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. 1.07 – July 9, 2021

RoHS Lead Free

Revision

Date	Version	Changes
July 9, 2021	1.07	Updated Section 2.3: Packing List Updated Chapter 6: Software Drivers
July 13, 2017	1.06	Removed **PCIe x16 Interface Setup** section Modified **PCIEX16 Power** BIOS option on page 103
November 16, 2015	1.05	Updated Section 1.6: Technical Specifications Updated Section 2.4: Optional Items Updated Chapter 5: BIOS
March 23, 2015	1.04	Updated Section 4.3.3: Flash Descriptor Security Override Jumper
November 5, 2014	1.03	Updated PCIe specifications on page 7
June 16, 2014	1.02	Modified LAN pinouts Updated Chapter 2: Packing List
March 24, 2014	1.01	Deleted I^2C information Updated Section 2.4: Optional Items
January 14, 2014	1.00	Initial release

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Manual Conventions

WARNING

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously.

CAUTION

Cautionary messages should be heeded to help reduce the chance of losing data or damaging the product.

NOTE

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help avoid making mistakes.

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Introduction

1.1 Introduction

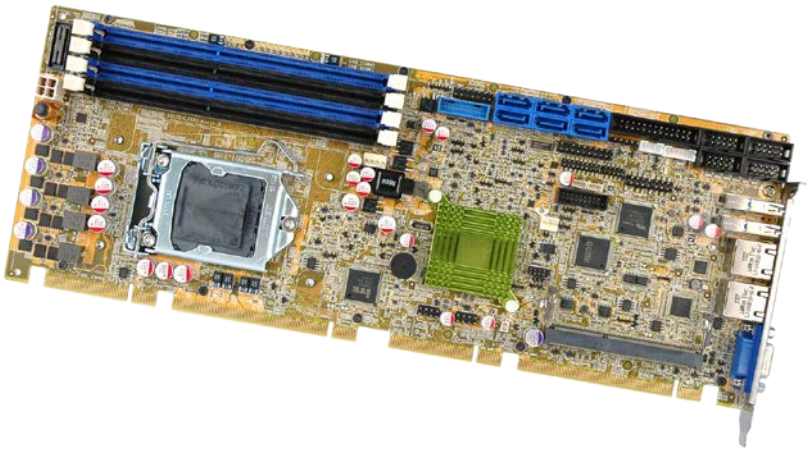


Figure 1-1: PCIE-Q870-i2

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 3.2 Gen 1 (5Gb/s) on the rear panel, two USB 3.2 Gen 1 (5Gb/s) 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.

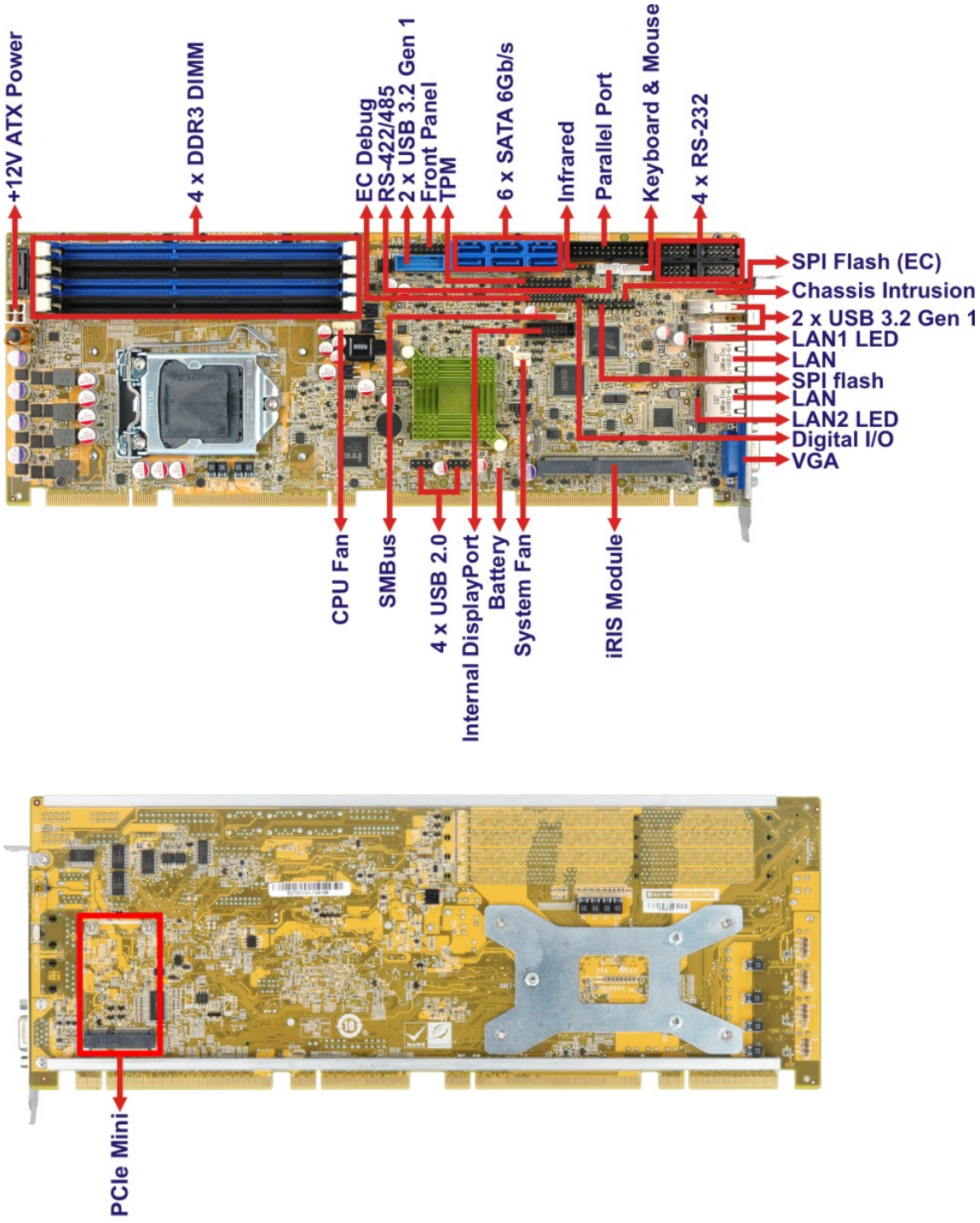


Figure 1-2: Connectors

1.4 Dimensions

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

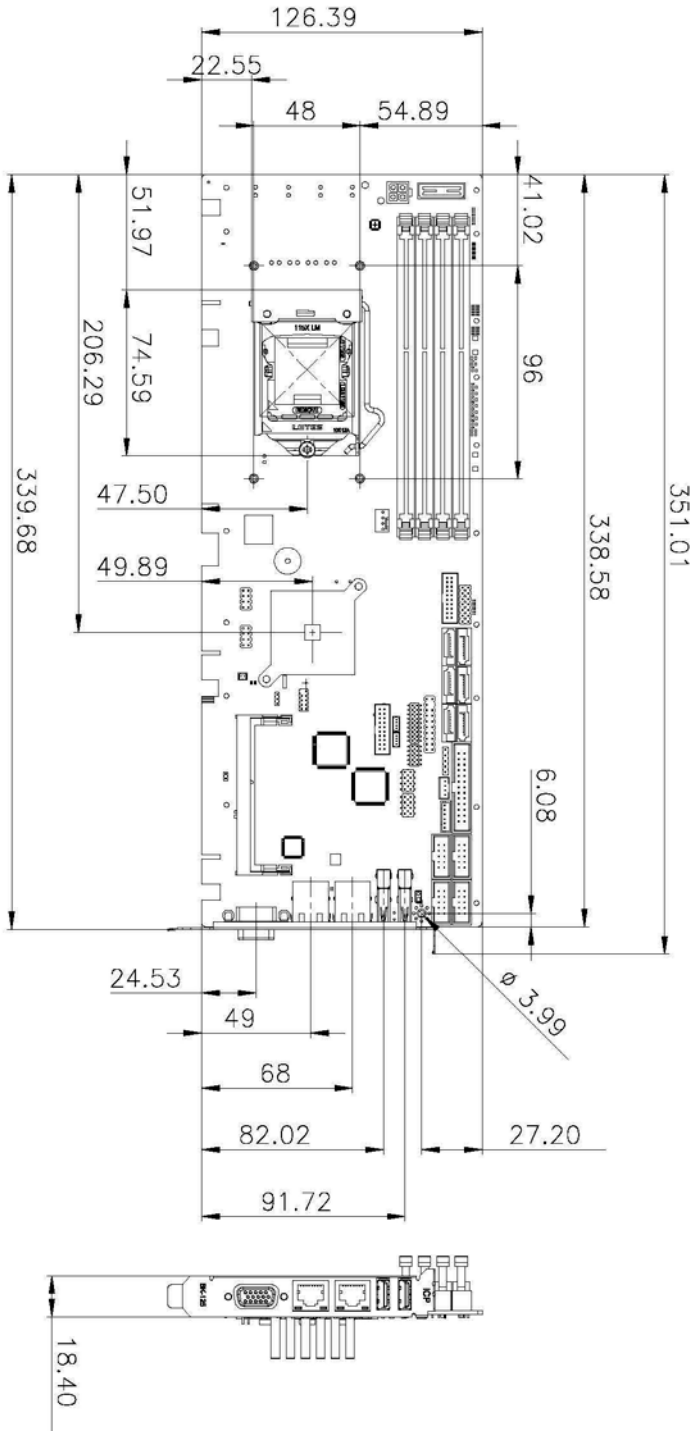


Figure 1-3: PCIE-Q870-i2 Dimensions (mm)

1.5 Data Flow

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

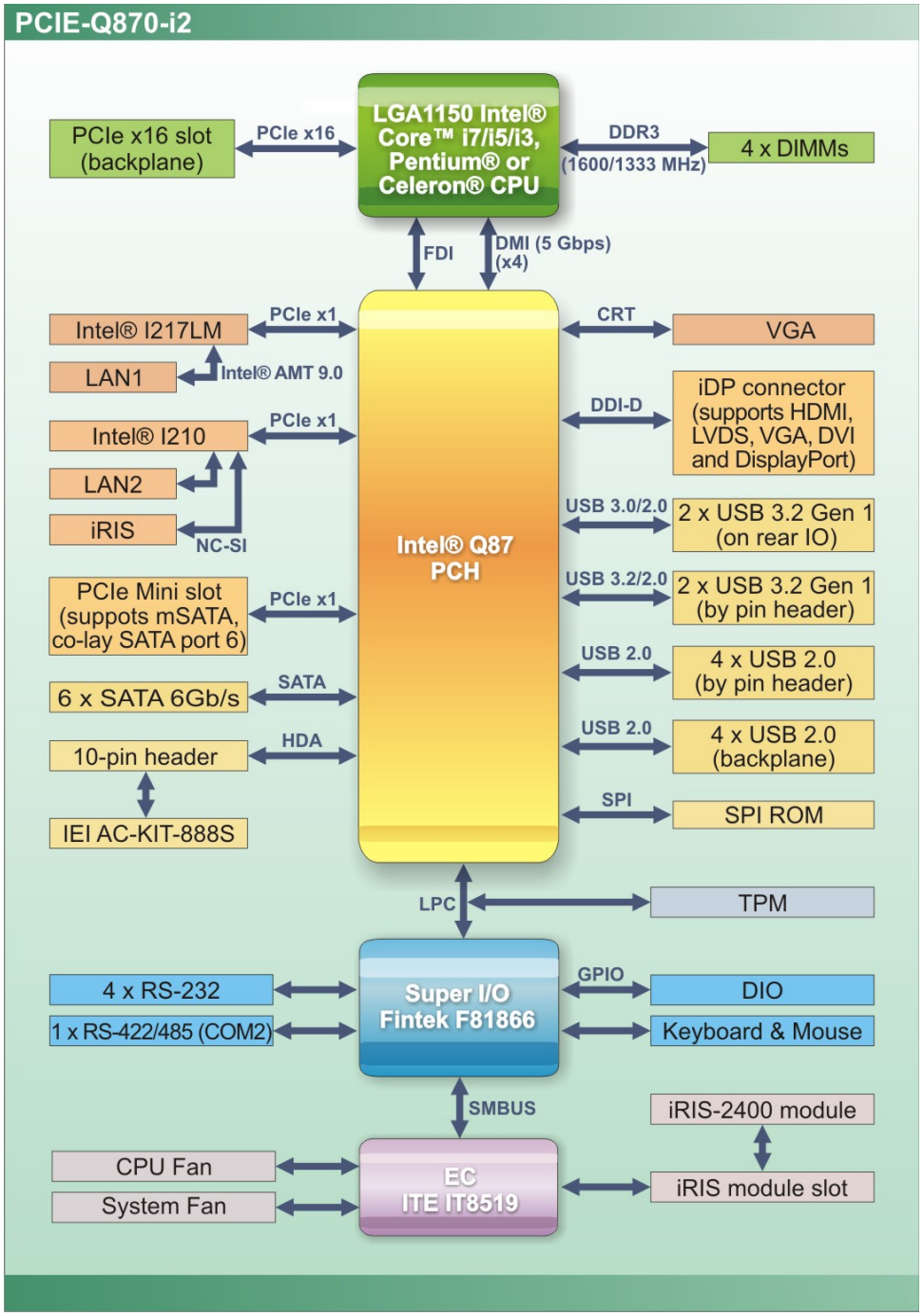


Figure 1-4: Data Flow Diagram

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-888S audio kit
BIOS	UEFI BIOS B273APxx supports four PCIe x1 slots (default) B273ARxx supports one PCIe x4 slot
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	One PCIe Mini slot supports PCIe x1, USB devices and mSATA (co-lay SATA port 6) PCI signal by ITE IT8892 (PCIe-to-PCI bridge) 4 x PCI link via golden finger **16-lane PCIe link from CPU via golden finger:** Support one PCIe x16 slot on the backplane **4-lane PCIe link from PCH via golden finger:** Support either one PCIe x4 slot or four PCIe x1 slots on the backplane For installing the PCIe x4 device on the backplane, the user must update BIOS to the version which supports one PCIe x4 slot

I/O Interface Connectors	
Audio Connector	One internal audio connector (10-pin header)
Chassis Intrusion	One 2-pin header
Digital I/O	8-bit digital I/O
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 3-pin 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 3.2 Gen 1 (5Gb/s) ports on rear IO Two internal USB 3.2 Gen 1 (5Gb/s) 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)
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 anti-static 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:

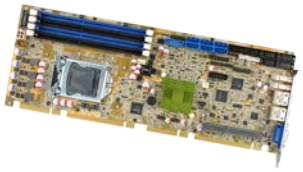
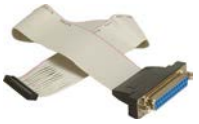
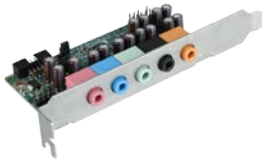
Quantity	Item and Part Number	Image
1	PCIE-Q870-i2 CPU card	
2	SATA cable	
1	Dual RS-232 cable	
1	Dual-port USB cable with bracket	
1	Quick Installation Guide	

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 3.2 Gen 1 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**: 19800-000049-RS)	
7.1-channel HD audio kit with Realtek ALC888S audio codec supporting dual audio stream (**P/N**: AC-KIT-888S-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)	

Item and Part Number	Image
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-R20)	
LGA1150 cooler kit (high-performance compatible, 65W) (**P/N**: CF-1150SB-R11)	
LGA1150 cooler kit (1U chassis compatible, 65W) (**P/N**: CF-1150SC-R20)	
LGA1150 cooler kit (high-performance compatible, 95W) (**P/N**: CF-1150SE-R11)	

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.

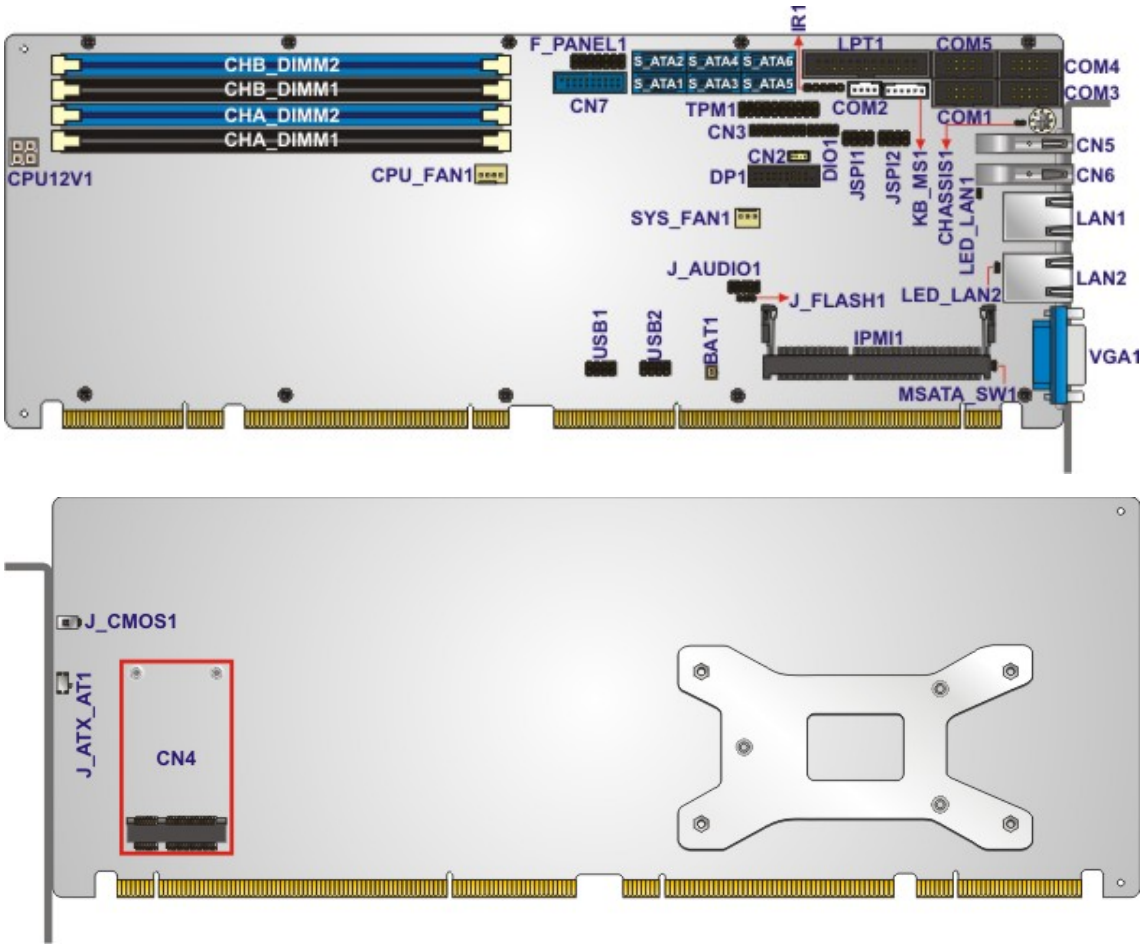


Figure 3-1: Peripheral Interface Connectors

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 3.2 Gen 1 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 3.2 Gen 1 ports	USB Type-A	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.

