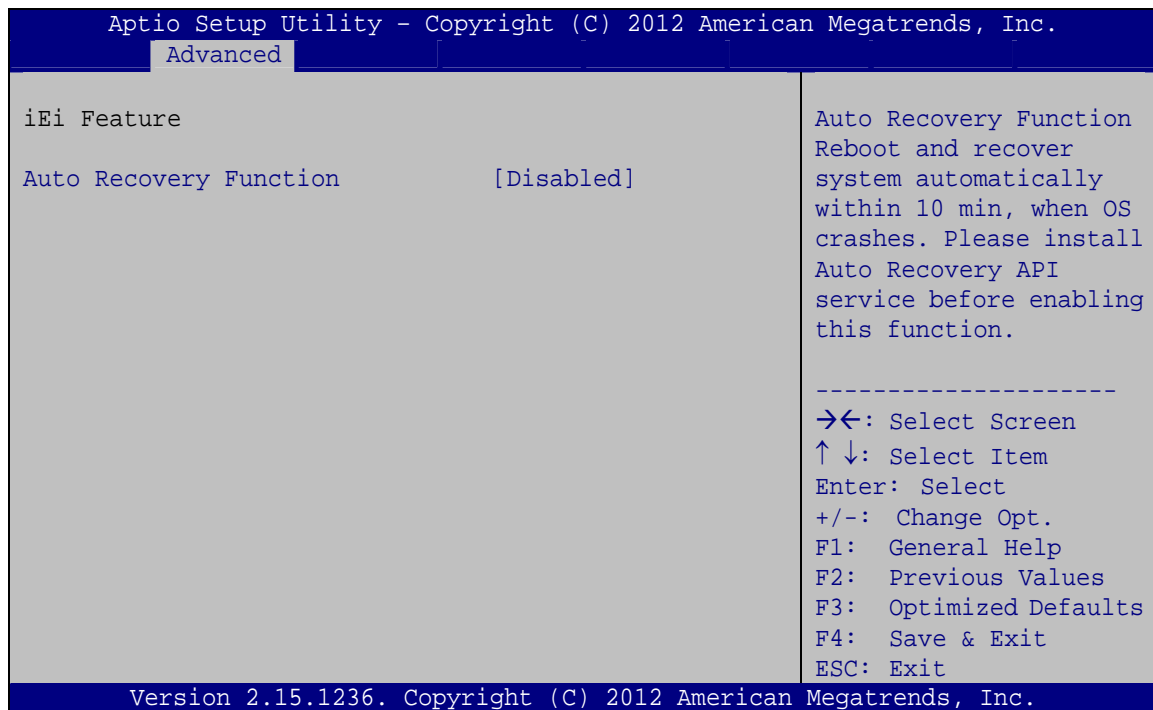
➔ **Stop Bits [1]**

Use the **Stop Bits** option to specify the number of stop bits used to indicate the end of a serial data packet. Communication with slow devices may require more than 1 stop bit.

➔ **1**   DEFAULT   Sets the number of stop bits at 1.

➔ **2**   Sets the number of stop bits at 2.

5.3.12 iEi Feature

Use the **iEi Feature** menu (**BIOS Menu 17**) to configure One Key Recovery function.

```
       Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
          Advanced

 iEi Feature                                          Auto Recovery Function
                                                      Reboot and recover
 Auto Recovery Function          [Disabled]           system automatically
                                                      within 10 min, when OS
                                                      crashes. Please install
                                                      Auto Recovery API
                                                      service before enabling
                                                      this function.


                                                      ---------------------
                                                      ➔←: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-:  Change Opt.
                                                      F1:   General Help
                                                      F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC: Exit
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 17: iEi Feature

➔ **Auto Recovery Function [Disabled]**

Use the **Auto Recovery Function** BIOS option to enable or disable the auto recovery function of the IEI One Key Recovery.

➔ **Disabled**   DEFAULT   Auto recovery function disabled

➔ **Enabled**   Auto recovery function enabled
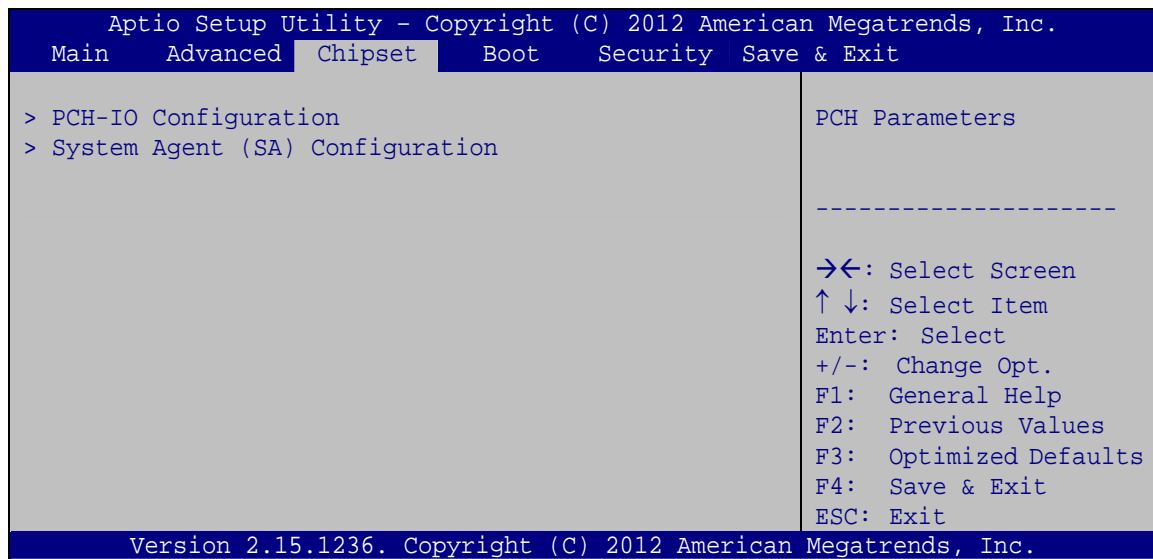
5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 18**) to access the PCH IO and System Agent (SA) configuration menus.

![Warning icon] **WARNING!**

Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
        Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
   Main    Advanced   Chipset    Boot    Security  Save & Exit

> PCH-IO Configuration                              PCH Parameters
> System Agent (SA) Configuration

                                                    ---------------------

                                                    →←: Select Screen
                                                    ↑ ↓: Select Item
                                                    Enter: Select
                                                    +/-:  Change Opt.
                                                    F1:   General Help
                                                    F2:   Previous Values
                                                    F3:   Optimized Defaults
                                                    F4:   Save & Exit
                                                    ESC: Exit
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 18: Chipset

5.4.1 PCH-IO Configuration

Use the **PCH-IO Configuration** menu (**BIOS Menu 19**) to configure the PCH parameters.

```
         Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
                        Chipset

Auto Power Button Status        [Disabled (ATX)]       Select AC power state
                                                       when power is re-applied
Restore AC Power Loss           [Last State]           after a power failure.

> PCI Express Configuration
> PCH Azalia Configuration                             --------------------

Power Saving Function(ERP)      [Disabled]             →←: Select Screen
                                                       ↑↓: Select Item
PCIEX16 Power                   [1 x16 PCIE]           Enter: Select
USB SW1 Power                   [+5V DUAL]             +/-:  Change Opt.
USB SW2 Power                   [+5V DUAL]             F1:   General Help
                                                       F2:   Previous Values
                                                       F3:   Optimized Defaults
                                                       F4:   Save & Exit
                                                       ESC:  Exit
         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 19: PCH-IO Configuration

➔ **Restore AC Power Loss [Last State]**

Use the **Restore AC Power Loss** BIOS option to specify what state the system returns to if there is a sudden loss of power to the system.

➔ **Power Off**   The system remains turned off

➔ **Power On**   The system turns on

➔ **Last State**   DEFAULT   The system returns to its previous state. If it was on, it turns itself on. If it was off, it remains off.

➔ **Power Saving Function(ERP) [Disabled]**

Use the **Power Saving Function(ERP)** BIOS option to enable or disable the power saving function.

➔ **Disabled**   DEFAULT   Power saving function is disabled.

➔ **Enabled**   Power saving function is enabled. It will reduce power consumption when the system is off.

➔ **PCIEX16 Power [1 x16 PCIE]**

Use the **PCIEX16 Power** BIOS option to configure the PCIe x16 channel mode on the backplane.

➔ **1 x16 PCIE**   D<small>EFAULT</small>   Sets the PCIe x16 slot as one PCIe x16

➔ **2 x8 PCIE**   Sets the PCIe x16 slot as two PCIe x8

➔ **1 x8, 2 x4 PCIE**   Sets the PCIe x16 slot as one PCIe x8 or two PCIe x4

➔ **USB SW1 Power [+5V DUAL]**

Use the **USB SW1 Power** BIOS option to configure the USB power source for the external USB 3.0 ports.

➔ **+5V**   Sets the USB power source to +5V

➔ **+5V DUAL**   D<small>EFAULT</small>   Sets the USB power source to +5V dual

➔ **USB SW2 Power [+5V DUAL]**

Use the **USB SW2 Power** BIOS option to configure the USB power source for the internal USB 3.0 and USB 2.0 ports.

➔ **+5V**   Sets the USB power source to +5V

➔ **+5V DUAL**   D<small>EFAULT</small>   Sets the USB power source to +5V dual
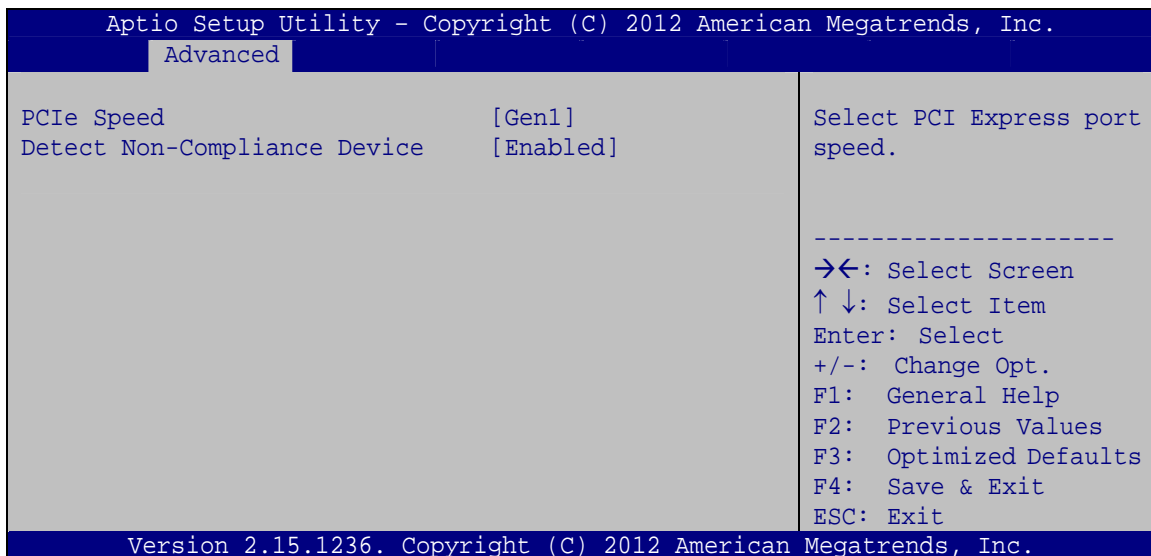
5.4.1.1 PCI Express Configuration

Use the **PCI Express Configuration** menu (**BIOS Menu 20**) to configure the PCI Express slots.

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
                  Chipset

PCI Express Configuration                          PCI Express Root Port 2
                                                   Settings.
> PCI Express Root Port 2
> PCI Express Root Port 5
> PCI Express Root Port 6                           ---------------------
> PCI Express Root Port 7                          →←: Select Screen
> PCI Express Root Port 8                          ↑ ↓: Select Item
                                                   Enter: Select
                                                   +/-:  Change Opt.
                                                   F1:  General Help
                                                   F2:  Previous Values
                                                   F3:  Optimized Defaults
                                                   F4:  Save & Exit
                                                   ESC: Exit
          Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 20: PCI Express Configuration

5.4.1.1.1 PCI Express Root Port n

Use the **PCI Express Root Port n** menu (**BIOS Menu 21**) to configure the PCI Express Root Port n settings.

```
          Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
                  Advanced

PCIe Speed                      [Gen1]             Select PCI Express port
Detect Non-Compliance Device    [Enabled]          speed.


                                                    ---------------------
                                                   →←: Select Screen
                                                   ↑ ↓: Select Item
                                                   Enter: Select
                                                   +/-:  Change Opt.
                                                   F1:  General Help
                                                   F2:  Previous Values
                                                   F3:  Optimized Defaults
                                                   F4:  Save & Exit
                                                   ESC: Exit
          Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 21: PCI Express Root Port n Configuration Menu

➔ **PCIe Speed [Gen1]**

Use this option to select the support type of the PCI Express ports. The following options are available:
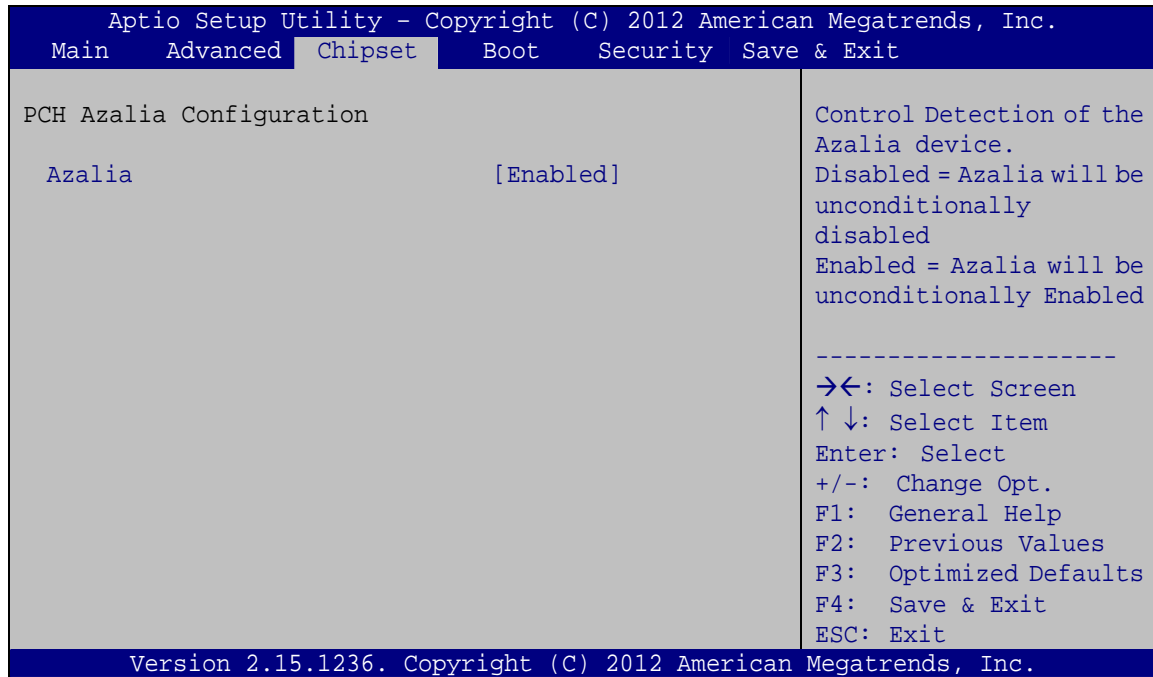
- Auto **Default**
- Gen1
- Gen2

➔ **Detect Non-Compliance Device [Enabled]**

Use the **Detect Non-Compliance Device** option to enable or disable detecting if a non-compliance PCI Express device is connected to the PCI Express port.

➔ **Disabled** Disables to detect if a non-compliance PCI Express device is connected to the PCI Express port.

➔ **Enabled** DEFAULT Enables to detect if a non-compliance PCI Express device is connected to the PCI Express port.

5.4.1.2 PCH Azalia Configuration

Use the **PCH Azalia Configuration** menu (**BIOS Menu 22**) to configure the PCH Azalia settings.

```
         Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
   Main    Advanced  Chipset    Boot    Security  Save & Exit

 PCH Azalia Configuration                            Control Detection of the
                                                     Azalia device.
   Azalia                          [Enabled]         Disabled = Azalia will be
                                                     unconditionally
                                                     disabled
                                                     Enabled = Azalia will be
                                                     unconditionally Enabled

                                                     ---------------------
                                                     →←: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-:  Change Opt.
                                                     F1:  General Help
                                                     F2:  Previous Values
                                                     F3:  Optimized Defaults
                                                     F4:  Save & Exit
                                                     ESC: Exit
         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 22: PCH Azalia Configuration Menu

➔ **Azalia [Enabled]**

Use the **Azalia** option to enable or disable the High Definition Audio controller.

