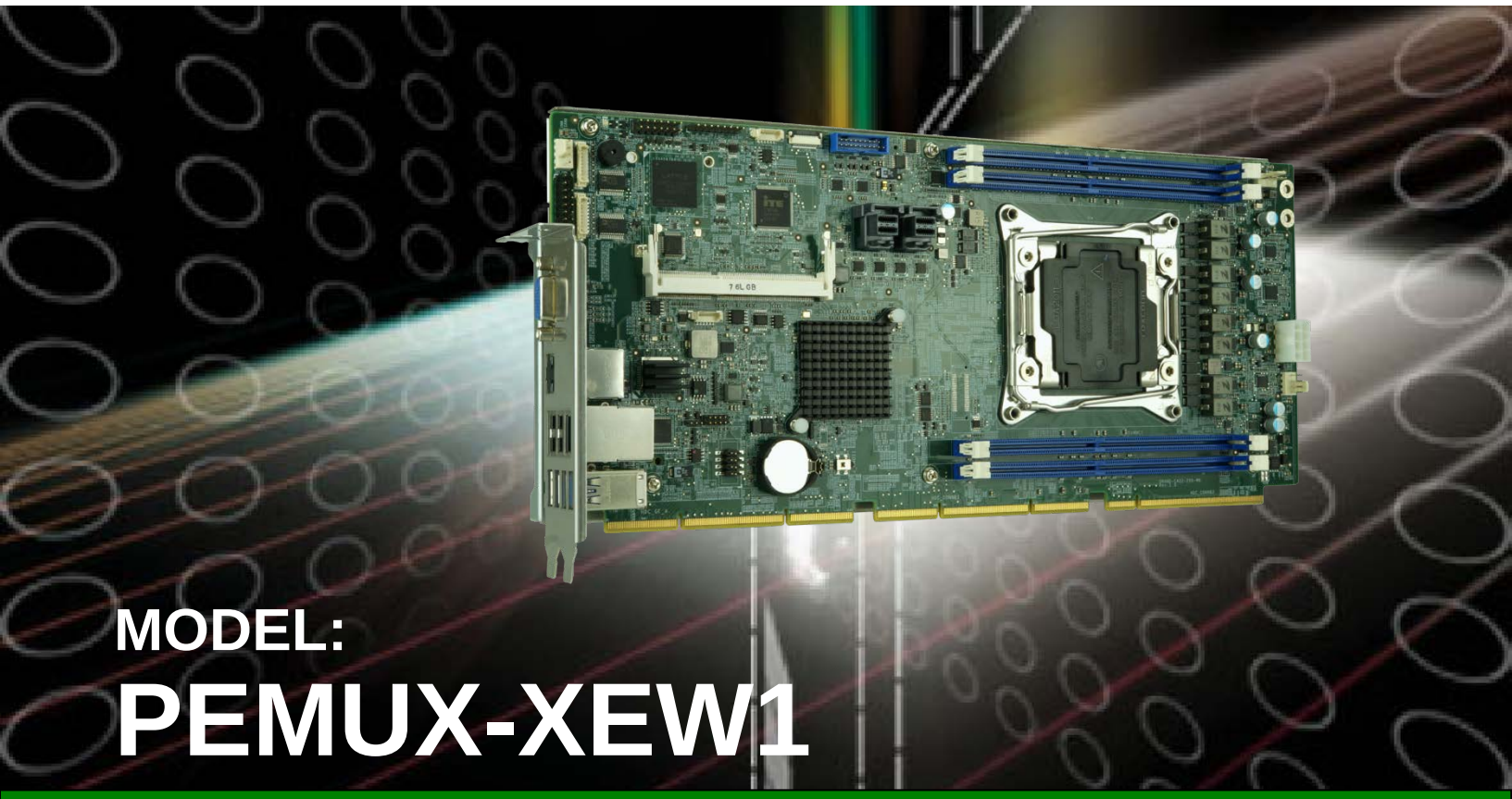
IEI Integration Corp.



MODEL:

PEMUX-XEW1

Full-Size CPU Card Supports LGA2066 Intel® Xeon® W CPU, Intel® C422 Chipset, DDR4 RDIMM/LRDIMM, 10 GbE, RS-232, USB 3.1 Gen1, SATA 6Gb/s, M.2, HD Audio and RoHS

User Manual

Rev. 1.00 – February 19, 2019

RoHS Lead Free

Revision

Date	Version	Changes
February 19, 2019	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

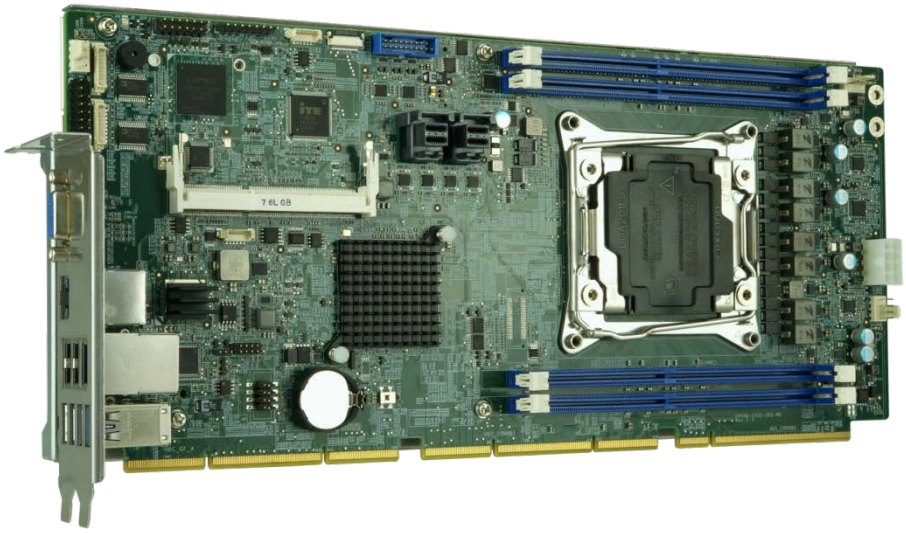


Figure 1-1: PEMUX-XEW1

The PEMUX-XEW1 is a full-size CPU card that can provide up to 56-lane PCIe signal to the backplane. It accepts a Socket LGA2066 Intel® Xeon® W processor and supports four 288-pin 2666MHz dual-channel ECC DDR4 RDIMM/LRDIMM modules up to 256 GB.

The PEMUX-XEW1 provides one 10GbE interface through the Aquantia AQC107 controller (with NCSI support) and one 1GbE through the Intel® I210AT PCIe controller. The integrated Intel® C422 chipset supports eight SATA 6Gb/s drives with RAID function.

Four USB 3.1 Gen 1 and two one USB 2.0 on the rear panel, two USB 3.1 Gen 1 by an internal box header, two RS-232, one USB DOM pin header and one M.2 M-key slot provide flexible expansion options. High Definition Audio (HDA) support ensures HDA devices can be easily implemented on the PEMUX-XEW1.

1.2 Features

The PEMUX-XEW1 motherboard features are listed below:

- Full-size CPU card supports up to 56-lane PCIe link to the backplane
- Supports PCI Express Generation 3.0
- LGA2066 Intel® Xeon® W processor family supported
- Intel® C422 chipset
- Four 288-pin 2666 MHz dual-channel ECC DDR4 RDIMMs/LRDIMMs support up to 256 GB of memory
- One 10GbE port, and one 1GbE port with NCSI support
- One M.2 2280 M-key slot for SSD
- Two Mini-SAS ports support 8 SATA 6Gb/s connectors with RAID
- Four USB 3.1 Gen 1 ports on the rear I/O
- Two USB 3.1 Gen 1 ports via internal box header
- Two USB 2.0 via external Type A connectors
- Two RS-232 serial ports
- TPM V2.0 hardware security function supported by TPM module
- High Definition Audio
- RoHS compliant

1.3 Connectors

The connectors on the PEMUX-XEW1 are shown in the figure below.

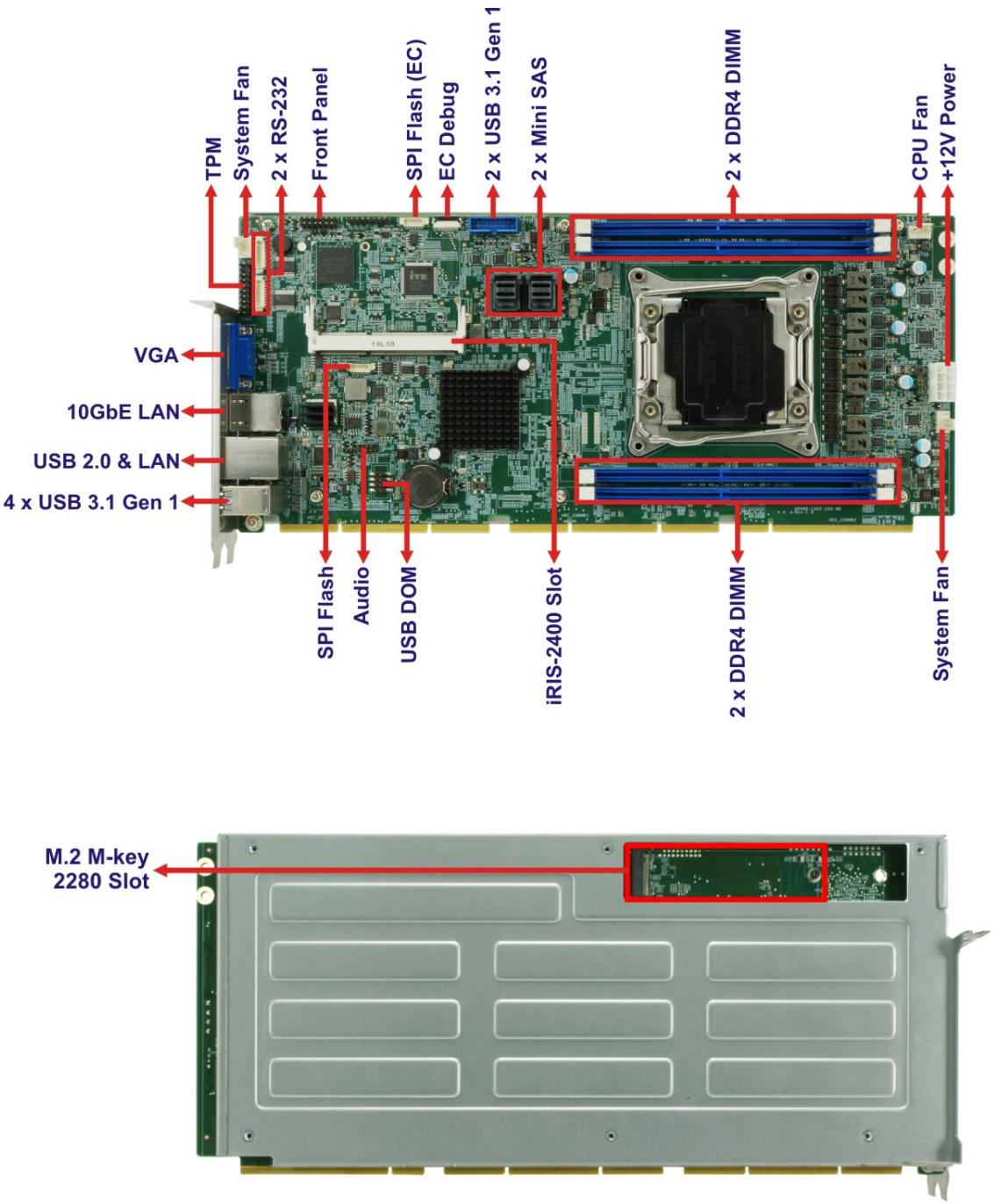


Figure 1-2: Connectors

1.4 Dimensions

The main dimensions of the PEMUX-XEW1 are shown in the diagram below.

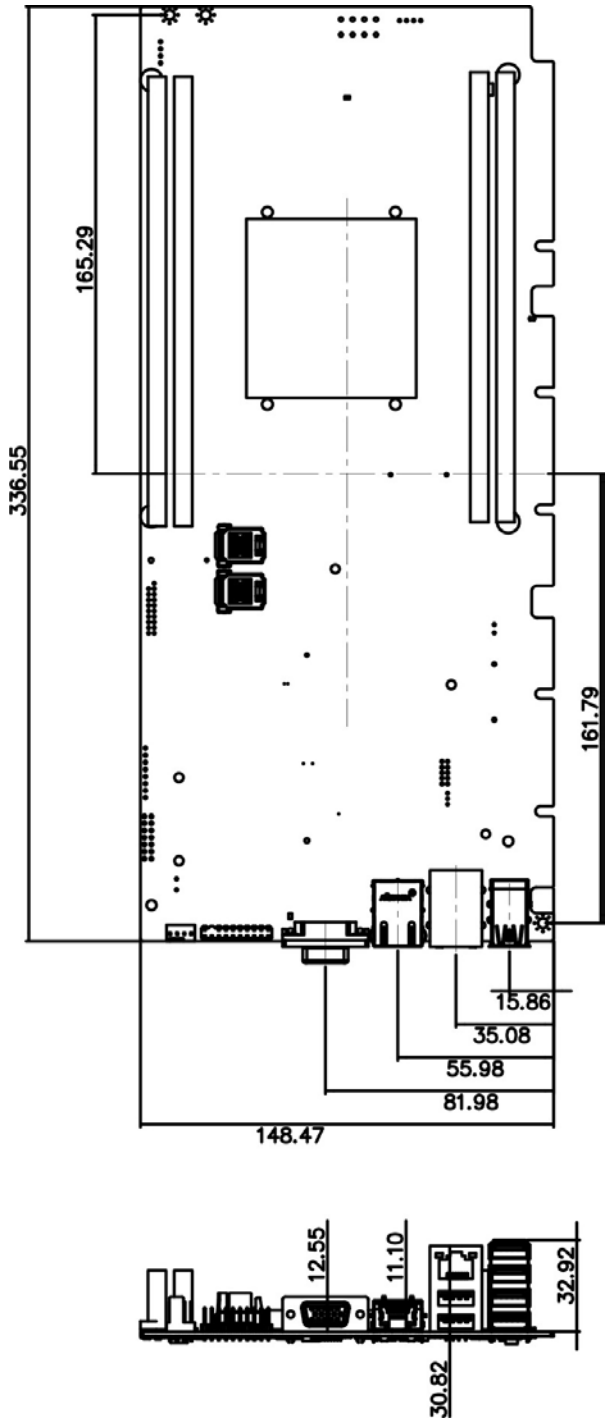


Figure 1-3: PEMUX-XEW1 Dimensions (mm)