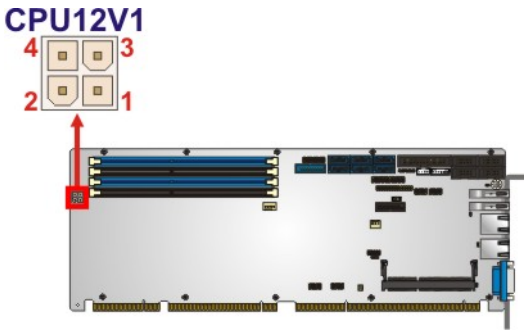


Figure 3-2: ATX Power Connector Pinout Location

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.

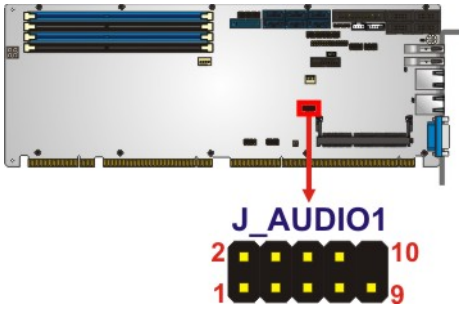


Figure 3-3: Audio Connector Location

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. **NOTE**: It is recommended to attach the RTC battery onto the system chassis in which the PCIE-Q870-i2 is installed.

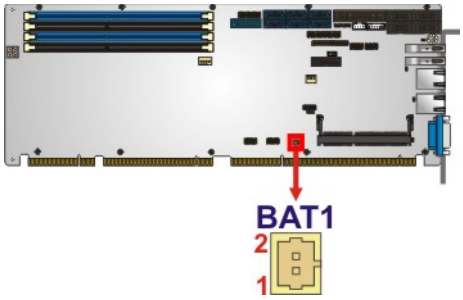


Figure 3-4: Battery Connector Location

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.

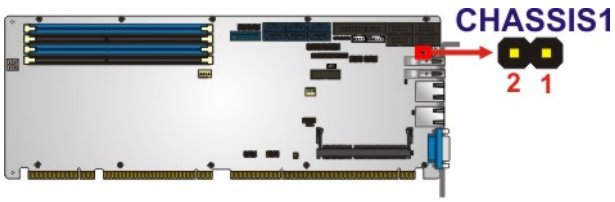


Figure 3-5: Chassis Intrusion Connector Location

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.

CAUTION:

For quad channel configuration, always install four identical memory modules that feature the same capacity, timings, voltage, number of ranks and the same brand.

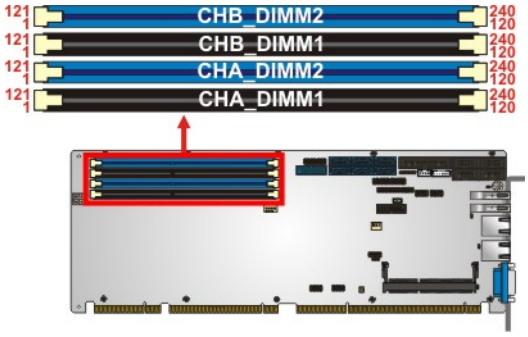


Figure 3-6: DDR3 DIMM Slot Locations

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.

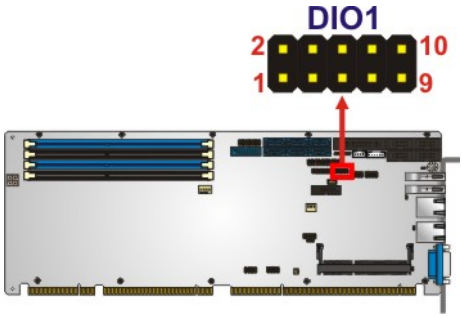


Figure 3-7: Digital I/O Connector Location

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.

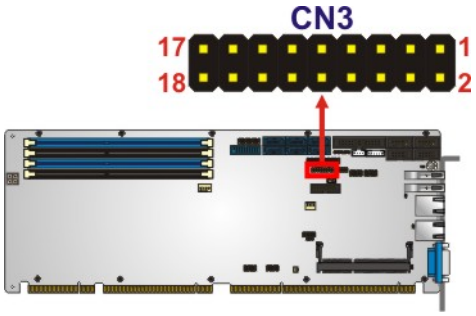


Figure 3-8: EC Debug Connector Location

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
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.

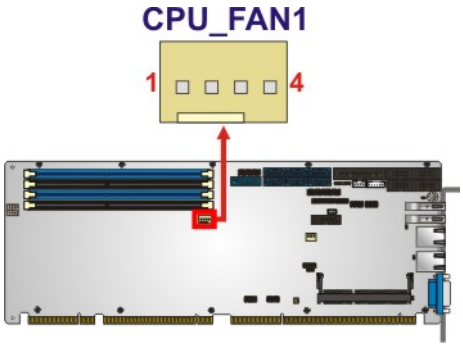


Figure 3-9: CPU Fan Connector Location

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.

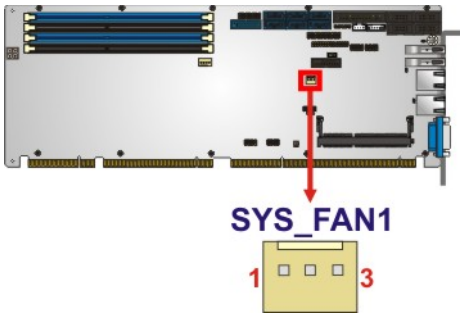


Figure 3-10: System Fan Connector Location

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.

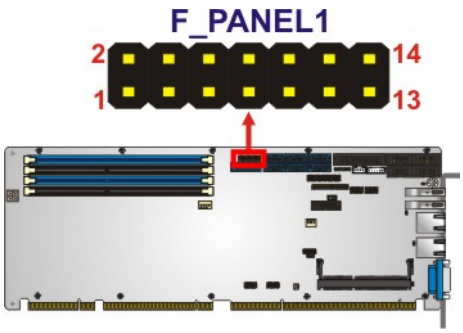


Figure 3-11: Front Panel Connector Location

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.

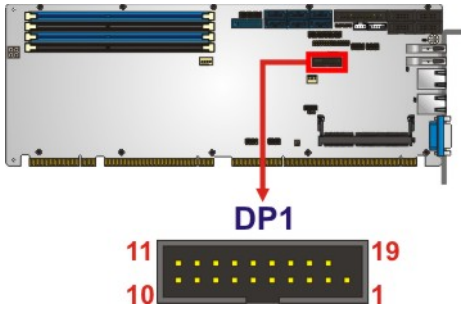


Figure 3-12: Internal DisplayPort Connector Location

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.

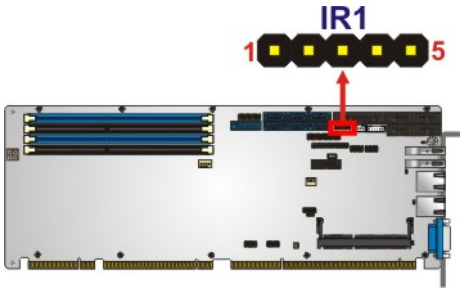


Figure 3-13: Infrared Connector Location

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.

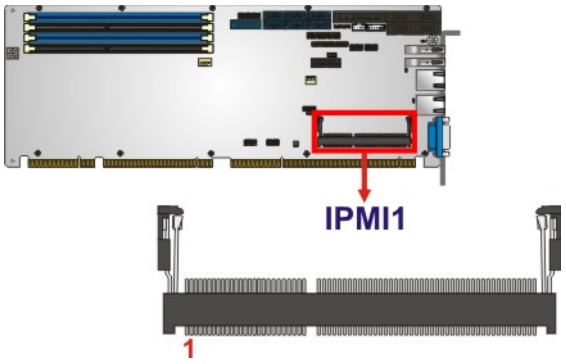


Figure 3-14: iRIS Module Slot Location

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.

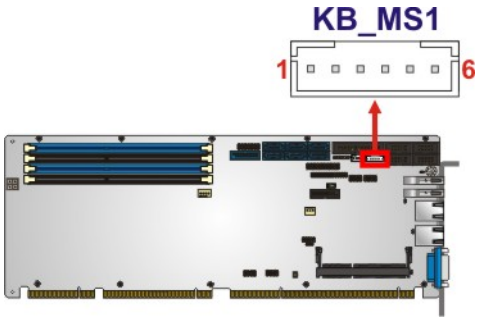


Figure 3-15: Keyboard and Mouse Connector Location

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.

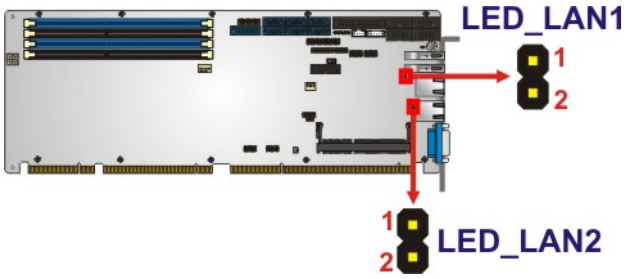


Figure 3-16: LAN LED Connector Locations

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.

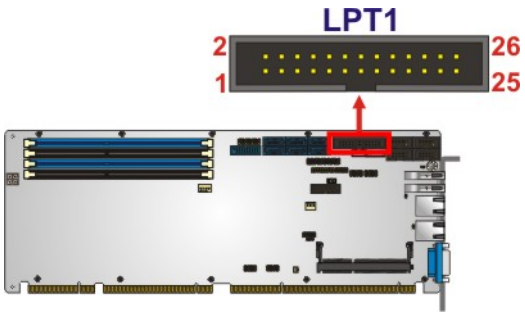


Figure 3-17: Parallel Port Connector Location

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.

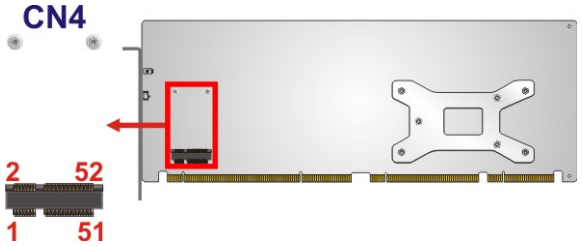


Figure 3-18: PCIe Mini Card Slot Location

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.

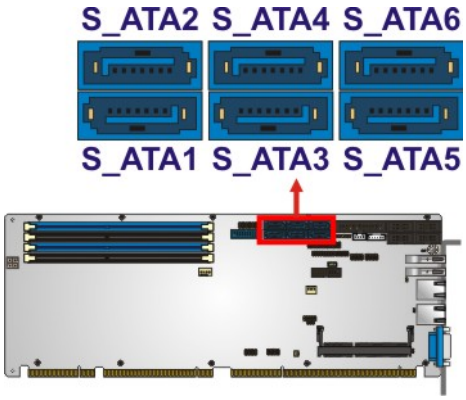


Figure 3-19: SATA 6Gb/s Drive Connector Location

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.

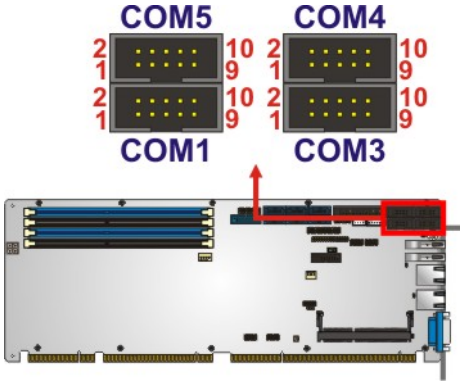


Figure 3-20: Serial Port Connector Location

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.

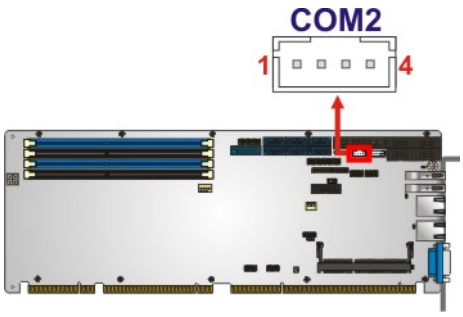


Figure 3-21: RS-422/485 Connector Location

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.

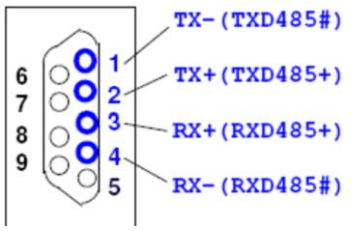
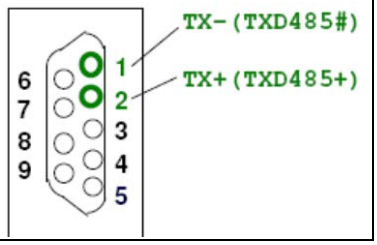
RS-422 Pinouts	RS-485 Pinouts
	

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.

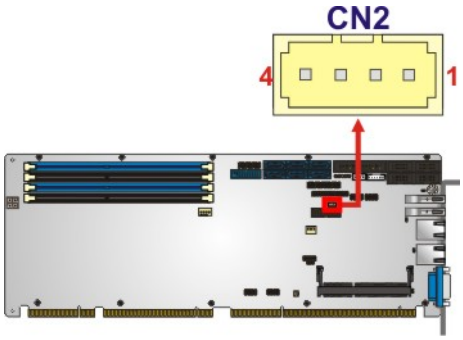


Figure 3-22: SMBus Connector Location

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.

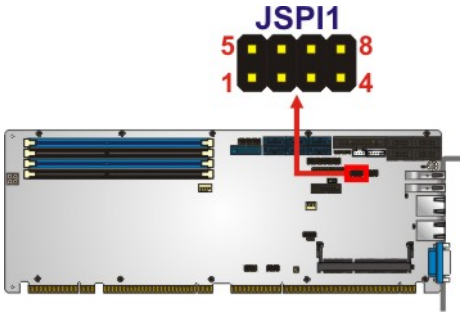


Figure 3-23: SPI Flash Connector Location

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.

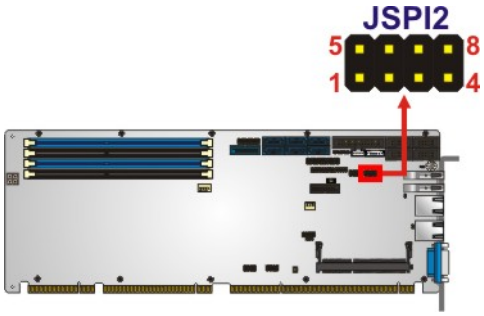


Figure 3-24: SPI EC Flash Connector Location

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.

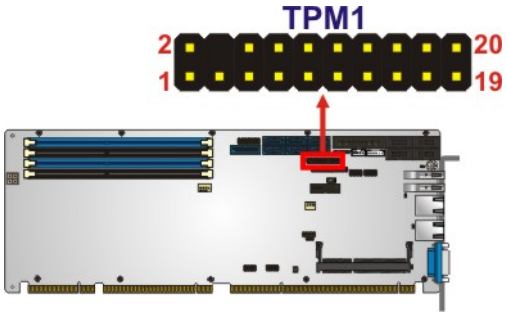


Figure 3-25: TPM Connector Location

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.

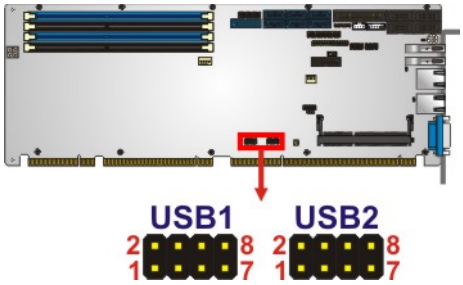


Figure 3-26: USB 2.0 Connector Pinout Locations

Pin	Description	Pin	Description
1	VCC	2	GND
3	USB_DATA-	4	USB_DATA+
5	USB_DATA+	6	USB_DATA-
7	GND	8	VCC

Table 3-27: USB 2.0 Connector Pinouts

3.2.26 USB 3.2 Gen 1 Connector

CN Label: **CN7**

CN Type: 19-pin box header

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

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

The USB 3.2 Gen 1 (5Gb/s) connector connects to USB 3.2 Gen 1 devices. This connector provides two USB 3.2 Gen 1 ports.