➔ **Disabled**   The onboard High Definition Audio controller is disabled

➔ **Enabled** DEFAULT The onboard High Definition Audio controller automatically detected and enabled

5.4.2 System Agent (SA) Configuration

Use the **System Agent (SA) Configuration** menu (**BIOS Menu 23**) to configure the System Agent (SA) parameters.

```
         Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
                      Chipset

 VT-d                             [Disabled]           Check to enable VT-d
                                                       function on MCH.
 > Graphics Configuration
 > NB PCIe Configuration
 > Memory Configuration                                --------------------
                                                       →←: Select Screen
                                                       ↑ ↓: Select Item
                                                       Enter: Select
                                                       +/-:  Change Opt.
                                                       F1:   General Help
                                                       F2:   Previous Values
                                                       F3:   Optimized Defaults
                                                       F4:   Save & Exit
                                                       ESC: Exit
         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```
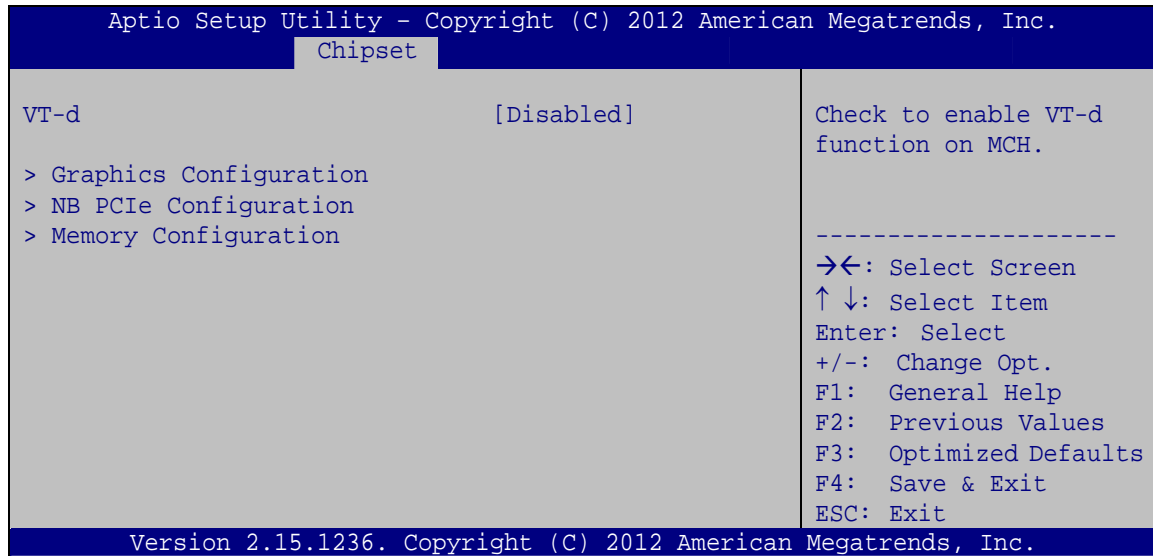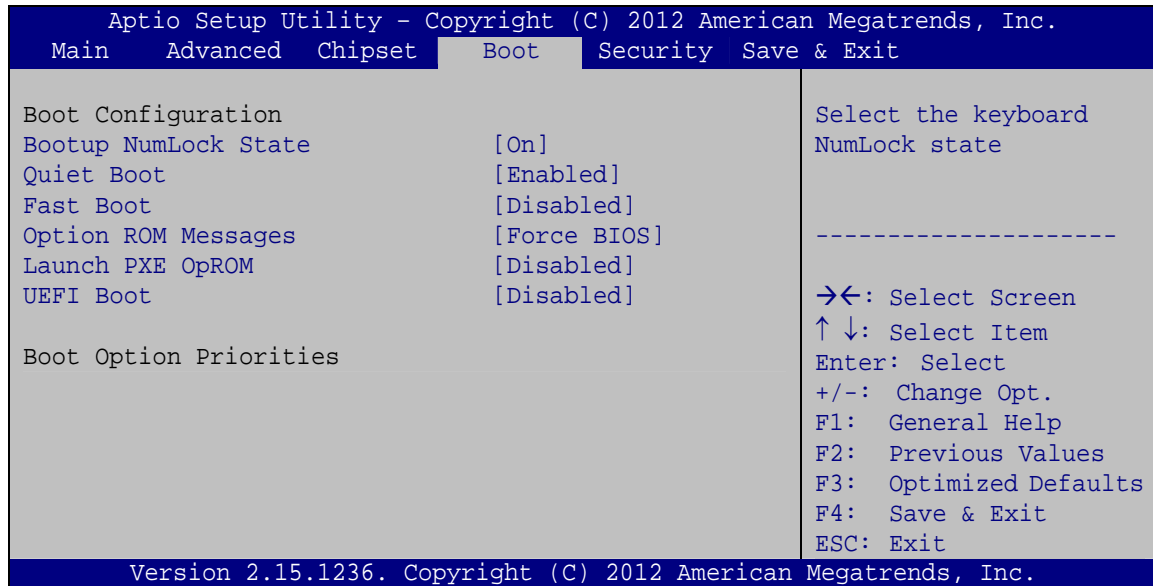
BIOS Menu 23: System Agent (SA) Configuration

➔ **VT-d [Disabled]**

Use the **VT-d** option to enable or disable VT-d support.

➔ **Disabled**   DEFAULT   Disables VT-d support.

➔ **Enabled**   Enables VT-d support.

5.4.2.1 Graphics Configuration

Use the **Graphics Configuration** (**BIOS Menu 24**) menu to configure the video device connected to the system.

```
       Aptio Setup Utility - Copyright (C) 2012 American Megatrends, Inc.
                    Chipset

Graphics Configuration                                    Select which of
                                                          IGFX/PEG/PCI Graphics
Primary Display                 [Auto]                     device should be Primary
DVMT Pre-Allocated              [256M]                     Display Or select SG for
DVMT Total Gfx Mem              [MAX]                      Switchable Gfx.
> LCD Control
                                                          ----------------------
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-:  Change Opt.
                                                          F1:   General Help
                                                          F2:   Previous Values
                                                          F3:   Optimized Defaults
                                                          F4:   Save & Exit
                                                          ESC: Exit
           Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 24: Graphics Configuration

➔ **Primary Display [Auto]**

Use the **Primary Display** option to select the primary graphics controller the system uses.
The following options are available:

- Auto   **Default**
- IGFX
- PEG
- PCI

➔ **DVMT Pre-Allocated [256M]**

Use the **DVMT Pre-Allocated** option to set the amount of system memory allocated to the
integrated graphics processor when the system boots. The system memory allocated can
then only be used as graphics memory, and is no longer available to applications or the
operating system. Configuration options are listed below:

- 32M
- 64M
- 128M
- 256M   **Default**
- 512M

➔ **DVMT Total Gfx Mem [MAX]**

Use the **DVMT Total Gfx Mem** option to select DVMT5.0 total graphic memory size used by the internal graphic device. The following options are available:

- 128M
- 256M
- MAX   **Default**

5.4.2.1.1 LCD Control

Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.	
Chipset	
LCD Control Primary IGFX Boot Display [VBIOS Default]	Select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes will be supported only on primary display. ---------------------- ➔←: Select Screen ↑ ↓: Select Item Enter: Select +/-: Change Opt. F1: General Help F2: Previous Values F3: Optimized Defaults F4: Save & Exit ESC: Exit
Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.	

BIOS Menu 25: LCD Control

➔ **Primary IGFX Boot Display [VBIOS Default]**

Use the **Primary IGFX Boot Display** option to select the display device used by the system when it boots. Configuration options are listed below.

- VBIOS Default   DEFAULT
- CRT
- DVI
- DP
- HDMI

5.4.2.2 NB PCIe Configuration

```
         Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
                  Chipset

NB PCIe Configuration                               Configure PEG0 B0:D1:F0
PEG0                           Not Present          Gen1-Gen3 (PCIEX16_1
  PEG0 – Gen X                 [Auto]               Slot)

Enable PEG                     [Enabled]
Detect Non-compliance Device   [Enabled]            ---------------------
                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-:  Change Opt.
                                                    F1:  General Help
                                                    F2:  Previous Values
                                                    F3:  Optimized Defaults
                                                    F4:  Save & Exit
                                                    ESC: Exit
         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 26: NB PCIe Configuration

➔ **PEG0 – Gen X [Auto]**

Use the **PEG0 – Gen X** option to select the support type of the PCI Express (PEG) controller. The following options are available:

- Auto **Default**
- Gen1
- Gen2
- Gen3

➔ **Enable PEG [Enabled]**

Use the **Enable PEG** option to enable or disable the PCI Express (PEG) controller.

➔ **Disabled** Disables the PCI Express (PEG) controller.

➔ **Enabled** DEFAULT Enables the PCI Express (PEG) controller.

➔ **Auto** The PCI Express (PEG) controller is disabled if no PCI Express devices are connected.

➔   **Detect Non-Compliance Device [Enabled]**

Use the **Detect Non-Compliance Device** option to enable or disable detecting if a non-compliance PCI Express device is connected to the PCI Express port.

➔   **Disabled**   Disables to detect if a non-compliance PCI Express device is connected to the PCI Express port.

➔   **Enabled**   DEFAULT   Enables to detect if a non-compliance PCI Express device is connected to the PCI Express port.

5.4.2.3 Memory Configuration

Use the **Memory Configuration** submenu (**BIOS Menu 27**) to view memory information.

```
        Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
                    Chipset

Memory Information

Total Memory                    4096 MB (DDR3)
CHA_DIMM1                       4096 MB (DDR3)
CHA_DIMM2                       Not Present
CHB_DIMM1                       Not Present
CHB_DIMM2                       Not Present             --------------------
                                                       ➔←: Select Screen
                                                       ↑ ↓: Select Item
                                                       Enter: Select
                                                       +/-:  Change Opt.
                                                       F1:   General Help
                                                       F2:   Previous Values
                                                       F3:   Optimized Defaults
                                                       F4:   Save & Exit
                                                       ESC: Exit
         Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 27: Memory Configuration

5.5 Boot

Use the **Boot** menu (**BIOS Menu 28**) to configure system boot options.

```
          Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
   Main    Advanced   Chipset     Boot     Security  Save & Exit

 Boot Configuration                                      Select the keyboard
 Bootup NumLock State              [On]                  NumLock state
 Quiet Boot                        [Enabled]
 Fast Boot                         [Disabled]
 Option ROM Messages               [Force BIOS]          --------------------
 Launch PXE OpROM                  [Disabled]
 UEFI Boot                         [Disabled]            →←: Select Screen
                                                         ↑ ↓: Select Item
 Boot Option Priorities                                  Enter: Select
                                                         +/-:  Change Opt.
                                                         F1:  General Help
                                                         F2:  Previous Values
                                                         F3:  Optimized Defaults
                                                         F4:  Save & Exit
                                                         ESC: Exit
          Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 28: Boot

➔ **Bootup NumLock State [On]**

Use the **Bootup NumLock State** BIOS option to specify if the number lock setting must be modified during boot up.

➔ **On** **DEFAULT** Allows the Number Lock on the keyboard to be enabled automatically when the computer system boots up. This allows the immediate use of the 10-key numeric keypad located on the right side of the keyboard. To confirm this, the Number Lock LED light on the keyboard is lit.

➔ **Off** Does not enable the keyboard Number Lock automatically. To use the 10-keys on the keyboard, press the Number Lock key located on the upper left-hand corner of the 10-key pad. The Number Lock LED on the keyboard lights up when the Number Lock is engaged.

➔ **Quiet Boot [Enabled]**

Use the **Quiet Boot** BIOS option to select the screen display when the system boots.

➔ **Disabled** Normal POST messages displayed

➔ **Enabled** DEFAULT OEM Logo displayed instead of POST messages

➔ **Fast Boot [Disabled]**

Use the **Fast Boot** BIOS option to enable or disable the fast boot function.

➔ **Disabled** DEFAULT Disables the fast boot function

➔ **Enabled** Enables to boot the system with initialization of a minimal set of devices required to launch boot option.

The following options will appear allowing the user to configure the boot options for specific devices:

　　SATA Support

　　VGA Support

　　USB Support

　　PS2 Devices Support

　　Network Stack Driver Support

➔ **Option ROM Messages [Force BIOS]**

Use the **Option ROM Messages** option to set the Option ROM display mode.

➔ **Force BIOS** DEFAULT Sets display mode to force BIOS.

➔ **Keep Current** Sets display mode to current.

➔ **Launch PXE OpROM [Disabled]**

Use the **Launch PXE OpROM** option to enable or disable boot option for legacy network devices.

➔ **Disabled**   D<small>EFAULT</small>   Ignore all PXE Option ROMs

➔ **Enabled**   Load PXE Option ROMs.

➔ **UEFI Boot [Disabled]**

Use the **UEFI Boot** option to enable or disable to boot from the UEFI devices.

➔ **Enabled**   Boot from UEFI devices is enabled.

➔ **Disabled**   D<small>EFAULT</small>   Boot from UEFI devices is disabled.

5.6 Security

Use the **Security** menu (**BIOS Menu 29**) to set system and user passwords.

```
          Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
   Main      Advanced   Chipset      Boot    Security  Save & Exit

 Password Description                                    Set Administrator
                                                         Password
 If ONLY the Administrator's password is set,
 then this only limits access to Setup and is
 only asked for when entering Setup.
 If ONLY the User's password is set, then this          --------------------
 is a power on password and must be entered to
 boot or enter Setup. In Setup the User will            →←: Select Screen
 have Administrator rights.                             ↑ ↓: Select Item
 The password length must be:                           Enter: Select
 Minimum length                     3                   +/-:  Change Opt.
 Maximum length                     20                  F1:   General Help
                                                        F2:   Previous Values
                                                        F3:   Optimized Defaults
 Administrator Password                                 F4:   Save & Exit
 User Password                                          ESC:  Exit

        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 29: Security

➔ **Administrator Password**

Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

Use the **User Password** to set or change a user password.