1.5 Data Flow

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

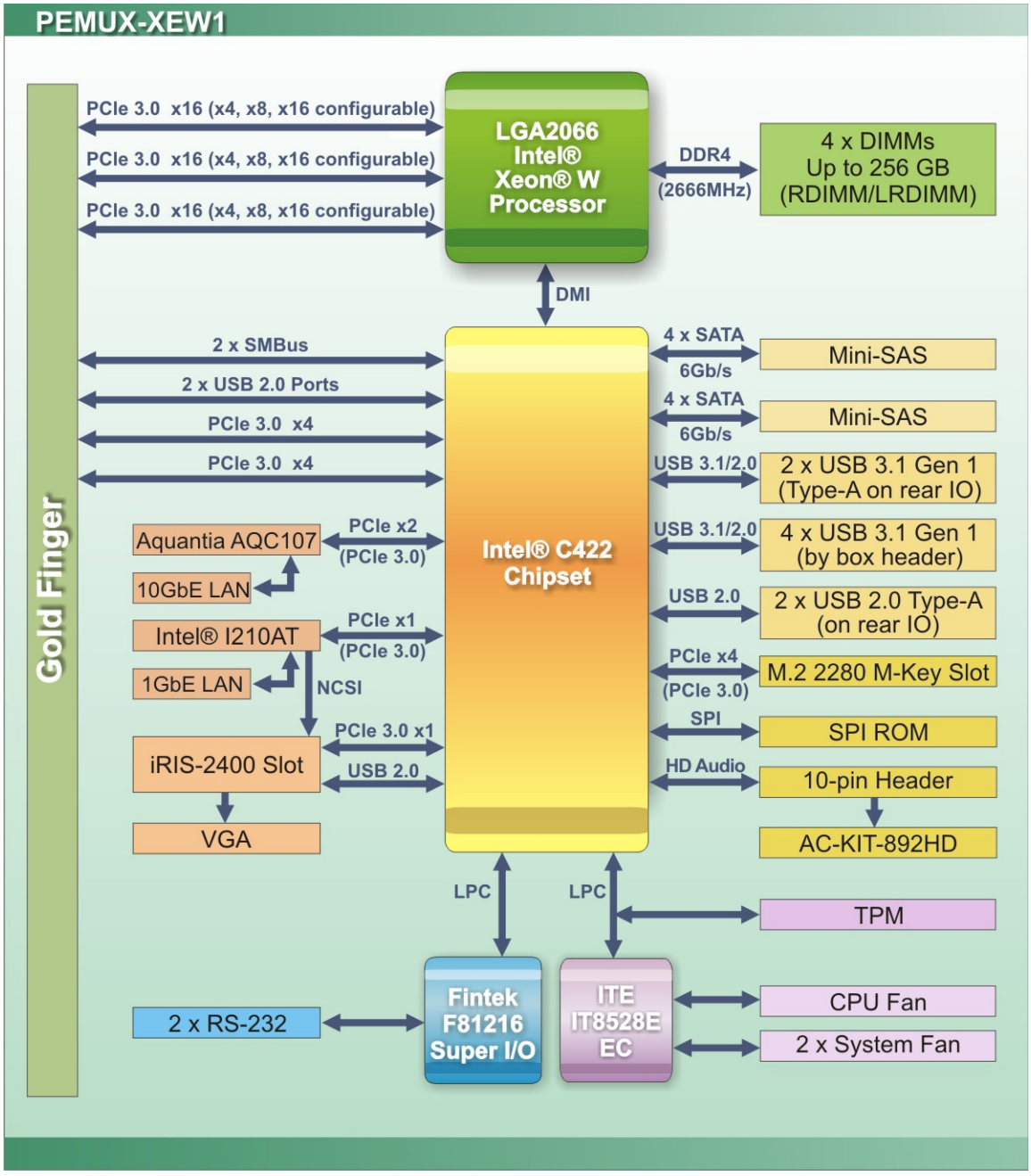


Figure 1-4: Data Flow Diagram

1.6 Technical Specifications

The PEMUX-XEW1 technical specifications are listed below.

Specification/Model	PEMUX-XEW1
Form Factor	Full-size PEMUX CPU card (12 layers)
CPU Supported	LGA2066 Intel® Xeon® W processor series
PCH	Intel® C422
Memory	Four 288-pin dual-channel ECC DDR4 RDIMMs/LRDIMMs supported (system max. 256 GB)
Display Output	One IPMI VGA port
Ethernet Controllers	**1GbE**: Intel® I210AT PCIe GbE controller with NCSI **10GbE**: Aquantia AQC107 PCIe GbE controller
Audio	Supports 7.1-channel HD audio by IEI AC-KIT-892HD kit
BIOS	UEFI BIOS
Expansions	One M.2 2280 slot (M key, PCIe x4 only) 56-lane PCIe link via golden finger
Super I/O Controller	Fintek F81216D
Embedded Controller	ITE IT8528E
Watchdog Timer	Software programmable supports 1~255 sec. system reset
I/O Interface Connectors	
Audio Connector	One audio connector (10-pin header)
Fan	One 4-pin CPU smart fan connector Two 4-pin system smart fan connectors
Front Panel	One 14-pin header (power LED, HDD LED, speaker, power button, reset button)
Serial ATA	Two Mini-SAS connectors for eight SATA 6Gb/s
Serial Ports	Two RS-232 via internal 9-pin wafer
USB 2.0	Two USB 2.0 ports by external Type A connectors

USB 3.1 Gen 1 (5 Gb/s)	Four USB 3.1 Gen 1 ports on rear panel Two USB 3.1 Gen 1 ports via internal box header
USB DOM	One USB DOM via internal 8-pin header
TPM	Support TPM v2.0 via one 20-pin header
SMBus	One SMBus to backplane
Environmental and Power Specifications	
Power Supply	5 V or 12 V, AT/ATX power support
Power Consumption	Windows idle: 91.09 W Windows max load: 270.55 W Windows standby: 9.694 W Widows off: 5.826 W (2.3 GHz Intel® Xeon® W-2195 CPU with four 16 GB 2400 MHz DDR4 ECC RDIMM, running Windows 10 OS)
Operating Temperature	-20ºC ~ 40ºC (-4ºF ~ 104ºF)
Storage Temperature	-30ºC ~ 50ºC (-22ºF ~ 122ºF)
Operating Humidity	5% ~ 95% (non-condensing)
Physical Specifications	
Dimensions	338.58 mm x 150.5 mm

Table 1-1: PEMUX-XEW1 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 PEMUX-XEW1 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 PEMUX-XEW1 was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The PEMUX-XEW1 is shipped with the following components:

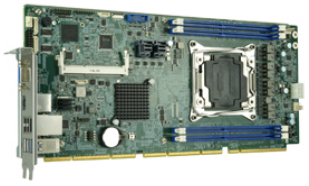
Quantity	Item and Part Number	Image
1	PEMUX-XEW1 CPU card	
1	Mini-SAS to 4 SATA cable	
1	Quick installation guide	

Table 2-1: Packing List

2.4 Optional Items

The following are optional components which may be separately purchased:

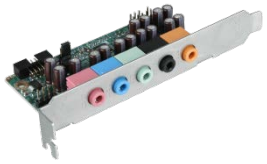
Item and Part Number	Image
SATA power cable (**P/N**: 32102-000100-200-RS)	
LGA2011 cooler kit (high-performance compatible, 130 W) (**P/N**: CF-2011B-R10)	
IPMI 2.0 adapter card with AST2400 BMC chip (**P/N**: iRIS-2400-R10)	
Mini-SAS to 4 SATA cable (**P/N**: 32037-000600-100-RS)	
RS-232 cable, 150 mm, p=1.25 (**P/N** : 32005-005000-100-RS)	
7.1-channel HD audio kit with Realtek ALC892 audio codec supporting dual audio stream (**P/N**: AC-KIT-892HD-R10)	

Table 2-2: Optional Items

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the peripheral interface connectors.

3.1.1 PEMUX-XEW1 Layout

The figure below shows all the peripheral interface connectors.

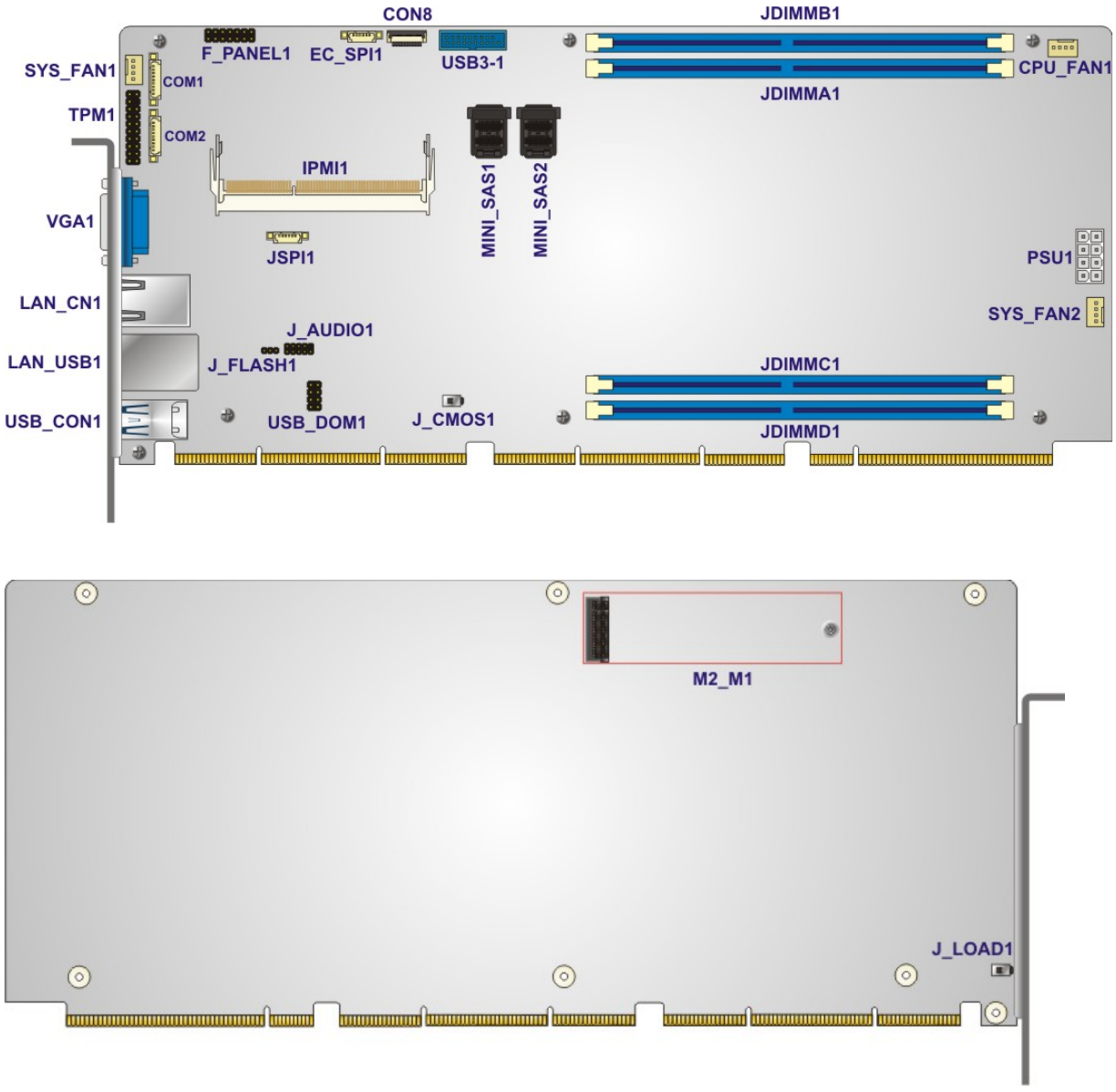


Figure 3-1: Peripheral Interface Connectors

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
+12V power connector	8-pin Molex	PSU1
Audio kit connector	10-pin header	J_AUDIO1
DDR4 DIMM sockets	288-pin socket	JDIMMA1, JDIMMB1, JDIMMC1, JDIMMD1
EC debug connector	20-pin FPC	CON8
Fan connector (CPU)	4-pin wafer	CPU_FAN1
Fan connector (system)	3-pin wafer	SYS_FAN1, SYS_FAN2
Front panel connector	14-pin header	F_PANEL1
iRIS-2400 module slot	iRIS-2400 module slot	IPMI1
M.2 M-key slot	M.2 M-key 2280	M2_M1
RS-232 serial ports	9-pin wafer	COM1, COM2
Mini-SAS connectors	36-pin Mini-SAS	MINI_SAS1, MINI_SAS2
SPI flash connector	6-pin wafer	JSPI1
SPI flash connector, EC	6-pin wafer	EC_SPI1
TPM connector	20-pin header	TPM1
USB 3.1 Gen 1 connector	19-pin box header	USB3-1
USB DOM connector	8-pin header	USB_DOM1

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
10GbE port	RJ-45	LAN_CN1
USB 2.0 and GbE combo port	USB Type-A, RJ-45	LAN_USB1
USB 3.1 Gen 1 ports	USB 3.1	USB_CON1
IPMI VGA connector	15-pin female	VGA1

Table 3-2: External Peripheral Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the PEMUX-XEW1.

3.2.1 +12V Power Connector

CN Label: **PSU1**

CN Type: 8-pin Molex power connector, p=4.2 mm

CN Location: See **Figure 3-2**

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

This connector provides power to the CPU.

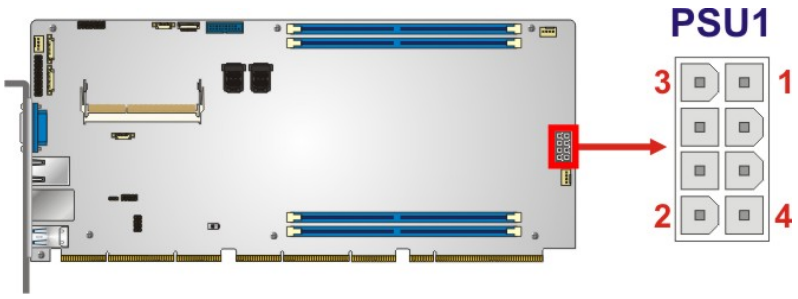


Figure 3-2: +12V Power Connector Pinout Location

Pin	Description	Pin	Description
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

Table 3-3: +12V Power Connector Pinouts

3.2.2 Audio Kit Connector

CN Label: **J_AUDIO1**

CN Type: 10-pin header, p=2.00 mm

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

CN Pinouts: See **Table 3-4**

This connector allows connection to an external audio kit.