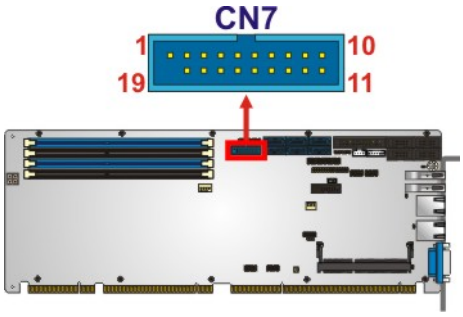


Figure 3-27: USB 3.2 Gen 1 Connector Location

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 3.2 Gen 1 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:

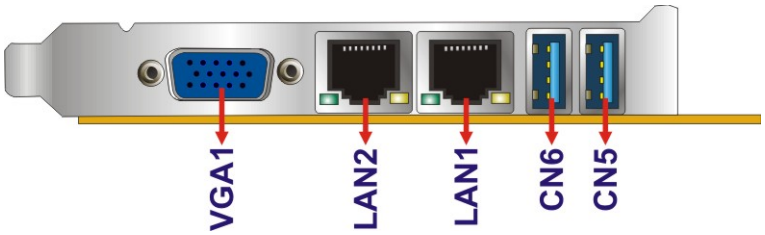


Figure 3-28: External Peripheral Interface Connector

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

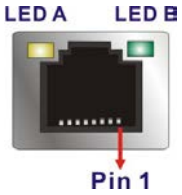


Figure 3-29: Ethernet Connector

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 3.2 Gen 1 Connectors

CN Label: **CN5, CN6**

CN Type: USB Type-A port

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

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

The PCIE-Q870-i2 has two external USB 3.2 Gen 1 (5Gb/s) 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 3.2 Gen 1 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

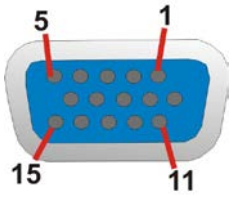


Figure 3-30: VGA Connector

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 anti-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 anti-static pad:
  - When installing or configuring the motherboard, place it on an anti-static 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:

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**.

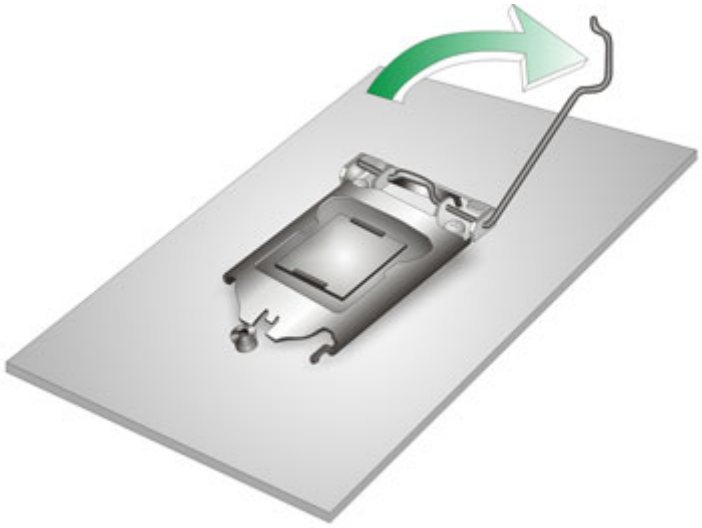


Figure 4-1: Disengage the CPU Socket Load Lever

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**.

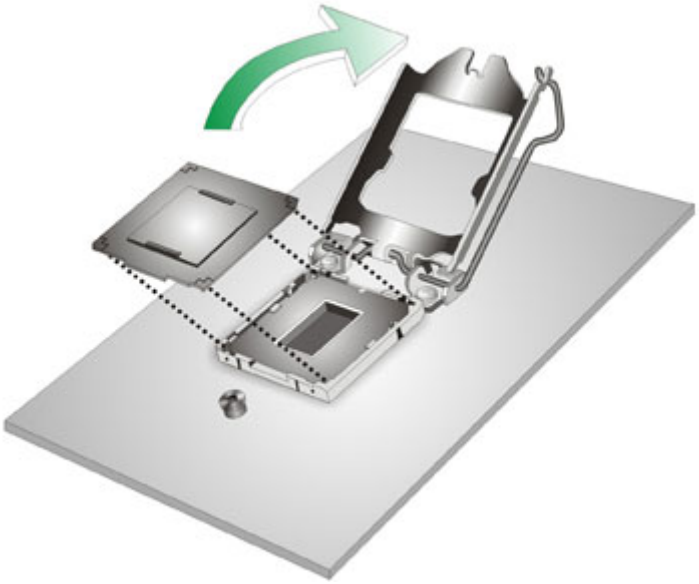


Figure 4-2: Remove Protective Cover

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:

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**.

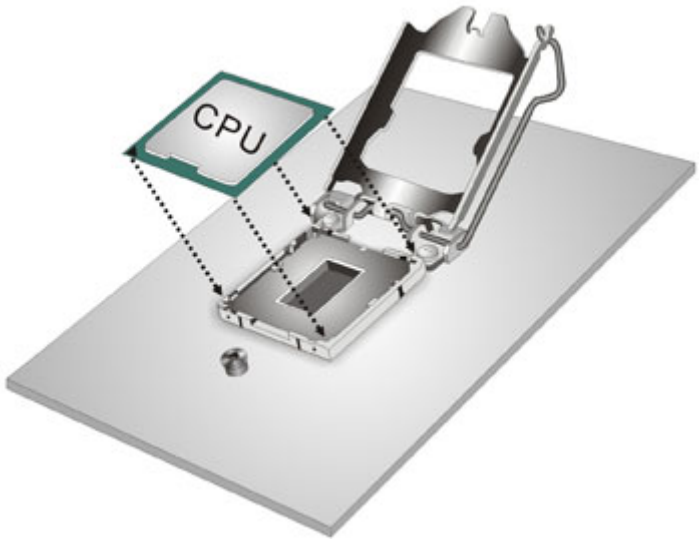


Figure 4-3: Insert the Socket LGA1150 CPU

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.**

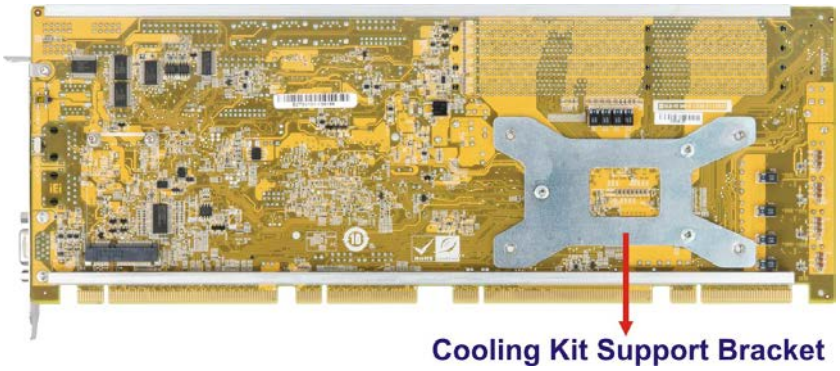


Figure 4-5: Cooling Kit Support Bracket

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**.

CAUTION:

For quad channel configuration, always install four identical memory modules that feature the same capacity, timings, voltage, number of ranks and the same brand.

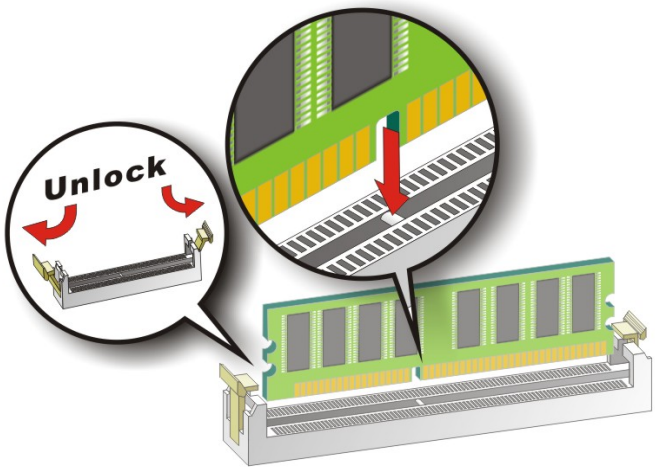


Figure 4-6: DIMM Installation

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**.

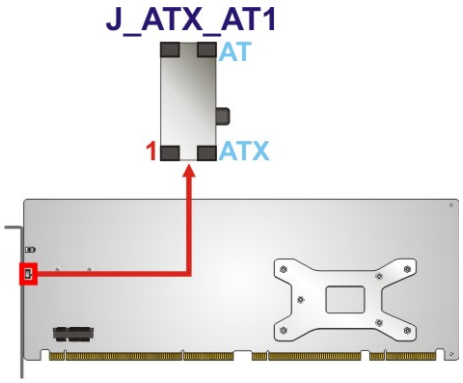


Figure 4-7: AT/ATX Power Mode Switch Location

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**.

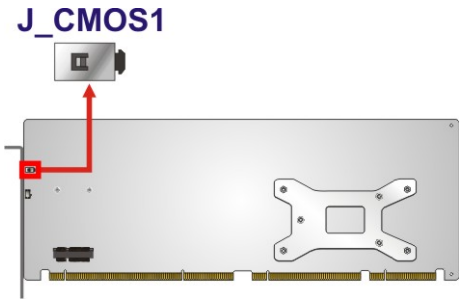


Figure 4-8: Clear CMOS Button Location

4.3.3 Flash Descriptor Security Override Jumper

The Flash Descriptor Security Override jumper (J_FLASH1) allows to enable or disable the ME firmware update. Refer to **Figure 4-9** and **Table 4-2** for the jumper location and settings.

Setting	Description
Short 1-2	Disabled (default)
Short 2-3	Enabled

Table 4-2: Flash Descriptor Security Override Jumper Settings

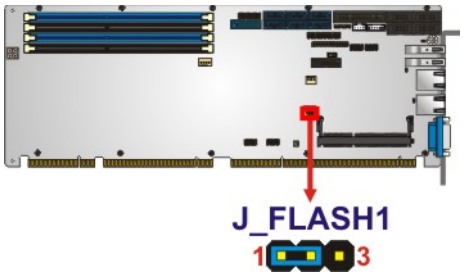


Figure 4-9: Flash Descriptor Security Override Jumper Location

To update the ME firmware, please follow the steps below.

Step 1: Before turning on the system power, short pin 2-3 of the Flash Descriptor Security Override jumper.

Step 2: Update the BIOS and ME firmware, and then turn off the system power.

Step 3: Remove the metal clip on the Flash Descriptor Security Override jumper or return to its default setting (short pin 1-2).

Step 4: Restart the system. The system will reboot 2 ~ 3 times to complete the ME firmware update.

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

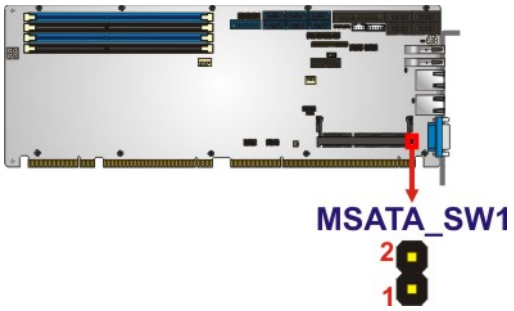


Figure 4-10: mSATA Mode Selection Jumper Location

4.3.5 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 4-4**) and refer to **Table 4-5** to select the USB power source.

BIOS Options	Configured USB Ports
USB SW1 Power	CN5 (external USB 3.2 Gen 1 port) CN6 (external USB 3.2 Gen 1 port)
USB SW2 Power	USB1 (internal USB 2.0 ports) USB2 (internal USB 2.0 ports) CN7 (internal USB 3.2 Gen 1 ports)

Table 4-4: BIOS Options and Configured USB Ports

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

Table 4-5: 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.

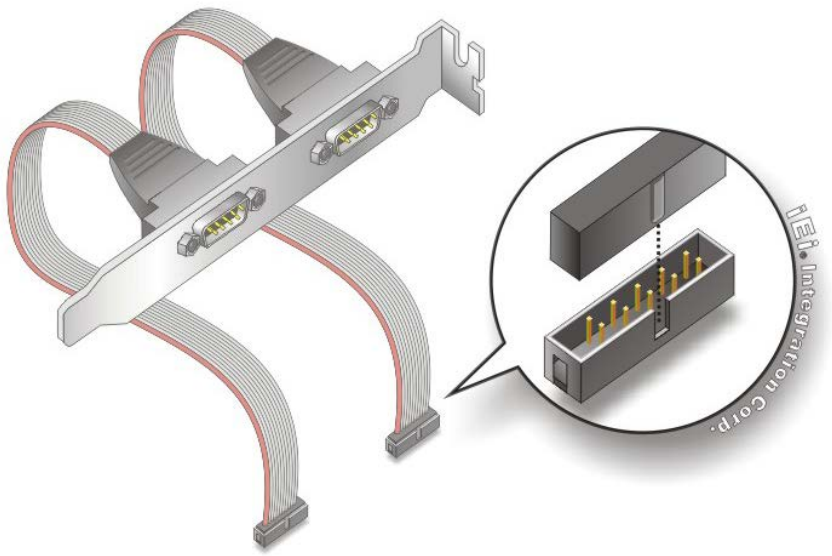


Figure 4-11: Dual RS-232 Cable Installation

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**.

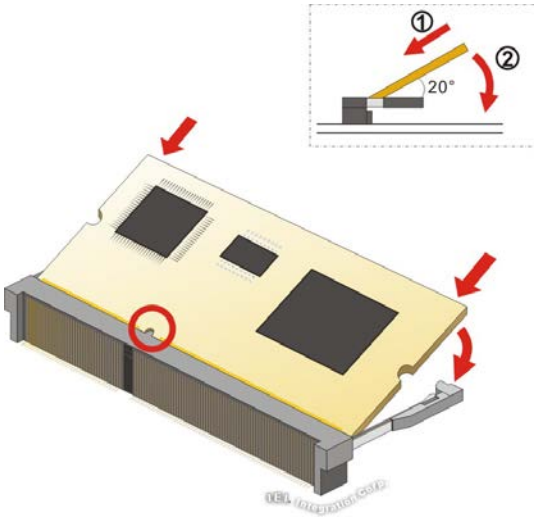


Figure 4-12: iRIS Module Installation

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 4.7** 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**.

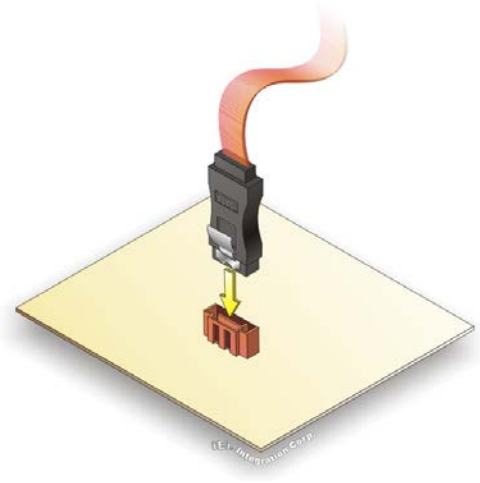


Figure 4-13: SATA Drive Cable Connection

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**.

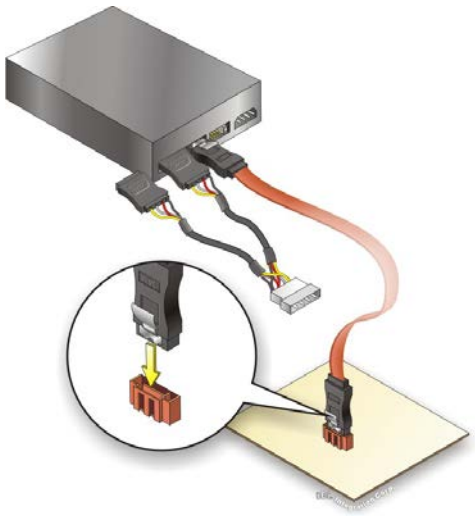


Figure 4-14: SATA Power Drive Connection

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:

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**.

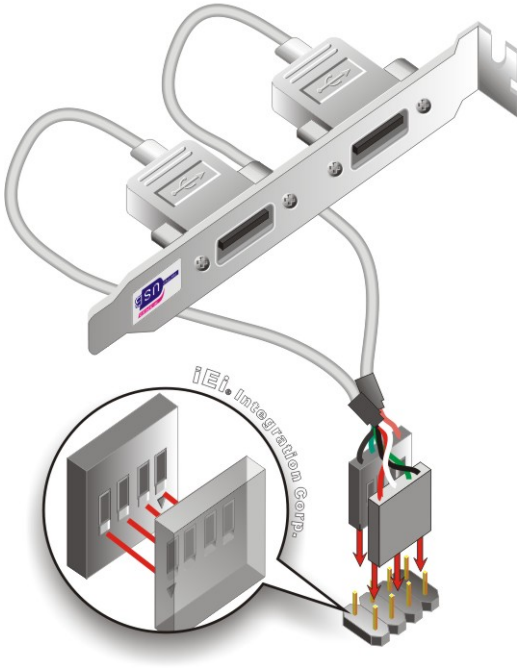


Figure 4-15: Dual USB Cable Connection

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**.

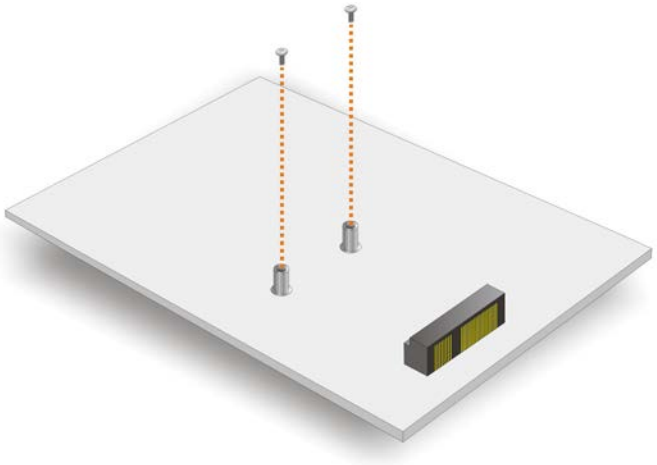


Figure 4-16: Remove the Retention Screws for the PCIe Mini Card

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**).