5.7 Save & Exit

Use the **Safe & Exit** menu (**BIOS Menu 30**) to load default BIOS values, optimal failsafe values and to save configuration changes.

```
        Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
   Main    Advanced   Chipset    Boot     Security  Save & Exit

   Save Changes and Reset                            Exit the system after
   Discard Changes and Reset                         saving the changes.

   Restore Defaults
   Save as User Defaults
   Restore User Defaults

                                                    --------------------
                                                    →←: Select Screen
                                                    ↑ ↓: Select Item
                                                    Enter: Select
                                                    +/-:  Change Opt.
                                                    F1:   General Help
                                                    F2:   Previous Values
                                                    F3:   Optimized Defaults
                                                    F4:   Save & Exit
                                                    ESC: Exit
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 30: Save & Exit

➔ **Save Changes and Reset**

Use the **Save Changes and Reset** option to save the changes made to the BIOS options and reset the system.

➔ **Discard Changes and Reset**

Use the **Discard Changes and Reset** option to exit the system without saving the changes made to the BIOS configuration setup program.

➔ **Restore Defaults**

Use the **Restore Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F3 key can be used for this operation.**

➔ **Save as User Defaults**

Use the **Save as User Defaults** option to save the changes done so far as user defaults.

➔ **Restore User Defaults**

Use the **Restore User Defaults** option to restore the user defaults to all the setup options.

Chapter

6

Software Drivers

6.1 Available Software Drivers

> **NOTE:**
>
> The content of the CD may vary throughout the life cycle of the product and is subject to change without prior notice. Visit the IEI website or contact technical support for the latest updates.

The following drivers can be installed on the system:

- Chipset
- VGA
- LAN
- USB 3.0
- Audio
- Intel® AMT

Installation instructions are given below.

6.2 Software Installation

All the drivers for the PCIE-Q870-i2 are on the CD that came with the system. To install the drivers, please follow the steps below.

Step 1: Insert the CD into a CD drive connected to the system.

> **NOTE:**
>
> If the installation program doesn't start automatically:
> Click "Start->My Computer->CD Drive->autorun.exe"

Step 2: The driver main menu appears (**Figure 6-1**).

Figure 6-1: Introduction Screen

Step 3:   Click PCIE-Q870.

Step 4:   A new screen with a list of available drivers appears (**Figure 6-2**).
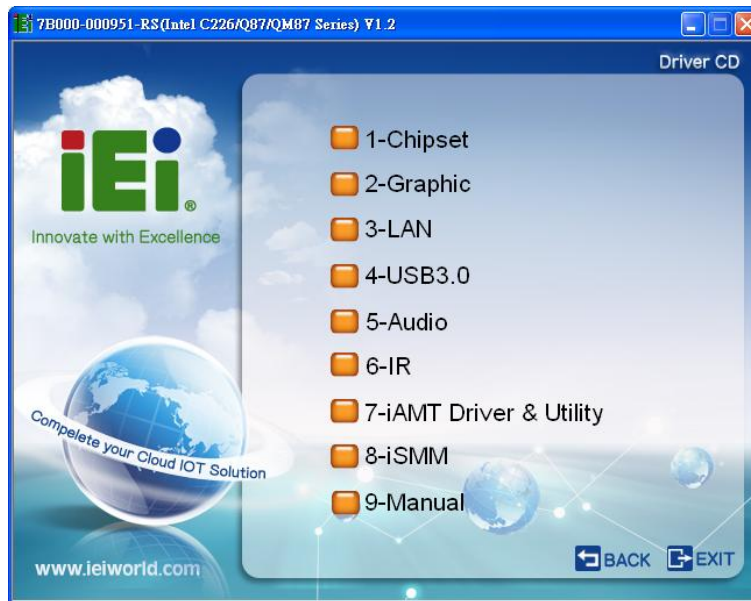
Figure 6-2: Available Drivers

Step 5:   Install all of the necessary drivers in this menu.

6.3 Chipset Driver Installation

To install the chipset driver, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**1-Chipset**".

Step 3: Locate the setup file and double click on it.

Step 4: When the setup files are completely extracted, the **Welcome Screen** in **Figure 6-3** appears.

Step 5: Click **Next** to continue.

Figure 6-3: Chipset Driver Welcome Screen

Step 6: The license agreement in **Figure 6-4** appears.

Step 7: Read the **License Agreement**.

Step 8: Click **Yes** to continue.

Figure 6-4: Chipset Driver License Agreement

Step 9: The **Read Me** file in **Figure 6-5** appears.

Step 10: Click **Next** to continue.
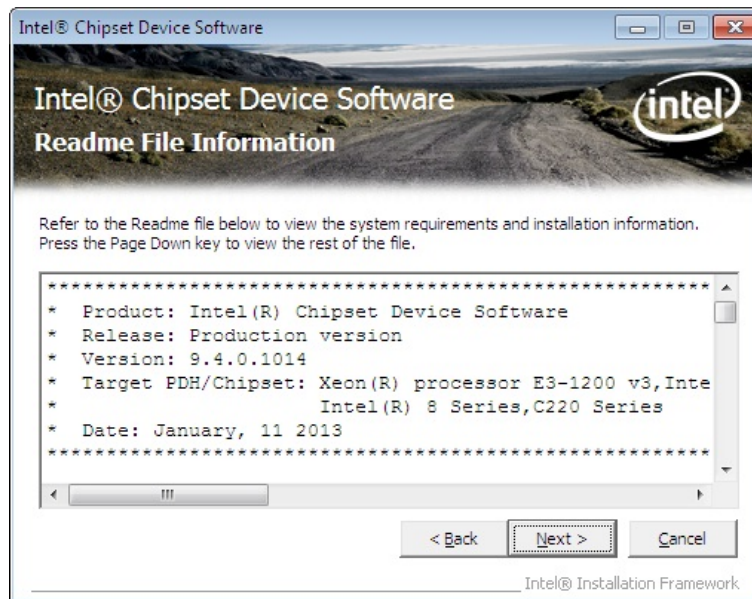
Figure 6-5: Chipset Driver Read Me File

Step 11: **Setup Operations** are performed as shown in **Figure 6-6**.

Step 12: Once the **Setup Operations** are complete, click **Next** to continue.
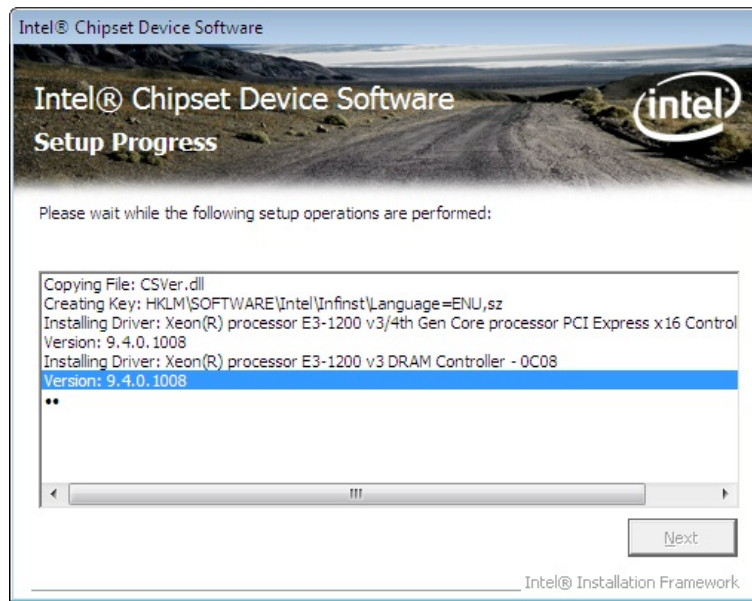
Figure 6-6: Chipset Driver Setup Operations

Step 13: The **Finish** screen in **Figure 6-7** appears.

Step 14: Select "**Yes, I want to restart this computer now**" and click **Finish**.

Figure 6-7: Chipset Driver Installation Finish Screen

6.4 Graphics Driver Installation

To install the Graphics driver, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**2-Graphic**" and select the folder which corresponds to the operating system.

Step 3: Locate the setup file and double click on it.

Step 4: The **Welcome Screen** in **Figure 6-8** appears.

Step 5: Click **Next** to continue.

Figure 6-8: Graphics Driver Welcome Screen

Step 6: The **License Agreement** in **Figure 6-9** appears.

Step 7: Click **Yes** to accept the agreement and continue.

Figure 6-9: Graphics Driver License Agreement

Step 8: The **Read Me** file in **Figure 6-10** appears. Click **Next** to continue.
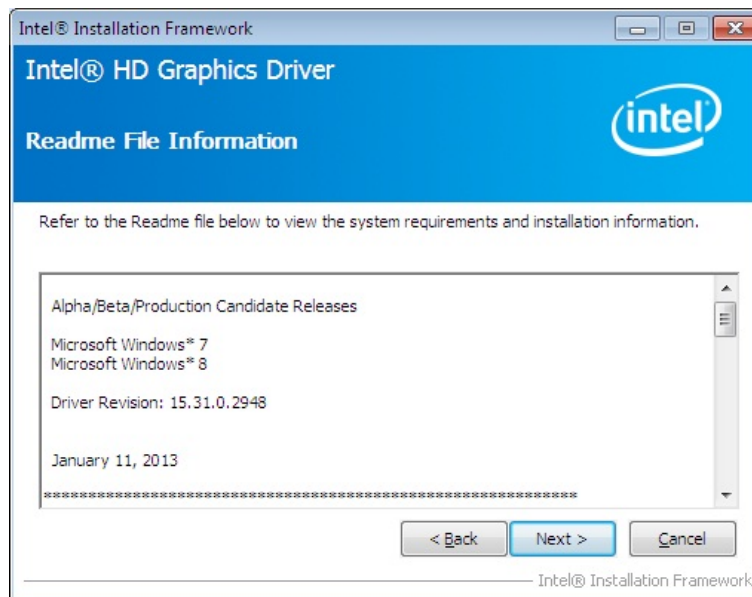
Figure 6-10: Graphics Driver Read Me File

Step 9: **Setup Operations** are performed as shown in **Figure 6-11**.

Step 10: Once the **Setup Operations** are complete, click **Next** to continue.
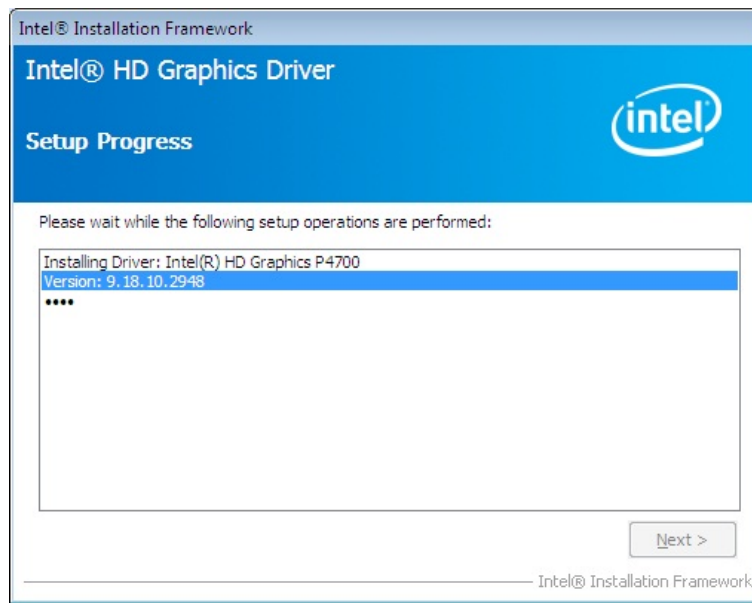
Figure 6-11: Graphics Driver Setup Operations

Step 11: The **Finish** screen in **Figure 6-12** appears.

Step 12: Select "**Yes, I want to restart this computer now**" and click **Finish**.
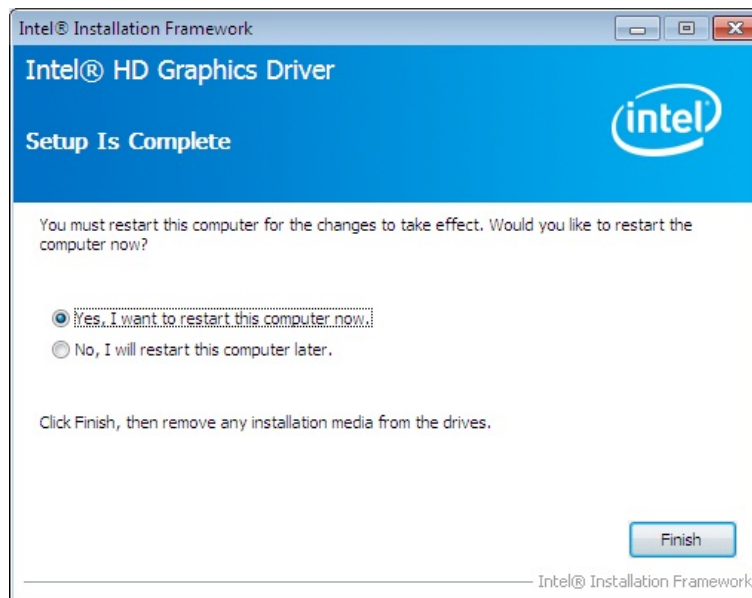
Figure 6-12: Graphics Driver Installation Finish Screen

6.5 LAN Driver Installation

To install the LAN driver, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**3-LAN**".

Step 3: Select the folder with the driver of correspondent LAN controller.

Step 4: Locate the Autorun file and double click on it.

Step 5: The Intel® Network Connection menu in **Figure 6-13** appears.

Step 6: Click **Install Drivers and Software**.
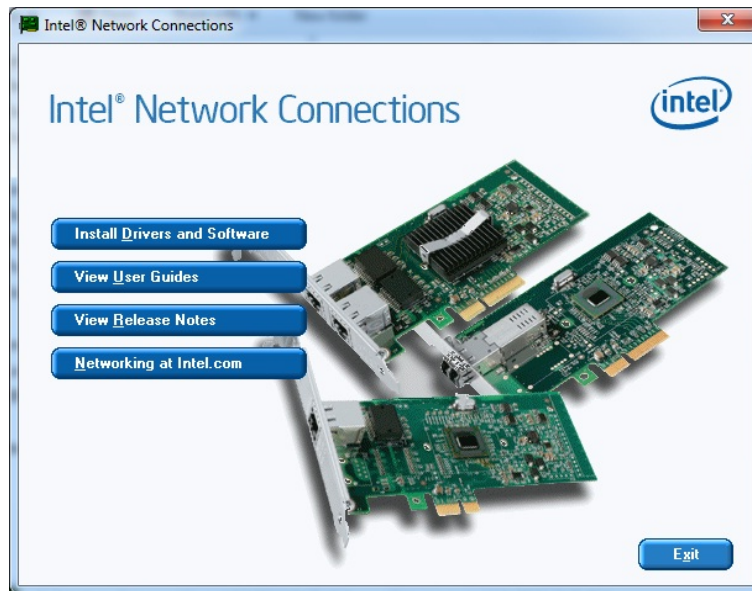
Figure 6-13: Intel® Network Connection Menu

Step 7: The **Welcome** screen in **Figure 6-14** appears.
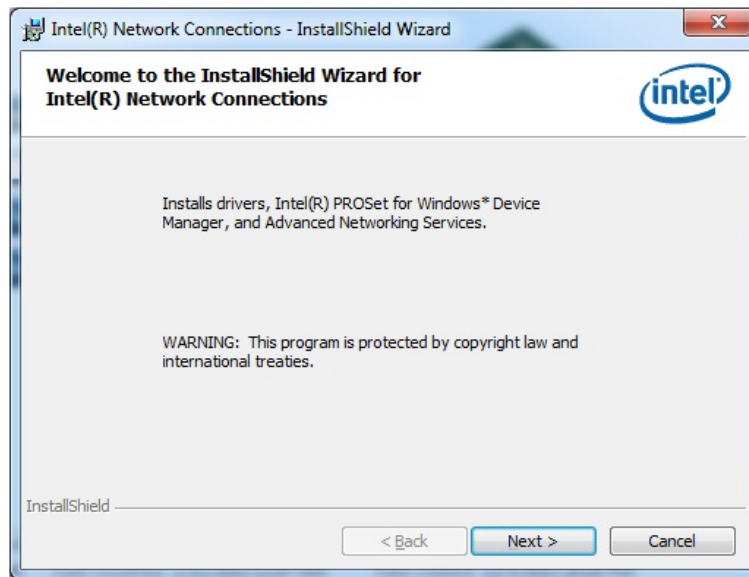
Figure 6-14: LAN Driver Welcome Screen

Step 8: Click **Next** to continue.

Step 9: The **License Agreement** in **Figure 6-15** appears.

Step 10: Accept the agreement by selecting "**I accept the terms in the license agreement**".

Step 11: Click **Next** to continue.

Figure 6-15: LAN Driver License Agreement

Step 12: The **Setup Options** screen in **Figure 6-16** appears.

Step 13: Select program features to install.

Step 14: Click **Next** to continue.
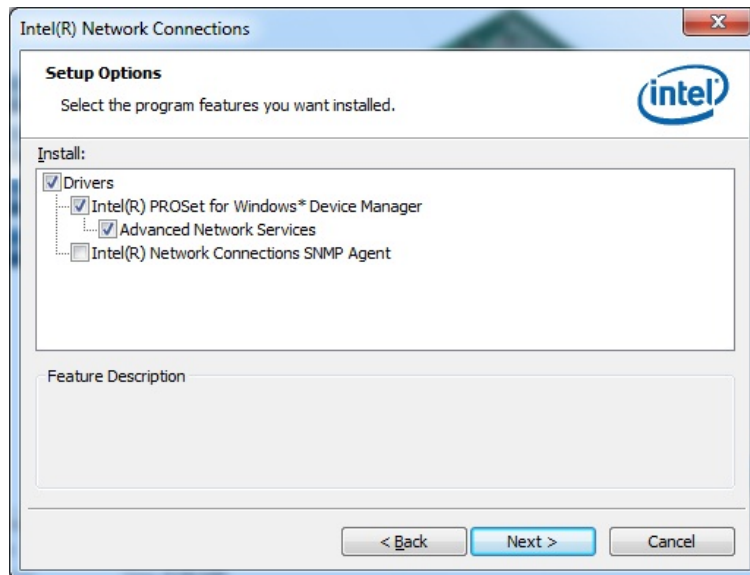
Figure 6-16: LAN Driver Setup Options

Step 15: The **Ready to Install the Program** screen in **Figure 6-17** appears.

Step 16: Click **Install** to proceed with the installation.
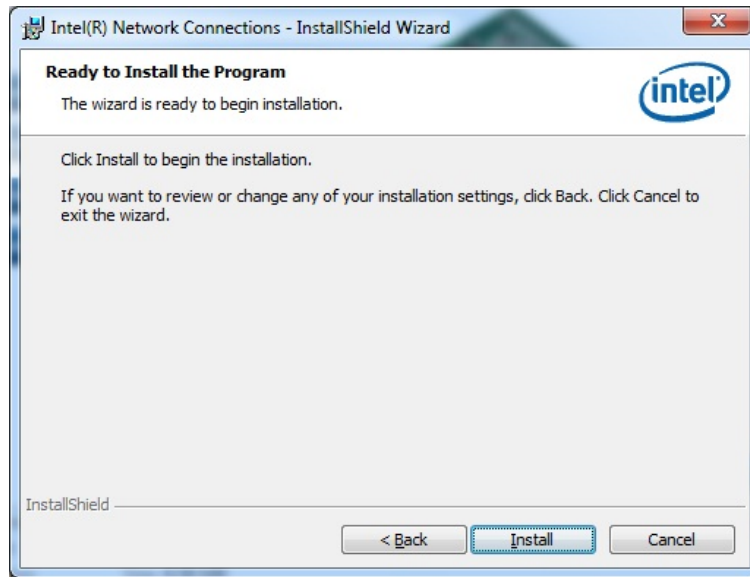
Figure 6-17: LAN Driver Installation

Step 17: The program begins to install.

Step 18: When the driver installation is complete, the screen in **Figure 6-18** appears.

Step 19: Click **Finish** to exit.
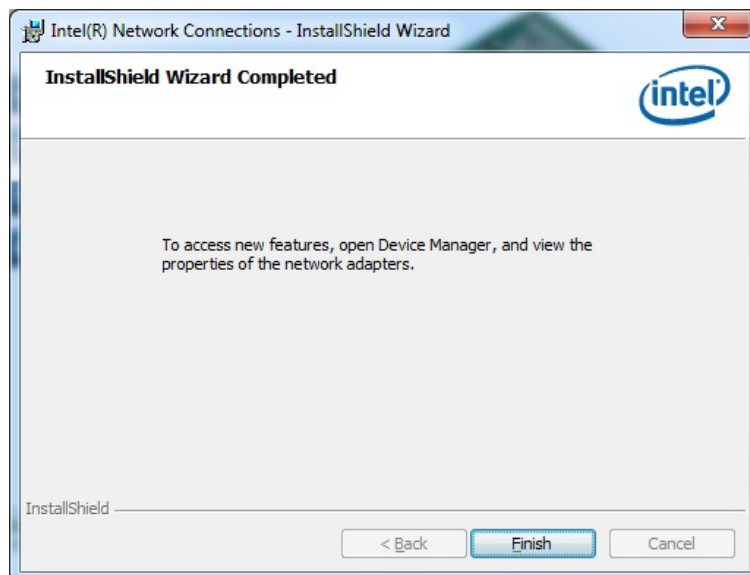
Figure 6-18: LAN Driver Installation Complete

6.6 USB 3.0 Driver Installation

> **WARNING:**
>
> Do not run this driver's installer (Setup.exe) from a USB storage device (ie. external USB hard drive or USB thumb drive). For proper installation, please copy driver files to a local hard drive folder and run from there.

To install the USB 3.0 driver, please follow the steps below.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**4-USB3.0**".

Step 3: Locate the setup file and double click on it.

Step 4: A **Welcome Screen** appears (**Figure 6-19**).

Step 5: Click **Next** to continue.

Figure 6-19: USB 3.0 Driver Welcome Screen

Step 6: The license agreement in **Figure 6-20** appears.

Step 7: Read the **License Agreement**.

Step 8: Click **Yes** to continue.

Figure 6-20: USB 3.0 Driver License Agreement

Step 9: The **Read Me** file in **Figure 6-21** appears.

Step 10: Click **Next** to continue.

Figure 6-21: USB 3.0 Driver Read Me File

Step 11: **Setup Operations** are performed as shown in **Figure 6-22**.

Step 12: Once the **Setup Operations** are complete, click **Next** to continue.
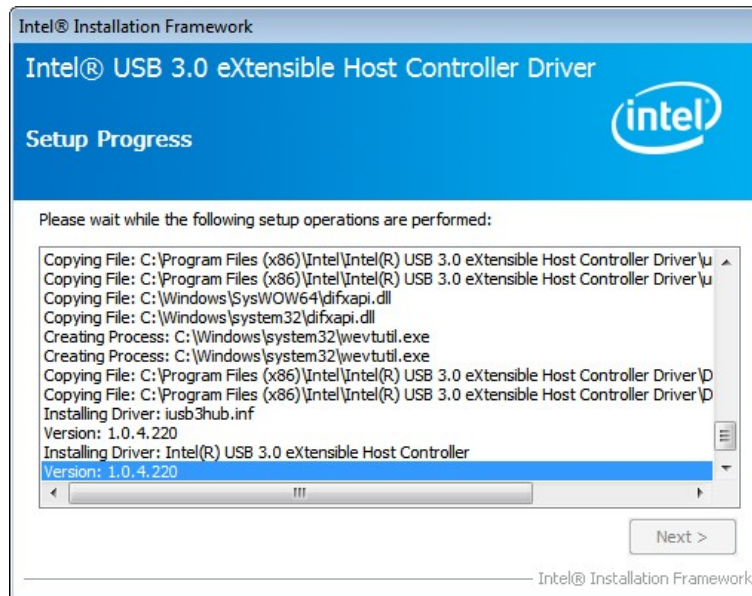
 Figure 6-22: USB 3.0 Driver Setup Operations

Step 13: The **Finish** screen in **Figure 6-23** appears.

Step 14: Select "**Yes, I want to restart this computer now**" and click **Finish**.

Figure 6-23: USB 3.0 Driver Installation Finish Screen

6.7 Audio Driver Installation

To install the audio driver, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**5-Audio**" and select the folder which corresponds to the operating system.

Step 3: Double click the setup file.

Step 4: The **InstallShield Wizard** is prepared to guide the user through the rest of the process.

Step 5: Once initialized, the **InstallShield Wizard** welcome screen appears (**Figure 6-24**).