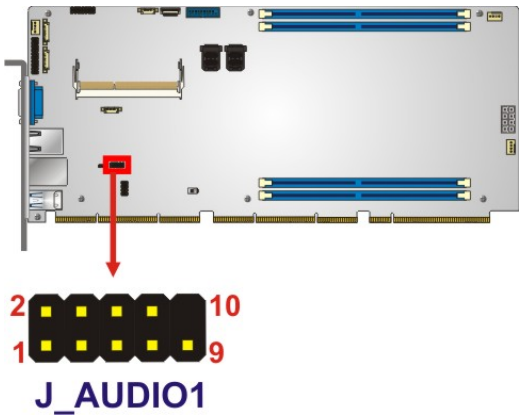


Figure 3-3: Audio Connector Location

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 DDR4 DIMM Sockets

CN Label:	**JDIMMA1, JDIMMB1, JDIMMC1, JDIMMD1**
CN Type:	288-pin DDR4 DIMM socket
CN Location:	See **Figure 3-4**

The DIMM sockets are for DDR4 DIMM memory modules.

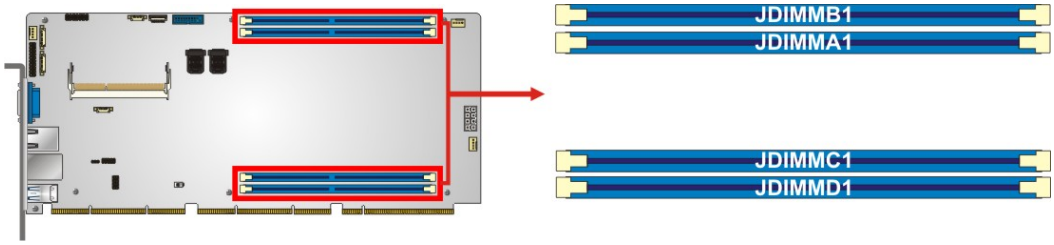


Figure 3-4: DDR4 DIMM Socket Locations

3.2.4 EC Debug Connector

CN Label:	**CON8**
CN Type:	20-pin FPC, p=0.5 mm
CN Location:	See **Figure 3-5**
CN Pinouts:	See **Table 3-5**

The EC debug connector is used for EC debug.

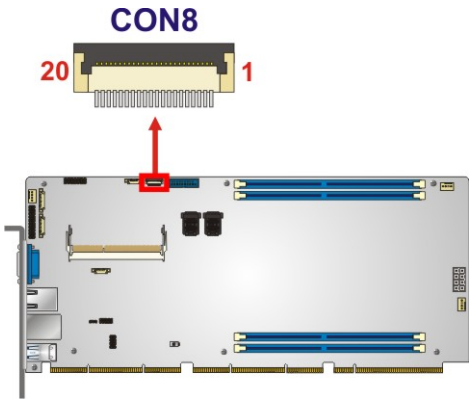


Figure 3-5: EC Debug Connector Location

Pin	Description	Pin	Description
1	KSI0	11	KSO9
2	KSO0	12	KSO10
3	KSO1	13	KSO12
4	KSO2	14	KSI1
5	KSO3	15	KSO11
6	KSO4	16	KSI2
7	KSO5	17	KSI3
8	KSO6	18	GND
9	KSO7	19	GND
10	KSO8	20	GND

Table 3-5: EC Debug Connector Pinouts

3.2.5 Fan Connector (CPU)

CN Label: **CPU_FAN1**

CN Type: 4-pin wafer, p=2.54 mm

CN Location: See **Figure 3-6**

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

The fan connector attaches to a CPU cooling fan.

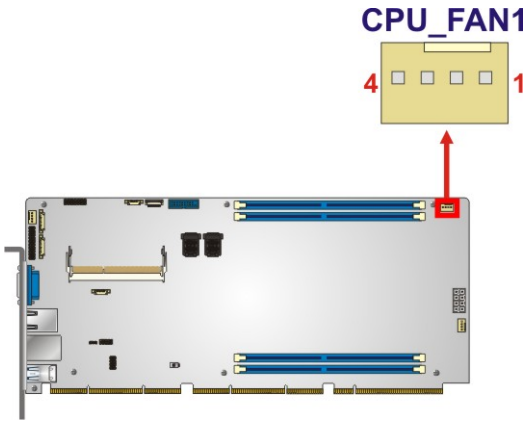


Figure 3-6: CPU Fan Connector Location

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

Table 3-6: CPU Fan Connector Pinouts

3.2.6 Fan Connectors (System)

CN Label: **SYS_FAN1, SYS_FAN2**

CN Type: 4-pin wafer, p=2.54 mm

CN Location: See **Figure 3-7**

CN Pinouts: See **Table 3-7**

The fan connector attaches to a system cooling fan.

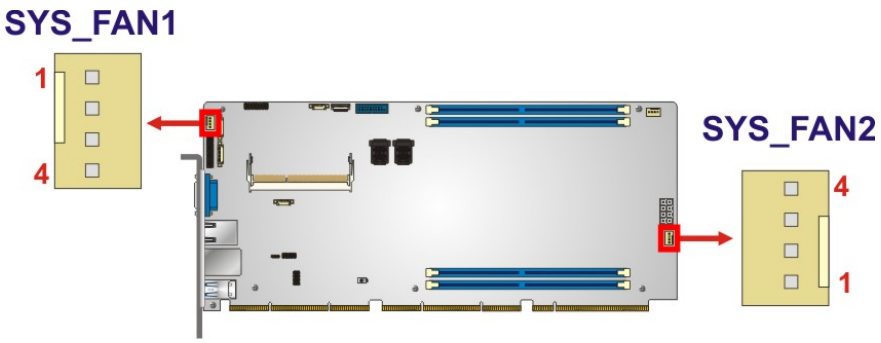


Figure 3-7: System Fan Connector Locations

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

Table 3-7: System Fan Connector Pinouts

3.2.7 Front Panel Connector

CN Label: **F_PANEL1**

CN Type: 14-pin header, p=2.54 mm

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

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

The front panel connector connects to the indicator LEDs and buttons on the computer's front panel.

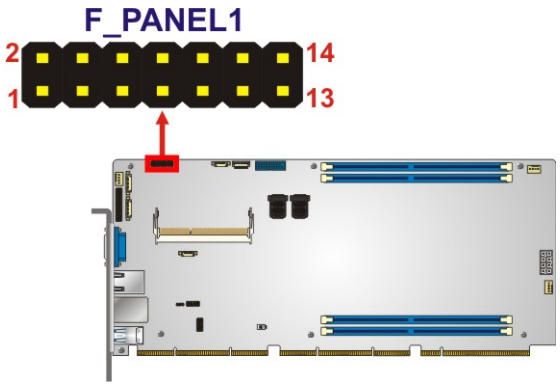


Figure 3-8: Front Panel Connector Location

Function	Pin	Description	Function	Pin	Description
Power LED	1	PWR_LED+	Speaker	2	SPKR+
	3	NC	IPMI LED	4	IPMI LED+
	5	PWR_LED-		6	IPMI LED-
Power Button	7	PWR_BTN+	Speaker	8	SPKR-
	9	PWR_BTN-		10	NC
HDD LED	11	HDD_LED+	Reset	12	Reset+
	13	HDD_LED-		14	Reset-

Table 3-8: Front Panel Connector Pinouts

3.2.8 iRIS-2400 Module Slot

CN Label:	**IPMI1**
CN Type:	iRIS-2400 module slot
CN Location:	See **Figure 3-9**

The iRIS-2400 module slot allows installation of the iRIS-2400 module.

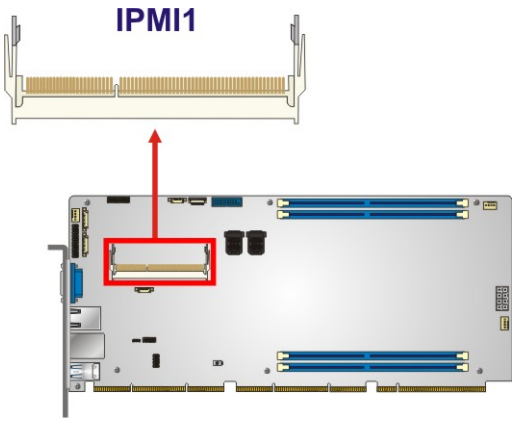


Figure 3-9: iRIS-2400 Module Slot Location

WARNING:

The iRIS-2400 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 PEMUX-XEW1.

3.2.9 M.2 2280 Slot, M-Key

CN Label:	**M2_M1**
CN Type:	M.2 2280 M-key slot
CN Location:	See **Figure 3-10**
CN Pinouts:	See **Table 3-9**

The M.2 2280 slot is keyed in the M position. The M.2 slot supports PCIe x4 interfaces.

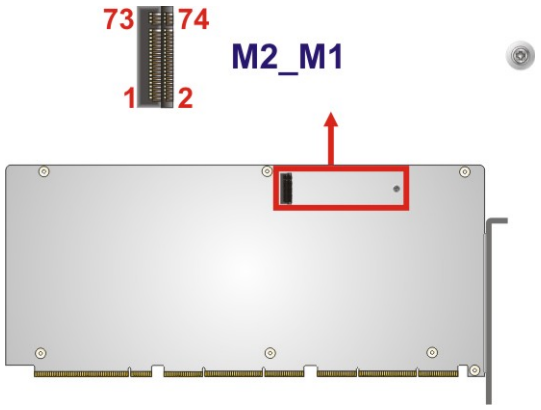


Figure 3-10: M.2 2280 Slot Location

Pin	Description	Pin	Description
1	GND	2	+3.3V
3	GND	4	+3.3V
5	PCIE_RXN3	6	N/C
7	PCIE_RXP3	8	N/C
9	GND	10	DAS/DSS#
11	PCIE_TXN3	12	+3.3V
13	PCIE_TXP3	14	+3.3V
15	GND	16	+3.3V
17	PCIE_RXN2	18	+3.3V
19	PCIE_RXP2	20	N/C
21	GND	22	N/C
23	PCIE_TXN2	24	N/C
25	PCIE_TXP2	26	N/C
27	GND	28	N/C
29	PCIE_RXN1	30	N/C
31	PCIE_RXP1	32	N/C
33	GND	34	N/C
35	PCIE_TXN1	36	N/C
37	PCIE_TXP1	38	DEVSLP
39	GND	40	N/C
41	PCIE_RXN0	42	N/C

Pin	Description	Pin	Description
43	PCIE_RXP0	44	N/C
45	GND	46	N/C
47	PCIE_TXN0	48	N/C
49	PCIE_TXP0	50	PERST#
51	GND	52	CLKREQ#
53	REFCLKN	54	PEWAKE
55	REFCLKP	56	N/C
57	GND	58	N/C
59	Notch	60	Notch
61	Notch	62	Notch
63	Notch	64	Notch
65	Notch	66	Notch
67	N/C	68	SUSCLK
69	PEDET	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND		

Table 3-9: M.2 2280 Connector Pinouts

3.2.10 RS-232 Serial Ports

CN Label: **COM1, COM2**

CN Type: 9-pin wafer, p=1.25 mm

CN Location: See **Figure 3-11**

CN Pinouts: See **Table 3-10**

Each of these connectors provides RS-232 connections.

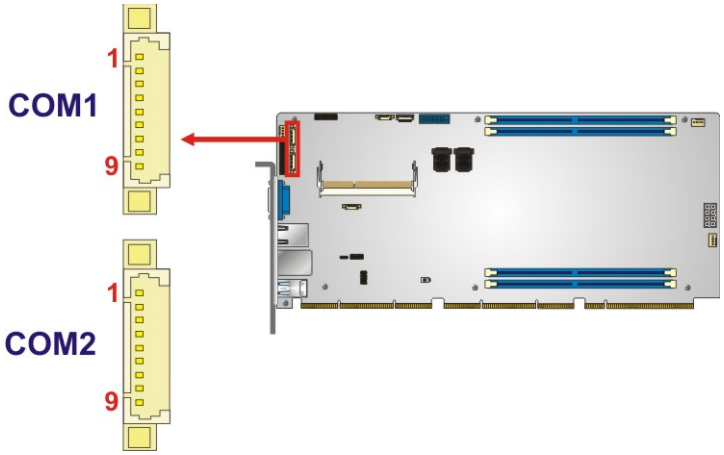


Figure 3-11: RS-232 Serial Port Locations

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

Table 3-10: RS-232 Serial Port Pinouts

3.2.11 Mini-SAS Connectors

CN Label:	**MINI_SAS1, MINI_SAS2**
CN Type:	36-pin Mini-SAS connector
CN Location:	See **Figure 3-12**

Each Mini-SAS connector can support four SATA 6Gb/s drives.

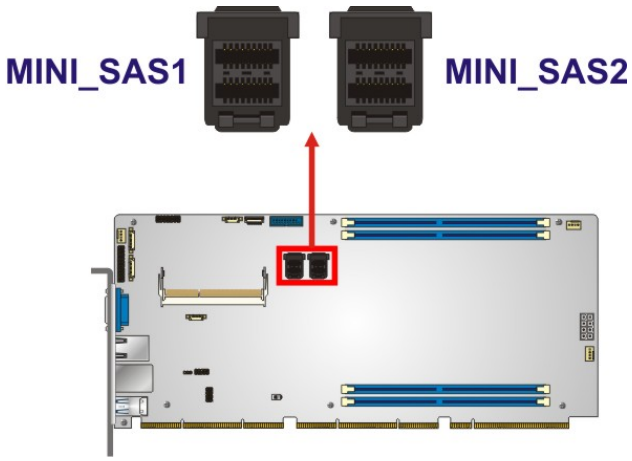


Figure 3-12: Mini-SAS Connector Locations

3.2.12 SPI Flash Connector

CN Label: **JSPI1**

CN Type: 6-pin wafer, p=1.25 mm

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

CN Pinouts: See **Table 3-11**

The SPI flash connector is used to flash the SPI ROM.

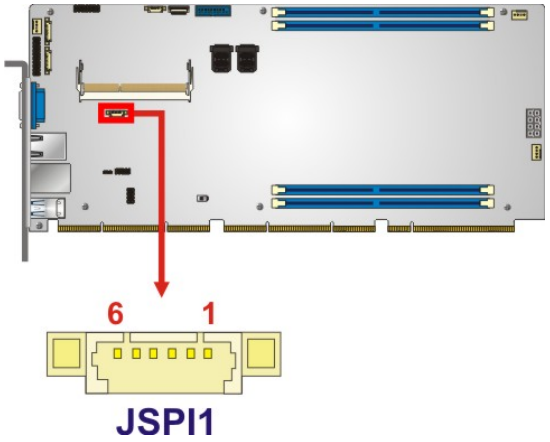


Figure 3-13: SPI Flash Connector Location

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

Table 3-11: SPI Flash Connector Pinouts

3.2.13 SPI Flash Connector, EC

CN Label:	**EC_SPI1**
CN Type:	6-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-14**
CN Pinouts:	See **Table 3-12**

The SPI flash connector is used to flash the EC ROM.