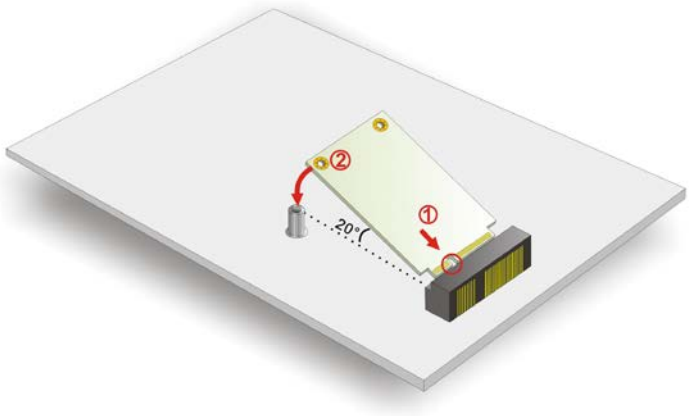


Figure 4-17: Insert the PCIe Mini Card into the Socket at an Angle

Step 4: **Secure the PCIe Mini card**. Secure the PCIe Mini card with the retention screws previously removed (**Figure 4-18**).

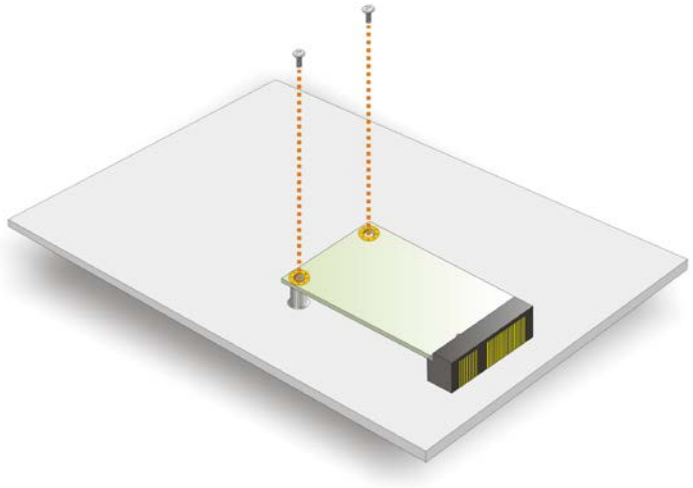


Figure 4-18: Secure the PCIe Mini Card

4.6 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 obtained from IEI Resource Download Center. See **Chapter 6**.

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:

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).

4.7 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.

4.7.1 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**).

4.7.2 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 4-19**).

Figure 4-19: 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.

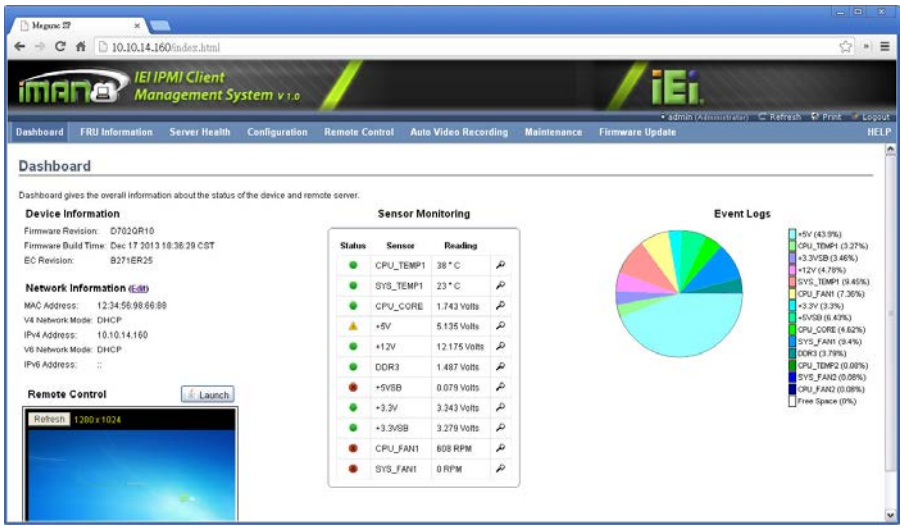


Figure 4-20: IEI iMAN Web GUI

NOTE:

To understand how to use the IEI iMAN Web GUI, please refer to the iRIS-2400 Web GUI user manual which can be obtained from IEI Resource Download Center. 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:

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
- Server Mgmt – Configures system event log and BMC network parameters

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  Server Mgmt

BIOS Information                                  Set the Date. Use Tab to
BIOS Vendor                    American Megatrends switch between Date
Core Version                   4.6.5.4             elements.
Compliancy                     UEFI 2.3.1; PI 1.2
Project Version                B273AP34.ROM
Build Date and Time            08/06/2015 11:53:40

iWDD Vendor                    ICP
iWDD Version                   B273ER38.bin

IPMI Module                    N/A

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                 →←: Select Screen
Stepping                       05/C2               ↑ ↓: Select Item
LAN PHY Revision               A3                  Enter: Select
                                                   +/-: Change Opt.
ME FW Version                  9.1.2.1010          F1: General Help
ME Firmware SKU                5MB                 F2: Previous Values
                                                   F3: Optimized Defaults
SPI Clock Frequency                                F4: Save & Exit
DOFR Support                   Supported           ESC: Exit
Read Status Clock Frequnecy    50 MHz
Write Status Clock Frequnecy   50 MHz
Fast Read Status Clock Frequnecy 50 MHz

System Date                    [Wed 11/04/2015]
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]**

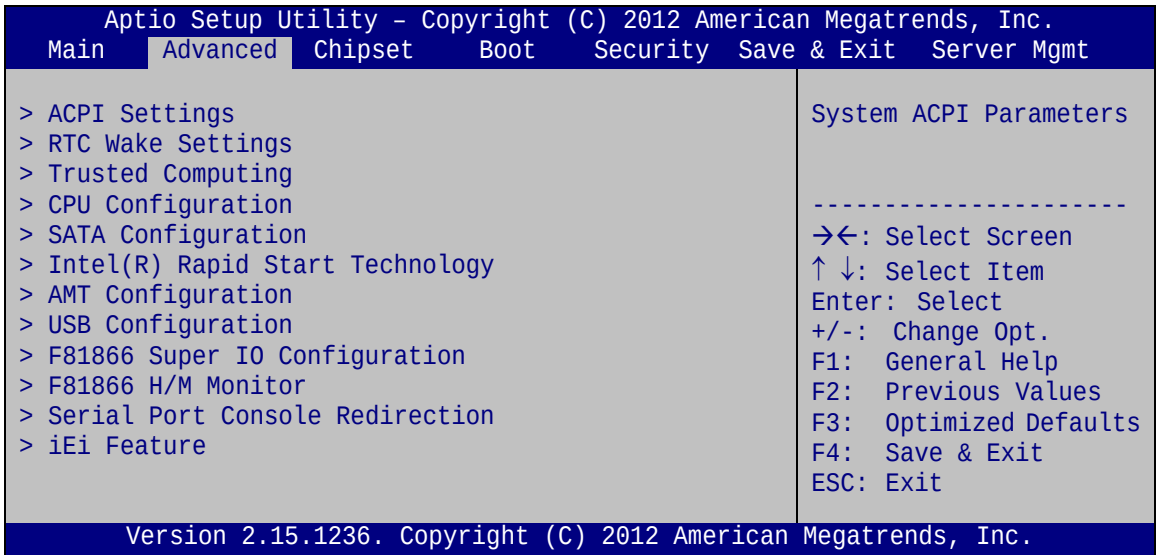
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

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

WARNING!

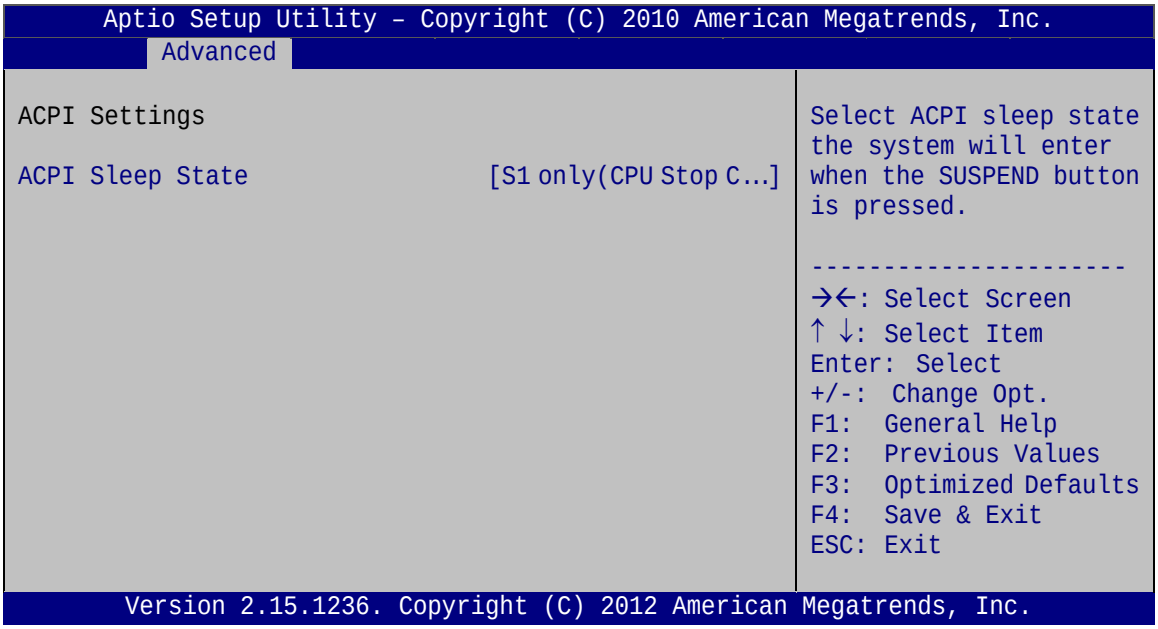
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.



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.



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

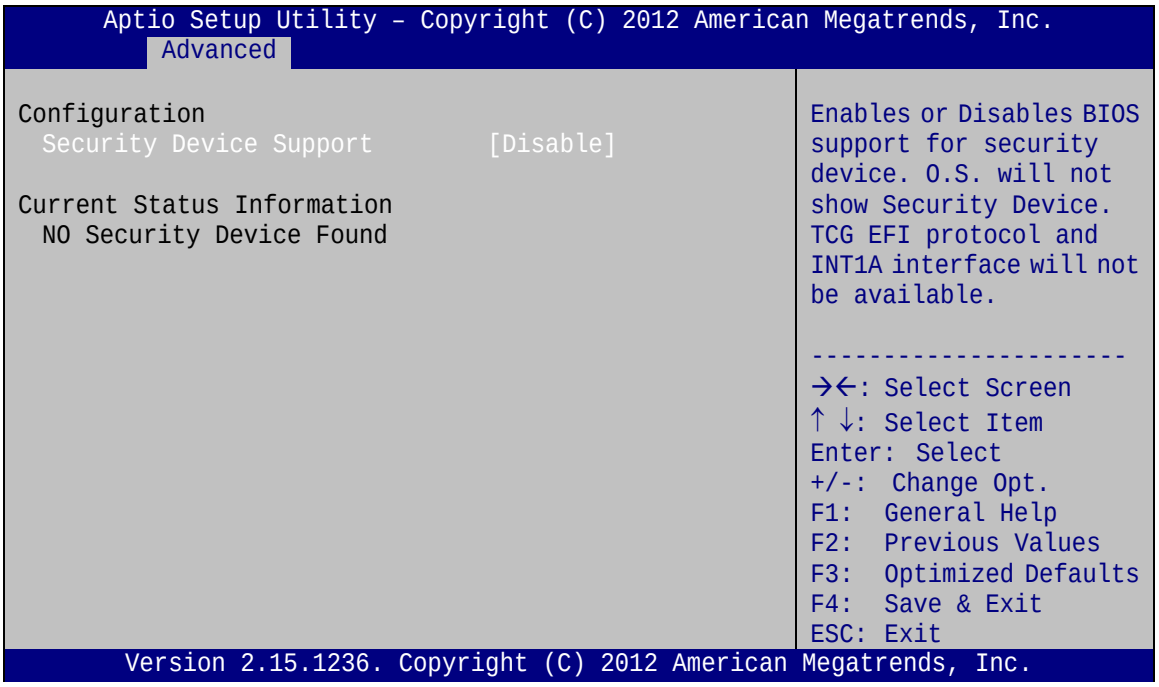
➔ **Wake system with Fixed Time [Disabled]**

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).



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
Microcode Patch                  7                 Technology
Max CPU Speed                    3100 MHz
Min CPU Speed                    800 MHz           ----------------------
CPU Speed                        3500 MHz
Processor Cores                  4
Intel HT Technology              Supported
Intel VT-x Technology            Supported         →←: Select Screen
Intel SMX Technology             Supported         ↑ ↓: Select Item
64-bit                           Supported         Enter: Select
EIST Technology                  Supported         +/-: Change Opt.
                                                   F1: General Help
L1 Data Cache                    32 kB x 4         F2: Previous Values
L1 Code Cache                    32 kB x 4         F3: Optimized Defaults
L2 Cache                         256 kB x 4        F4: Save & Exit
L3 Cache                         8192 kB           ESC: Exit

Hyper-threading                  [Enabled]
Active Processor Cores           [All]
Intel Virtualization Technology  [Disabled]
EIST                             [Enabled]
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.

➔ **Active Processor Cores [All]**

Use the **Active Processor Cores** BIOS option to enable numbers of cores in the processor package.

➔	**All**	**DEFAULT**	Enable all cores in the processor package.
➔	**1**		Enable one core in the processor package.
➔	**2**		Enable two cores in the processor package.
➔	**3**		Enable three cores in the processor package.

➔ **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.

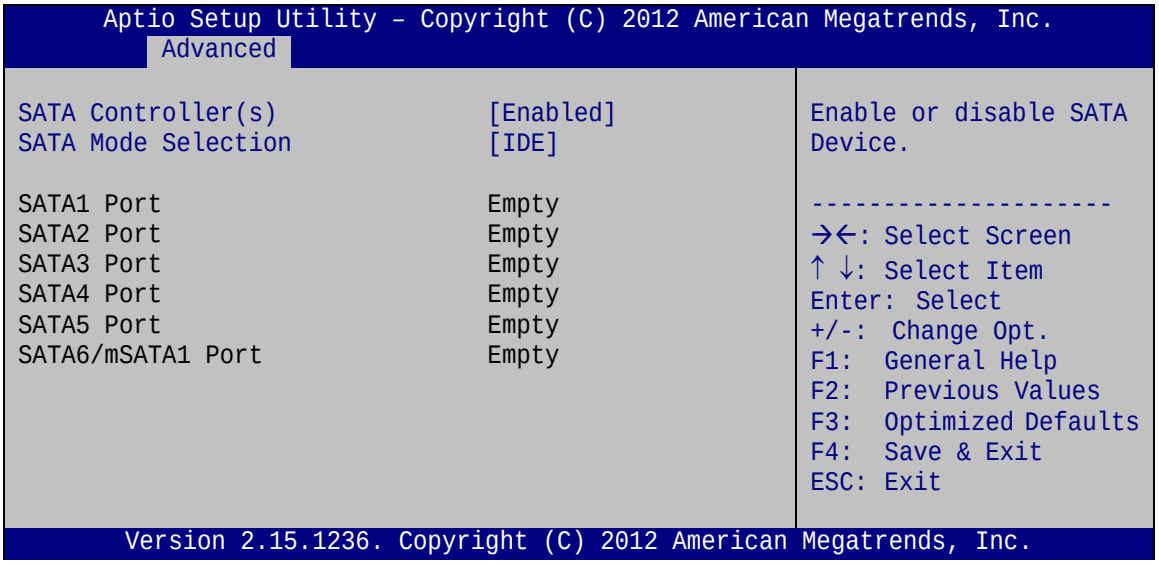
➔ **EIST [Enabled]**

Use the **EIST** option to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).

➔	**Disabled**		Disables Enhanced Intel® SpeedStep Technology
➔	**Enabled**	**DEFAULT**	Enables Enhanced Intel® SpeedStep 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.



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.

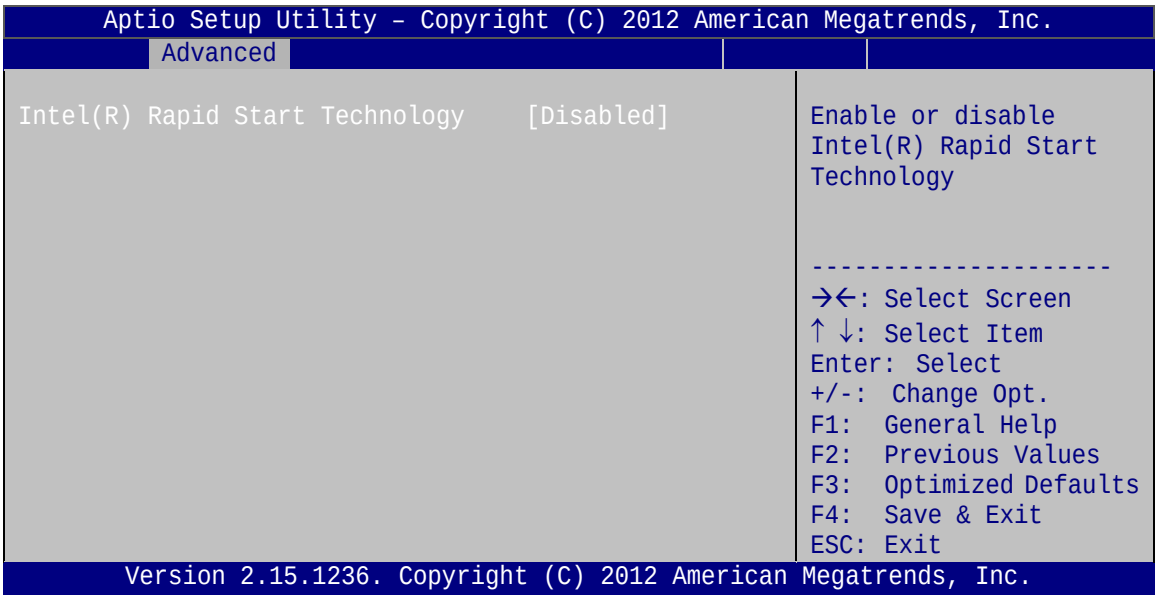
➔ **SATA Mode Selection [IDE]**

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.