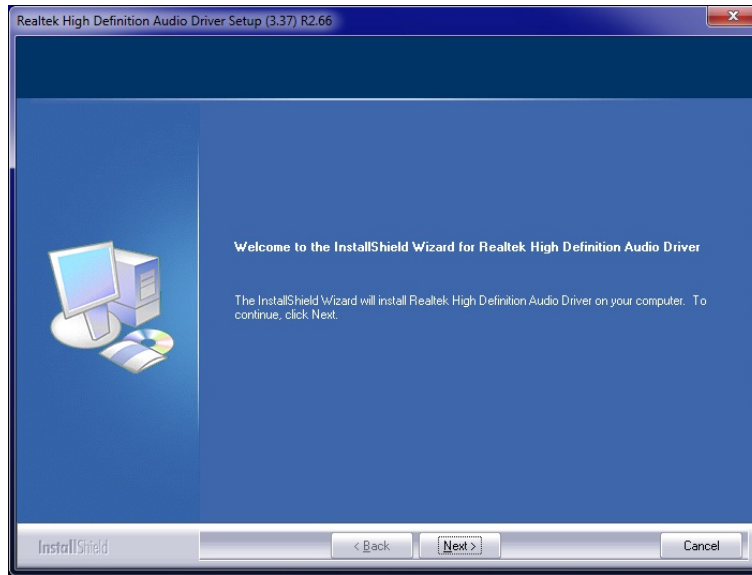
Figure 6-24: InstallShield Wizard Welcome Screen

Step 6: Click **Next** to continue the installation.

Step 7: InstallShield starts to install the new software as shown in **Figure 6-25**.
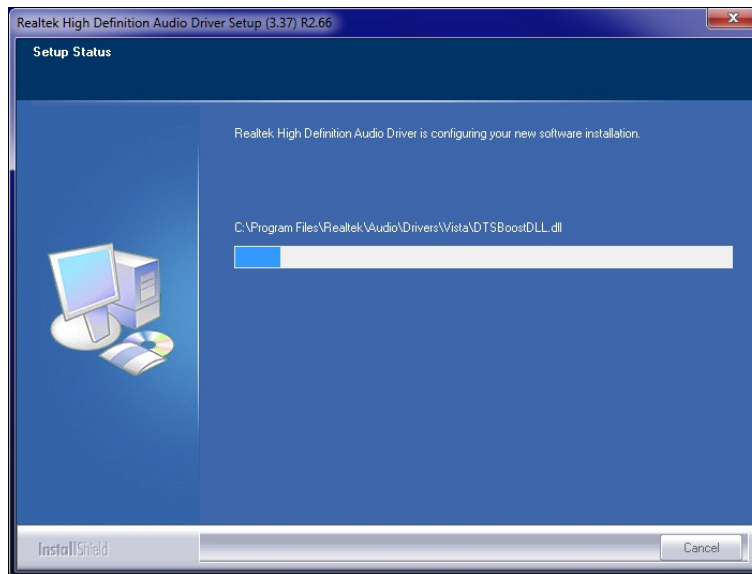
Figure 6-25: Audio Driver Software Configuration

Step 8: After the driver installation process is complete, a confirmation screen appears

(**Figure 6-26**).
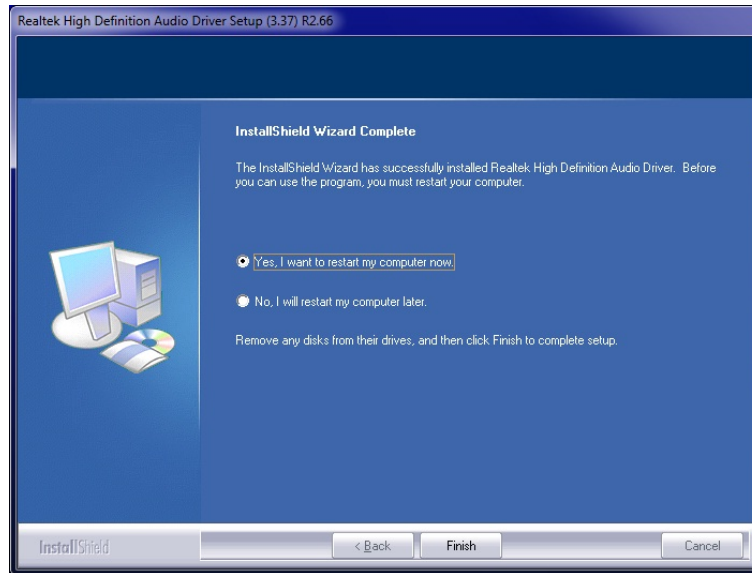
Figure 6-26: Restart the Computer

Step 9: The confirmation screen offers the option of restarting the computer now or later. For the settings to take effect, the computer must be restarted. Click **Finish** to restart the computer.

6.8 Intel® AMT Driver Installation

The package of the Intel® ME components includes

- Intel® Management Engine Interface (Intel® ME Interface)
- Intel® Dynamic Application Loader
- Intel® Identity Protection Technology (Intel® IPT)
- Serial Over LAN (SOL) driver
- Intel® Management and Security Status Application
- Local Manageability Service (LMS)

To install these Intel® ME components, please do the following.

Step 1: Access the driver list. (See **Section 6.2**)

Step 2: Click "**7-iAMT Driver & Utility**".

Step 3: Double click the setup file in the **ME_SW** folder.

Step 4: When the setup files are completely extracted the **Welcome Screen** in

Figure 6-27 appears.

Step 5: Click **Next** to continue.
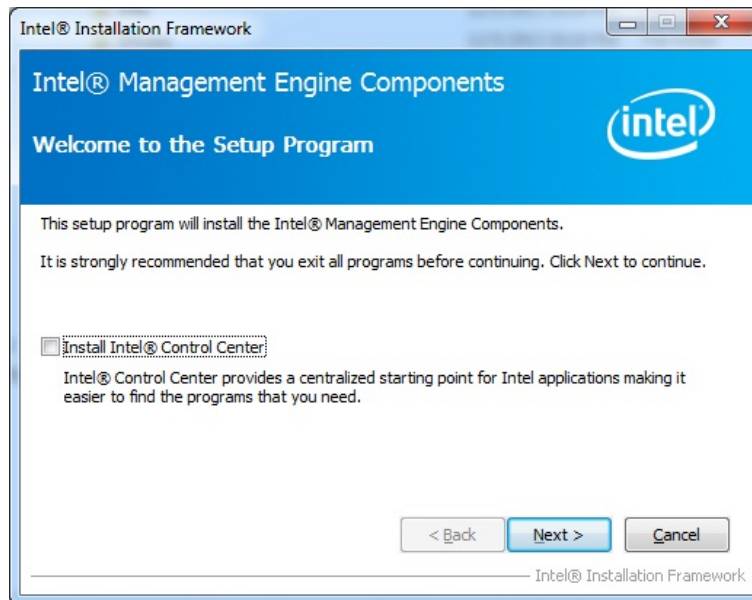
Figure 6-27: Intel® ME Driver Welcome Screen

Step 6: The license agreement in **Figure 6-28** appears.

Step 7: Read the **License Agreement**.

Step 8: Click **Yes** to continue.

Figure 6-28: Intel® ME Driver License Agreement

Step 9: **Setup Operations** are performed as shown in **Figure 6-29**.

Step 10: Once the **Setup Operations** are complete, click **Next** to continue.
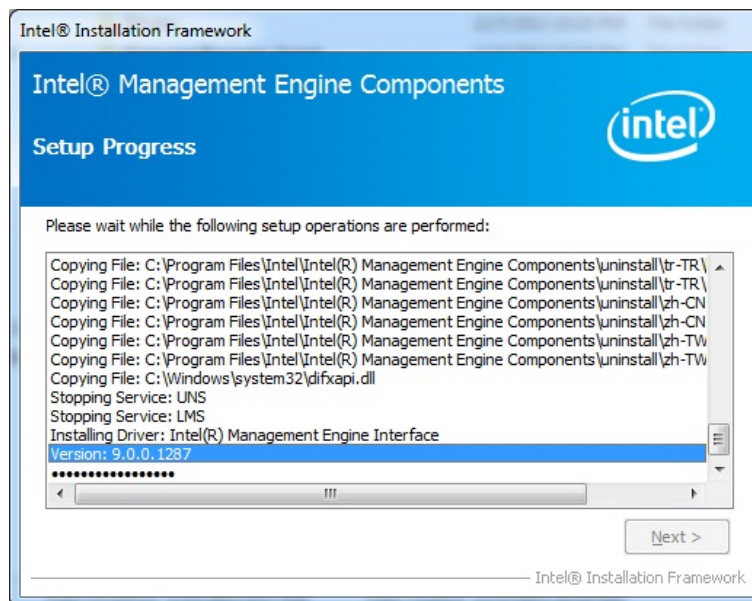
Figure 6-29: Intel® ME Driver Setup Operations

Step 11: The **Finish** screen in **Figure 6-30** appears.

Step 12: Select "**Yes, I want to restart this computer now**" and click **Finish**.
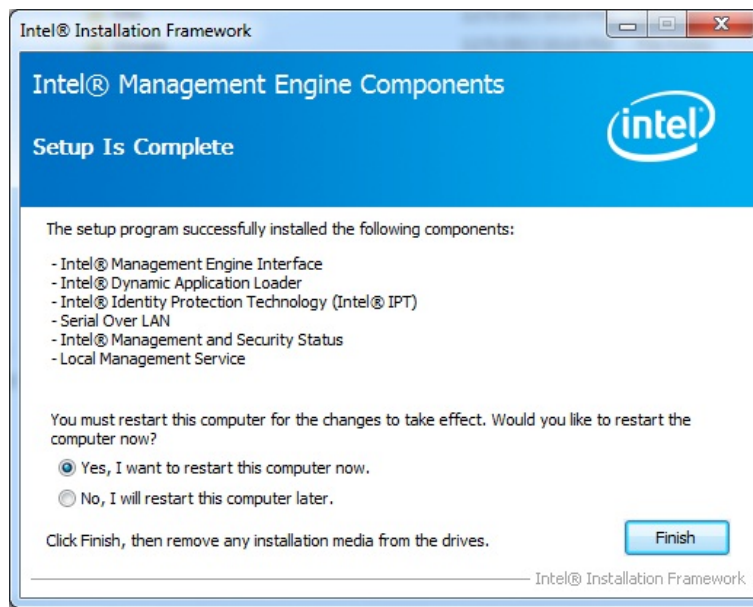
Figure 6-30: Intel® ME Driver Installation Finish Screen

Appendix

A

BIOS Options

Below is a list of BIOS configuration options in the BIOS chapter.

Appendix

B

One Key Recovery

B.1 One Key Recovery Introduction

The IEI one key recovery is an easy-to-use front end for the Norton Ghost system backup and recovery tool. This tool provides quick and easy shortcuts for creating a backup and reverting to that backup or reverting to the factory default settings.

![NOTE icon] **NOTE:**

> The latest One Key Recovery software provides an auto recovery function that allows a system running Microsoft Windows OS to automatically restore from the factory default image after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. Please refer to Section B.3 for the detailed setup procedure.

The IEI One Key Recovery tool menu is shown below.
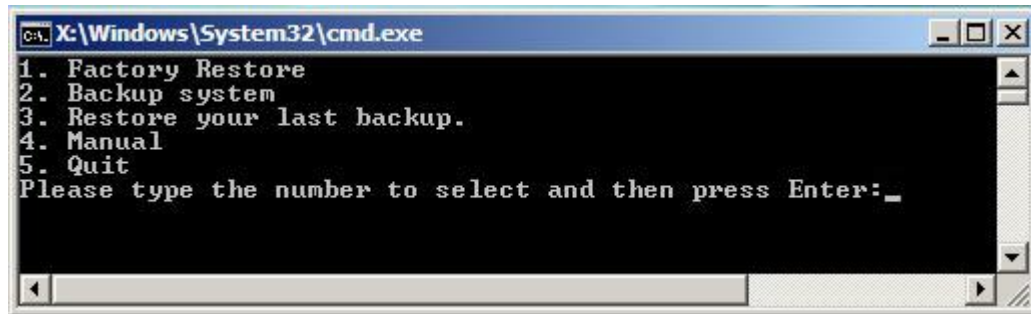
Figure B-1: IEI One Key Recovery Tool Menu

Prior to using the IEI One Key Recovery tool (as shown in **Figure B-1**) to backup or restore Windows system, five setup procedures are required.

1. Hardware and BIOS setup (see Section B.2.1)
2. Create partitions (see **Section B.2.2**)
3. Install operating system, drivers and system applications (see **Section B.2.3**)
4. Build-up recovery partition (see **Section B.2.4**)
5. Create factory default image (see **Section B.2.5**)

After completing the five initial setup procedures as described above, users can access the recovery tool by pressing <**F3**> while booting up the system. The detailed information of each function is described in **Section B.5**.

 NOTE:

The initial setup procedures for Linux system are described in **Section B.3**.

B.1.1 System Requirement

 NOTE:

The recovery CD can only be used with IEI products. The software will fail to run and a warning message will appear when used on non-IEI hardware.
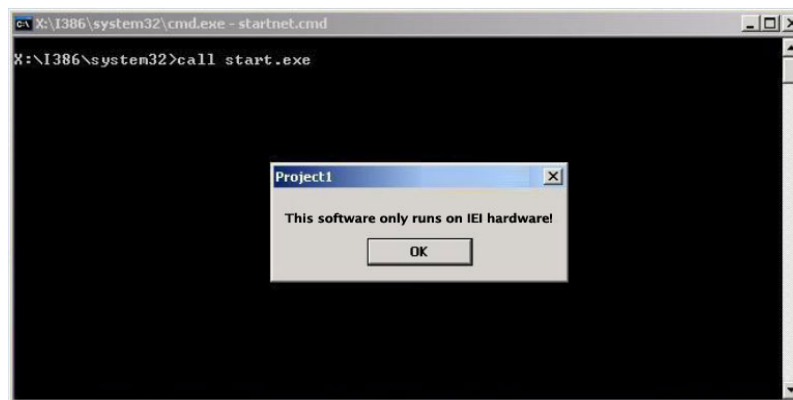
To create the system backup, the main storage device must be split into two partitions (three partitions for Linux). The first partition will be for the operating system, while the second partition will be invisible to the operating system and contain the backup made by the one key recovery software.

The partition created for recovery images must be big enough to contain both the factory default image and the user backup image. The size must be calculated before creating the

partitions. Please take the following table as a reference when calculating the size of the partition.

	OS	OS Image after Ghost	Compression Ratio
Windows® 7	7 GB	5 GB	70%
Windows® XPE	776 MB	560 MB	70%
Windows® CE 6.0	36 MB	28 MB	77%

 NOTE:

Specialized tools are required to change the partition size if the operating system is already installed.

B.1.2 Supported Operating System

The recovery CD is compatible with both Microsoft Windows and Linux operating system (OS). The supported OS versions are listed below.

- Microsoft Windows
  - Windows 2000
  - Windows XP (Service Pack 2 or 3 required)
  - Windows Vista
  - Windows 7
  - Windows CE 5.0
  - Windows CE 6.0
  - Windows XP Embedded
  - Windows Embedded Standard 7

 NOTE:

The auto recovery function (described in Section B.3) and the restore through LAN function (described in Section B.6) are not supported in the Windows CE 5.0/6.0 operating system environment.

▪ Linux

o Fedora Core 12 (Constantine)

o Fedora Core 11 (Leonidas)

o Fedora Core 10 (Cambridge)

o Fedora Core 8 (Werewolf)

o Fedora Core 7 (Moonshine)

o RedHat RHEL-5.4

o RedHat 9 (Ghirke)

o Ubuntu 8.10 (Intrepid)

o Ubuntu 7.10 (Gutsy)

o Ubuntu 6.10 (Edgy)

o Debian 5.0 (Lenny)

o Debian 4.0 (Etch)

o SuSe 11.2

o SuSe 10.3

NOTE:

Installing unsupported OS versions may cause the recovery tool to fail.

B.2 Setup Procedure for Windows

Prior to using the recovery tool to backup or restore, a few setup procedures are required.

Step 1: Hardware and BIOS setup (see Section **B.2.1**).

Step 2: Create partitions (see **Section B.2.2**)

Step 3: Install operating system, drivers and system applications (see **Section B.2.3**)

Step 4: Build the recovery partition (see **Section B.2.4**) or build the auto recovery

partition (see **Section B.3**)

Step 5: Create factory default image (see **Section B.2.5**)

The detailed descriptions are described in the following sections.

NOTE:

The setup procedures described below are for Microsoft Windows operating system users. For Linux, most of the setup procedures are the same except for several steps described in **Section B.3**.

B.2.1 Hardware and BIOS Setup

Step 1: Make sure the system is powered off and unplugged.

Step 2: Install a hard drive or SSD in the system. An unformatted and unpartitioned disk is recommended.

Step 3: Connect an optical disk drive to the system and insert the recovery CD.

Step 4: Turn on the system.

Step 5: Press the <**DELETE**> key as soon as the system is turned on to enter the BIOS.

Step 6: Select the connected optical disk drive as the 1st boot device. (**Boot → Boot Device Priority → 1st Boot Device**).

Step 7: Save changes and restart the computer. Continue to the next section for instructions on partitioning the internal storage.

B.2.2 Create Partitions

To create the system backup, the main storage device must be split into two partitions (three partitions for Linux). The first partition will be for the operating system, while the second partition will be invisible to the operating system and contain the backup made by the one key recovery software.

Step 1: Put the recovery CD in the optical drive of the system.

Step 2: **Boot the system from recovery CD**. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!
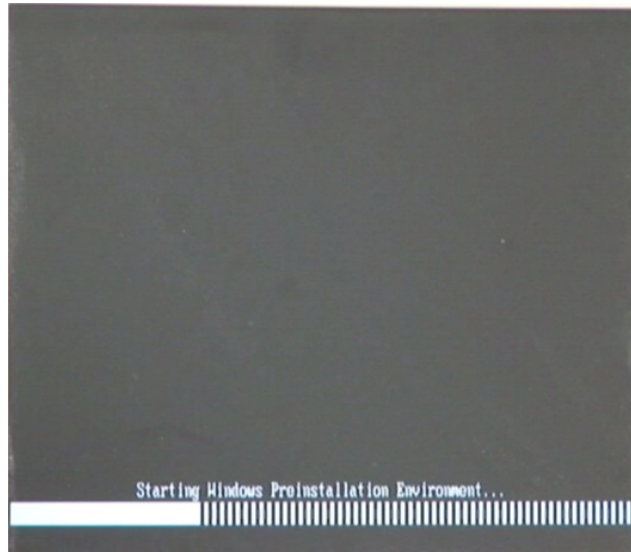
Figure B-2: Launching the Recovery Tool

Step 3: The recovery tool setup menu is shown as below.
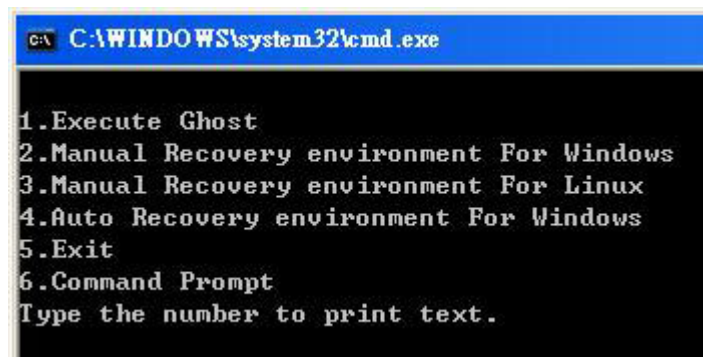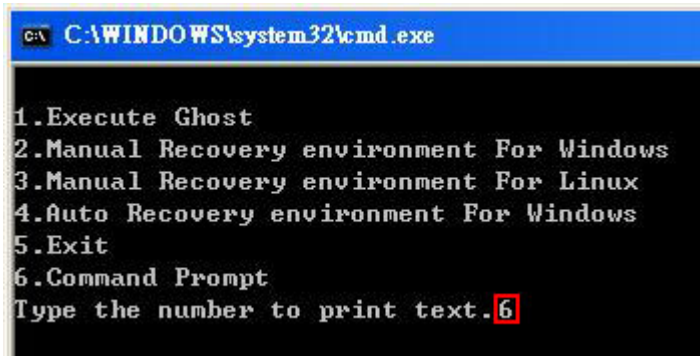
Figure B-3: Recovery Tool Setup Menu

Step 4: Press <**6**> then <Enter>.

Figure B-4: Command Mode

Step 5: The command prompt window appears. Type the following commands (marked

in red) to create two partitions. One is for the OS installation; the other is for

saving recovery files and images which will be an invisible partition.

(Press <Enter> after entering each line below)

system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>create part pri size= ___

DISKPART>assign letter=F

DISKPART>exit

system32>format N: /fs:ntfs /q /y

system32>format F: /fs:ntfs /q /v:Recovery /y

system32>exit

Figure B-5: Partition Creation Commands

![NOTE icon] **NOTE:**

Use the following commands to check if the partitions were created successfully.