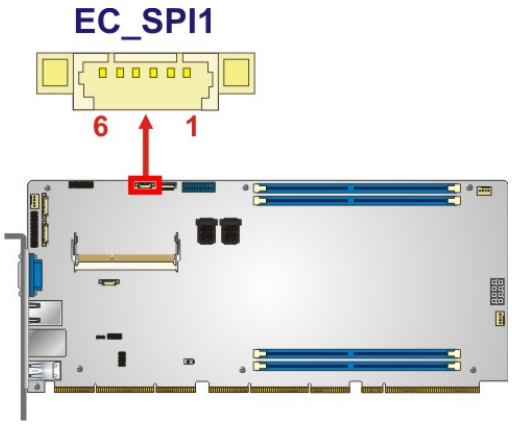


Figure 3-14: SPI EC Flash Connector Location

Pin	Description
1	+3.3V
2	SPI_CS#_EC
3	SPI_SO_EC
4	SPI_CLK_EC
5	SPI_SI_EC
6	GND

Table 3-12: SPI EC Flash Connector Pinouts

3.2.14 TPM Connector

CN Label: **TPM1**

CN Type: 20-pin header, p=2.54 mm

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

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

The TPM connector connects to a TPM module.

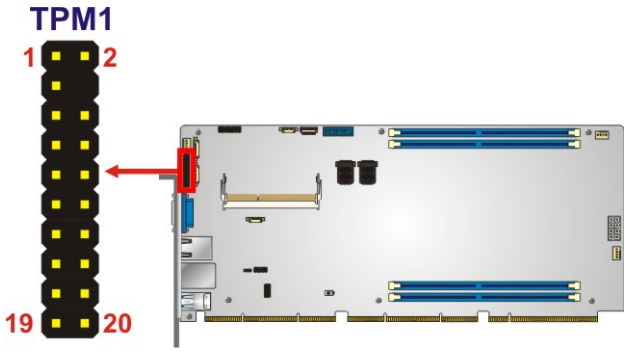


Figure 3-15: TPM Connector Location

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 3-13: TPM Connector Pinouts

3.2.15 USB 3.1 Gen 1 Connector

CN Label: **USB3-1**

CN Type: 19-pin box header, p=2.00 mm

CN Location: See **Figure 3-16**

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

The USB 3.1 Gen 1 connector connects to USB 3.1 devices. This connector provides two USB 3.1 Gen 1 ports.

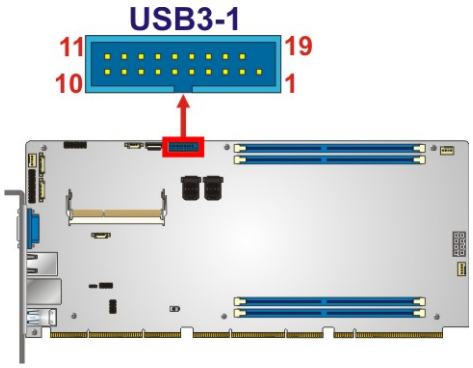


Figure 3-16: USB 3.1 Gen 1 Connector Location

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 3-14: USB 3.1 Gen 1 Connector Pinouts

3.2.16 USB DOM Connector

CN Label: **USB_DOM1**

CN Type: 8-pin header, p=2.54 mm

CN Location: See **Figure 3-17**

CN Pinouts: See **Table 3-15**

The USB DOM connector supports one USB DOM device.

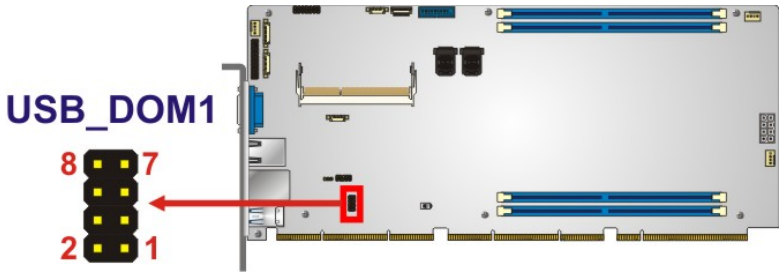


Figure 3-17: USB DOM Connector Location

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

Table 3-15: USB DOM 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:

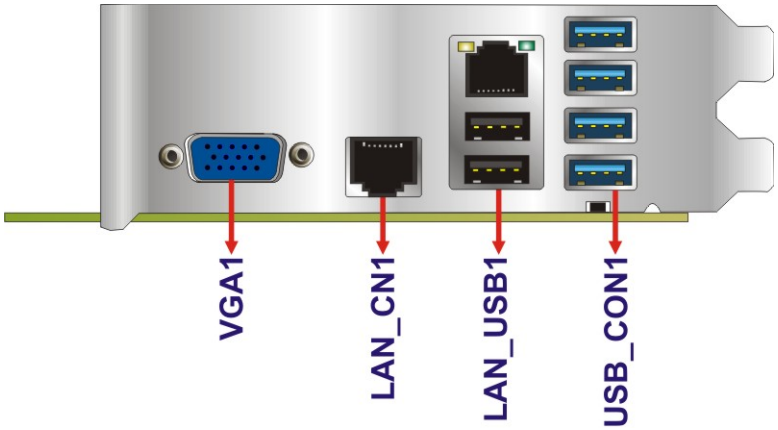


Figure 3-18: External Peripheral Interface Connector

3.3.1 10GbE LAN Connector

CN Label: **LAN_CN1**

CN Type: RJ-45

CN Location: See **Figure 3-18**

CN Pinouts: See **Table 3-16**

The LAN connector connects to a local network and transmits Ethernet frames at a rate of 10 gigabits per second.

Pin	Description	Pin	Description
1	10G_MDI0+	5	10G_MDI2+
2	10G_MDI0-	6	10G_MDI2-
3	10G_MDI1+	7	10G_MDI3+
4	10G_MDI1-	8	10G_MDI3-

Table 3-16: 10GbE LAN Pinouts

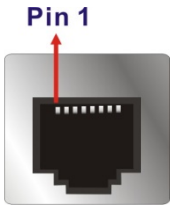


Figure 3-19: 10GbE LAN Connector

3.3.2 USB 2.0 and GbE Combo Connector

CN Label: **LAN_USB1**

CN Type: USB Type-A, RJ-45

CN Location: See **Figure 3-18**

CN Pinouts: See **Table 3-17** and Table 3-18

The USB connector can be connected to a USB device.

Pin	Description
1	5 V
2	Data-
3	Data+
4	GND

Table 3-17: USB 2.0 Port Pinouts

A 10/100/1000 Mb/s connection can be made to a Local Area Network via the 1GbE port.

Pin	Description	Pin	Description
1	LAN_MDI0+	5	LAN_MDI2+
2	LAN_MDI0-	6	LAN_MDI2-
3	LAN_MDI1+	7	LAN_MDI3+
4	LAN_MDI1-	8	LAN_MDI3-

Table 3-18: 1GbE LAN Connector Pinouts

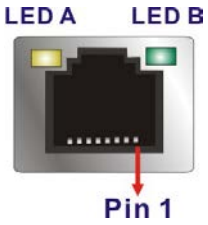


Figure 3-20: 1GbE LAN Connector

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

Table 3-19: 1GbE LAN Connector LEDs

3.3.3 USB 3.1 Gen 1 Connectors

CN Label: **USB_CON1**

CN Type: USB 3.1 Gen 1

CN Location: See **Figure 3-18**

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

There are four external USB 3.1 Gen 1 (5 Gb/s) connectors on the PEMUX-XEW1.

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 3-20: USB 3.1 Gen 1 Port Pinouts

3.3.4 IPMI VGA Connector

CN Label: **VGA1**

CN Type: 15-pin VGA

CN Location: See **Figure 3-18**

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

With the iRIS-2400 IPMI module installed, the 15-pin VGA connector can connect to a monitor that accepts a standard VGA input.

NOTE:

The user has to install the optional iRIS-2400 module before the VGA port can be used to connect to a monitor for display.

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

Table 3-21: IPMI VGA Connector Pinouts

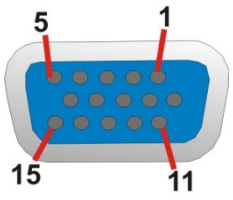


Figure 3-21: IPMI VGA Connector

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the PEMUX-XEW1 may result in permanent damage to the PEMUX-XEW1 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the PEMUX-XEW1. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the PEMUX-XEW1 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 PEMUX-XEW1, place it on an anti-static pad. This reduces the possibility of ESD damaging the PEMUX-XEW1.
- ***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 PEMUX-XEW1 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 PEMUX-XEW1 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 PEMUX-XEW1 off:
  - When working with the PEMUX-XEW1, 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 PEMUX-XEW1, **DO NOT:**

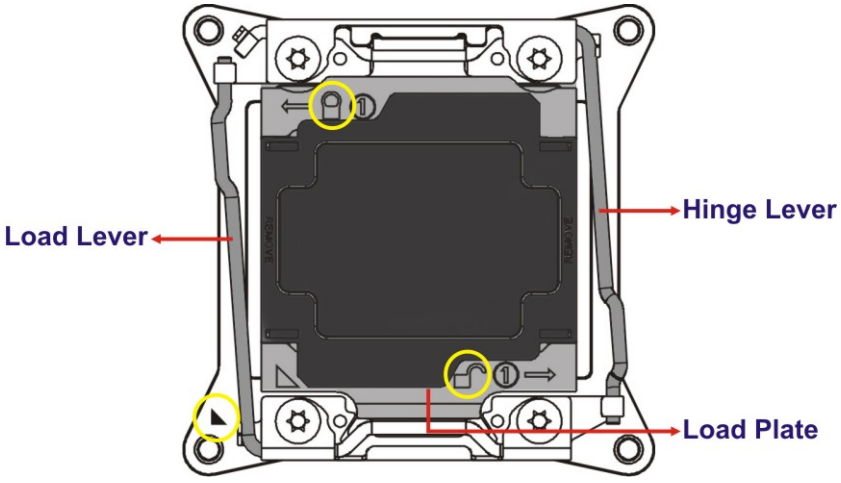
- Remove any of the stickers on the PCB board. These stickers are required for warranty validation.
- Use the product before verifying all the cables and power connectors are properly connected.
- Allow screws to come in contact with the PCB circuit, connector pins, or its components.

4.3 Socket LGA2066 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.

To install the CPU, follow the steps below.



Step 1: Unlatch the hinge lever (indicated with an unlocked padlock symbol) by pressing the lever down and slightly inward to clear the retention tab. It is important NOT to open this lever passed the resistant point at approximately 35 degree; otherwise, the socket can be damaged.

Step 2: Unlatch the load lever (indicated with a locked padlock symbol) by pressing the lever down and slightly inward to clear the retention tab. Fully open the load lever to release the top metal load plate.

Step 3: Press the hinge lever down a little to lift the load plate.

Step 4: Once the load plate is raised, carefully grip the front and open it fully to expose the LGA2066 socket.

WARNING:

Never touch the socket contacts any time when the contacts are exposed as it could cause damage.

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

Step 5: 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 6: Orientate the CPU properly. The contact array should be facing the CPU socket.

Step 7: Correctly position the CPU. Match the Pin 1 mark (little gold triangle) on the CPU with the triangle stamped into the LGA2066 metal socket frame.

Step 8: 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.

Step 9: Carefully close the load plate and latch the load lever by pushing it back to its closed position. There will be some resistance, but will not require extreme pressure. At this point the black plastic protective cap should automatically pop of the load plate. Remove the protective cap.

Step 10: Close the hinge lever and push the end of the lever arm under the small tab to lock it back into the closed position.

NOTE:

Processor installation video from Intel is available here.

4.4 Socket LGA2066 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: Place the cooling kit onto the socket LGA2066 CPU. Make sure the CPU fan cable can be properly routed when the cooling kit is installed.

Step 2: 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 in the CPU socket frame.

Step 3: Tighten the screws. Use a screwdriver to tighten the four screws. In a diagonal pattern, tighten each screw a few turns then move to the next one, until they are all secured. Do not overtighten the screws.

Step 4: Connect the cooling kit fan cable to the CPU fan connector on the PEMUX-XEW1. Carefully route the cable and avoid heat generating chips and fan blades.

4.5 DIMM Installation

To install a DIMM, please follow the steps below and refer to **Figure 4-1**.

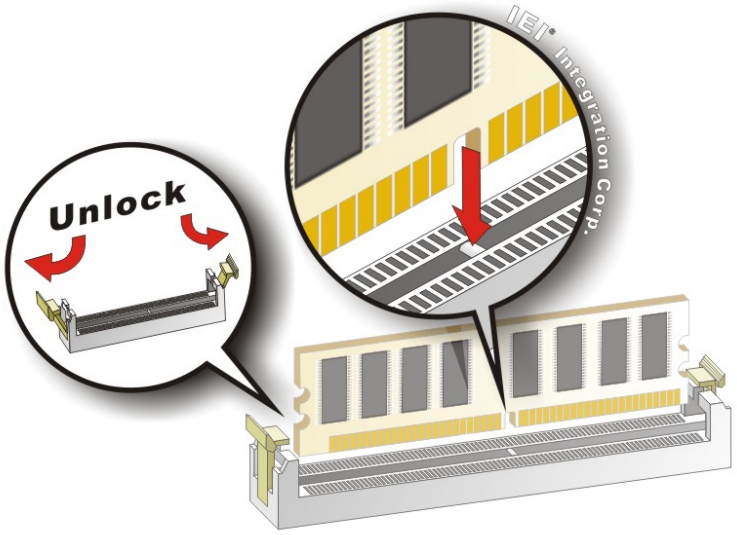


Figure 4-1: DIMM Installation

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

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 4-1**.

Step 3: **Insert the DIMM**. Once aligned, press down until the DIMM is properly seated. Clip the two handles into place. See **Figure 4-1**.

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

CAUTION:

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

4.6 iRIS-2400 Module Installation (Optional)

WARNING:

The iRIS-2400 module slot is designed to install the IEI iRIS-2400 IPMI 2.0 module only. DO NOT install other modules into the iRIS module slot. Doing so may cause damage to the PEMUX-XEW1.

To install the iRIS-2400 module, please follow the steps below and refer to **Figure 4-2**.

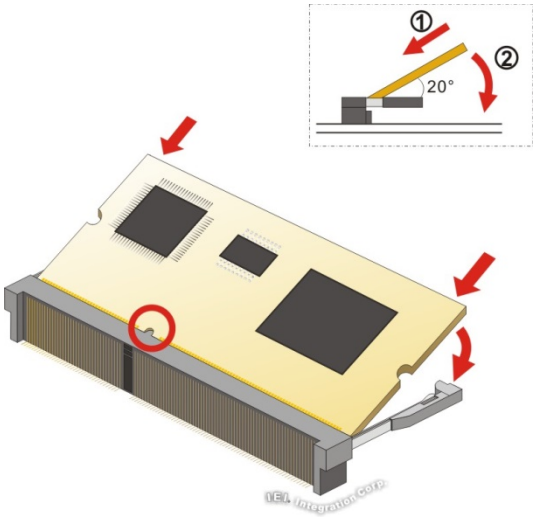


Figure 4-2: iRIS-2400 Module Installation

Step 1: **Locate the IPMI module slot**. Place the PEMUX-XEW1 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 4-2).