BIOS Menu 8: Intel(R) Rapid Start Technology

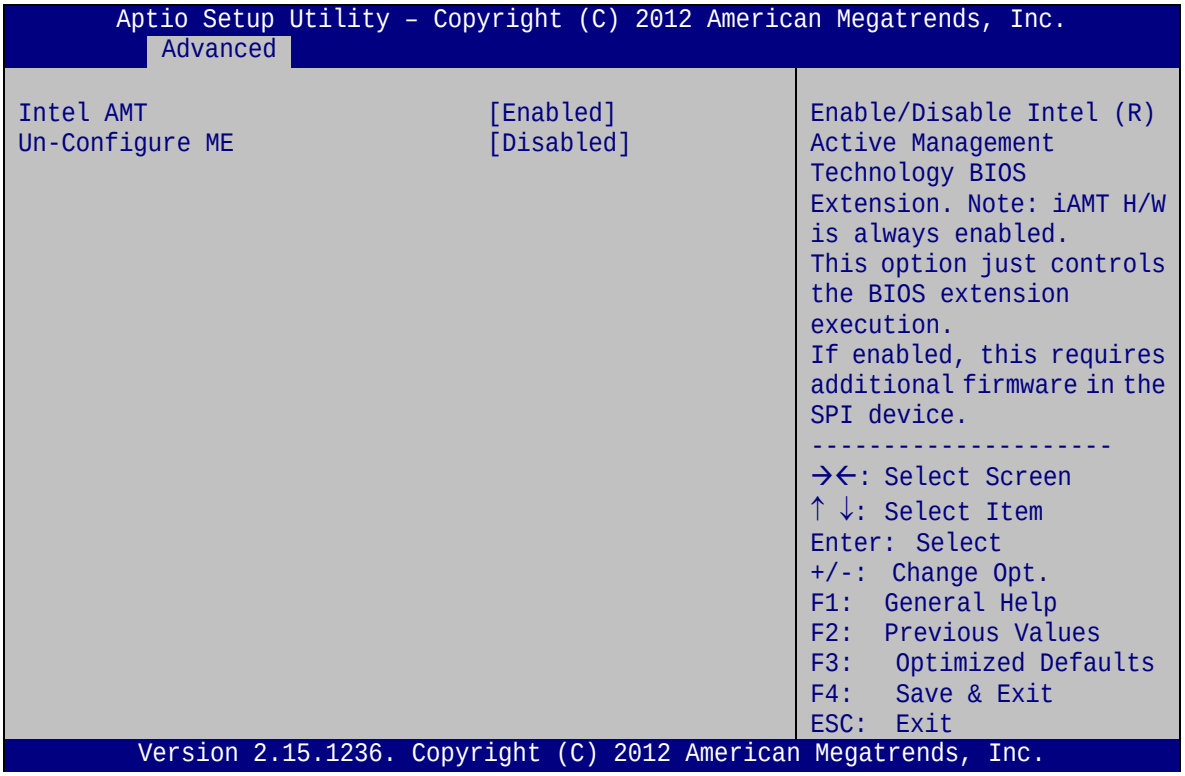
➔ **Intel(R) Rapid Start Technology [Disabled]**

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.



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]**

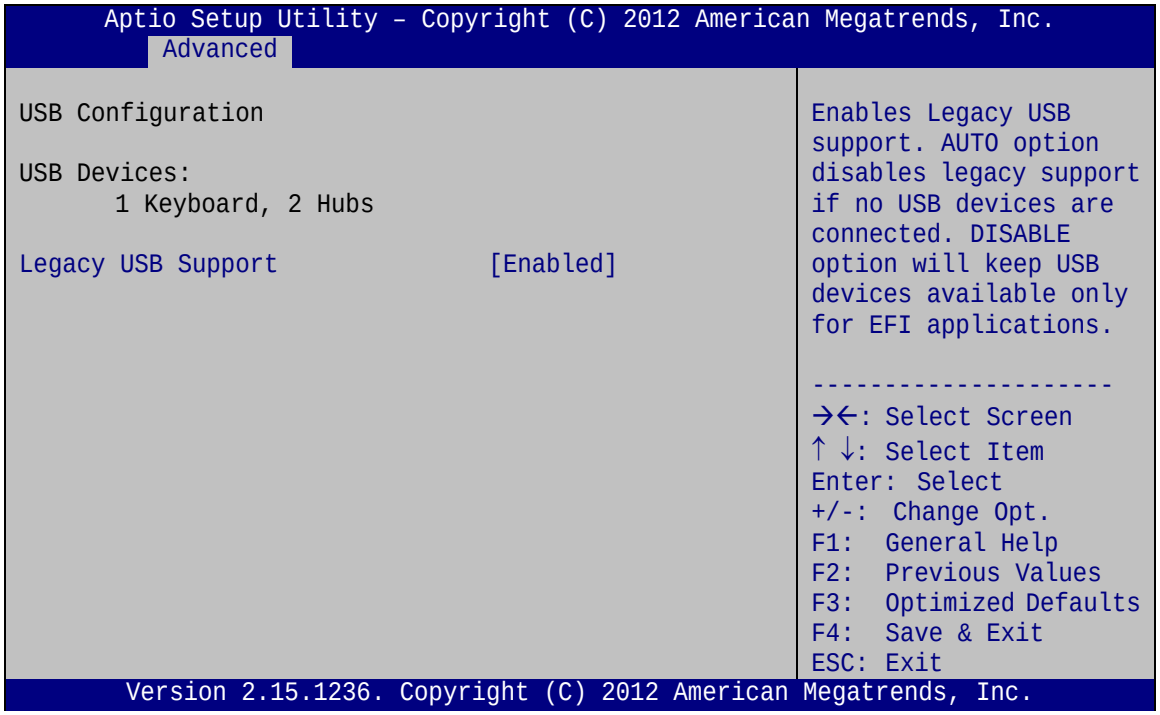
Use the **Un-Configure ME** option to perform ME unconfigure without password operation.

➔ **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.



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

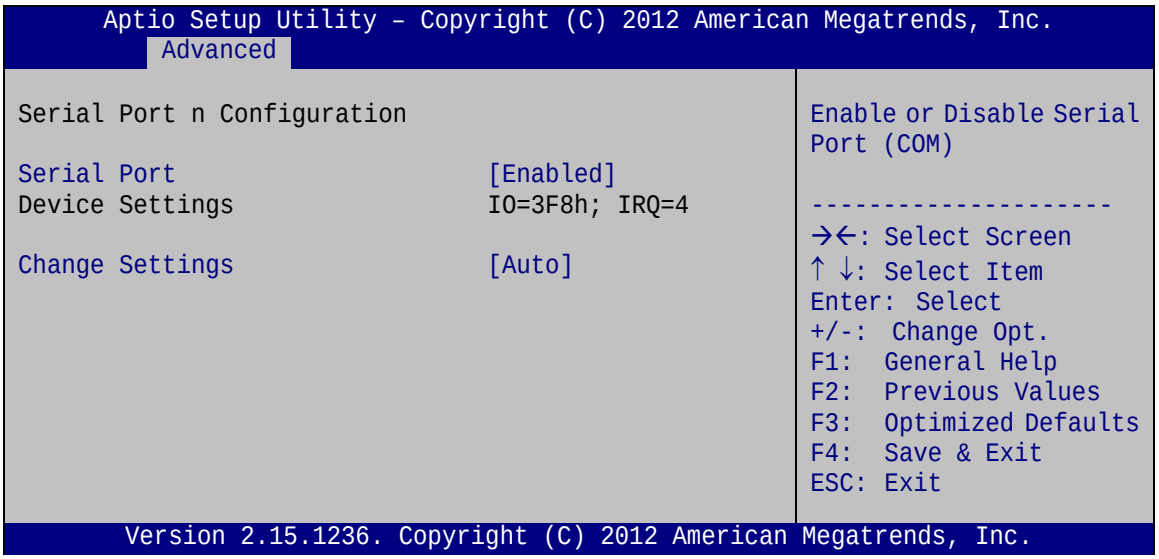
Use the **F81866 Super IO Configuration** menu (**BIOS Menu 11**) to set or change the configurations for the parallel ports and serial ports.

```
      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                  | →←: Select Screen
 > Serial Port 3 Configuration                  | ↑ ↓: Select Item
 > Serial Port 4 Configuration                  | Enter: Select
 > Serial Port 5 Configuration                  | +/-: Change Opt.
 > IrDA Configuration                           | F1: General Help
 > Parallel Port Configuration                  | 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

5.3.9.1 Serial Port n Configuration

Use the **Serial Port n Configuration** menu (**BIOS Menu 12**) to configure the serial port n.



BIOS Menu 12: Serial Port n Configuration Menu

5.3.9.1.1 Serial Port 1 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=3F8h; IRQ=4**		Serial Port I/O port address is 3F8h and the interrupt address is IRQ4

- ➔ **IO=3F8h; IRQ=3, 4** — Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4
- ➔ **IO=2C0h; IRQ=3, 4** — Serial Port I/O port address is 2C0h and the interrupt address is IRQ3, 4
- ➔ **IO=2C8h; IRQ=3, 4** — Serial Port I/O port address is 2C8h and the interrupt 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; IRQ=3** — Serial Port I/O port address is 2F8h and the interrupt address is IRQ3
- ➔ **IO=3F8h; IRQ=3, 4** — Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4
- ➔ **IO=2F8h; IRQ=3, 4** — Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4
- ➔ **IO=2C0h; IRQ=3, 4** — Serial Port I/O port address is 2C0h and the interrupt address is IRQ3, 4
- ➔ **IO=2C8h; IRQ=3, 4** — Serial Port I/O port address is 2C8h and the interrupt address is IRQ3, 4

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; IRQ=11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ11
➔ **IO=2D0h; IRQ=10, 11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10, 11
➔ **IO=2D8h; IRQ=10, 11**		Serial Port I/O port address is 2D8h and the interrupt address is IRQ10, 11
➔ **IO=2C0h; IRQ=10, 11**		Serial Port I/O port address is 2C0h and the interrupt address is IRQ10, 11
➔ **IO=2C8h; IRQ=10, 11**		Serial Port I/O port address is 2C8h and the interrupt 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=2D8h; IRQ=10**		Serial Port I/O port address is 2D8h and the interrupt address is IRQ10
➔ **IO=2D0h; IRQ=10, 11**		Serial Port I/O port address is 2D0h and the interrupt address is IRQ10, 11
➔ **IO=2D8h; IRQ=10, 11**		Serial Port I/O port address is 2D8h and the interrupt address is IRQ10, 11
➔ **IO=2C0h; IRQ=10, 11**		Serial Port I/O port address is 2C0h and the interrupt address is IRQ10, 11
➔ **IO=2C8h; IRQ=10, 11**		Serial Port I/O port address is 2C8h and the interrupt 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=2C0h; IRQ=11**	Serial Port I/O port address is 2C0h and the interrupt address is IRQ11
➔	**IO=2D0h; IRQ=10, 11**	Serial Port I/O port address is 2D0h and the interrupt address is IRQ10, 11
➔	**IO=2D8h; IRQ=10, 11**	Serial Port I/O port address is 2D8h and the interrupt address is IRQ10, 11
➔	**IO=2C0h; IRQ=10, 11**	Serial Port I/O port address is 2C0h and the interrupt address is IRQ10, 11
➔	**IO=2C8h; IRQ=10, 11**	Serial Port I/O port address is 2C8h and the interrupt address is IRQ10, 11

5.3.9.2 IrDA Configuration

Use the **IrDA Configuration** menu (**BIOS Menu 13**) to configure the infrared port.

```
Aptio Setup Utility – Copyright (C) 2012 American Megatrends, Inc.
        Advanced
IrDA Configuration                          Enable or Disable Serial
                                            Port (COM)
Serial Port                  [Enabled]
Device Settings              IO=2C8h; IRQ=10 ---------------------
                                            →←: Select Screen
Change Settings              [Auto]         ↑ ↓: Select Item
Duplex Function              [Full Duplex]  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: IrDA Configuration Menu

➔ **Serial Port [Enabled]**

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

➔	**Disabled**		Disable the infrared port
➔	**Enabled**	**DEFAULT**	Enable the infrared port

➔ **Change Settings [Auto]**

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

➔ **Auto**	**DEFAULT**	The infrared port IO port address and interrupt address are automatically detected.
➔ **IO=2C8h; IRQ=10**		Infrared port I/O port address is 2C8h and the interrupt address is IRQ10
➔ **IO=2D0h; IRQ=10, 11**		Infrared port I/O port address is 2D0h and the interrupt address is IRQ10, 11
➔ **IO=2D8h; IRQ=10, 11**		Infrared port I/O port address is 2D8h and the interrupt address is IRQ10, 11
➔ **IO=2C0h; IRQ=10, 11**		Infrared port I/O port address is 2C0h and the interrupt address is IRQ10, 11
➔ **IO=2C8h; IRQ=10, 11**		Infrared port I/O port address is 2C8h and the interrupt address is IRQ10, 11

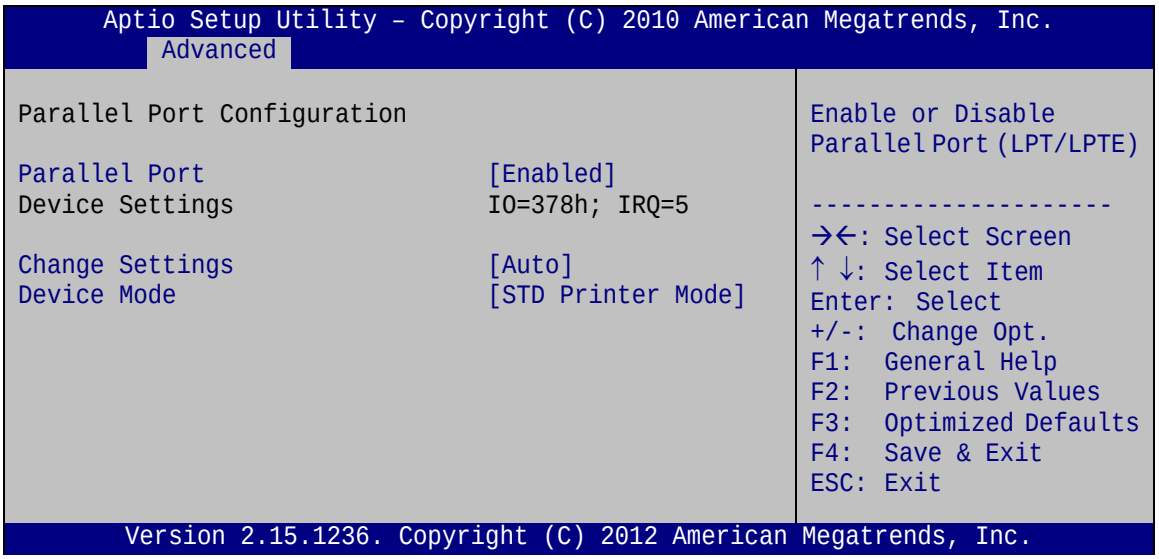
➔ **Duplex Function [Full Duplex]**

Use the **Duplex Function** option to select the IR data transmission mode.

➔ **Full Duplex**	**DEFAULT**	The communication channels is used to send and receive the data in both directions at the same time.
➔ **Half Duplex**		Transmission signals are sent in both directions but one direction at a time so half duplex lines can alternatively send and receive data.

5.3.9.3 Parallel Port Configuration

Use the **Parallel Port Configuration** menu (**BIOS Menu 14**) to configure the serial port n.