```
X:\I386\SYSTEM32>diskpart

Microsoft DiskPart version 5.2.3790.1830
Copyright (C) 1999-2001 Microsoft Corporation.
On computer: MININT-JVC

DISKPART> sel disk 0

Disk 0 is now the selected disk.

DISKPART> list part

  Partition ###  Type              Size     Offset
  -------------  ----------------  -------  -------
  Partition 1    Primary           2000 MB    32 KB
  Partition 2    Primary           1804 MB  2000 MB

DISKPART> exit
```

Step 6: Press any key to exit the recovery tool and automatically reboot the system.

Please continue to the following procedure: Build the Recovery Partition.

B.2.3 Install Operating System, Drivers and Applications

Install the operating system onto the unlabelled partition. The partition labeled "Recovery" is for use by the system recovery tool and should not be used for installing the operating system or any applications.

![NOTE icon] **NOTE:**

The operating system installation program may offer to reformat the chosen partition. DO NOT format the partition again. The partition has already been formatted and is ready for installing the new operating system.

To install the operating system, insert the operating system installation CD into the optical drive. Restart the computer and follow the installation instructions.

B.2.4 Build-up Recovery Partition

Step 1: Put the recover CD in the optical drive.

Step 2: Start the system.

Step 3: **Boot the system from the recovery CD**. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!
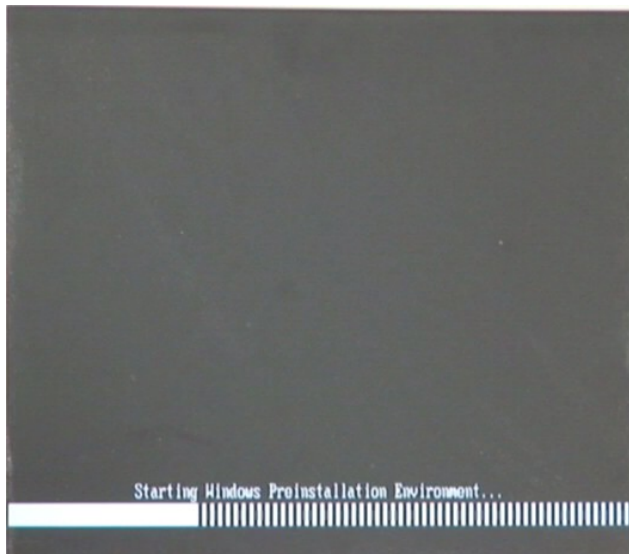
Figure B-6: Launching the Recovery Tool

Step 4: When the recovery tool setup menu appears, press <**2**> then <Enter>.
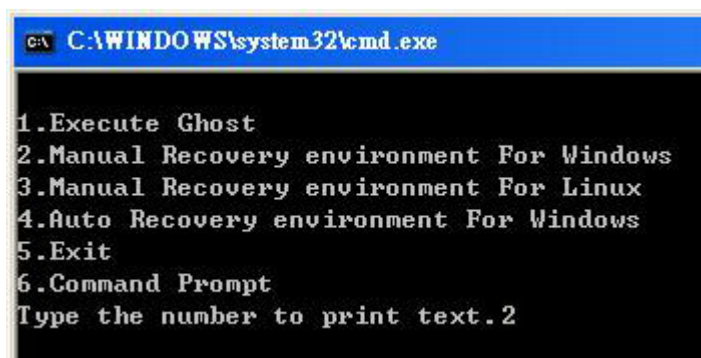
Figure B-7: Manual Recovery Environment for Windows

Step 5: The Symantec Ghost window appears and starts configuring the system to build a recovery partition. In this process the partition created for recovery files in **Section B.2.2** is hidden and the recovery tool is saved in this partition.
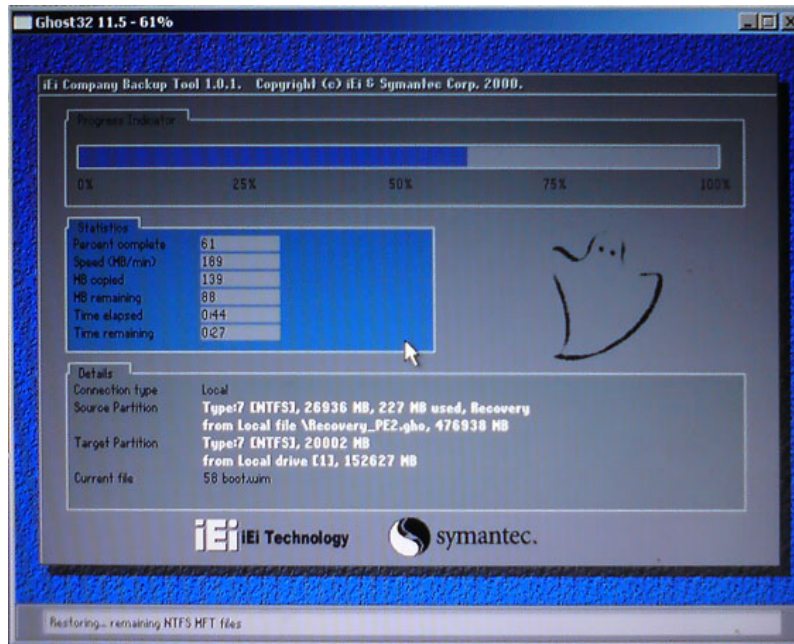
Figure B-8: Building the Recovery Partition

Step 6: After completing the system configuration, press any key in the following window to reboot the system.
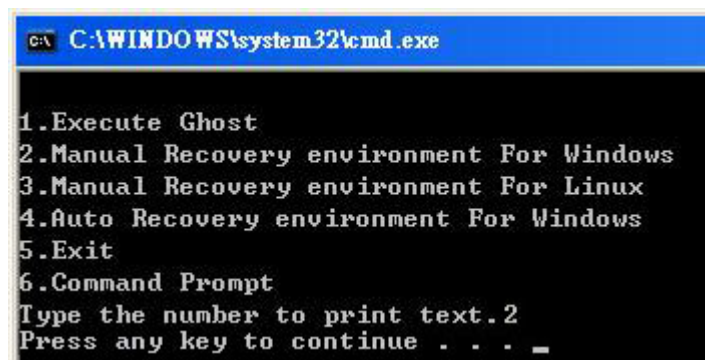
Figure B-9: Press Any Key to Continue

Step 7: Eject the recovery CD.
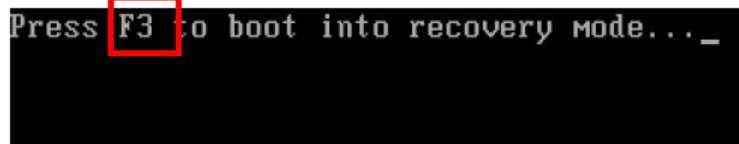
B.2.5 Create Factory Default Image

> **NOTE:**
>
> Before creating the factory default image, please configure the system to a factory default environment, including driver and application installations.

To create a factory default image, please follow the steps below.

Step 1: Turn on the system. When the following screen displays (**Figure B-10**), press the <**F3**> key to access the recovery tool. The message will display for 10 seconds, please press F3 before the system boots into the operating system.

Figure B-10: Press F3 to Boot into Recovery Mode

Step 2: The recovery tool menu appears. Type <**4**> and press <**Enter**>. (**Figure B-11**)
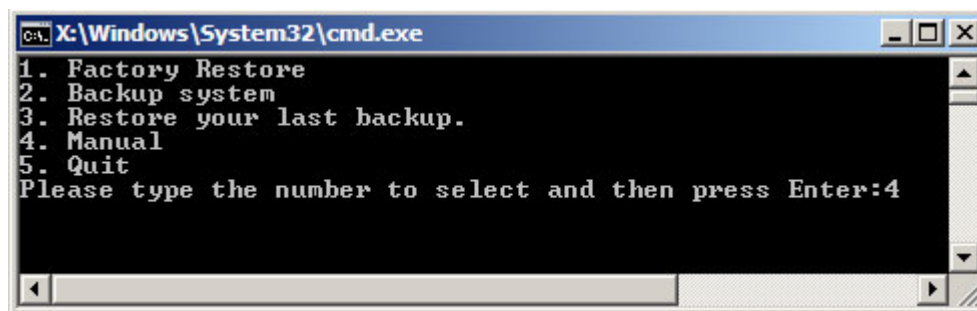
Figure B-11: Recovery Tool Menu

Step 3: The About Symantec Ghost window appears. Click **OK** button to continue.
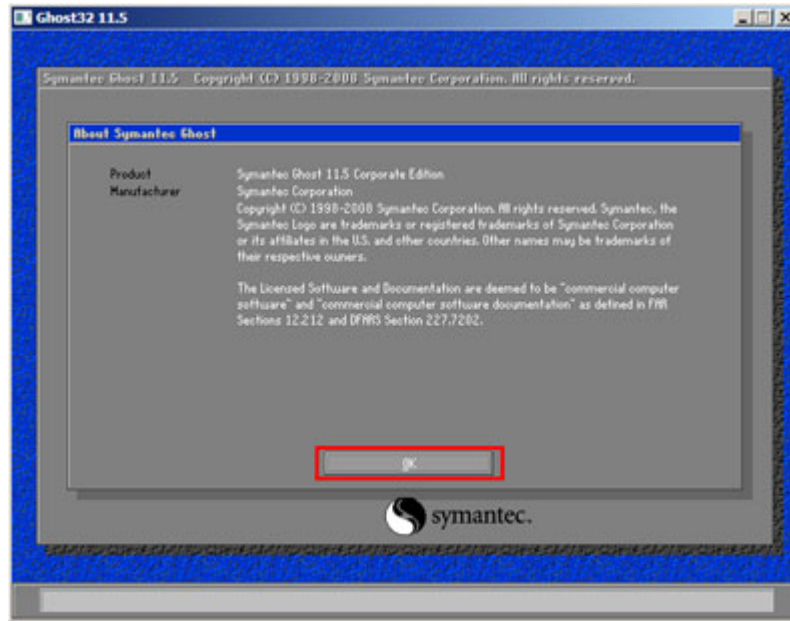
Figure B-12: About Symantec Ghost Window

Step 4: Use mouse to navigate to the option shown below (**Figure B-13**).
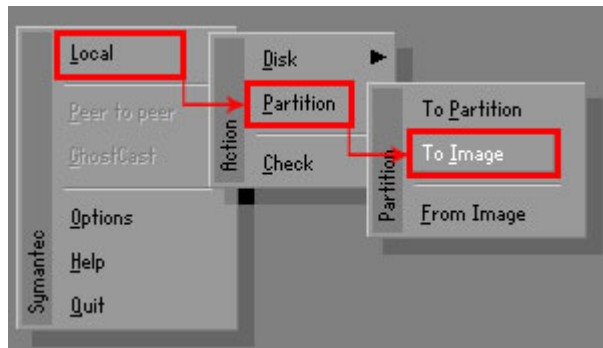
Figure B-13: Symantec Ghost Path

Step 5: Select the local source drive (Drive 1) as shown in **Figure B-14**. Then click OK.
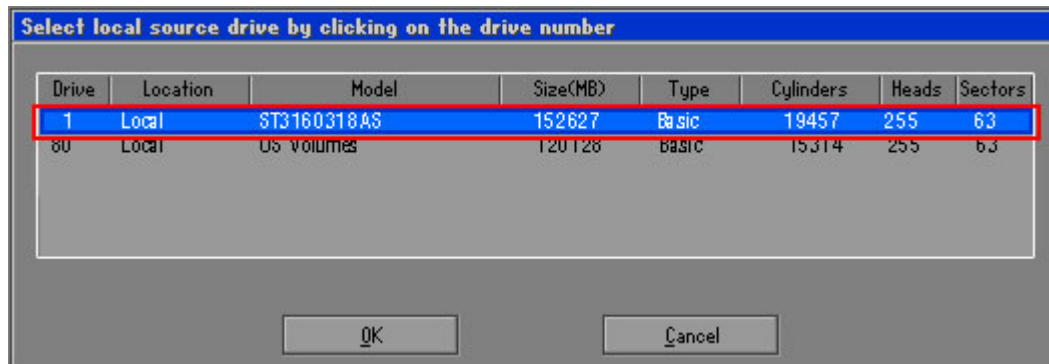
Figure B-14: Select a Local Source Drive

Step 6: Select a source partition (Part 1) from basic drive as shown in **Figure B-15**.

Then click OK.
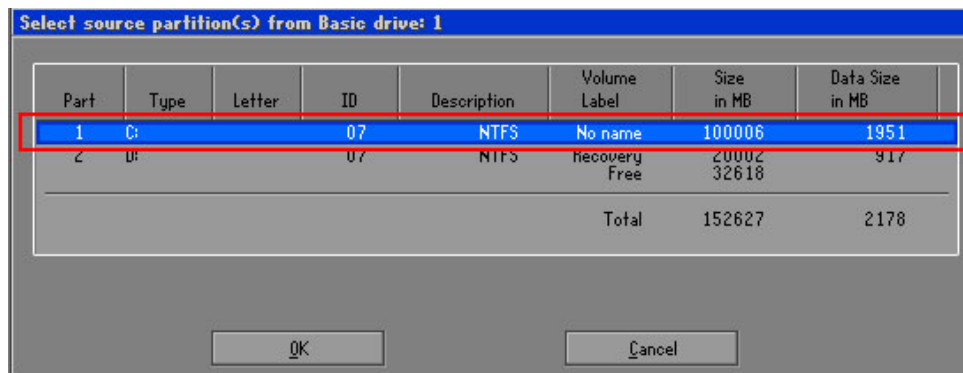
Figure B-15: Select a Source Partition from Basic Drive

Step 7: Select **1.2: [Recovery] NTFS drive** and enter a file name called **iei**

(**Figure B-16**). Click **Save**. The factory default image will then be saved in the

selected recovery drive and named IEI.GHO.

WARNING:

The file name of the factory default image must be **iei.GHO**.
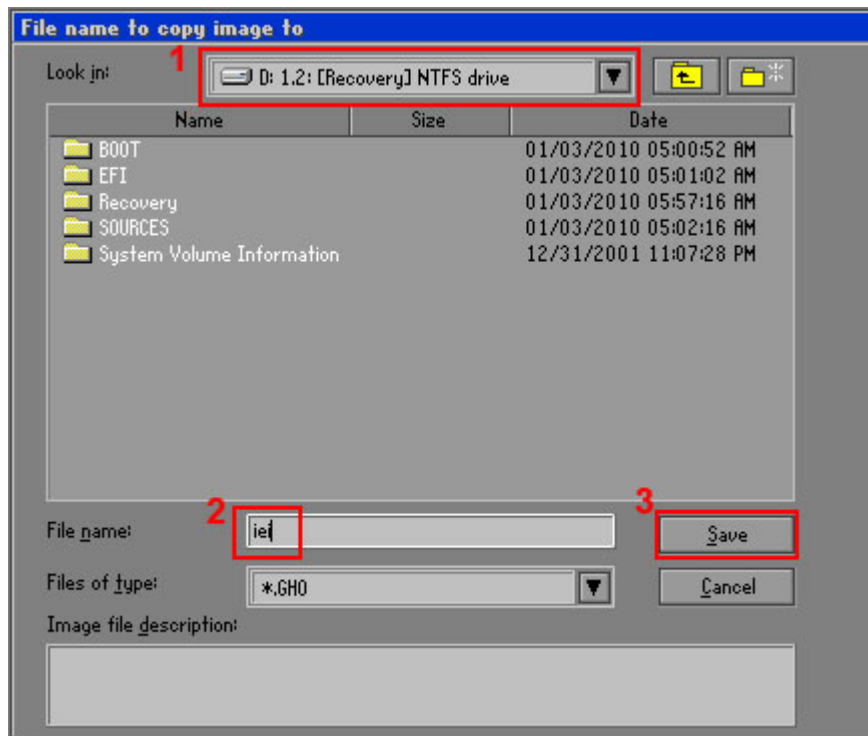
Figure B-16: File Name to Copy Image to

Step 8: When the Compress Image screen in **Figure B-17** prompts, click **High** to make