Step 4: Seat the iRIS-2400 module. Gently push downwards and the arms clip into place (Figure 4-2).

4.7 System Configuration

The system configuration should be performed before installation.

4.7.1 Clear CMOS Button

To reset the BIOS, remove the on-board battery and press the clear CMOS button (J_CMOS1) for three seconds or more. The clear CMOS button location is shown in **Figure 4-3**.

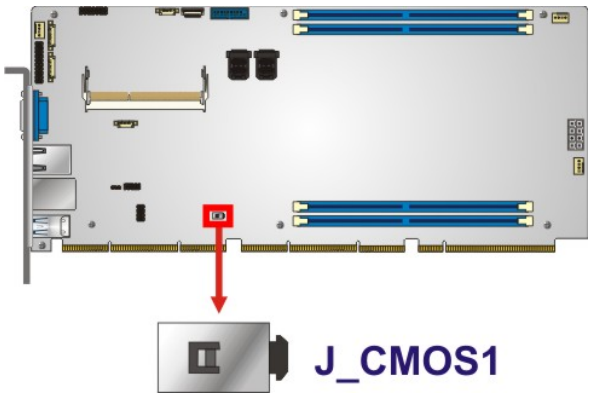


Figure 4-3: Clear CMOS Button Location

4.7.2 Load Default Button

To load system default, press the load default button (J_LOAD1). The load default button location is shown below.

Figure 4-4: Load Default Button Location

4.7.3 Flash Descriptor Security Override Jumper

The flash descriptor security override jumper (J_FLASH1) allows to enable or disable the ME firmware update. Refer to **Table 4-1** and **Figure 4-5** for the jumper location and settings.

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

Table 4-1: Flash Descriptor Security Override Jumper Settings

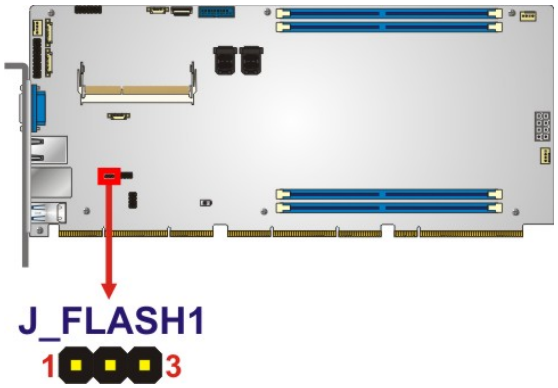


Figure 4-5: Flash Descriptor Security Override Jumper Location

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.

4.8 Software Installation

All the drivers for the PEMUX-XEW1 are available on IEI Resource Download Center (https://download.ieiworld.com). Type PEMUX-XEW1 and press Enter to find all the relevant software, utilities, and documentation.

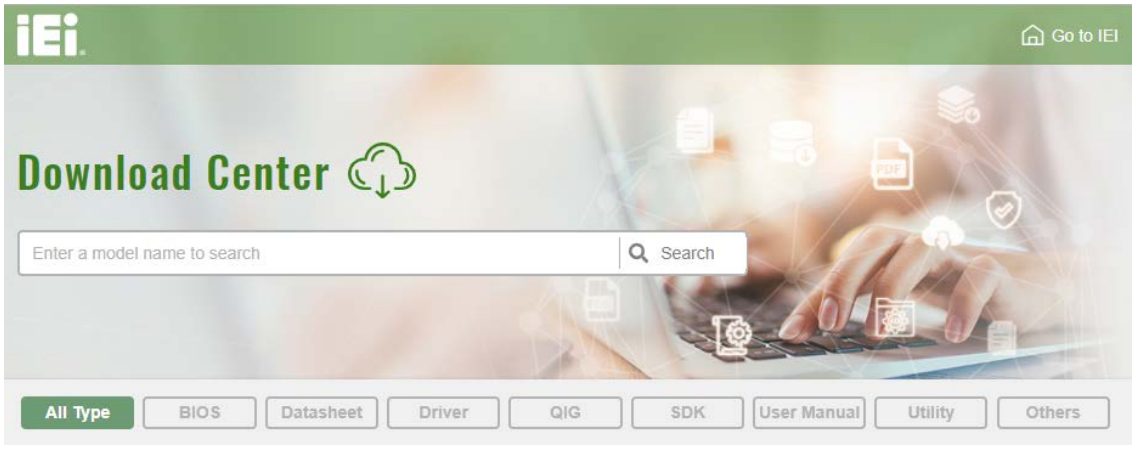
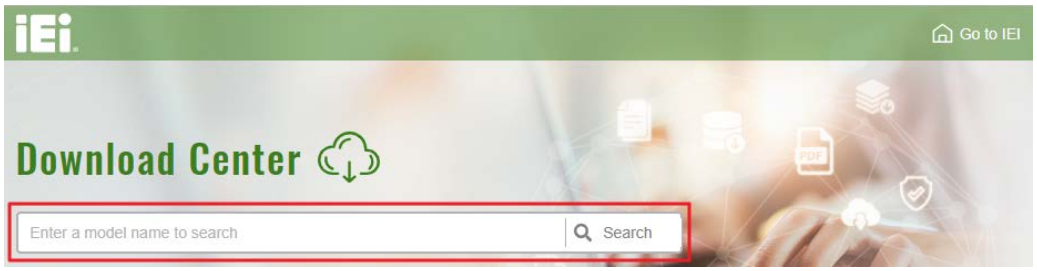


Figure 4-6: IEI Resource Download Center

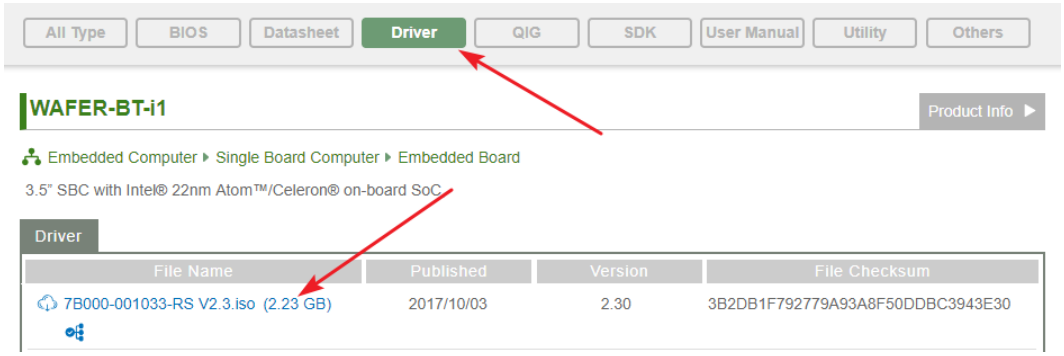
4.8.1 Driver Download

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

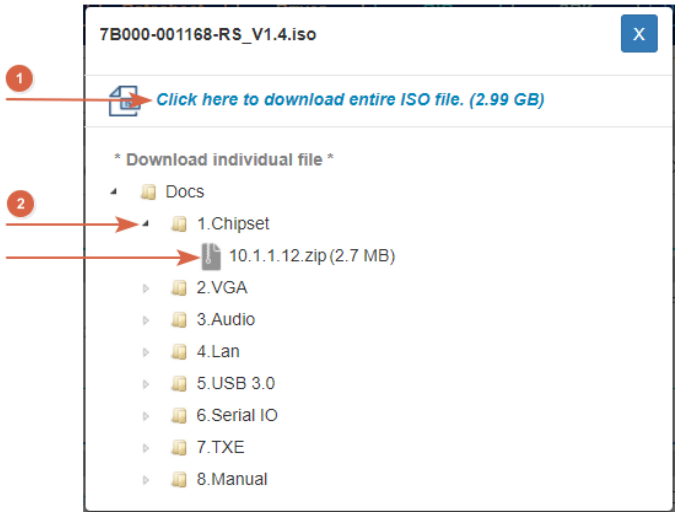
Step 1: Go to https://download.ieiworld.com. Type PEMUX-XEW1 and press Enter.



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 click the small arrow to find an individual driver 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.

4.9 IPMI Setup Procedure

The PEMUX-XEW1 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 PEMUX-XEW1 supports IPMI 2.0 through the optional iRIS-2400 module. Follow the steps below to setup IPMI.

4.9.1 Managed System Hardware Setup

The hardware configuration of the managed system (PEMUX-XEW1) is described below.

Step 1: Install an iRIS-2400 module to the IPMI module socket (refer to **Section 4.6**).

Step 2: Make sure at least one DDR4 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 1GbE RJ-45 connector labeled **LAN_CN1** (**Figure 3-18**).

4.9.2 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 PEMUX-XEW1
c. The PEMUX-XEW1 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 4-7**).

Figure 4-7: 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.

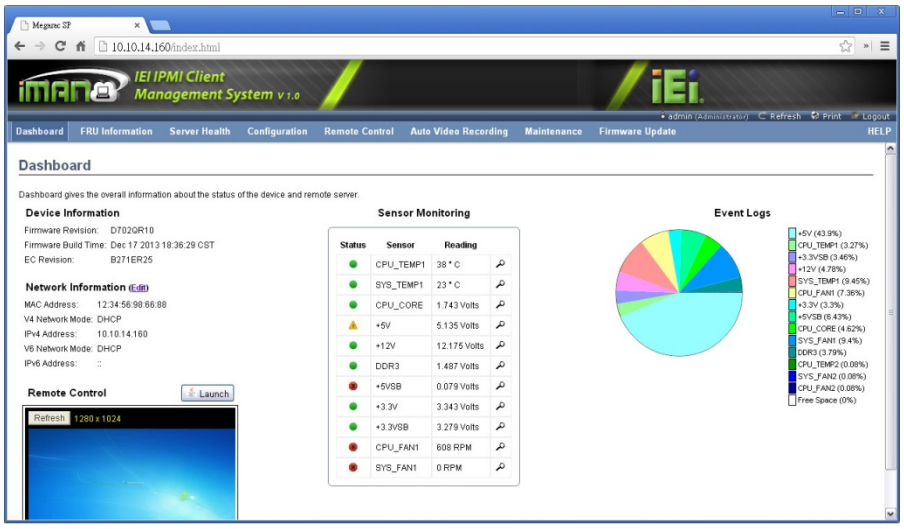


Figure 4-8: IEI iMAN Web GUI

NOTE:

To understand how to use the IEI iMAN Web GUI, please refer to the iRIS-2400 Web GUI user manual in the utility CD came with the PEMUX-XEW1. 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 the following table.

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
-	Decrease the numeric value or make changes
Page Up	Move to the previous page
Page Dn	Move to the next page

Key	Function
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**.

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

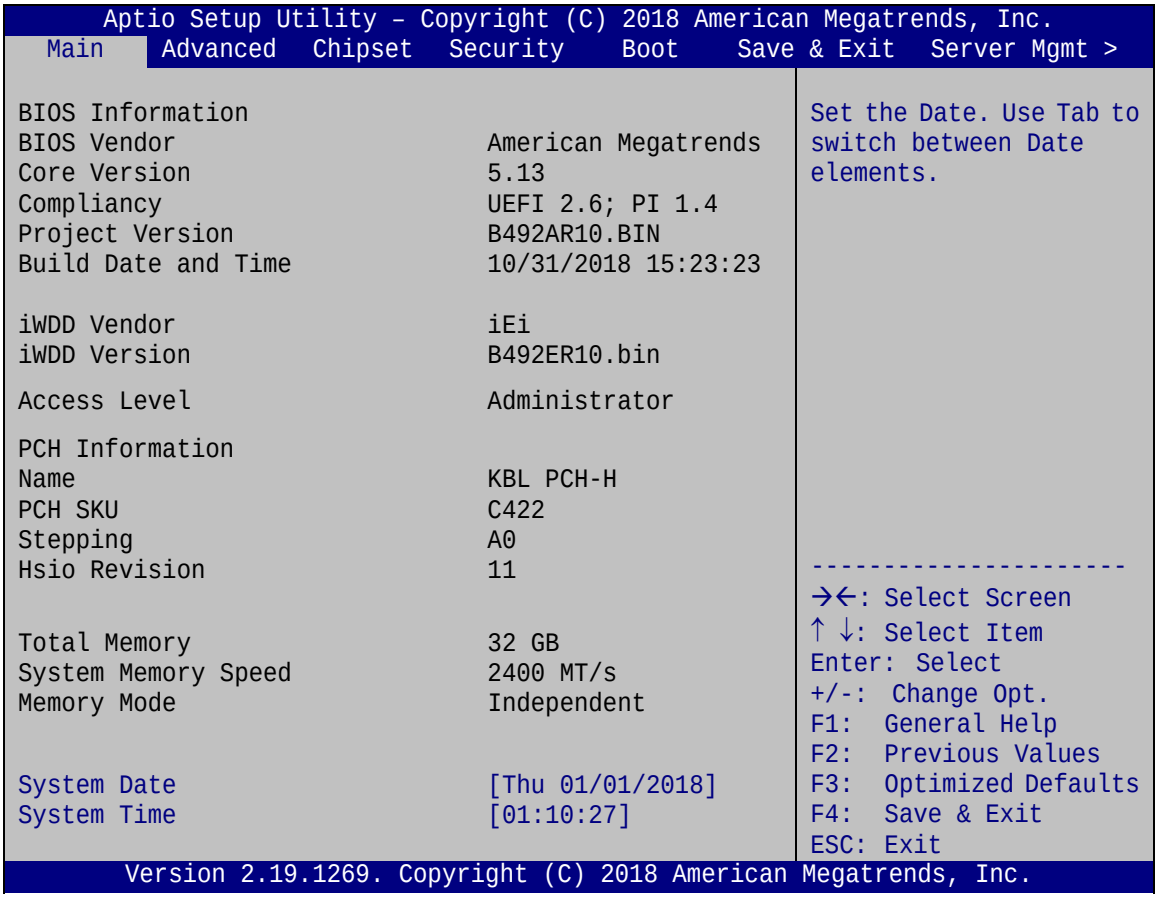
The **menu bar** on top of the BIOS screen has the following main items:

- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Security – Sets User and Supervisor Passwords.
- Boot – Changes the system boot configuration.
- Save & Exit – Selects exit options and loads default settings
- Server Mgmt – Configures system event log and BMC network parameters
- Socket Configuration – Configures CPU and Intel VT 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.