BIOS Menu 14: 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; IRQ=5**		Parallel Port I/O port address is 378h and the interrupt address is IRQ5
➔ **IO=378h; IRQ=5, 7**		Parallel Port I/O port address is 378h and the interrupt address is IRQ5, 7

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

➔ **IO=3BCh; IRQ=5, 7** Parallel Port I/O port address is 3BCh and the 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 15**) 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                       :+1.792 V        | +/-: Change Opt.
 +5V                              :+5.096 V        | F1: General Help
 +12V                             :+12.207 V       | F2: Previous Values
 DDR                              :+1.519 V        | F3: Optimized Defaults
 +5VSB                            :+4.922 V        | F4: Save & Exit
 +3.3V                            :+3.286 V        | ESC: Exit
 +3.3VSB                          :+3.294 V        |
        Version 2.15.1236. Copyright (C) 2012 American Megatrends, Inc.
```

BIOS Menu 15: F81866 H/W Monitor

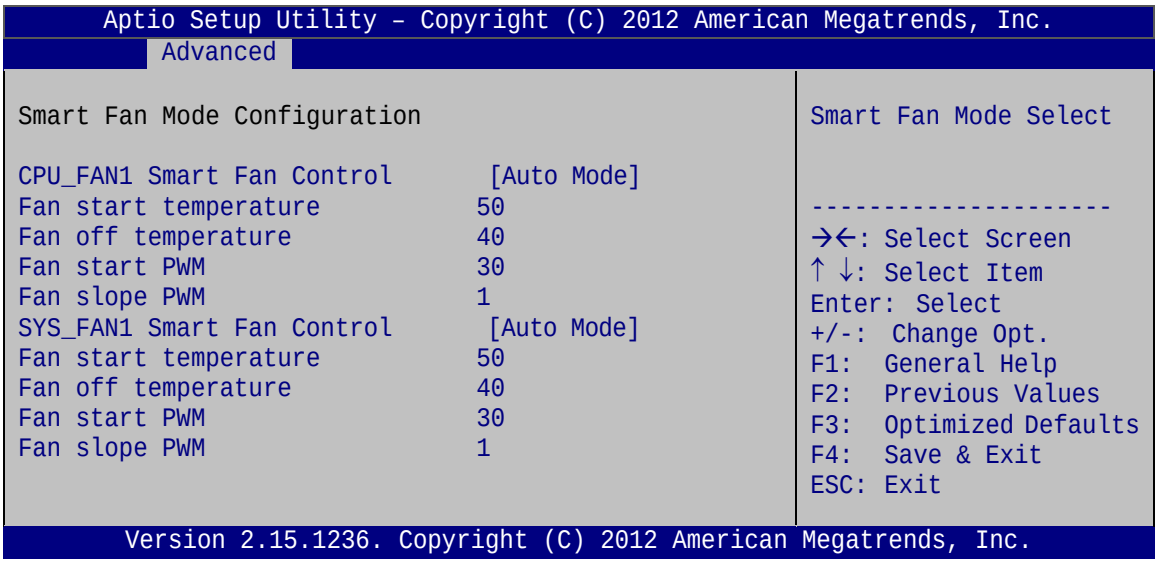
➔ **PC Health Status**

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
  - DDR
  - +5VSB
  - +3.3V
  - +3.3VSB

5.3.10.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration submenu** (**BIOS Menu 16**) to configure fan 1 temperature and speed settings.



BIOS Menu 16: 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**

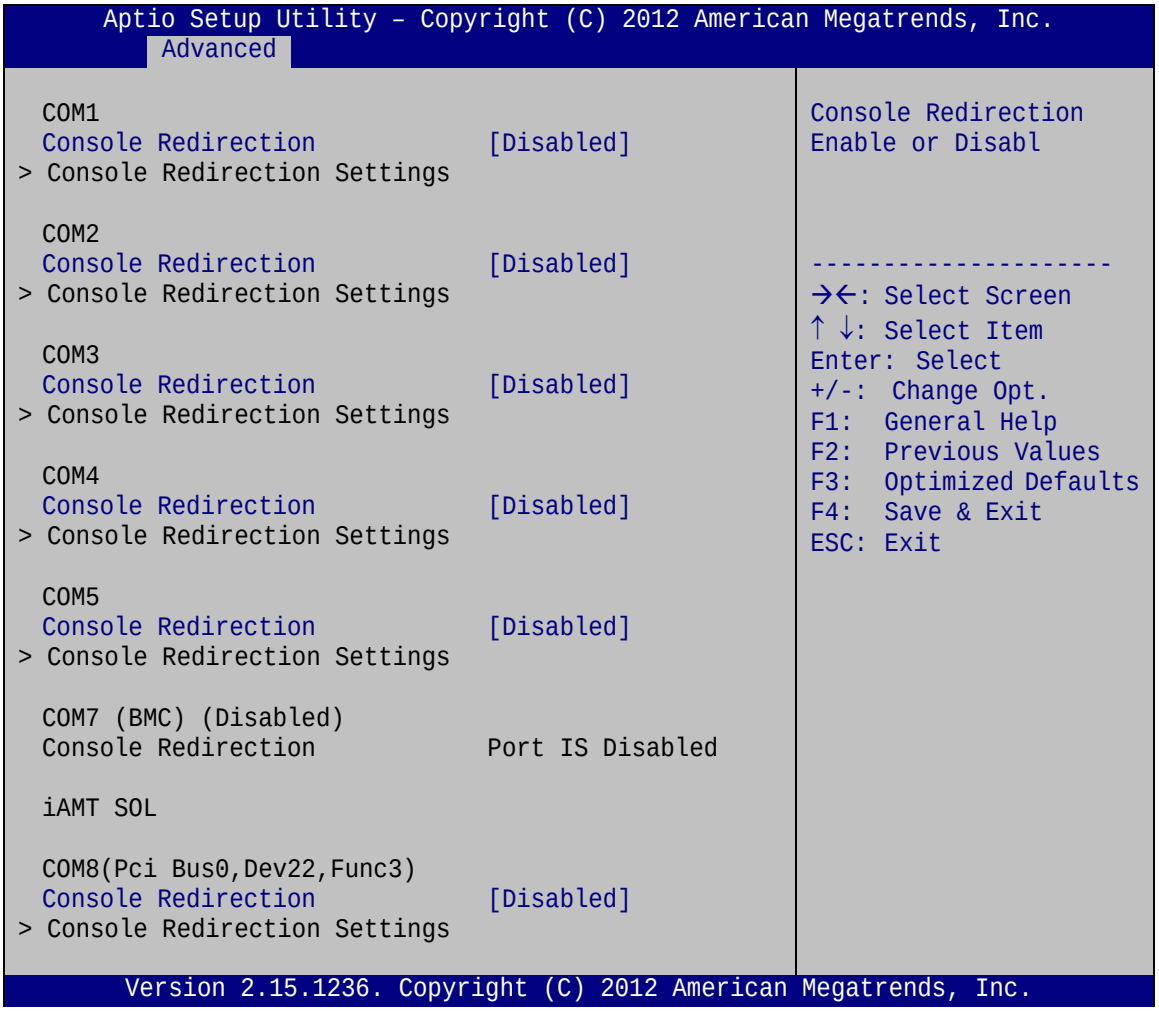
Use the + or – key to change the **Fan start PWM** value. Enter a decimal number between 1 and 128.

➔ **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 17**) 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.



BIOS Menu 17: 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.

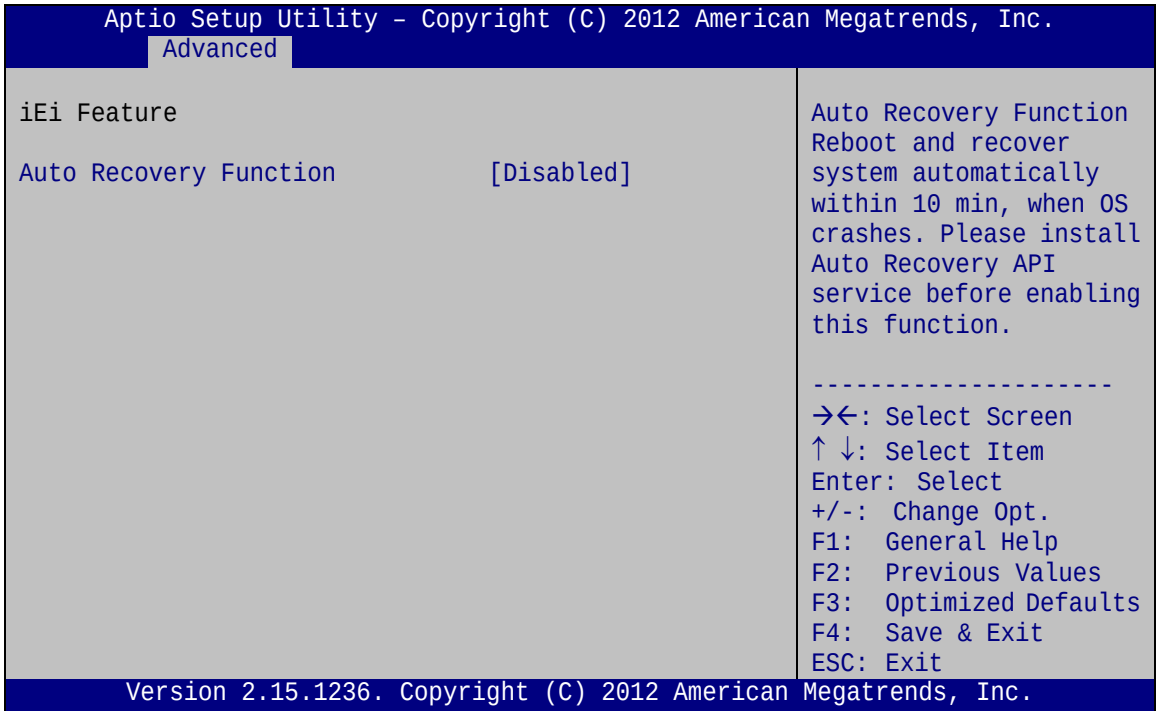
➔ **Stop Bits [1]**

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 18**) to configure One Key Recovery function.



BIOS Menu 18: 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.

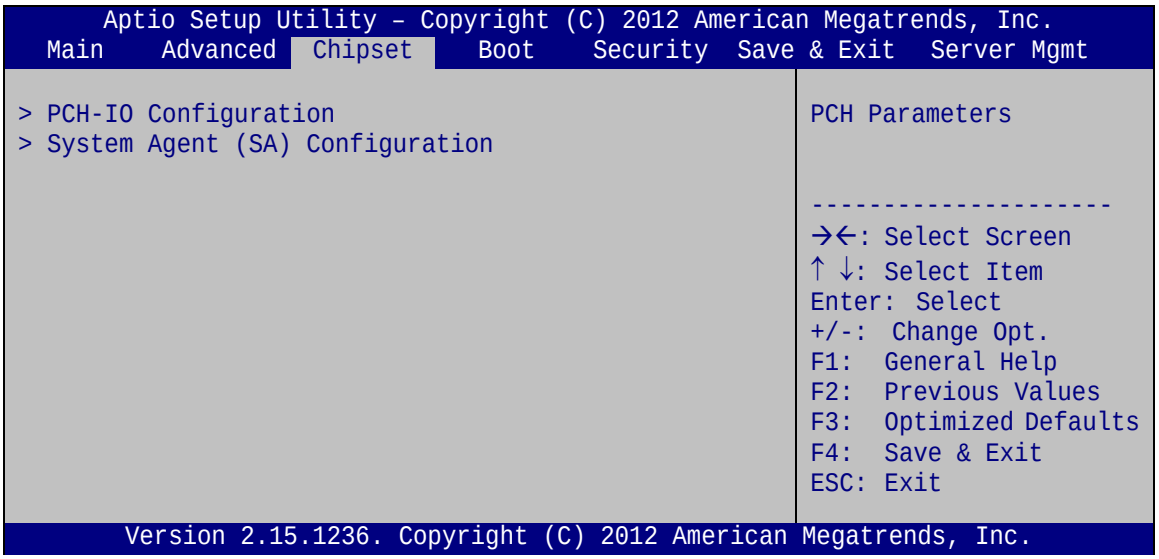
➔	**Disabled**	**DEFAULT**	Auto recovery function disabled
➔	**Enabled**		Auto recovery function enabled

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 19**) to access the PCH IO and System Agent (SA) configuration menus.

WARNING!

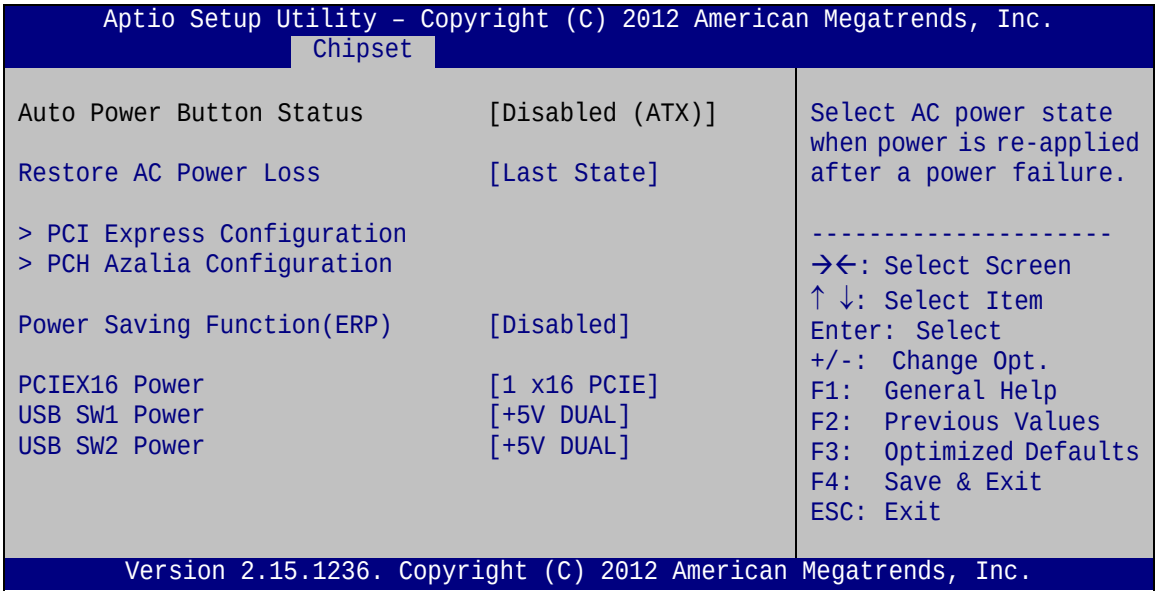
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 19: Chipset

5.4.1 PCH-IO Configuration

Use the **PCH-IO Configuration** menu (**BIOS Menu 20**) to configure the PCH parameters.



BIOS Menu 20: 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**	**DEFAULT**	Sets the PCIe x16 slot as one PCIe x16

➔ **USB SW1 Power [+5V DUAL]**

Use the **USB SW1 Power** BIOS option to configure the USB power source for the external USB 3.2 Gen 1 ports.

➔ **+5V**		Sets the USB power source to +5V
➔ **+5V DUAL**	**DEFAULT**	Sets the USB power source to +5V dual

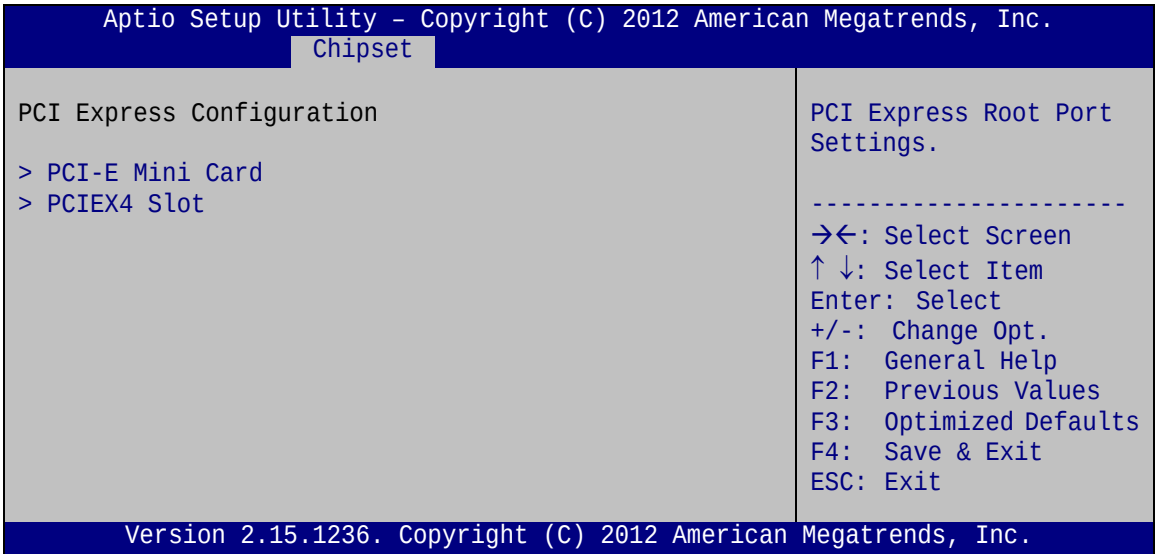
➔ **USB SW2 Power [+5V DUAL]**

Use the **USB SW2 Power** BIOS option to configure the USB power source for the internal USB 3.2 Gen 1 and USB 2.0 ports.

➔ **+5V**		Sets the USB power source to +5V
➔ **+5V DUAL**	**DEFAULT**	Sets the USB power source to +5V dual

5.4.1.1 PCI Express Configuration

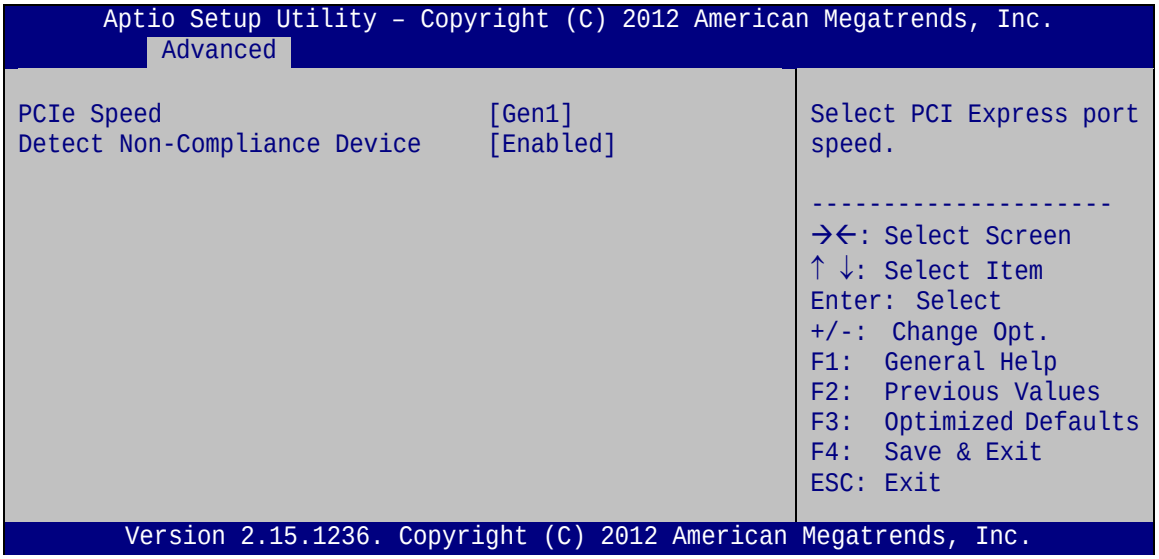
Use the **PCI Express Configuration** menu (**BIOS Menu 21**) to configure the PCI Express slots.



BIOS Menu 21: PCI Express Configuration

5.4.1.1.1 PCI-E Mini Card/PCIEX4 Slot

Use the **PCI-E Mini Card/PCIEX4 Slot** menu (**BIOS Menu 22**) to configure the PCIe Mini and PCIe x4 settings.



BIOS Menu 22: 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

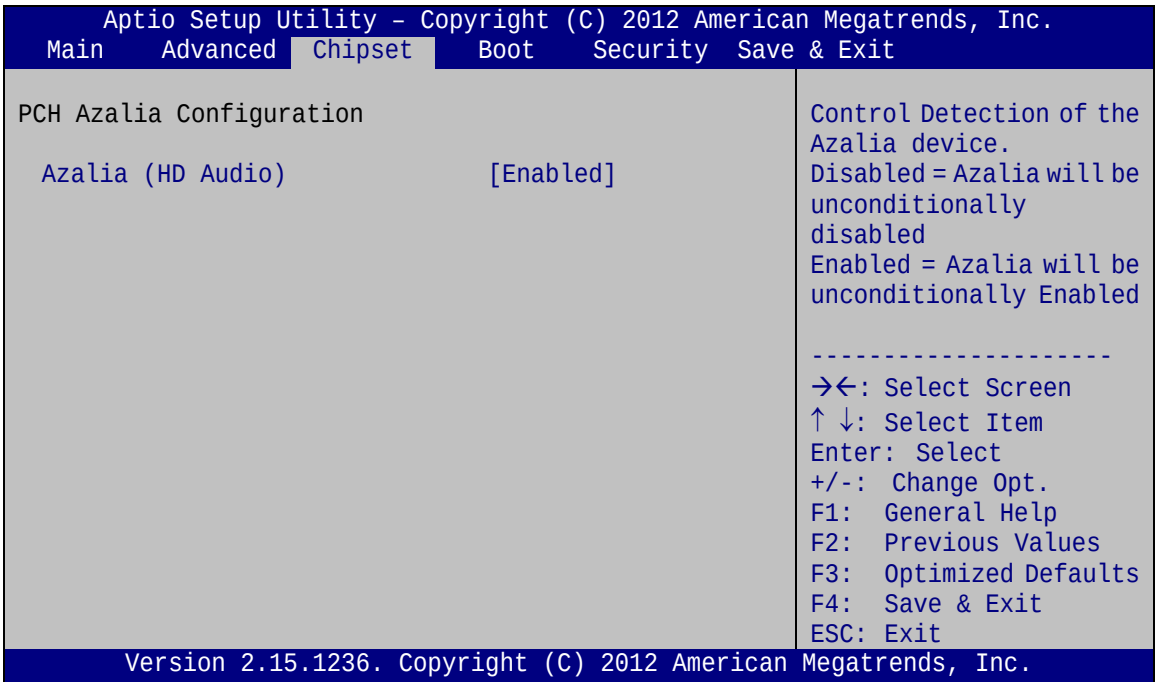
➔ **Detect Non-Compliance Device [Enabled]**

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 23**) to configure the PCH Azalia settings.



BIOS Menu 23: PCH Azalia Configuration Menu

➔ **Azalia (HD Audio) [Enabled]**

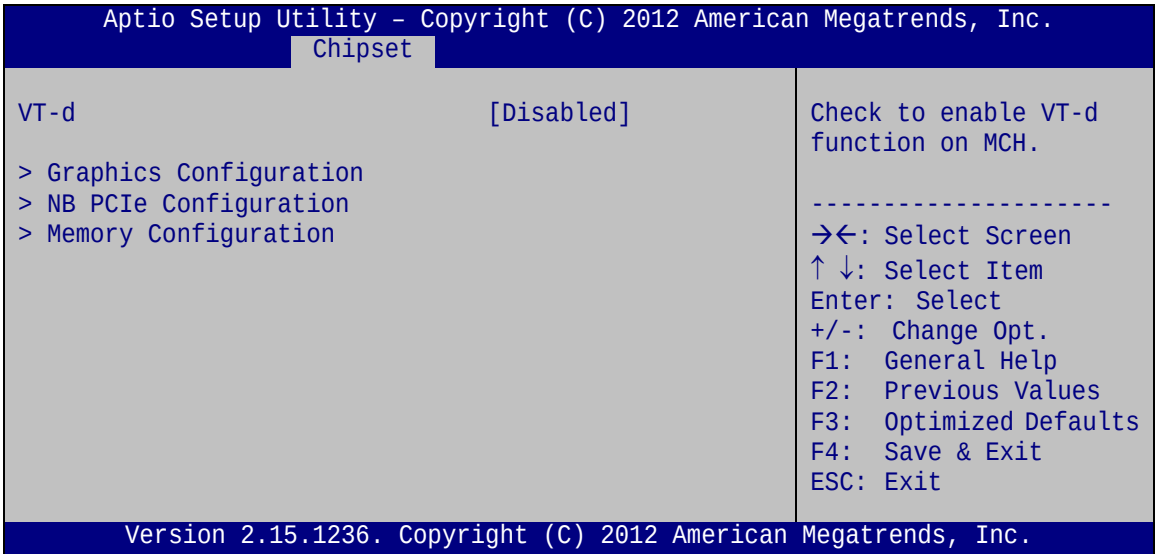
Use the **Azalia (HD Audio)**option to enable or disable the High Definition Audio controller.

➔ **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 24**) to configure the System Agent (SA) parameters.



BIOS Menu 24: System Agent (SA) Configuration

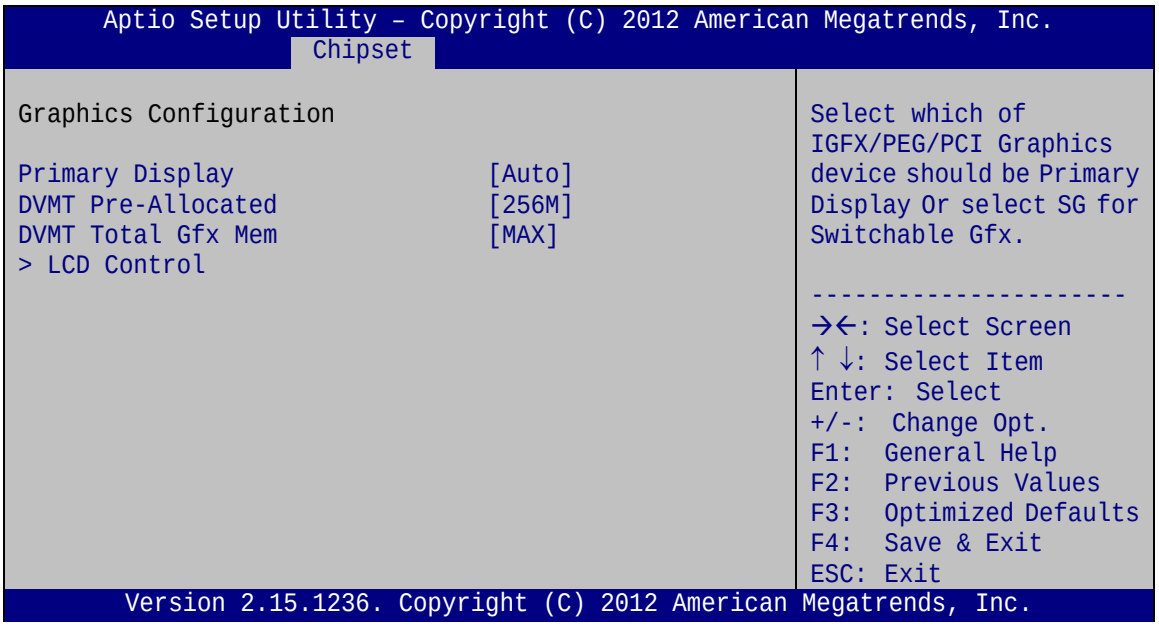
➔ **VT-d [Disabled]**

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 25**) menu to configure the video device connected to the system.



BIOS Menu 25: 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                                  | Select the Video Device
                                             | which will be activated
Primary IGFX Boot Display       [VBIOS Default] | 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.
```