the image file smaller.
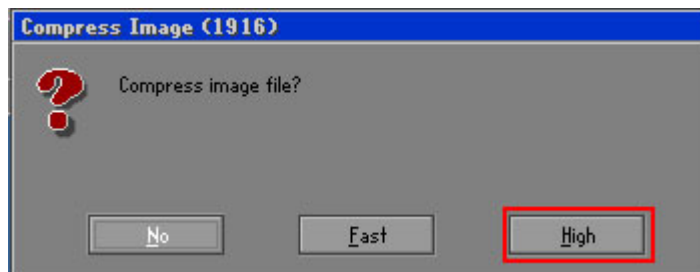
Figure B-17: Compress Image

Step 9: The Proceed with partition image creation window appears, click **Yes** to

continue.
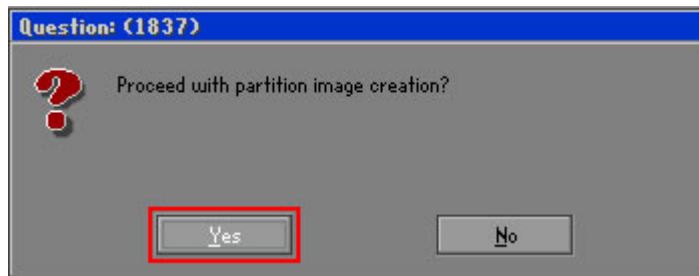
Figure B-18: Image Creation Confirmation

Step 10: The Symantec Ghost starts to create the factory default image (**Figure B-19**).
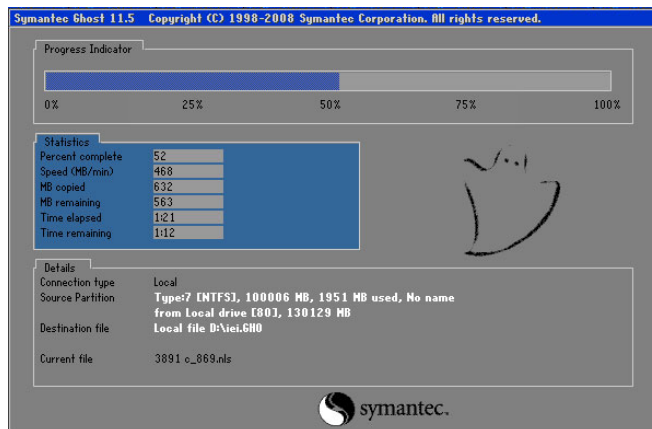
Figure B-19: Image Creation Complete

Step 11: When the image creation completes, a screen prompts as shown in **Figure B-20**.

Click **Continue** and close the Ghost window to exit the program.
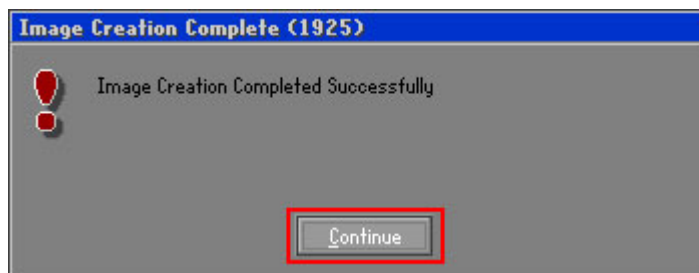
Figure B-20: Image Creation Complete

Step 12: The recovery tool main menu window is shown as below. Press any key to reboot the system.
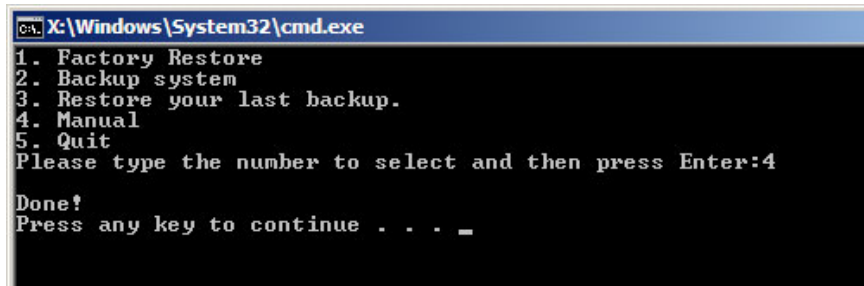
Figure B-21: Press Any Key to Continue

B.3 Auto Recovery Setup Procedure

The auto recovery function allows a system to automatically restore from the factory default image after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. To use the auto recovery function, follow the steps described in the following sections.

⚠ **CAUTION:**

The auto recovery function can only run on a Microsoft Windows system with the following OS versions:

- Windows 2000   - Windows 7
- Windows XP   - Windows XP Embedded
- Windows Vista   - Windows Embedded Standard 7

⚠ **CAUTION:**

The setup procedure may include a step to create a factory default image. It is suggested to configure the system to a factory default environment before the configuration, including driver and application installations.

Step 1: Follow the steps described in **Section B.2.1 ~ Section B.2.3** to setup BIOS, create partitions and install operating system.

Step 2: Install the auto recovery utility into the system by double clicking the **Utility/AUTORECOVERY-SETUP.exe** in the One Key Recovery CD. This utility MUST be installed in the system, otherwise, the system will automatically restore from the factory default image every ten (10) minutes.

Figure B-22: Auto Recovery Utility

Step 3: Disable the automatically restart function before creating the factory default image. Go to: My Computer → Properties → Advanced. Click the Settings button of Startup and Recovery. Deselect "Automatically restart". Click OK to save the settings and exit. (See Figure B-23)
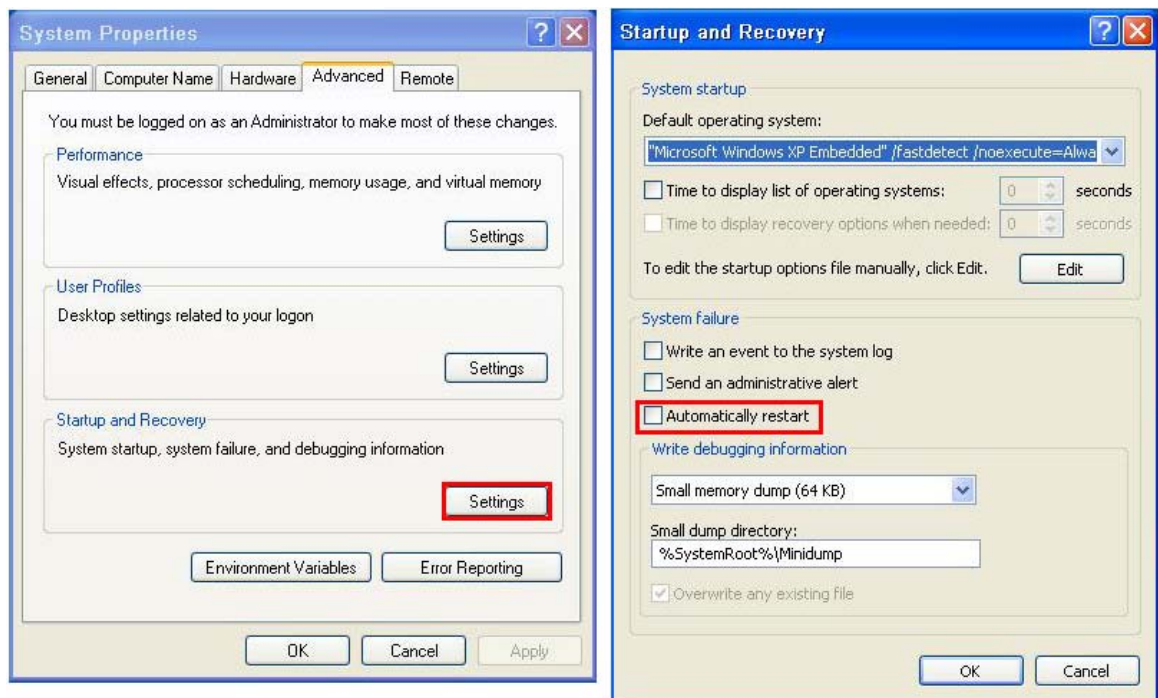
Figure B-23: Disable Automatically Restart

Step 4: Reboot the system from the recovery CD. When prompted, press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient!
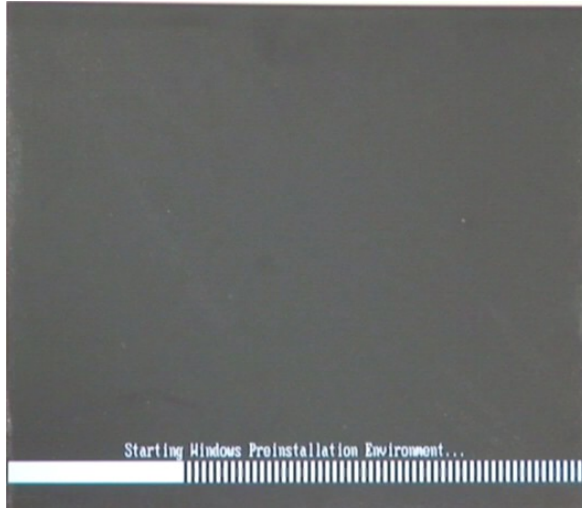
Figure B-24: Launching the Recovery Tool

Step 5: When the recovery tool setup menu appears, press <**4**> then <Enter>.
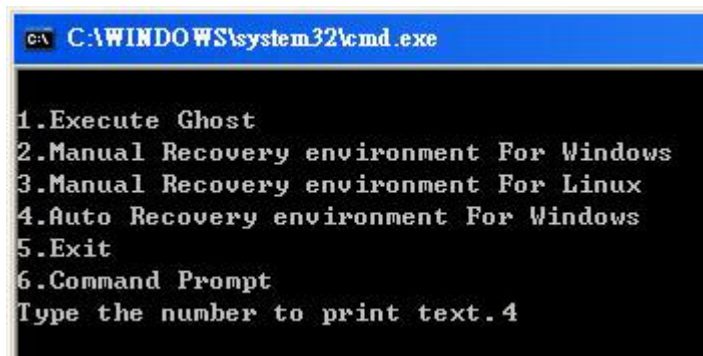
Figure B-25: Auto Recovery Environment for Windows

Step 6: The Symantec Ghost window appears and starts configuring the system to build an auto recovery partition. In this process the partition created for recovery files in **Section B.2.2** is hidden and the auto recovery tool is saved in this partition.
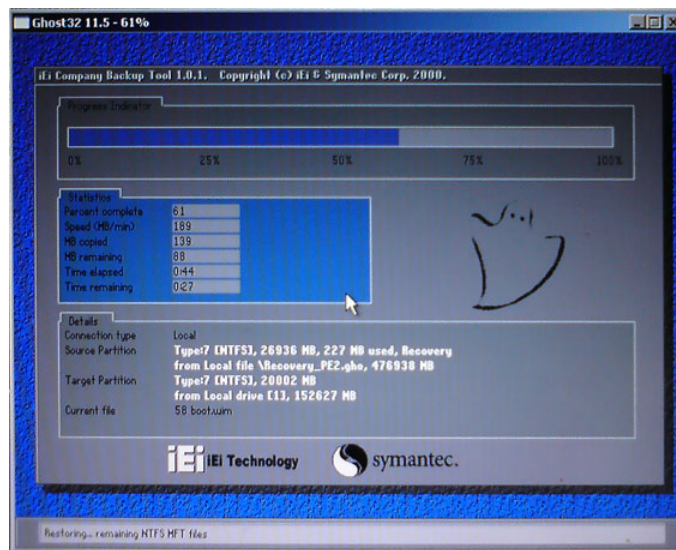
Figure B-26: Building the Auto Recovery Partition

Step 7: After completing the system configuration, the following message prompts to confirm whether to create a factory default image. Type **Y** to have the system create a factory default image automatically. Type **N** within 6 seconds to skip this process (The default option is YES). It is suggested to choose YES for this option.

Figure B-27: Factory Default Image Confirmation

Step 8: The Symantec Ghost starts to create the factory default image (**Figure B-28**).
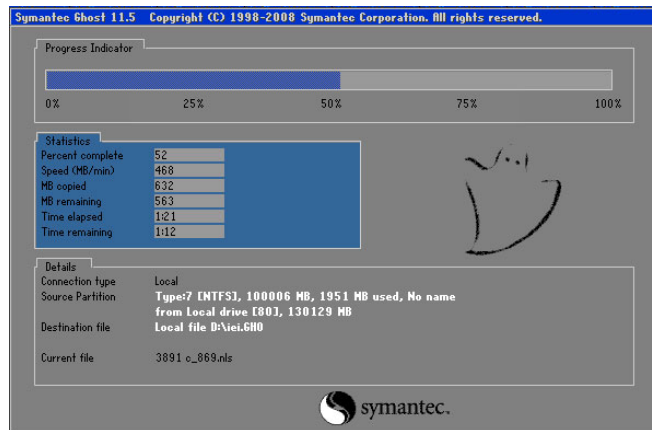
Figure B-28: Image Creation Complete

Step 9: After completing the system configuration, press any key in the following window to restart the system.
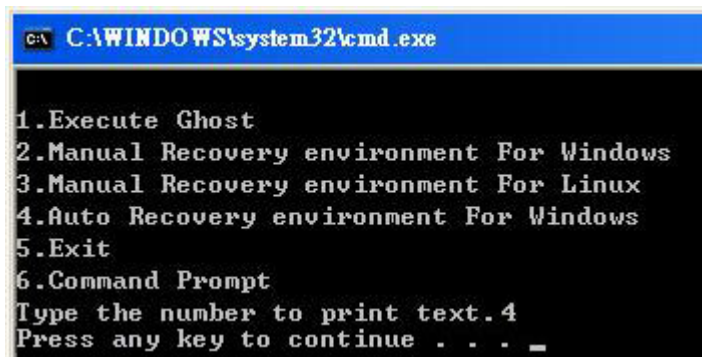
Figure B-29: Press any key to continue

Step 10: Eject the One Key Recovery CD and restart the system.

Step 11: Press the <**DELETE**> key as soon as the system is turned on to enter the BIOS.

Step 12: Enable the Auto Recovery Function option (**Advanced → iEi Feature → Auto Recovery Function**).