BIOS Menu 1: Main

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]**

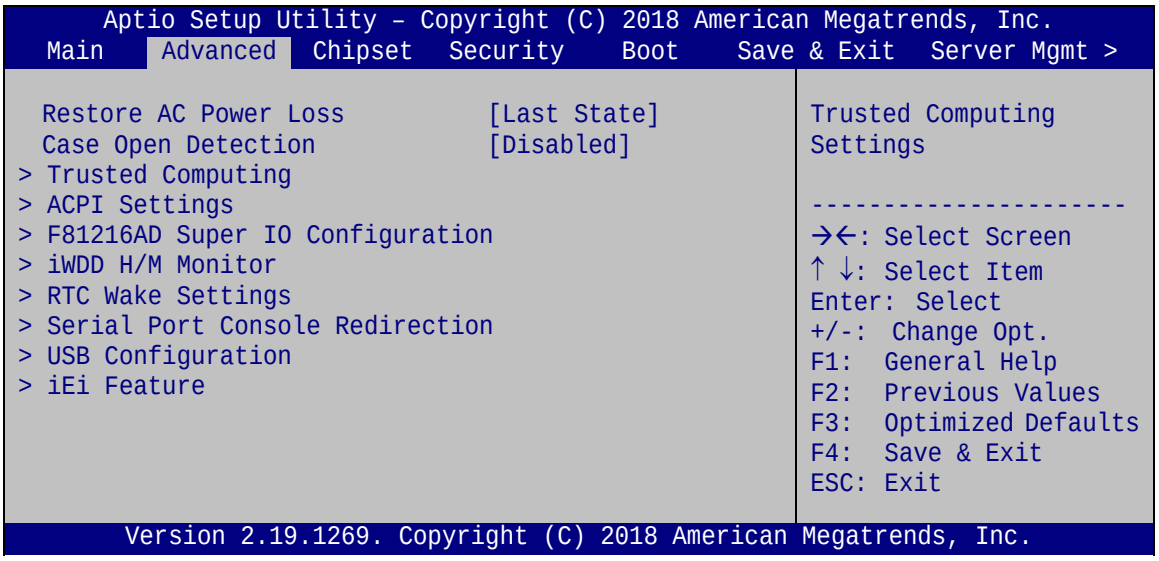
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

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

➔ **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.

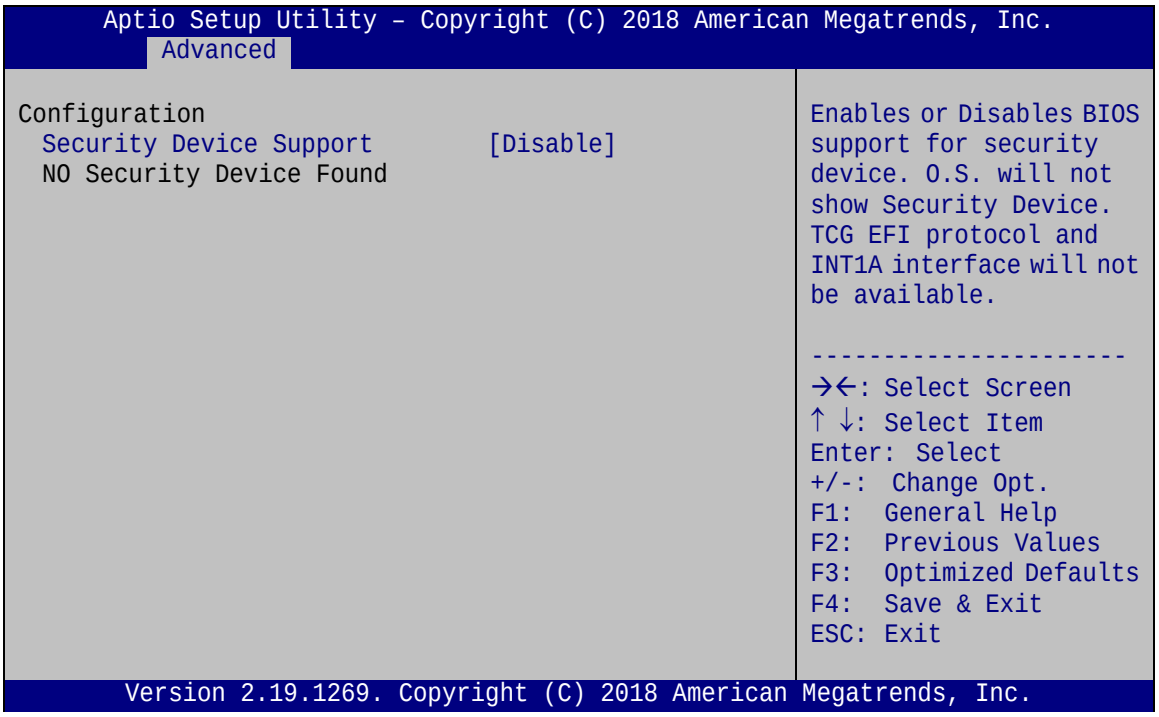
➔ **Case Open Detection [Disabled]**

Use the **Case Open Detection** option to enable or disable the case open beep function.

➔	**Disabled**	**DEFAULT**	Disable the case open beep function
➔	**Enabled**		Enable the case open beep function

5.3.1 Trusted Computing

Use the **Trusted Computing** menu (**BIOS Menu 3**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).



BIOS Menu 3: Trusted Computing

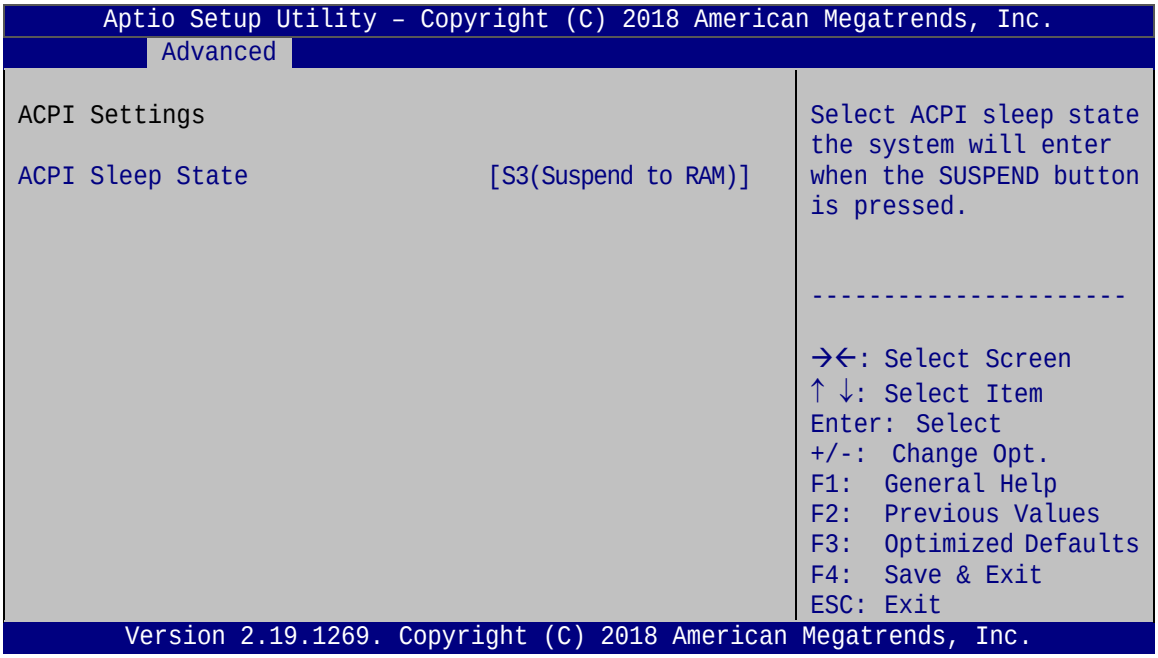
➔ **Security Device Support [Disable]**

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

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

5.3.2 ACPI Settings

The **ACPI Settings** menu (**BIOS Menu 4**) configures the Advanced Configuration and Power Interface (ACPI) options.



BIOS Menu 4: ACPI Settings

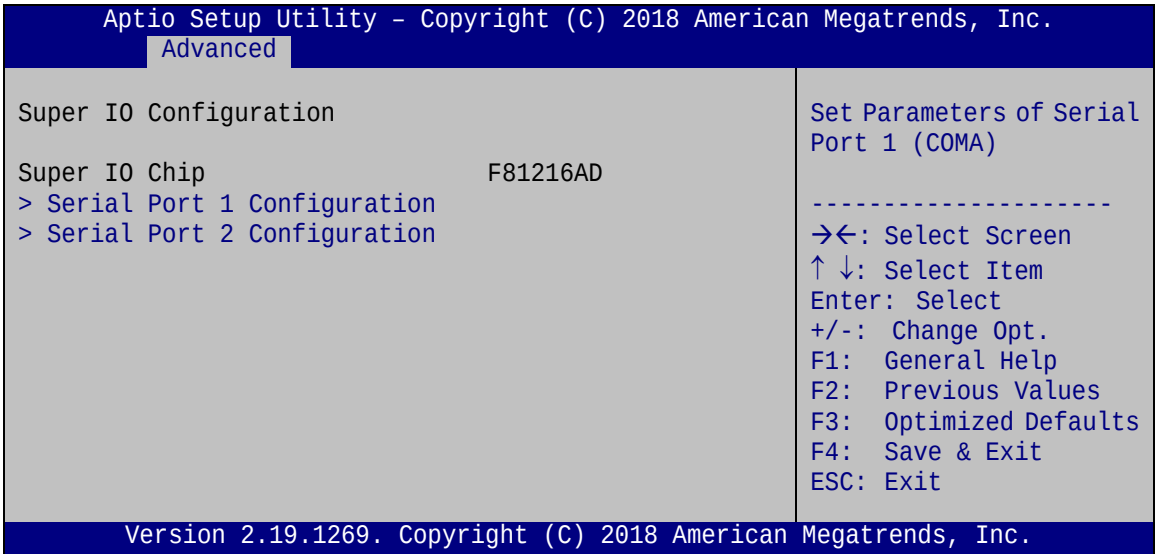
➔ **ACPI Sleep State [S3 (Suspend to RAM)]**

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

➔ **S3 (Suspend to RAM)** **DEFAULT** 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.

5.3.3 F81216AD Super IO Configuration

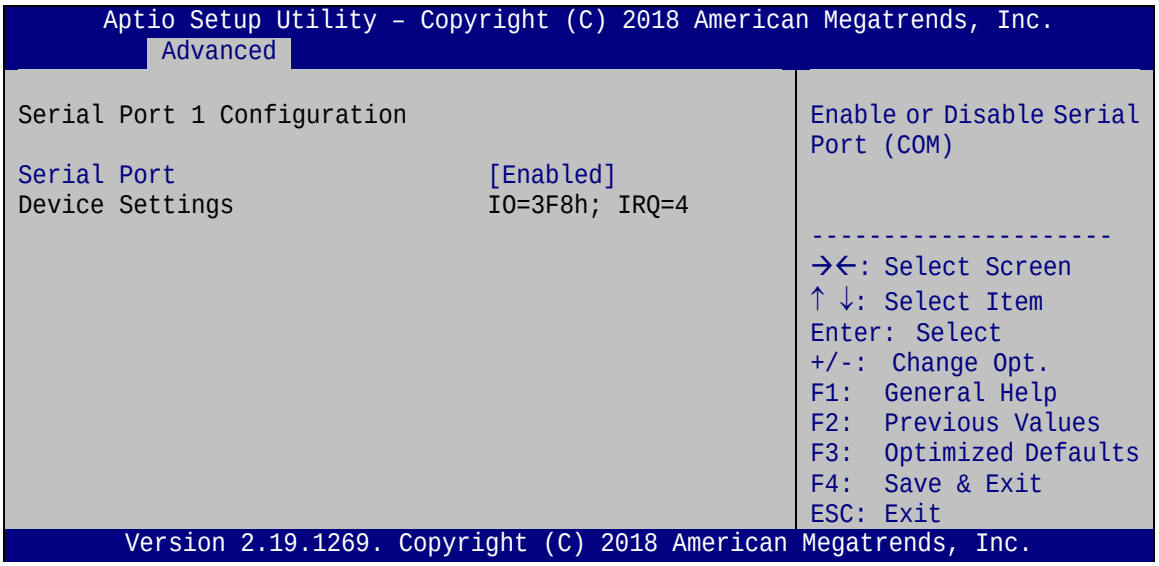
Use the **F81216AD Super IO Configuration** menu (**BIOS Menu 5**) to set or change the configurations for the parallel ports and serial ports.



BIOS Menu 5: F81216AD Super IO Configuration

5.3.3.1 Serial Port 1 Configuration

Use the **Serial Port 1 Configuration** menu (**BIOS Menu 6**) to configure the serial port 1.



BIOS Menu 6: Serial Port 1 Configuration Menu

➔ **Serial Port [Enabled]**

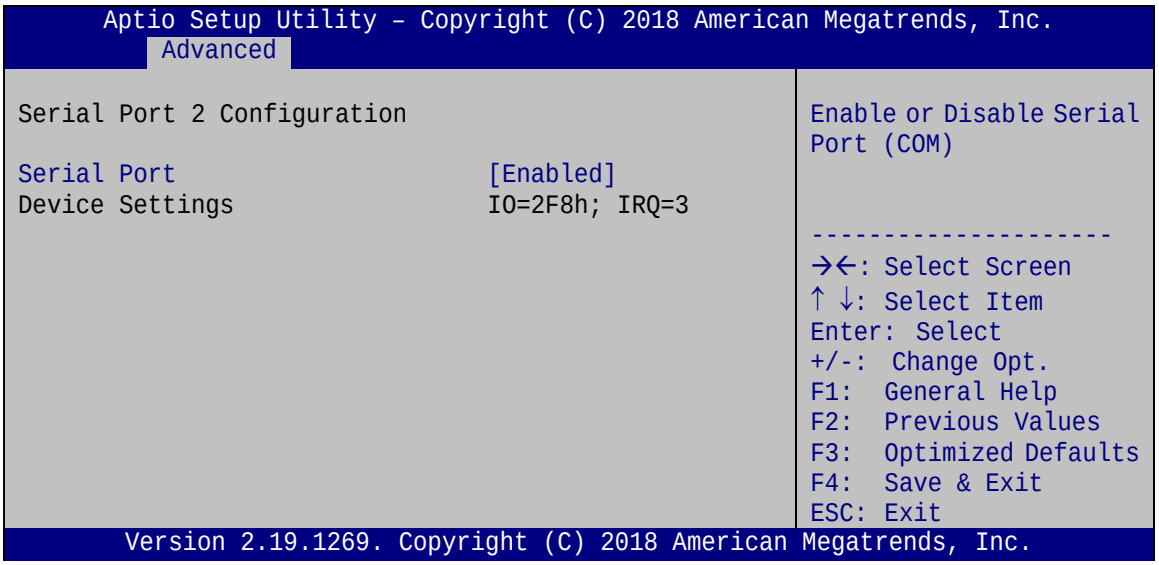
Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled** Disable the serial port

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

5.3.3.2 Serial Port 2 Configuration

Use the **Serial Port 2 Configuration** menu (**BIOS Menu 7**) to configure the serial port 2.