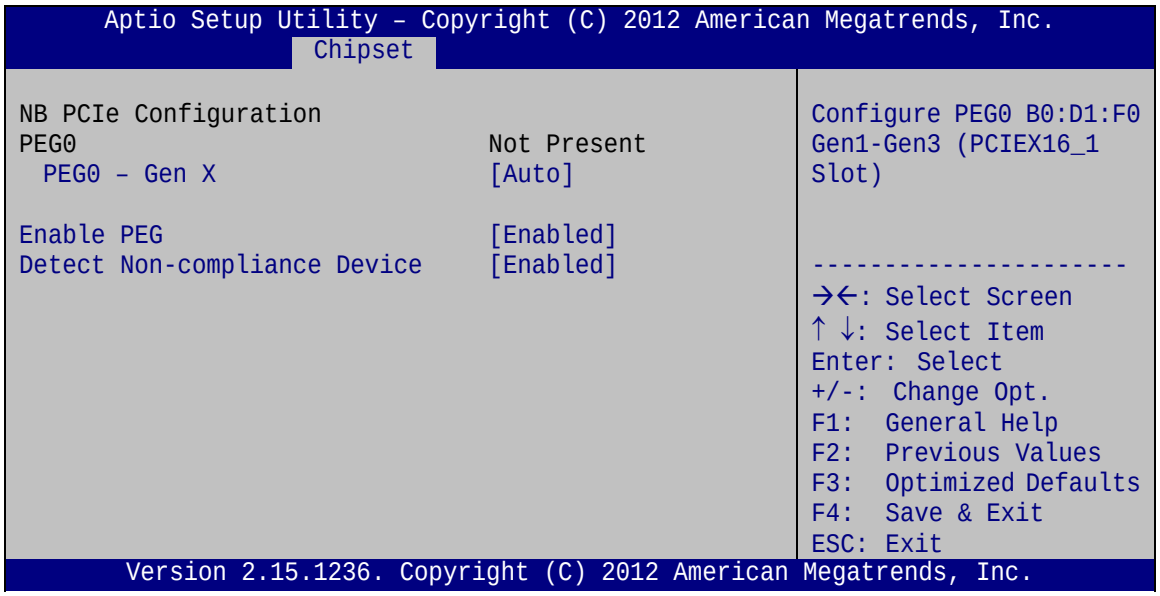
BIOS Menu 26: LCD Control

➔ **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
- DP

5.4.2.2 NB PCIe Configuration



BIOS Menu 27: 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

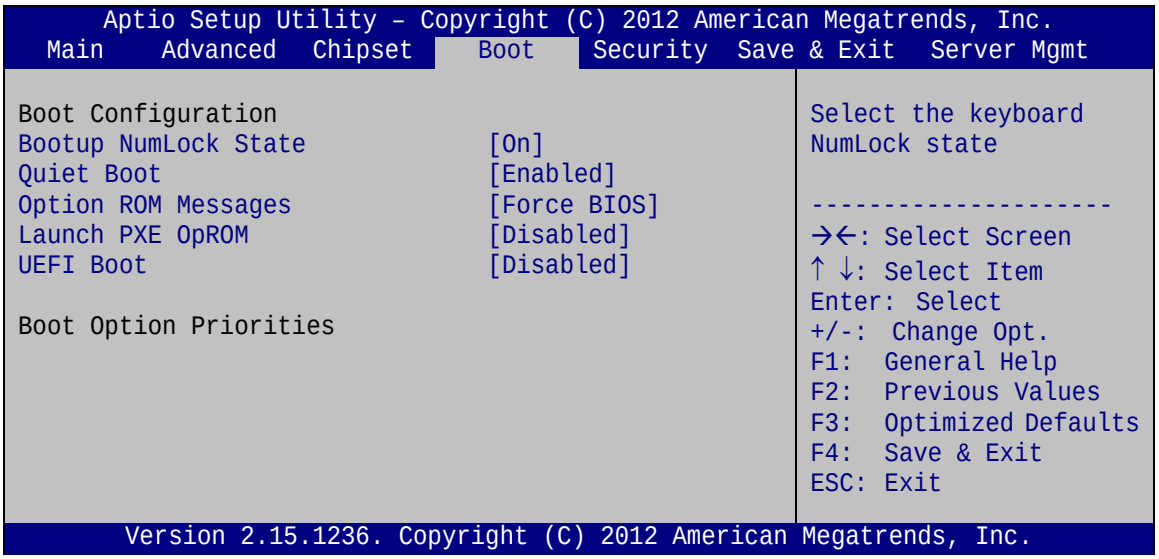
Use the **Memory Configuration** submenu (**BIOS Menu 28**) to view memory information.

```
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 28: Memory Configuration

5.5 Boot

Use the **Boot** menu (**BIOS Menu 29**) to configure system boot options.



BIOS Menu 29: 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

➔ **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**	**DEFAULT**	Ignore all PXE Option ROMs
➔	**Enabled**		Load PXE Option ROMs.

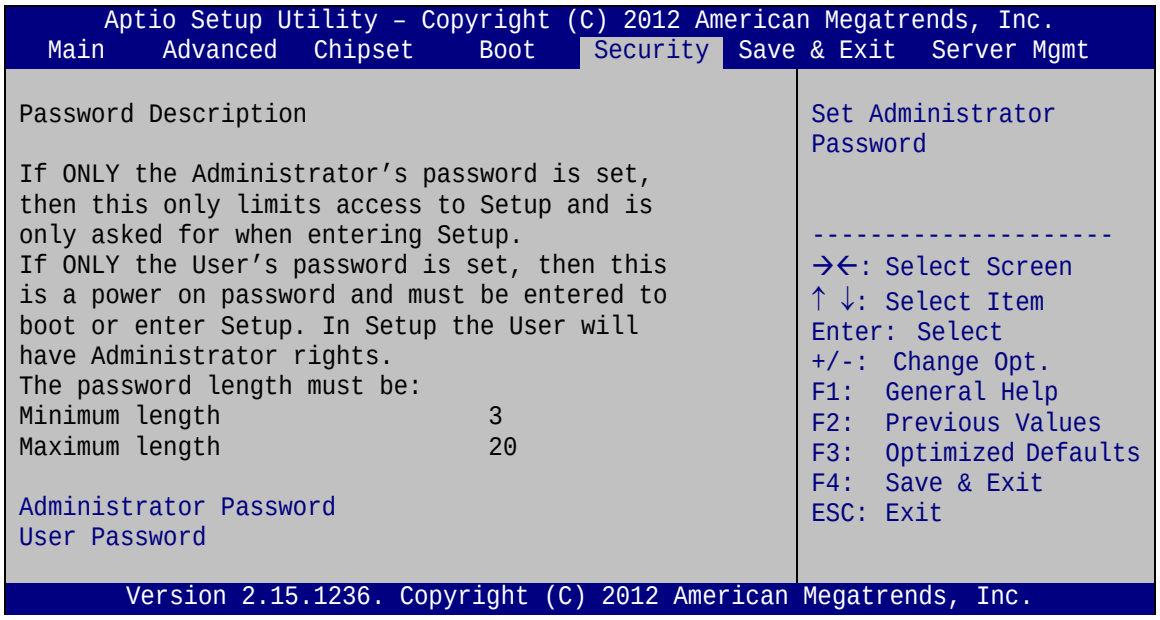
➔ **UEFI Boot [Disabled]**

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

➔	**Enabled**		Boot from UEFI devices is enabled.
➔	**Disabled**	**DEFAULT**	Boot from UEFI devices is disabled.

5.6 Security

Use the **Security** menu (**BIOS Menu 30**) to set system and user passwords.



BIOS Menu 30: Security

➔ **Administrator Password**

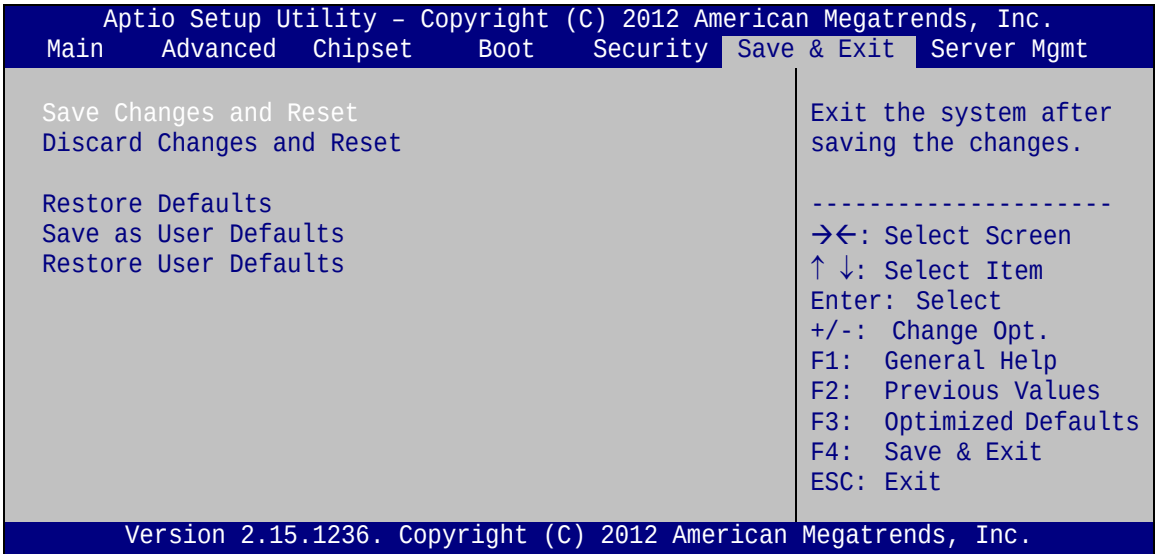
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.7 Save & Exit

Use the **Safe & Exit** menu (**BIOS Menu 31**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 31: 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**

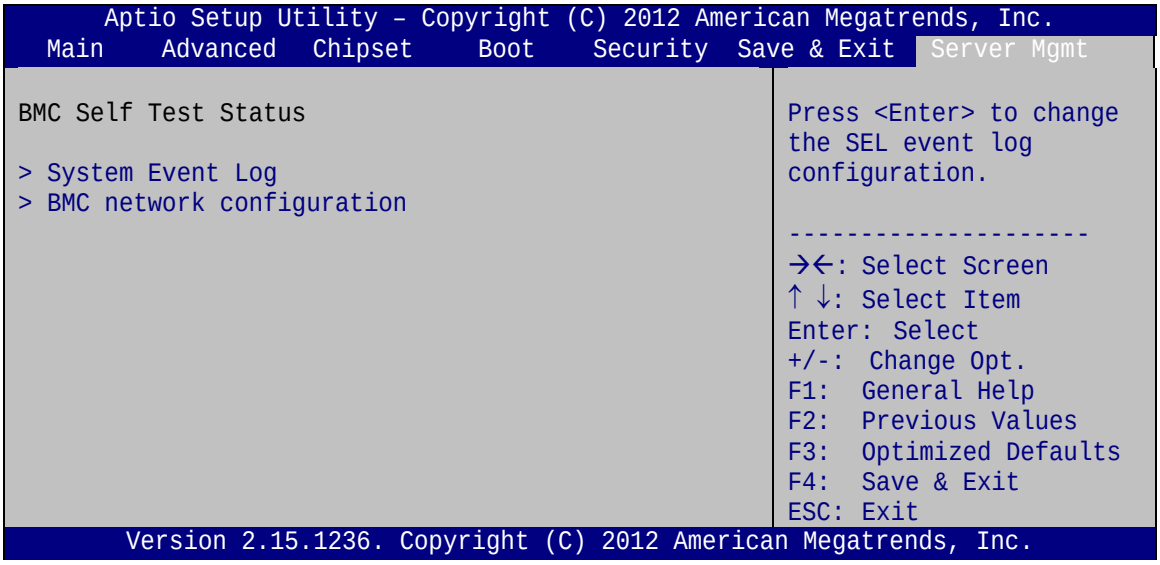
Use the **Save as User Defaults** option to save the changes done so far as user defaults.

➔ **Restore User Defaults**

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

5.8 Server Mgmt

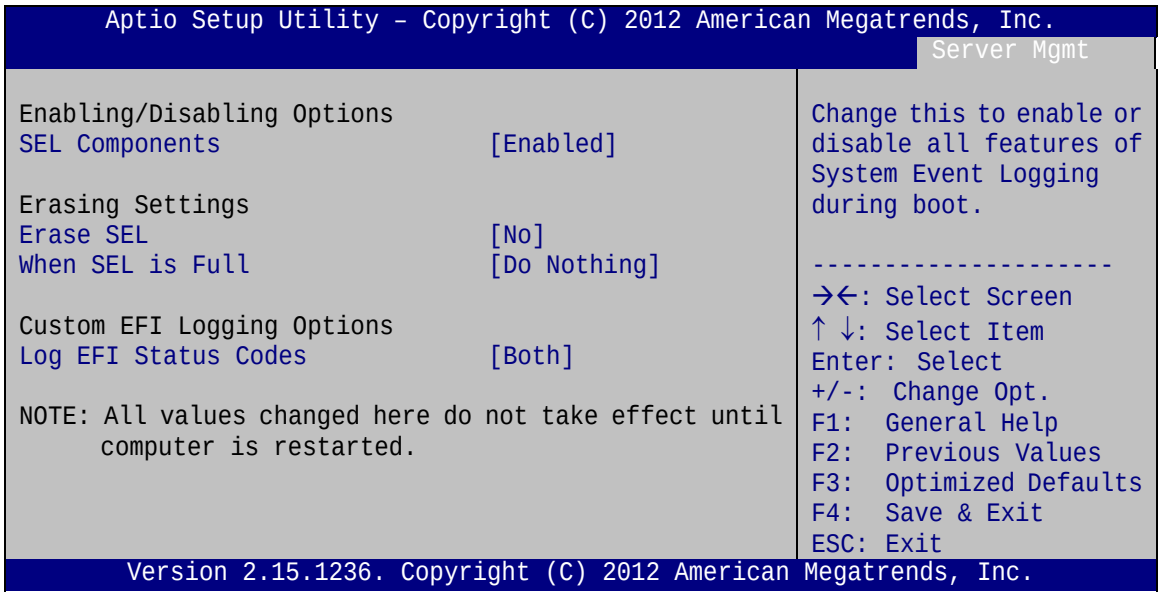
Use the **Server Mgmt** menu (**BIOS Menu 32**) to configure system event log and BMC network parameters.



BIOS Menu 32: Server Mgmt

5.8.1 System Event Log

Use the **System Event Log** menu (**BIOS Menu 33**) to configure system event log options.



BIOS Menu 33: System Event Log

➔ **SEL Components [Enabled]**

Use the **SEL Components** option to enable or disable all features of System Event Log during boot.

➔ **Disabled**		System Event Log features disabled.
➔ **Enabled**	**DEFAULT**	System Event Log features enabled.

➔ **Erase SEL [No]**

Use the **Erase SEL** option to select an option for erasing SEL (system event log).

➔ **No**	**DEFAULT**	Do not erase SEL
➔ **Yes, On next reset**		Erase SEL on next reset
➔ **Yes, On every reset**		Erase SEL on every reset

➔ **When SEL is Full [Do Nothing]**

Use the **When SEL is Full** option to select an option for reaction to a full SEL.

➔ **Do Nothing**	**DEFAULT**	Do nothing when SEL is full
➔ **Erase Immediately**		Erase SEL immediately when SEL is full

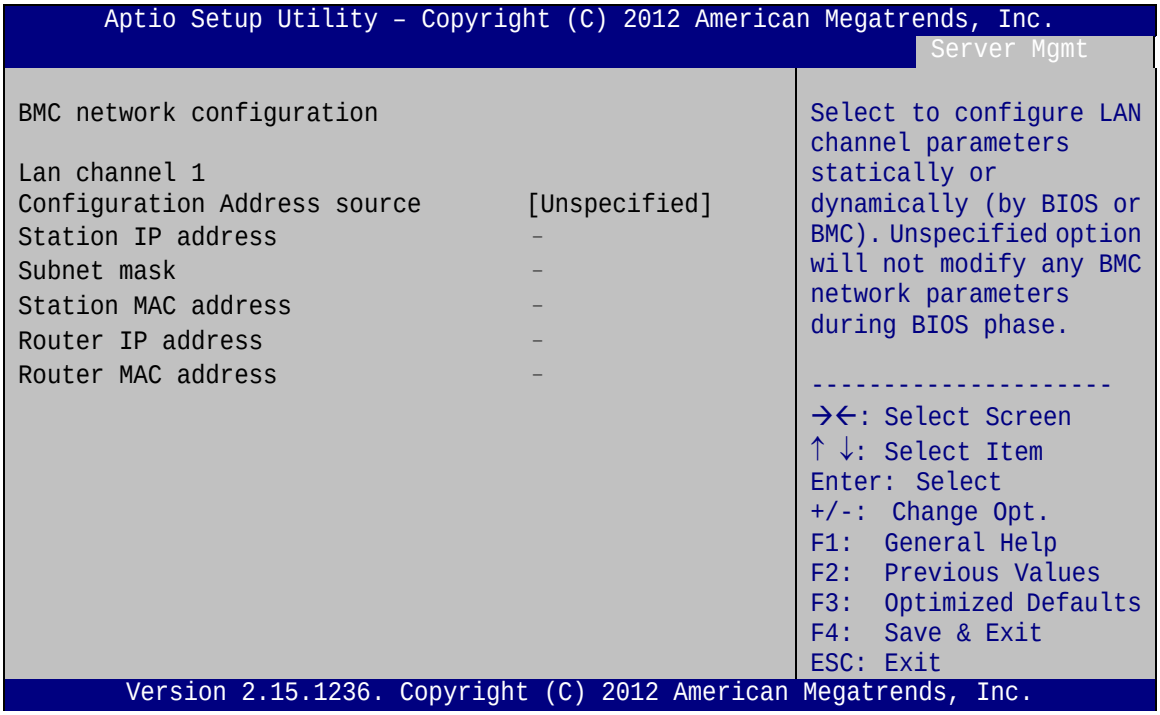
➔ **Log EFI Status Codes [Both]**

Use the **Log EFI Status Codes** option to select an option to log EFI status codes.

➔ **Disabled**		Disables the logging of EFI status codes
➔ **Both**	**DEFAULT**	Logs both the error codes and progress codes
➔ **Error code**		Logs only the error codes
➔ **Progress code**		Logs only the progress codes

5.8.2 BMC Network Configuration

Use the **BMC Network Configuration** menu (**BIOS Menu 34**) to configure BMC network parameters.



BIOS Menu 34: System Event Log

➔ **Configuration Address source [Unspecified]**

Use the **Configuration Address source** to configure LAN channel parameters statically or dynamically (by BIOS or BMC).

➔ **Unspecified** **DEFAULT** BMC network parameters will not be modified during BIOS phase.

➔ **Static** Select to modify the following BMC network parameters:

- Station IP address
- Subnet mask
- Station MAC address
- Router IP address
- Router MAC address

➔ **Dynamic-Obtained by BMC**	Select to configure LAN channel parameters dynamically by BMC
➔ **Dynamic-Loaded by BIOS**	Select to configure LAN channel parameters dynamically by BIOS
➔ **Dynamic-BMC running Other Protocol**	Select to configure LAN channel parameters dynamically by BMC running other protocol

Chapter

6

Software Drivers

6.1 Available Drivers

All the drivers for the PCIE-Q870-i2 are available on IEI Resource Download Center (https://download.ieiworld.com). Type PCIE-Q870-i2 and press Enter to find all the relevant software, utilities, and documentation.

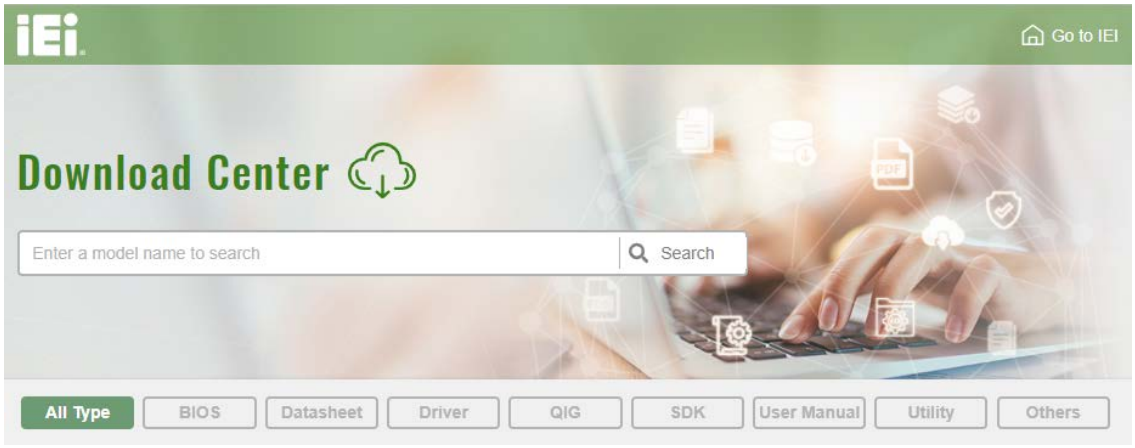
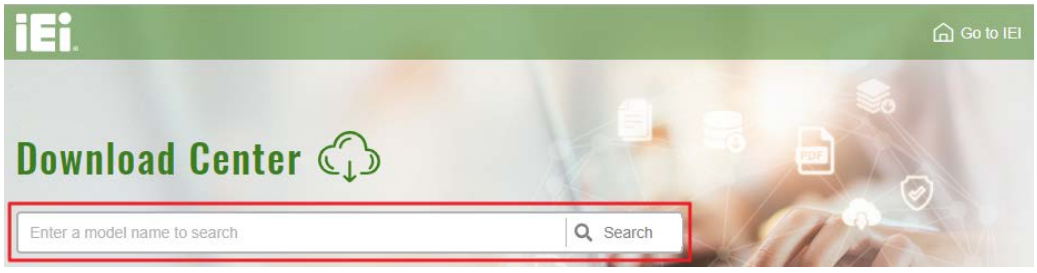


Figure 6-1: IEI Resource Download Center

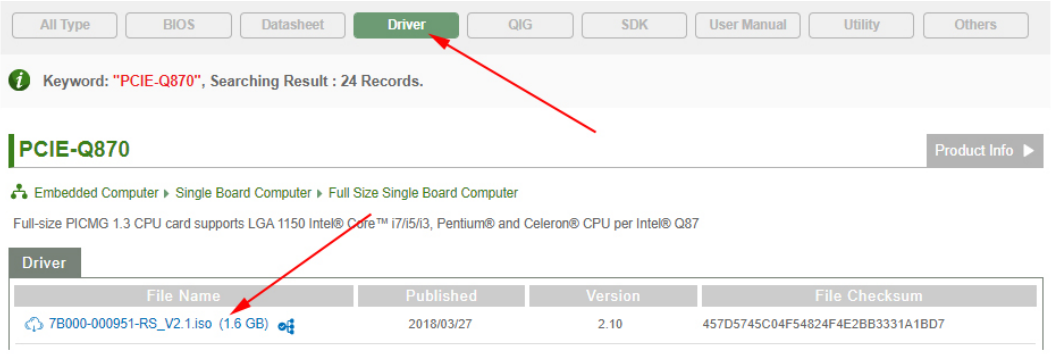
6.2 Driver Download

To download drivers from IEI Resource Download Center, follow the steps below.