```
                          BIOS SETUP UTILITY
   Main    Advanced   PCIPNP    Boot    Security  Chipset    Exit

 iEi Feature
 _____
 Auto Recovery Function           [Enabled]
    Recover from PXE              [Disabled]


                                              Select Screen
                                       ↑ ↓    Select Item
                                       Enter Go to SubScreen
                                       F1    General Help
                                       F10   Save and Exit
                                       ESC   Exit

        v02.61 ©Copyright 1985-2006, American Megatrends, Inc.
```
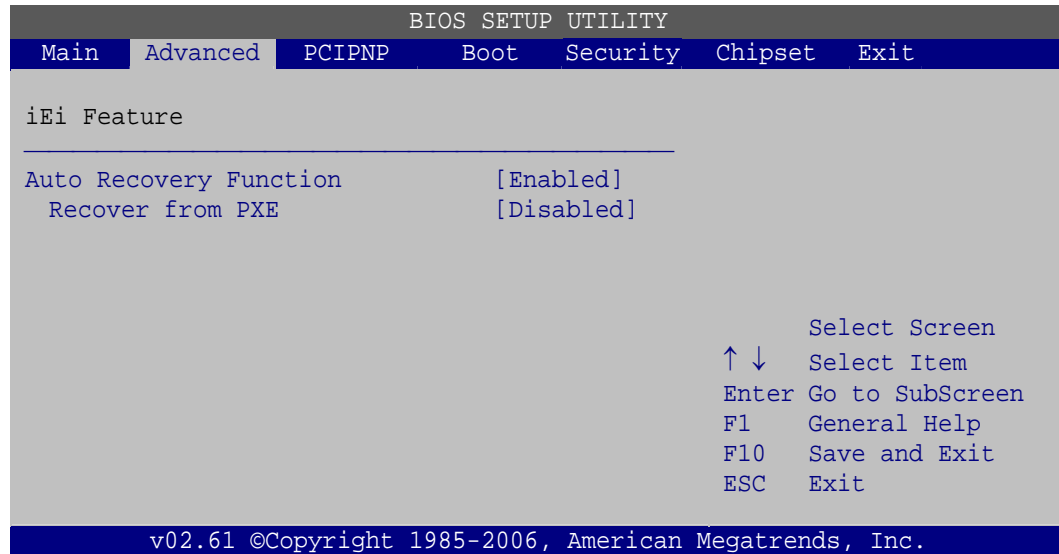
BIOS Menu 31: IEI Feature

Step 13: Save changes and restart the system. If the system encounters a Blue Screen of Death (BSoD) or a hang for around 10 minutes, it will automatically restore from the factory default image.

B.4 Setup Procedure for Linux

The initial setup procedures for a Linux system are mostly the same with the procedure for Microsoft Windows. Please follow the steps below to setup the recovery tool for Linux OS.

Step 1:   **Hardware and BIOS setup**. Refer to **Section B.2.1**.

Step 2:   **Install Linux operating system**. Make sure to install GRUB (v0.97 or earlier) MBR type and Ext3 partition type. Leave enough space on the hard drive to create the recover partition later.

NOTE:

If the Linux OS is not installed with GRUB (v0.97 or earlier) and Ext3, the Symantec Ghost may not function properly.

While installing Linux OS, please create two partitions:

- ▪ Partition 1: **/**
- ▪ Partition 2: **SWAP**

![NOTE icon] **NOTE:**

Please reserve enough space for partition 3 for saving recovery images.
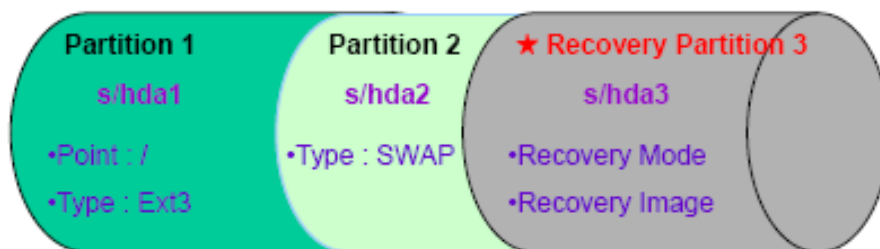
Figure B-30: Partitions for Linux

Step 3: **Create a recovery partition**. Insert the recovery CD into the optical disk drive. Follow **Step 1** ~ **Step 3** described in **Section B.2.2**. Then type the following commands (marked in red) to create a partition for recovery images.
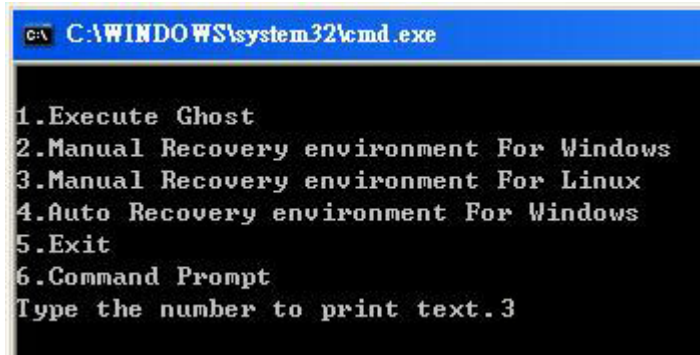
system32>diskpart

DISKPART>list vol

DISKPART>sel disk 0

DISKPART>create part pri size= ___

DISKPART>assign letter=N

DISKPART>exit

system32>format N: /fs:ntfs /q /v:Recovery /y

system32>exit

Step 4: **Build-up recovery partition**. Press any key to boot from the recovery CD. It will take a while to launch the recovery tool. Please be patient. When the recovery tool setup menu appears, type **<3>** and press <Enter> (**Figure B-31**). The Symantec Ghost window appears and starts configuring the system to build-up a

recovery partition. After completing the system configuration, press any key to

reboot the system. Eject the recovery CD.
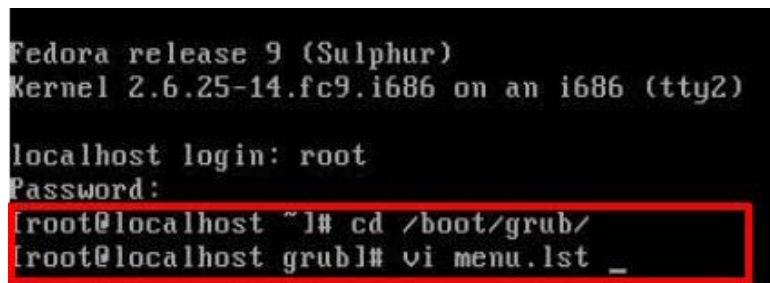
Figure B-31: System Configuration for Linux

Step 5:   **Access the recovery tool main menu by modifying the "menu.lst".** To first

access the recovery tool main menu, the menu.lst must be modified. In Linux,

enter Administrator (root). When prompt appears, type:

cd /boot/grub

vi menu.lst

Figure B-32: Access menu.lst in Linux (Text Mode)

Step 6:   Modify the menu.lst as shown below.

- Type command:
   title Recovery Partition
   root (hd0,2)
   makeactive
   chainloader +1

Step 7: The recovery tool menu appears. (**Figure B-33**)

Figure B-33: Recovery Tool Menu

Step 8: **Create a factory default image**. Follow **Step 2** ~ **Step 12** described in **Section B.2.5** to create a factory default image.

B.5 Recovery Tool Functions

After completing the initial setup procedures as described above, users can access the recovery tool by pressing **<F3>** while booting up the system. However, if the setup procedure in Section B.3 has been completed and the auto recovery function is enabled, the system will automatically restore from the factory default image without pressing the F3 key. The recovery tool main menu is shown below.
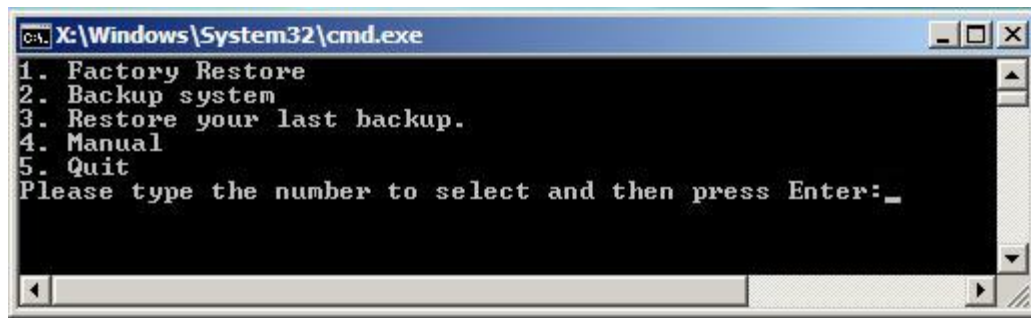
Figure B-34: Recovery Tool Main Menu

The recovery tool has several functions including:

1. Factory Restore: Restore the factory default image (iei.GHO) created in Section B.2.5.
2. **Backup system**: Create a system backup image (iei_user.GHO) which will be saved in the hidden partition.
3. **Restore your last backup**: Restore the last system backup image
4. **Manual**: Enter the Symantec Ghost window to configure manually.
5. **Quit**: Exit the recovery tool and restart the system.

![Warning icon] **WARNING:**

Please do not turn off the system power during the process of system recovery or backup.

![Warning icon] **WARNING:**

All data in the system will be deleted during the system recovery. Please backup the system files before restoring the system (either Factory Restore or Restore Backup).

B.5.1 Factory Restore

To restore the factory default image, please follow the steps below.

Step 1:   Type <**1**> and press <**Enter**> in the main menu.

Step 2:   The Symantec Ghost window appears and starts to restore the factory default. A

factory default image called **iei.GHO** is created in the hidden Recovery partition.
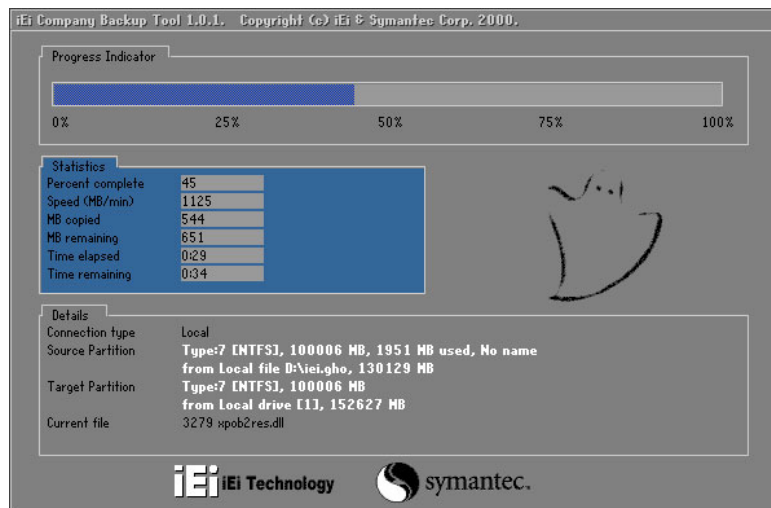

Figure B-35: Restore Factory Default

Step 3:   The screen is shown in **Figure B-36** appears when completed. Press any key to

reboot the system.
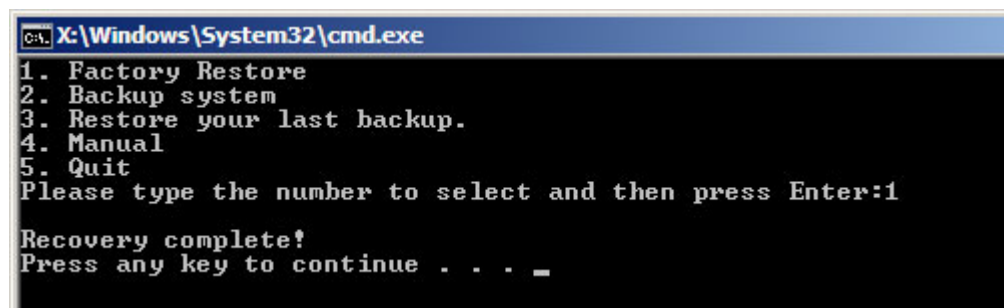
Figure B-36: Recovery Complete Window

B.5.2 Backup System

To backup the system, please follow the steps below.

Step 1: Type <**2**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to backup the system. A

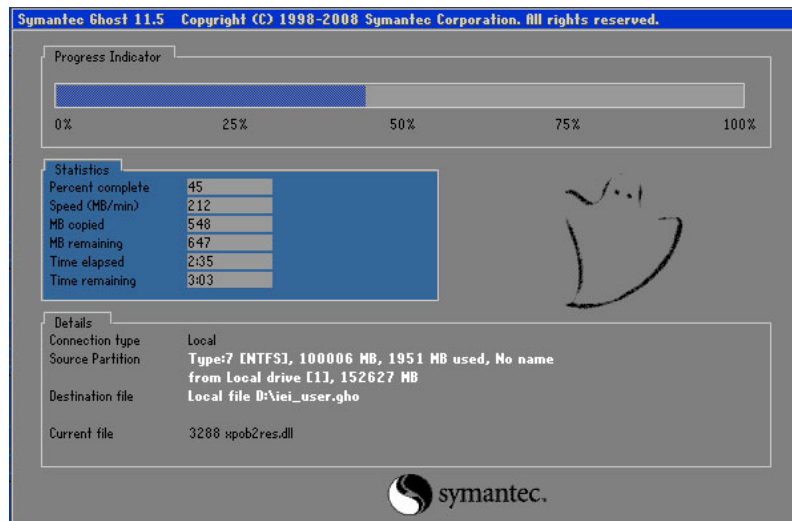backup image called **iei_user.GHO** is created in the hidden Recovery partition.

Figure B-37: Backup System

Step 3: The screen is shown in **Figure B-38** appears when system backup is complete.
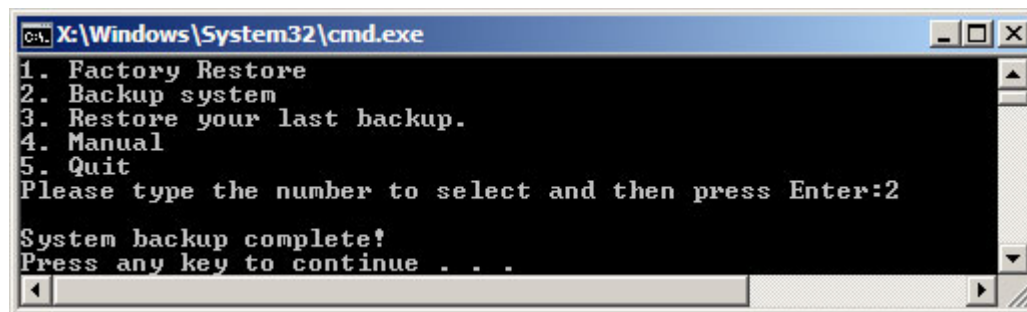
Press any key to reboot the system.

Figure B-38: System Backup Complete Window

B.5.3 Restore Your Last Backup

To restore the last system backup, please follow the steps below.

Step 1: Type <**3**> and press <**Enter**> in the main menu.

Step 2: The Symantec Ghost window appears and starts to restore the last backup
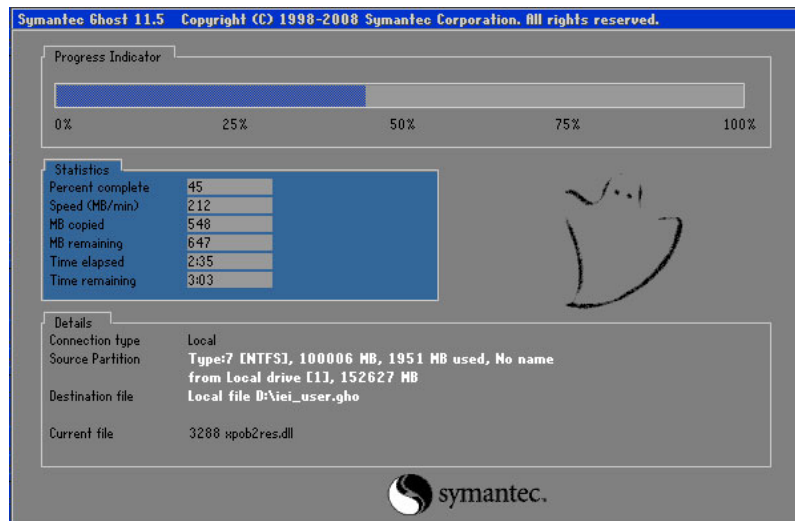
image (iei_user.GHO).

Figure B-39: Restore Backup

Step 3: The screen shown in **Figure B-40** appears when backup recovery is complete.
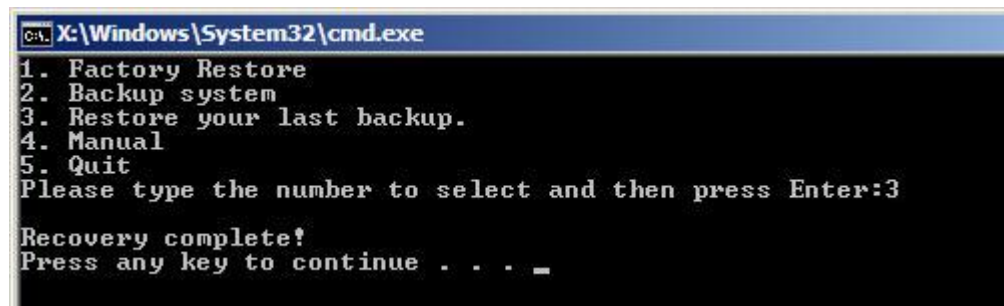
Press any key to reboot the system.

Figure B-40: Restore System Backup Complete Window

B.5.4 Manual

To restore the last system backup, please follow the steps below.

Step 1: Type <**4**> and press <**Enter**> in the main menu.

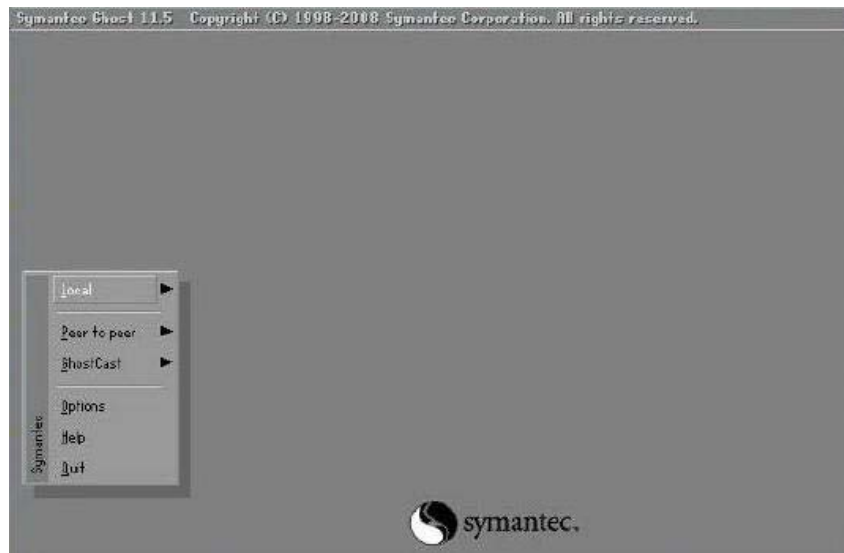**Step 2:** The Symantec Ghost window appears. Use the Ghost program to backup or recover the system manually.

Figure B-41: Symantec Ghost Window

Step 3: When backup or recovery is completed, press any key to reboot the system.

B.6 Restore Systems from a Linux Server through LAN

The One Key Recovery allows a client system to automatically restore to a factory default image saved in a Linux system (the server) through LAN connectivity after encountering a Blue Screen of Death (BSoD) or a hang for around 10 minutes. To be able to use this function, the client system and the Linux system MUST reside in the same domain.
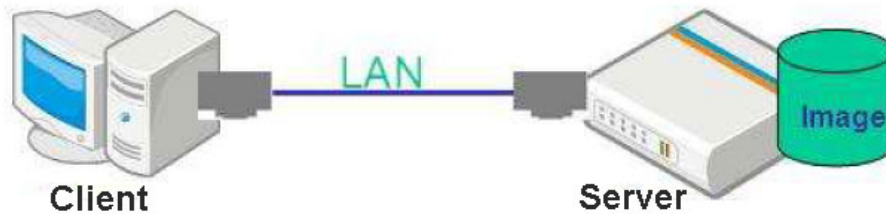
⚠️ **CAUTION:**

The supported client OS includes:

- Windows 2000
- Windows XP
- Windows Vista
- Windows 7
- Windows XP Embedded
- Windows Embedded Standard 7

Prior to restoring client systems from a Linux server, a few setup procedures are required.

Step 1: Configure DHCP server settings

Step 2: Configure TFTP settings

Step 3: Configure One Key Recovery server settings

Step 4: Start DHCP, TFTP and HTTP

Step 5: Create a shared directory

Step 6: Setup a client system for auto recovery

The detailed descriptions are described in the following sections. In this document, two types of Linux OS are used as examples to explain the configuration process – CentOS 5.5 (Kernel 2.6.18) and Debian 5.0.7 (Kernel 2.6.26).

B.6.1 Configure DHCP Server Settings

Step 1: Install the DHCP

#yum install dhcp (CentOS, commands marked in red)

#apt-get install dhcp3-server (Debian, commands marked in blue)

Step 2: Confirm the operating system default settings: dhcpd.conf.

<u>CentOS</u>

Use the following command to show the DHCP server sample location:

#vi /etc/dhcpd.conf

The DHCP server sample location is shown as below:

Use the following command to copy the DHCP server sample to etc/dhcpd.conf:

#cp /usr/share/doc/dhcp-3.0.5/dhcpd.conf.sample /etc/dhcpd.conf

#vi /etc/dhcpd.conf

<u>Debian</u>

#vi /etc/dhcpd.conf

Edit "/etc/dhcpd.conf" for your environment. For example, add

next-server PXE server IP address;

filename "pxelinux.0";

B.6.2 Configure TFTP Settings

Step 1: Install the tftp, httpd and syslinux.

#yum install tftp-server httpd syslinux (CentOS)

#apt-get install tftpd-hpa xinetd syslinux (Debian)

Step 2: Enable the TFTP server by editing the "/etc/xinetd.d/tftp" file and make it use the remap file. The "-vvv" is optional but it could definitely help on getting more information while running the remap file. For example:

CentOS

#vi /etc/xinetd.d/tftp

Modify:

disable = no

server_args = -s /tftpboot –m /tftpboot/tftpd.remap -vvv

Debian

Replace the TFTP settings from "inetd" to "xinetd" and annotate the "inetd" by

adding "#".

#vi /etc/inetd.conf

Modify: #tftp dgram udp wait root /usr/sbin....... (as shown below)

```
#:BOOT: TFTP service is provided primarily for booting.  Most sites
#       run this only on machines acting as "boot servers."
#tftp          dgram   udp     wait    root  /usr/sbin/in.tftpd /usr/sbin/in.tftpd -s
/var/lib/tftpboot
```

#vi /etc/xinetd.d/tftp

```
socket_type            = dgram
protocol               = udp
wait                   = yes
user                   = root
server                 = /usr/sbin/in.tftpd
server_args            = -s /tftpboot -m /tftpboot/tftpd.remap -vvv
disable                = no
per_source             = 11
cps                    = 100 2
flags                  = IPv4
```

B.6.3 Configure One Key Recovery Server Settings

Step 1: Copy the **Utility/RECOVERYR10.TAR.BZ2** package from the One Key

Recovery CD to the system (server side).

```
RECOVERYR10.TAR.BZ2
bz2 Archive
197,416 KB
```

Step 2: Extract the recovery package to /.

#cp RecoveryR10.tar.bz2 /

#cd /

#tar –xvjf RecoveryR10.tar.bz2

Step 3: Copy "pxelinux.0" from "syslinux" and install to "/tftboot".

#cp /usr/lib/syslinux/pxelinux.0 /tftpboot/

B.6.4 Start the DHCP, TFTP and HTTP

Start the DHCP, TFTP and HTTP. For example:

CentOS

#service xinetd restart

#service httpd restart

#service dhcpd restart

Debian

#/etc/init.d/xinetd reload

#/etc/init.d/xinetd restart

#/etc/init.d/dhcp3-server restart

B.6.5 Create Shared Directory

Step 1: Install the samba.

#yum install samba

Step 2: Create a shared directory for the factory default image.

#mkdir /share

#cd /share

#mkdir /image

#cp iei.gho /image

> **WARNING:**
>
> The file name of the factory default image must be **iei.gho**.

Step 3: Confirm the operating system default settings: smb.conf.

#vi /etc/samba/smb.conf

Modify:

[image]

   comment = One Key Recovery

   path = /share/image

   browseable = yes

   writable = yes

   public = yes

   create mask = 0644

   directory mask = 0755

Step 4:   Edit "/etc/samba/smb.conf" for your environment. For example:

```
# "security = user" is always a good idea. This will require a Unix account
# in this server for every user accessing the server. See
# /usr/share/doc/samba-doc/htmldocs/Samba3-HOWTO/ServerType.html
# in the samba-doc package for details.
  security = share

[image]
  comment = One Key Recovery
  path = /share/image
  browseable = yes
  writable = yes
  public = yes
  create mask = 0644
  directory mask = 0755
```

Step 5:   Modify the hostname

   #vi /etc/hostname

   Modify: RecoveryServer