BIOS Menu 7: Serial Port 2 Configuration Menu

➔ **Serial Port [Enabled]**

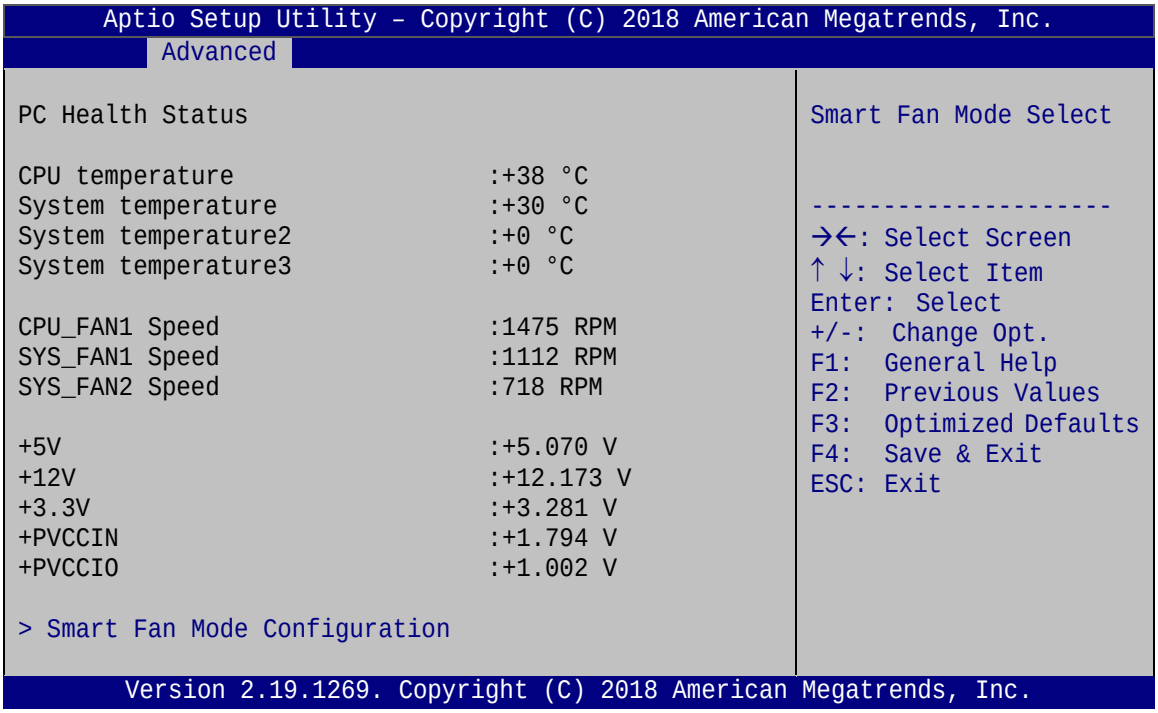
Use the **Serial Port** option to enable or disable the serial port.

➔ **Disabled** Disable the serial port

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

5.3.4 iWDD H/W Monitor

The **iWDD H/W Monitor** menu (**BIOS Menu 8**) contains the fan configuration submenu, and displays the system temperature and CPU fan speed.



BIOS Menu 8: iWDD 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:
  - +5V
  - +12V

- +3.3V
- PVCCIN
- PVCCIO

5.3.4.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 9**) to configure the CPU/system fan temperature and speed settings.

```
Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
        Advanced
Smart Fan Mode Configuration                    Smart Fan Mode Select

CPU_FAN1 Smart Fan Control        [Auto Mode]
Auto mode fan start temperature   40          ---------------------
Auto mode fan off temperature     30          →←: Select Screen
Auto mode fan start PWM           30          ↑ ↓: Select Item
Auto mode fan slope PWM           2           Enter: Select
                                              +/-:  Change Opt.
SYS_FAN1 Smart Fan Control        [Auto Mode] F1:  General Help
Auto mode fan start temperature   50          F2:  Previous Values
Auto mode fan off temperature     40          F3:  Optimized Defaults
Auto mode fan start PWM           40          F4:  Save & Exit
Auto mode fan slope PWM           2           ESC: Exit
Version 2.19.1269. Copyright (C) 2018 American Megatrends, Inc.
```

BIOS Menu 9: 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.

➔ **Manual Mode**		The fan spins at the speed set in Manual Mode settings.
➔ **Auto Mode**	**DEFAULT**	The fan adjusts its speed using Auto Mode settings.

The following options can only be set if the CPU/SYS Smart Fan Control option is set to Auto Mode.

➔ **Auto mode fan start temperature**

If the CPU temperature is between **fan off** and **fan start**, the fan speed change to **fan start PWM**. To set a value, Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **Auto mode fan off temperature**

If the CPU temperature is lower than the value set this option, the fan speed change to be lowest. To set a value, Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **Auto mode fan start PWM**

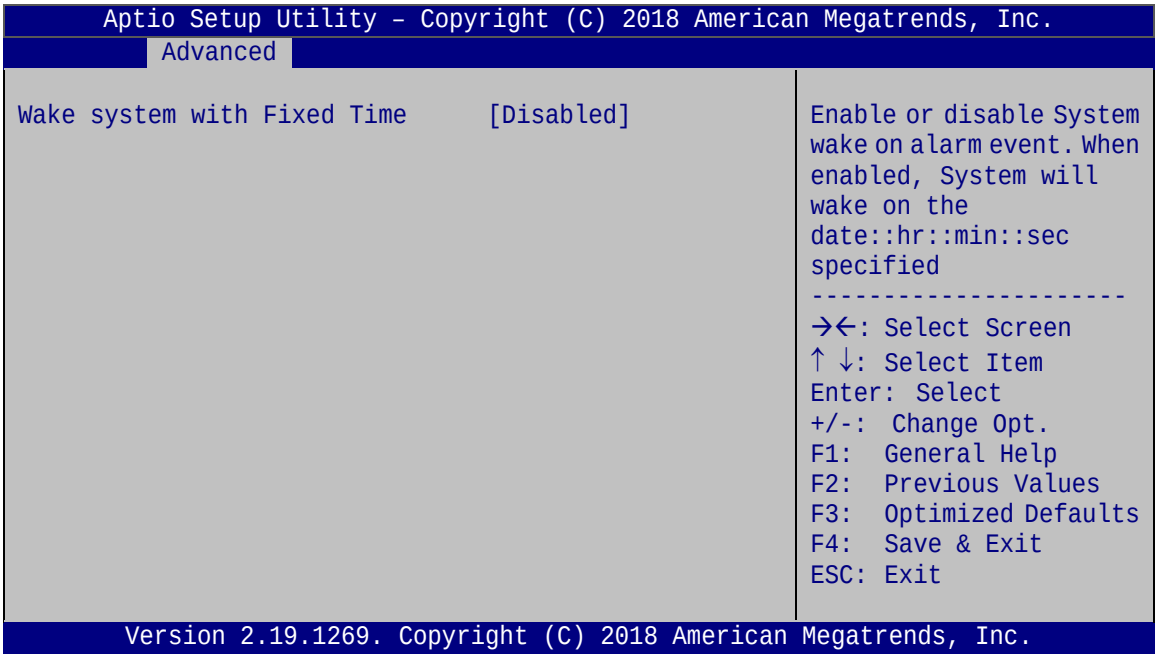
Use the **Auto mode fan start PWM** option to set the PWM start value. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **Auto mode fan slope PWM**

Use the **Auto mode fan slope PWM** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. Use the + or – key to change the value or enter a decimal number between 1 and 8.

5.3.5 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 10**) enables the system to wake at the specified time.



BIOS Menu 10: 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

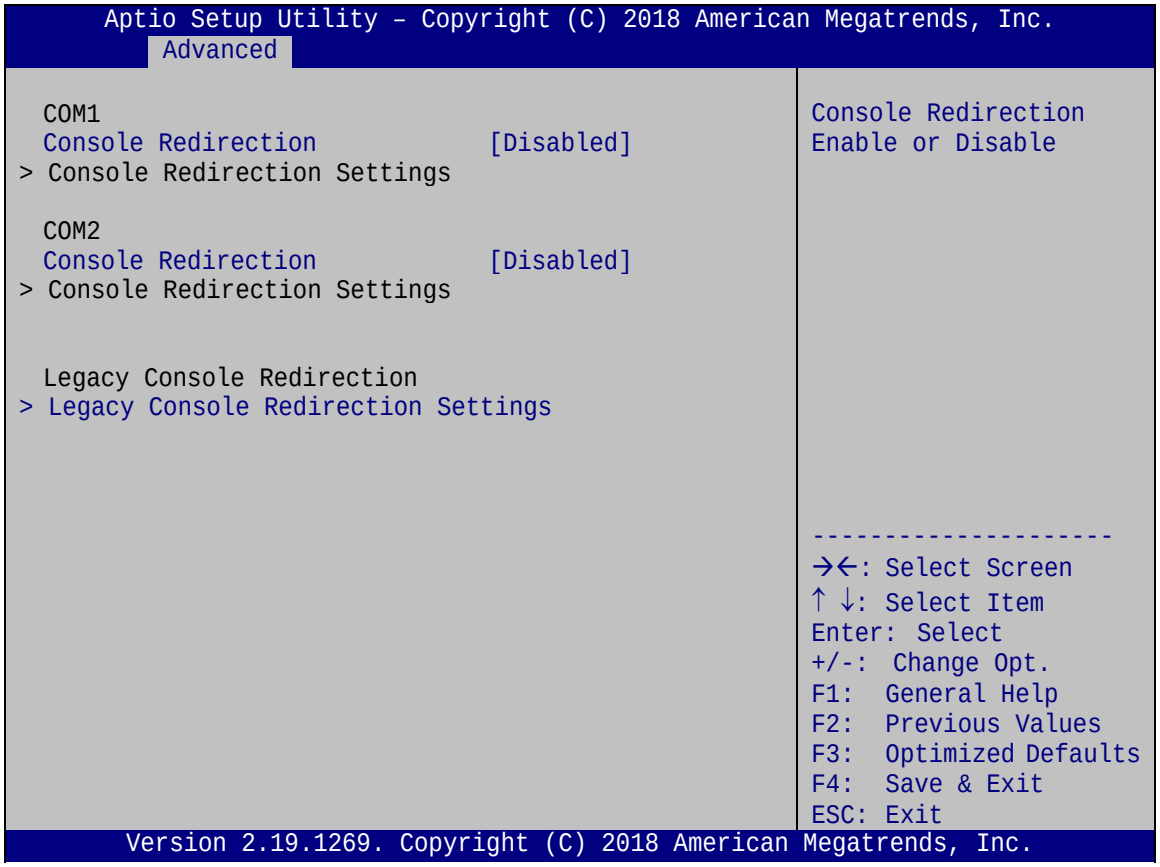
Wake up minute

Wake up second

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

5.3.6 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 11**) 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 11: 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

The following options are available in the **Console Redirection Settings** submenu when the **Console Redirection** option is enabled.

➔ **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.

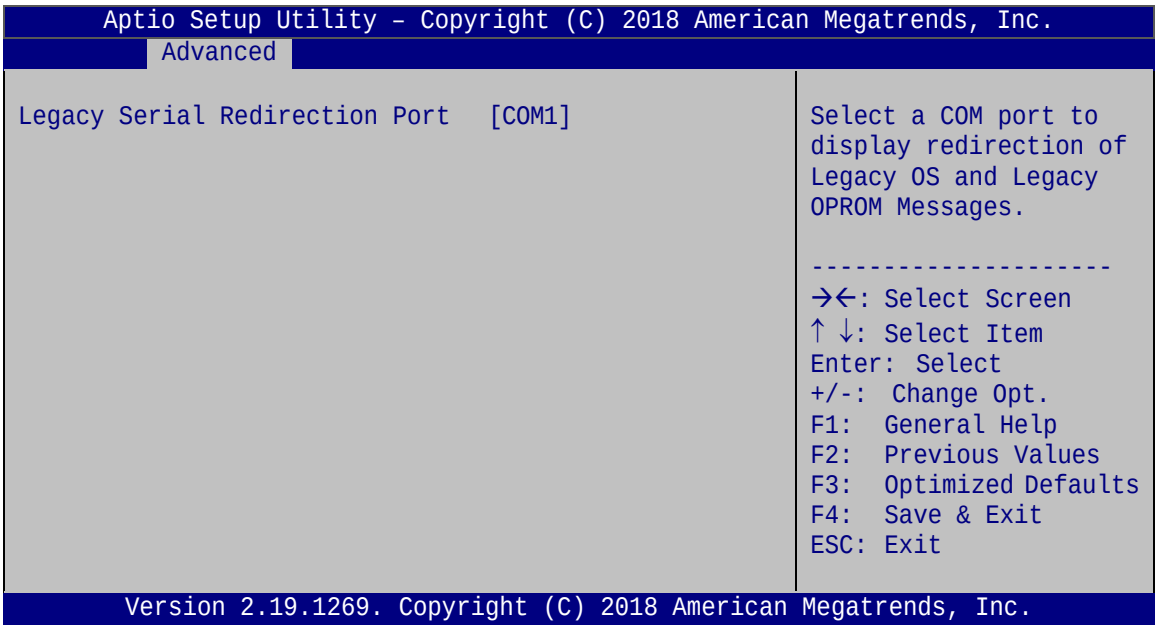
➔ **None**	**DEFAULT**	No parity bit is sent with the data bits.
➔ **Even**		The parity bit is 0 if the number of ones in the data bits is even.
➔ **Odd**		The parity bit is 0 if the number of ones in the data bits is odd.
➔ **Mark**		The parity bit is always 1. This option does not provide error detection.
➔ **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.