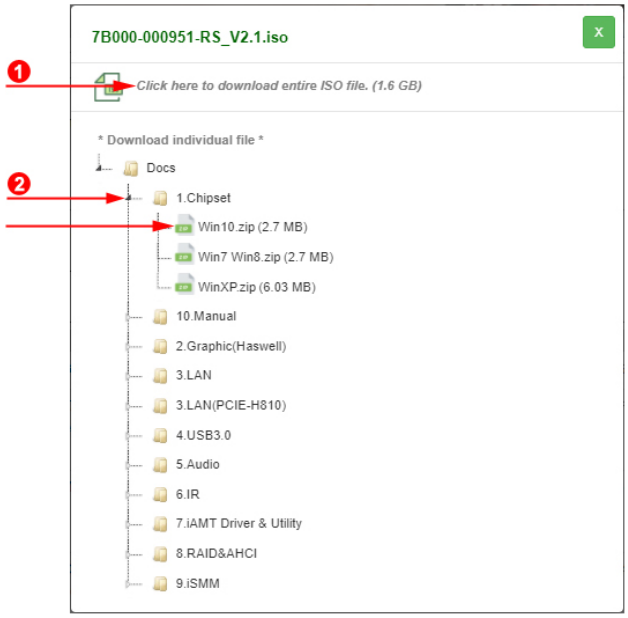
Step 1: Go to https://download.ieiworld.com. Type PCIE-Q870-i2 and press Enter.



Step 2: All product-related software, utilities, and documentation will be listed. You can choose **Driver** to filter the result.



Step 3: Click the driver file name on the page and you will be prompted with the following window. You can download the entire ISO file (❶), or double click an individual item to find its driver file and click the file name to download (❷).



NOTE:

To install software from the downloaded ISO image file in Windows 8, 8.1 or 10, double-click the ISO file to mount it as a virtual drive to view its content. On Windows 7 system, an additional tool (such as Virtual CD-ROM Control Panel from Microsoft) is needed to mount the file.

Appendix

A

Regulatory Compliance

DECLARATION OF CONFORMITY

This equipment has been tested and found to comply with specifications for CE marking. If the user modifies and/or installs other devices in the equipment, the CE conformity declaration may no longer apply.

FCC WARNING

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Appendix

B

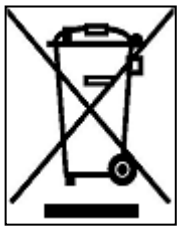
Product Disposal

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.

- Outside the European Union – If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union – The device that produces less waste and is easier to recycle is classified as electronic device in terms of the European Directive 2012/19/EU (WEEE), and must not be disposed of as domestic garbage.



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your device, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

Appendix

C

BIOS Options

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

Appendix

D

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 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:

For further information, please refer to the datasheet for the Super I/O chipset.

The BIOS interrupt call **INT 15H** controls the digital I/O.

INT 15H:

AH – 6FH
Sub-function:
AL – 8 :Set the digital port as INPUT
AL :Digital I/O input value

D.2 Assembly Language Sample 1

```
MOV     AX, 6F08H       ;setting the digital port as input
INT     15H             ;
```

AL low byte = value

AH – 6FH	
Sub-function:	
AL – 9	:Set the digital port as OUTPUT
BL	:Digital I/O input value

D.3 Assembly Language Sample 2

```
MOV     AX, 6F09H       ;setting the digital port as output
MOV     BL, 09H         ;digital value is 09H
INT     15H             ;
```

Digital Output is 1001b

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!

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:

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 in the RAID folder of the downloaded driver. 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

Error Beep Code

G.1 PEI Beep Codes

Number of Beeps	Description
1	Memory not Installed
1	Memory was installed twice (InstallPeiMemory routine in PEI Core called twice)
2	Recovery started
3	DXEIPL was not found
3	DXE Core Firmware Volume was not found
4	Recovery failed
4	S3 Resume failed
7	Reset PPI is not available

G.2 DXE Beep Codes

Number of Beeps	Description
1	Invalid password
4	Some of the Architectural Protocols are not available
5	No Console Output Devices are found
5	No Console Input Devices are found
6	Flash update is failed
7	Reset protocol is not available
8	Platform PCI resource requirements cannot be met

NOTE:

If you have any question, please contact IEI for further assistance.

Appendix

H

Hazardous Materials Disclosure

H.1 RoHS II Directive (2015/863/EU)

The details provided in this appendix are to ensure that the product is compliant with the RoHS II Directive (2015/863/EU). The table below acknowledges the presences of small quantities of certain substances in the product, and is applicable to RoHS II Directive (2015/863/EU).

Please refer to the following table.

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)	Bis(2-ethylhexyl) phthalate (DEHP)	Butyl benzyl phthalate (BBP)	Dibutyl phthalate (DBP)	Diisobutyl phthalate (DIBP)
Housing	O	O	O	O	O	O	O	O	O	O
Display	O	O	O	O	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O	O	O	O	O
Battery	O	O	O	O	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 Directive (EU) 2015/863.

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 Directive (EU) 2015/863.

H.2 China RoHS

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/T11364-2014與GB/T26572-2011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/T11364-2014 與 GB/T26572-2011 标准规定的限量要求。