```
RecoveryServer
~
```

B.6.6 Setup a Client System for Auto Recovery

Step 1:   **Disable the automatically restart function before creating the factory**

   default image. Go to: My Computer → Properties → Advanced. Click the

   Settings button of Startup and Recovery. Deselect "Automatically restart". Click

   OK to save the settings and exit. (See Figure B-23)
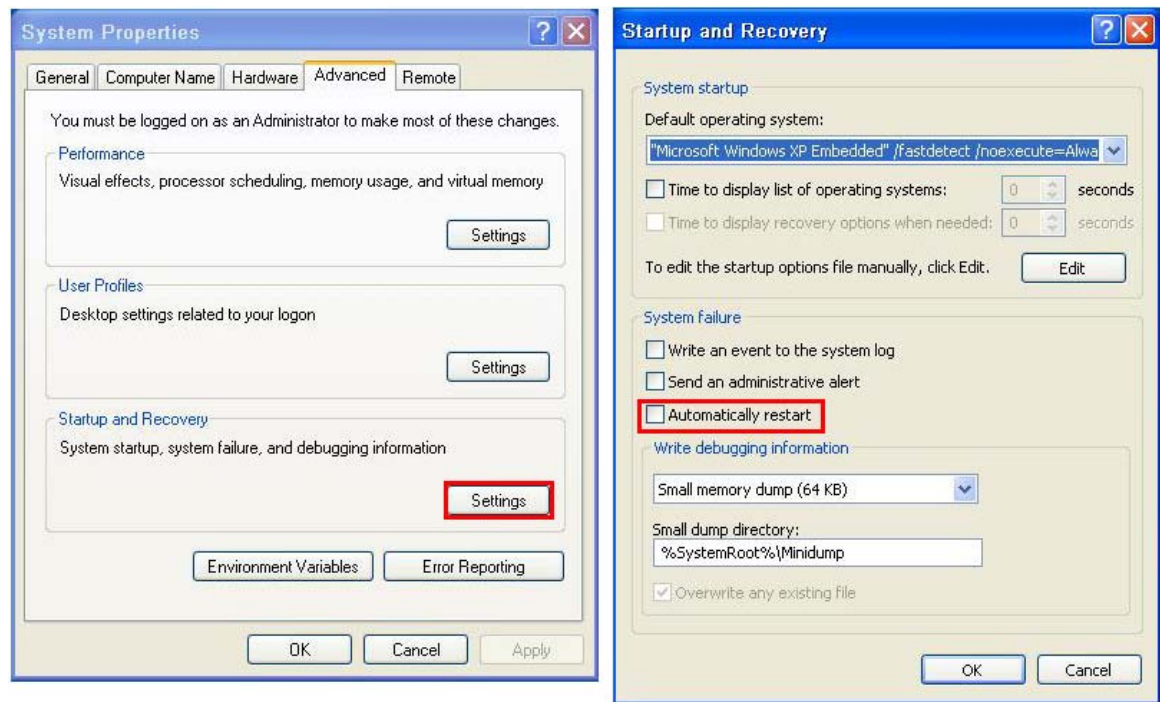
Figure B-42: Disable Automatically Restart

Step 2: Configure the following BIOS options of the client system.

Advanced → iEi Feature → Auto Recovery Function → **Enabled**

Advanced → iEi Feature → Recover from PXE → **Enabled**

Boot → Launch PXE OpROM → **Enabled**

Step 3: Continue to configure the **Boot Option Priorities** BIOS option of the client

system:

Boot Option #1 → remain the default setting to boot from the original OS.

Boot Option #2 → select the boot from LAN option.

Step 4: Save changes and exit BIOS menu.

Exit → **Save Changes and Exit**

Step 5: Install the auto recovery utility into the system by double clicking the

Utility/AUTORECOVERY-SETUP.exe in the One Key Recovery CD. This utility

MUST be installed in the system, otherwise, the system will automatically

restore from the factory default image every ten (10) minutes.

AUTORECOVERY-SETUP.EXE
Setup Launcher
IEI

Step 6: Restart the client system from LAN. If the system encounters a Blue Screen of

Death (BSoD) or a hang for around 10 minutes, it will automatically restore from

the factory default image. The following screens will show when the system

starts auto recovering.

Realtek PCIe GBE Family Controller Series v2.35 (06/14/10)

CLIENT MAC ADDR: 00 18 7D 13 E6 89   GUID: 00020003-0004-0005-0006-000700080(
DHCP..∠

My IP address seems to be C0A80009 192.168.0.9
ip=192.168.0.9:192.168.0.8:192.168.0.2:255.255.255.0
TFTP prefix:
Trying to load: pxelinux.cfg/00020003-0004-0005-0006-000700080009
Trying to load: pxelinux.cfg/01-00-18-7d-13-e6-89
Trying to load: pxelinux.cfg/C0A80009
Trying to load: pxelinux.cfg/C0A8000
Trying to load: pxelinux.cfg/C0A800
Trying to load: pxelinux.cfg/C0A80
Trying to load: pxelinux.cfg/C0A8
Trying to load: pxelinux.cfg/C0A
Trying to load: pxelinux.cfg/C0
Trying to load: pxelinux.cfg/C
Trying to load: pxelinux.cfg/default
boot:

Windows is loading files...

IP: 192.168.0.8, File: \Boot\WinPE.wim
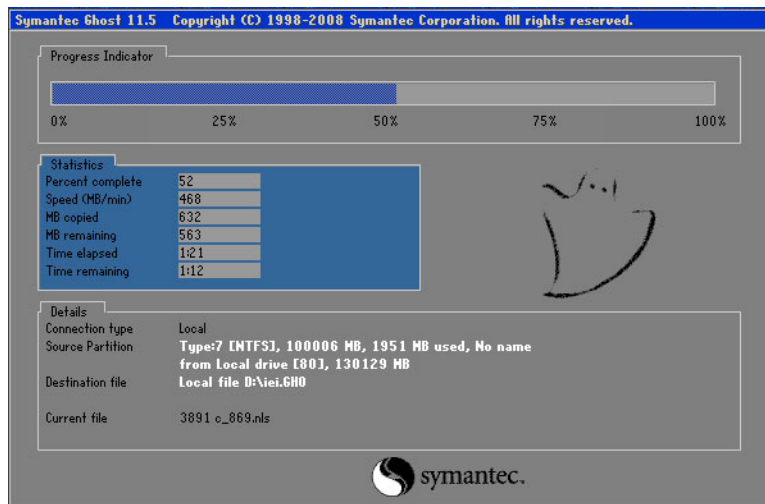
![NOTE icon] **NOTE:**

A firewall or a SELinux is not in use in the whole setup process described above. If there is a firewall or a SELinux protecting the system, modify the configuration information to accommodate them.

B.7 Other Information

B.7.1 Using AHCI Mode or ALi M5283 / VIA VT6421A Controller

When the system uses AHCI mode or some specific SATA controllers such as ALi M5283 or VIA VT6421A, the SATA RAID/AHCI driver must be installed before using one key recovery. Please follow the steps below to install the SATA RAID/AHCI driver.

Step 1: Copy the SATA RAID/AHCI driver to a floppy disk and insert the floppy disk into a USB floppy disk drive. The SATA RAID/AHCI driver must be especially designed for the on-board SATA controller.

Step 2: Connect the USB floppy disk drive to the system.

Step 3: Insert the One Key Recovery CD into the system and boot the system from the CD.

Step 4: When launching the recovery tool, press <**F6**>.
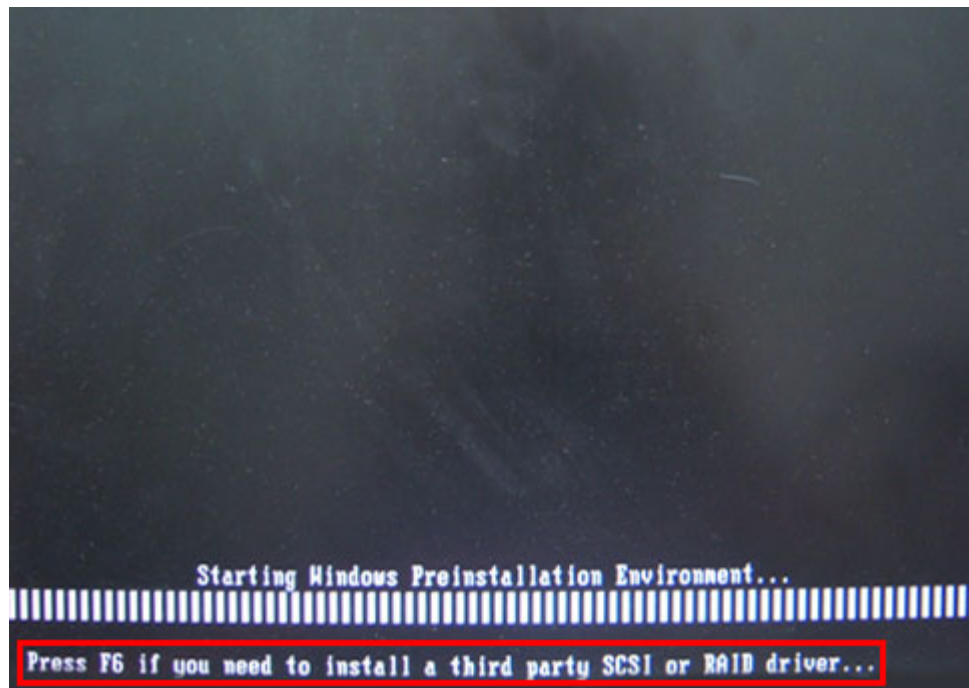
Step 5: When the following window appears, press **<S>** to select "Specify Additional

Device".
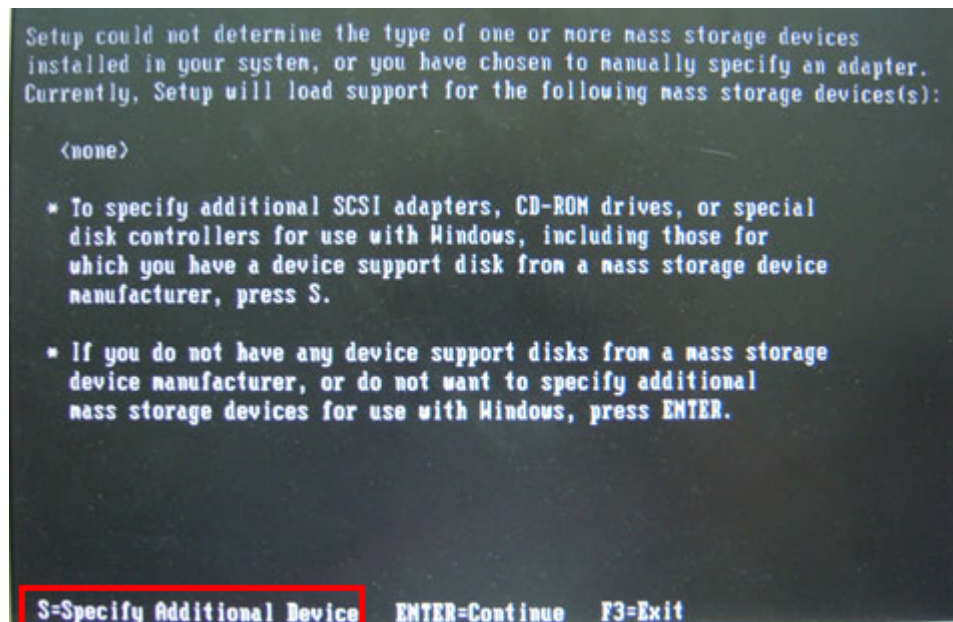
Step 6: In the following window, select a SATA controller mode used in the system. Then press <**Enter**>. The user can now start using the SATA HDD.
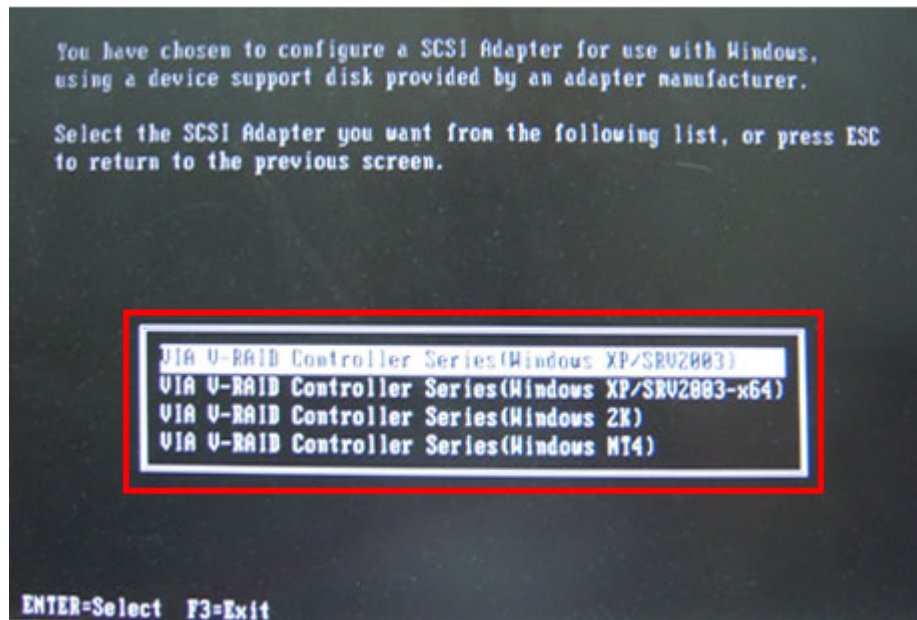
Step 7: After pressing <Enter>, the system will get into the recovery tool setup menu. Continue to follow the setup procedure from **Step 4** in **Section B.2.2 Create Partitions** to finish the whole setup process.

B.7.2 System Memory Requirement

To be able to access the recovery tool by pressing <**F3**> while booting up the system, please make sure to have enough system memory. The minimum memory requirement is listed below.

- **Using Award BIOS**: 128 MB system memory
- **Using AMI BIOS**: 512 MB system memory.

Appendix

C

Terminology

AC '97   Audio Codec 97 (AC'97) refers to a codec standard developed by Intel® in 1997.

ACPI   Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.

AHCI   Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.

ATA   The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.

ARMD   An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.

ASKIR   Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude ("volume") of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.

BIOS   The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user

CODEC   The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.

CMOS   Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.

COM   COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.

DAC   The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.

DDR   Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.

DMA   Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.

DIMM	Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.
DIO	The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.
EHCI	The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.
EIDE	Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MBps and 16.6 MBps.
EIST	Enhanced Intel® SpeedStep Technology (EIST) allows users to modify the power consumption levels and processor performance through application software. The application software changes the bus-to-core frequency ratio and the processor core voltage.
FSB	The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.
GbE	Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.
GPIO	General purpose input
HDD	Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.
ICH	The Input/Output Control Hub (ICH) is an Intel® Southbridge chipset.
IrDA	Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.
L1 Cache	The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.
L2 Cache	The Level 2 Cache (L2 Cache) is an external processor memory cache.
LCD	Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.

LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates and USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Digital I/O Interface

D.1 Introduction

The DIO connector on the PCIE-Q870-i2 is interfaced to GPIO ports on the Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

![NOTE icon] **NOTE:**

> For further information, please refer to the datasheet for the Super I/O chipset.

D.2 DIO Connector Pinouts

Pin	Description	Super I/O Pin	Super I/O Pin Description
1	Ground	N/A	N/A
2	VCC	N/A	N/A
3	Output 3	GP27	General purpose I/O port 2 bit 7.
4	Output 2	GP26	General purpose I/O port 2 bit 6.
5	Output 1	GP25	General purpose I/O port 2 bit 5.
6	Output 0	GP24	General purpose I/O port 2 bit 4.
7	Input 3	GP23	General purpose I/O port 2 bit 3.
8	Input 2	GP22	General purpose I/O port 2 bit 2
9	Input 1	GP21	General purpose I/O port 2 bit 1
10	Input 0	GP20	General purpose I/O port 2 bit 0

Table 6-1: Digital I/O Connector Pinouts

D.3 Assembly Language Samples

D.3.1 Enable the DIO Input Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O input functions is listed below.

MOV	AX, 6F08H	Sets the digital port as input
INT	15H	Initiates the INT 15H BIOS call

D.3.2 Enable the DIO Output Function

The BIOS interrupt call INT 15H controls the digital I/O. An assembly program to enable digital I/O output functions is listed below.

MOV	AX, 6F09H	Sets the digital port as output
MOV	BL, 09H	
INT	15H	Initiates the INT 15H BIOS call

Appendix

E

Watchdog Timer

NOTE:

The following discussion applies to DOS environment. Contact IEI support or visit the IEI website for specific drivers for other operating systems.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMIs or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer.

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table E-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. When the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

EXAMPLE PROGRAM:

; INITIAL TIMER PERIOD COUNTER

;

W_LOOP:

;

```
        MOV         AX, 6F02H           ;setting the time-out value
        MOV         BL, 30              ;time-out value is 48 seconds
        INT     15H
```

;

; ADD THE APPLICATION PROGRAM HERE

;

```
        CMP         EXIT_AP, 1          ;is the application over?
        JNE     W_LOOP              ;No, restart the application

        MOV         AX, 6F02H           ;disable Watchdog Timer
        MOV         BL, 0           ;
        INT     15H
```

;

; EXIT ;

Appendix

F

Intel® Matrix Storage Manager

F.1 Introduction

The PCIE-Q870-i2 can provide data protection for serial ATA (SATA) disks via the Intel® Matrix Storage Manager using one of three fault-tolerant RAID levels: RAID 1, 5 or 10. When using two hard drives, matrix RAID allows RAID 0 and RAID 1 functions to be combined, where critical files can be stored on RAID 1, and RAID 0 can be used for non-critical items such as software. RAID 5 and RAID 0 can be combined to provide higher performance, capacity, and fault tolerance.

> ⚠️ **CAUTION!**
>
> A configured RAID volume (which may consist of multiple hard drives) appears to an operating system as a contingent storage space. The operating system will not be able to distinguish the physical disk drives contained in a RAID configuration.

F.1.1 Precautions

One key benefit a RAID configuration brings is that a single hard drive can fail within a RAID array without damaging data. With RAID1 array, a failed drive can be replaced and the RAID configuration restored.

> ⚡ **WARNING!**
>
> Irrecoverable data loss occurs if a working drive is removed when trying to remove a failed drive. It is strongly recommended to mark the physical connections of all SATA disk drives. Drive locations can be identified by attaching stickers to the drive bays. If a drive member of a RAID array should fail, the failed drive can then be correctly identified.

![CAUTION icon] **CAUTION!**

Do not accidentally disconnect the SATA drive cables. Carefully route the cables within the chassis to avoid system down time.

F.2 Features and Benefits

- Supports RAID levels 0, 1, 5 and 10
- Supports connectivity to two or more disk drives
- Supported Operating Systems include: Windows XP, Windows Server 2003, Windows Server 2008, Windows Vista and Windows 7

F.3 Accessing the Intel® Matrix Storage Manager

To access the Intel® Matrix Storage Manager, please follow the steps below.

Step 1: **Connect SATA drives to the system**. Connect two or more SATA drives to the system. Make sure the drives have the same capacity, are the same type and have the same speed.

![NOTE icon] **NOTE:**

Make sure the SATA drives are EXACTLY the same when they are configured in a RAID configuration. If they are not the same size, disk drive capacity is sacrificed and overall performance affected.

Step 2: **Enable SATA drives in BIOS**. Start the computer and access the BIOS setup program. Enable RAID support for all SATA devices. Refer to the applicable BIOS configuration section in this user manual.

Step 3: **Configure "Option ROM Messages"** BIOS option to **Force BIOS**. This is to allow the "Press <CTRL+I> to enter Configuration Utility……" message to

appear during the POST. Refer to the applicable BIOS configuration section in this user manual.

Step 4: **Save and Exit BIOS**. After the SATA support option is enabled, save and exit the BIOS.

Step 5: **Reboot the system**. Reboot the system after saving and exiting the BIOS.

Step 6: **Press Ctrl+I. during the system boot process**. Press Ctrl+I when prompted to enter the RAID configuration software.

Step 7: **Configure the RAID settings**. Use the Intel® Matrix Storage Manager to configure the RAID array. Brief descriptions of configuration options are given below.

F.4 Installing the Operating System to the RAID Array

To install the operating system to the RAID array some extra steps are necessary during the installation process.

Step 1: **Prepare a RAID driver floppy disk on another computer**. If installing on the RAID array a RAID driver floppy disk must be made. The RAID driver floppy disk utility is on the CD in the "5-SATA/Floppy Configuration Utility" folder. The floppy disk will be formatted and the drivers installed.

Step 2: **Restart the system with a floppy drive attached**. Attach a normal floppy drive or USB floppy drive to the system.

Step 3: **Press F6 when prompted**. During the installation process, Windows OS prompts the user to press F6 to install the RAID drivers. Press F6 and choose from the drivers on the floppy disk.

Step 4: **Install the OS**. Continue with OS installation as usual.

Appendix

G

Hazardous Materials Disclosure

G.1 Hazardous Materials Disclosure Table for IPB Products Certified as RoHS Compliant Under 2002/95/EC Without Mercury

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated "Environmentally Friendly Use Period" (EFUP). This is an estimate of the number of years that these substances would "not leak out or undergo abrupt change." This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to the table on the next page.

Part Name	Toxic or Hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
Display	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O
Battery	O	O	O	O	O	O
O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006 X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006						

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	O	O	O	O	O	O
显示	O	O	O	O	O	O
印刷电路板	O	O	O	O	O	O
金属螺帽	O	O	O	O	O	O
电缆组装	O	O	O	O	O	O
风扇组装	O	O	O	O	O	O
电力供应组装	O	O	O	O	O	O
电池	O	O	O	O	O	O
O: 表示该有毒有害物质在该部件所有物质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。 X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。						