5.3.6.1 Legacy Console Redirection Settings



BIOS Menu 12: Legacy Console Redirection Settings

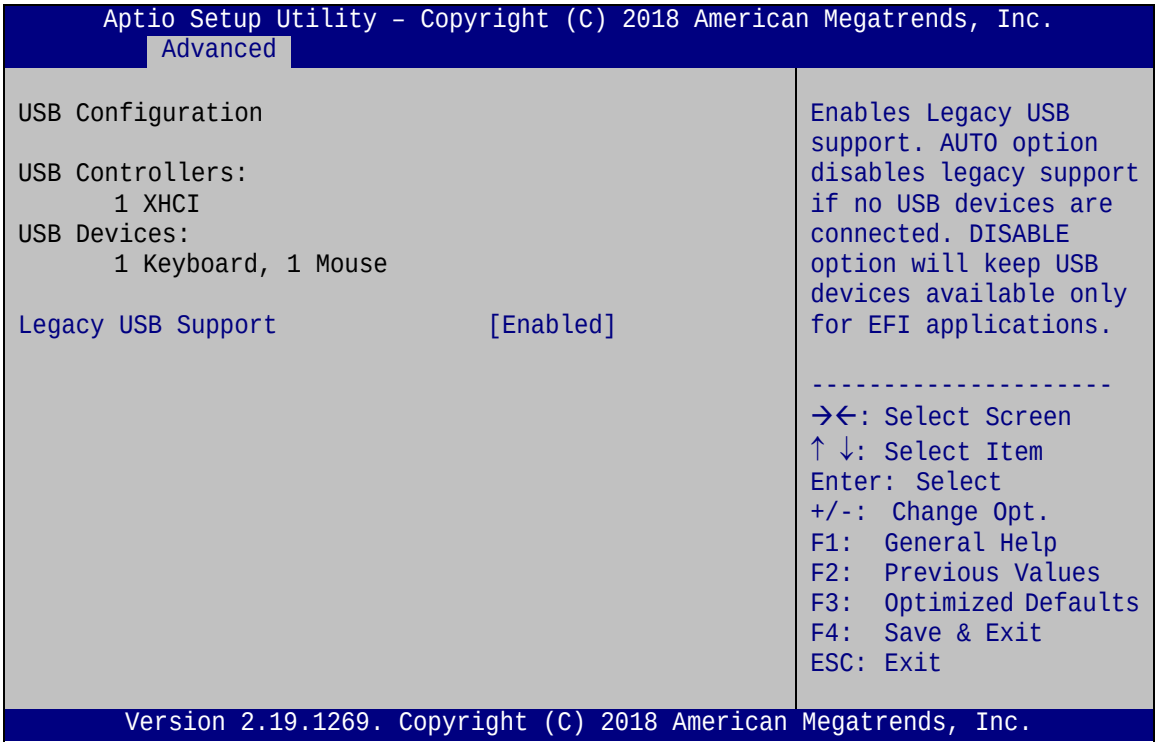
➔ **Legacy Serial Redirection Port [COM1]**

Use the **Legacy Serial Redirection Port** option to select a COM port to display redirection of legacy OS and legacy OPROM messages. Configuration options are listed below.

- COM1 **Default**
- COM2

5.3.7 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 13**) to read USB configuration information and configure the USB settings.



BIOS Menu 13: USB Configuration

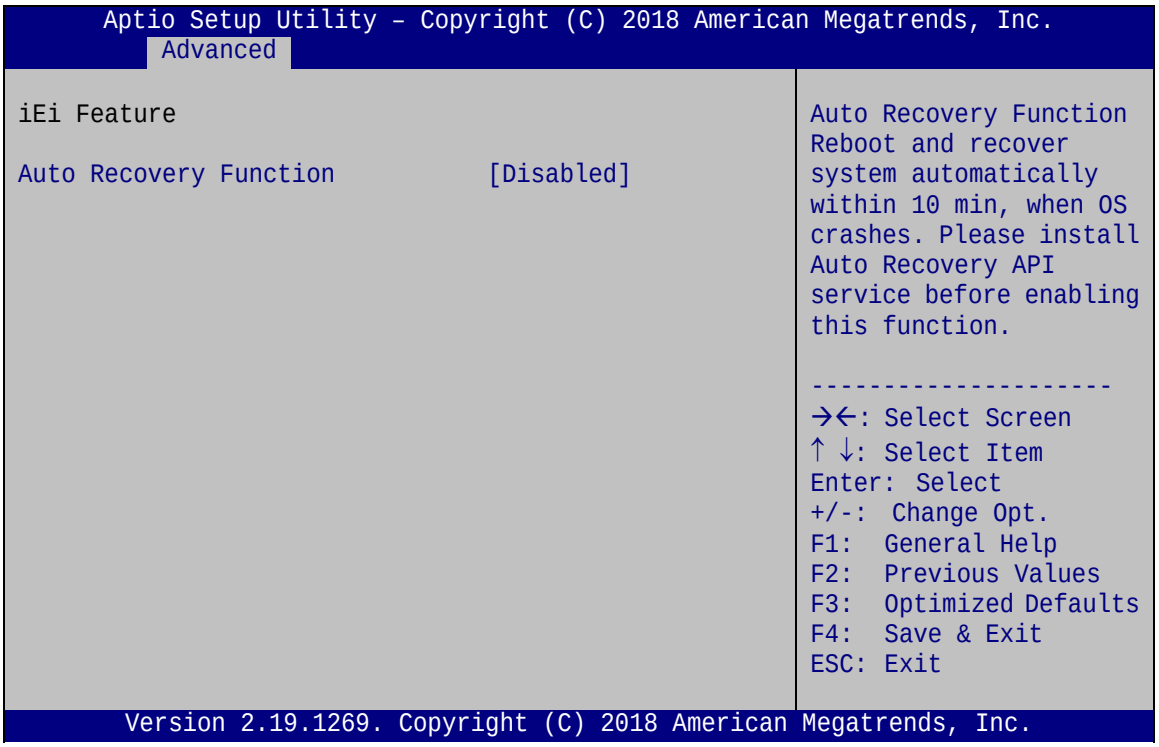
➔ **Legacy USB Support [Enabled]**

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

5.3.8 iEi Feature

Use the **iEi Feature** menu (**BIOS Menu 14**) to configure One Key Recovery function.



BIOS Menu 14: 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

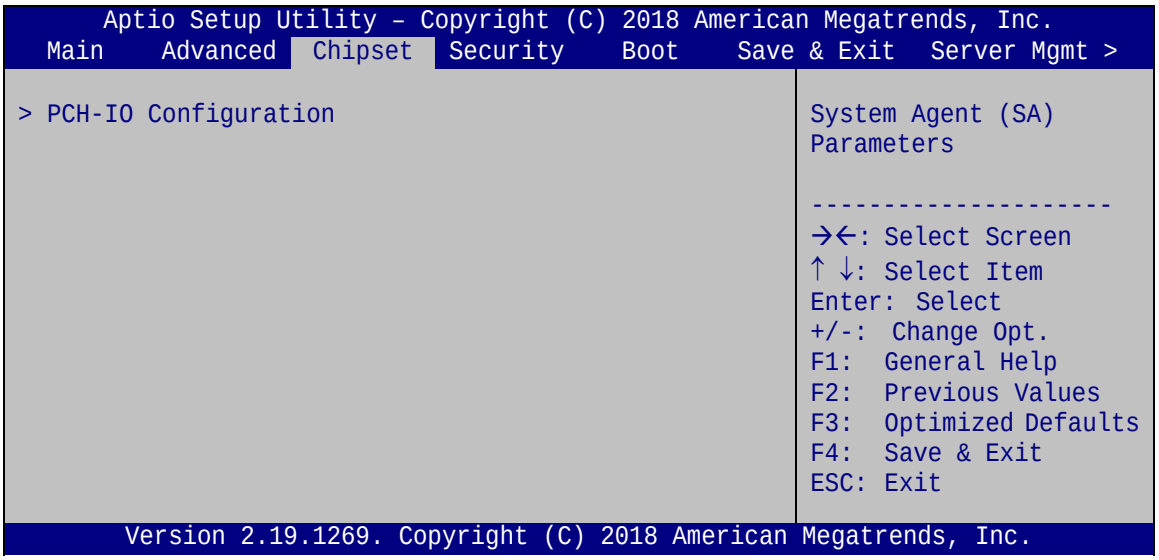
➔ **Enabled** Auto recovery function enabled

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 15**) to access the PCH IO and System Agent (SA) configuration menus.

WARNING!

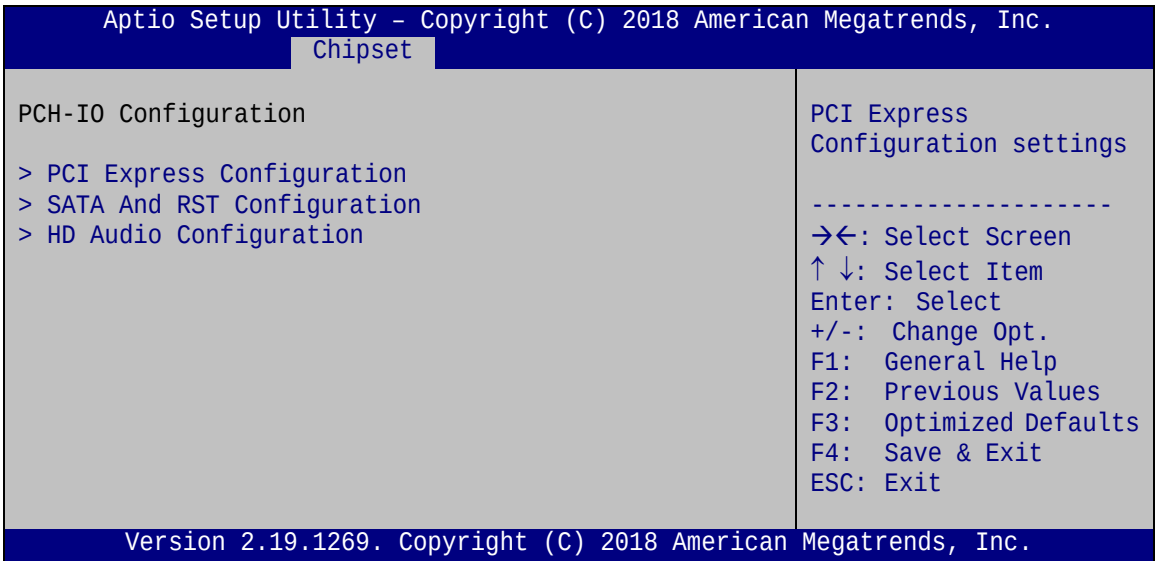
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 15: Chipset

5.4.1 PCH-IO Configuration

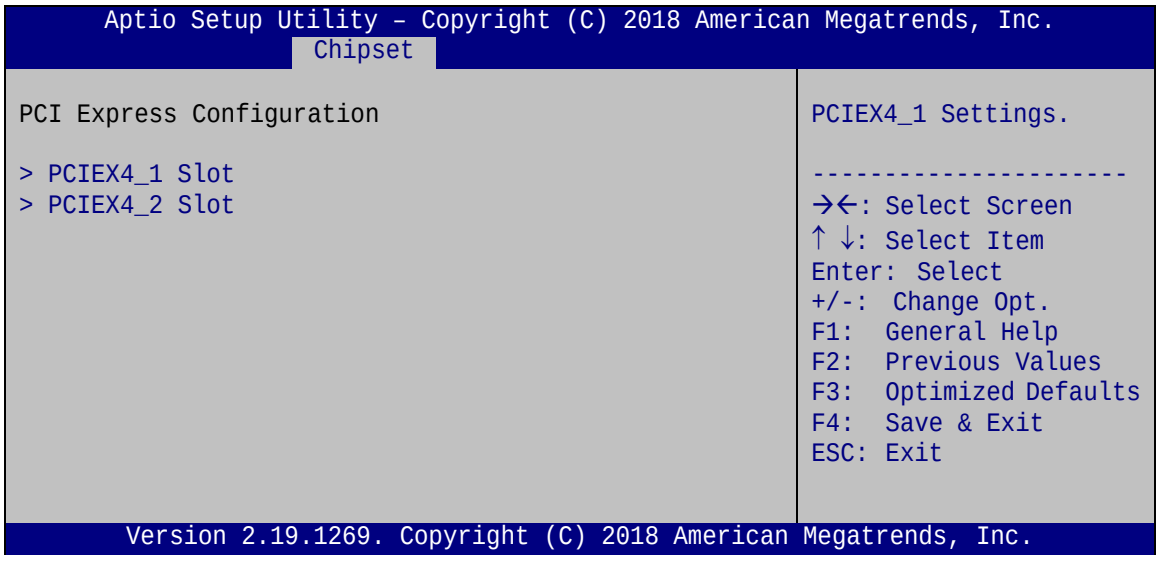
Use the **PCH-IO Configuration** menu (**BIOS Menu 16**) to configure the PCH parameters.



BIOS Menu 16: PCH-IO Configuration

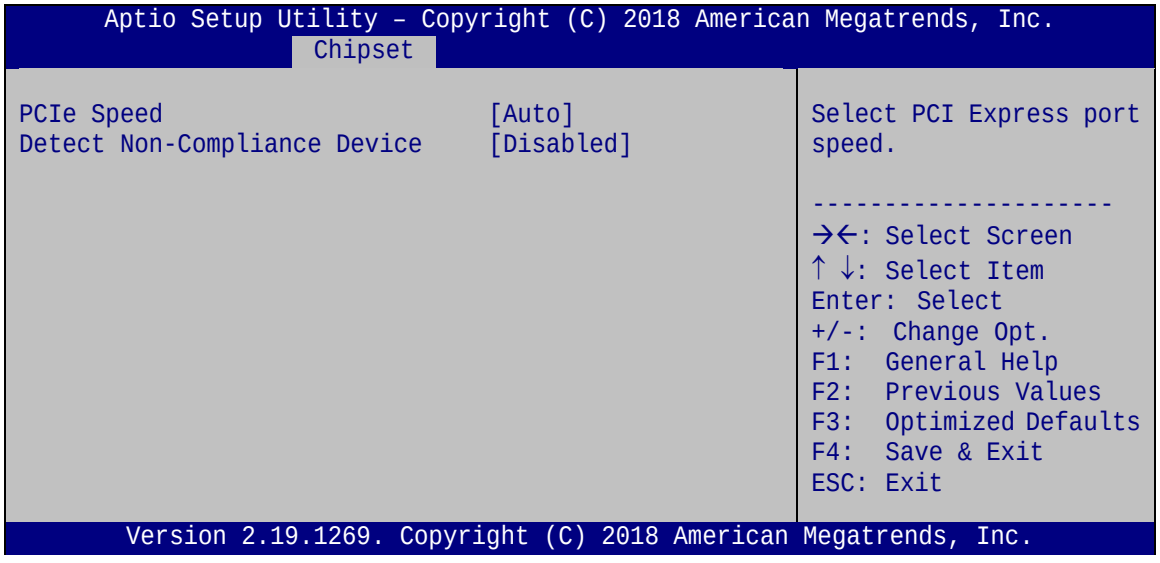
5.4.1.1 PCI Express Configuration

Use the **PCI Express Configuration** menu (**BIOS Menu 17**) to configure the PCI Express slots.



BIOS Menu 17: PCI Express Configuration

5.4.1.1.1 PCIEX4 Slot



BIOS Menu 18: PCIEX4 Slot

➔ **PCIe Speed [Auto]**

Use this option to select the support type of the PCI Express slots. The following options are available:

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

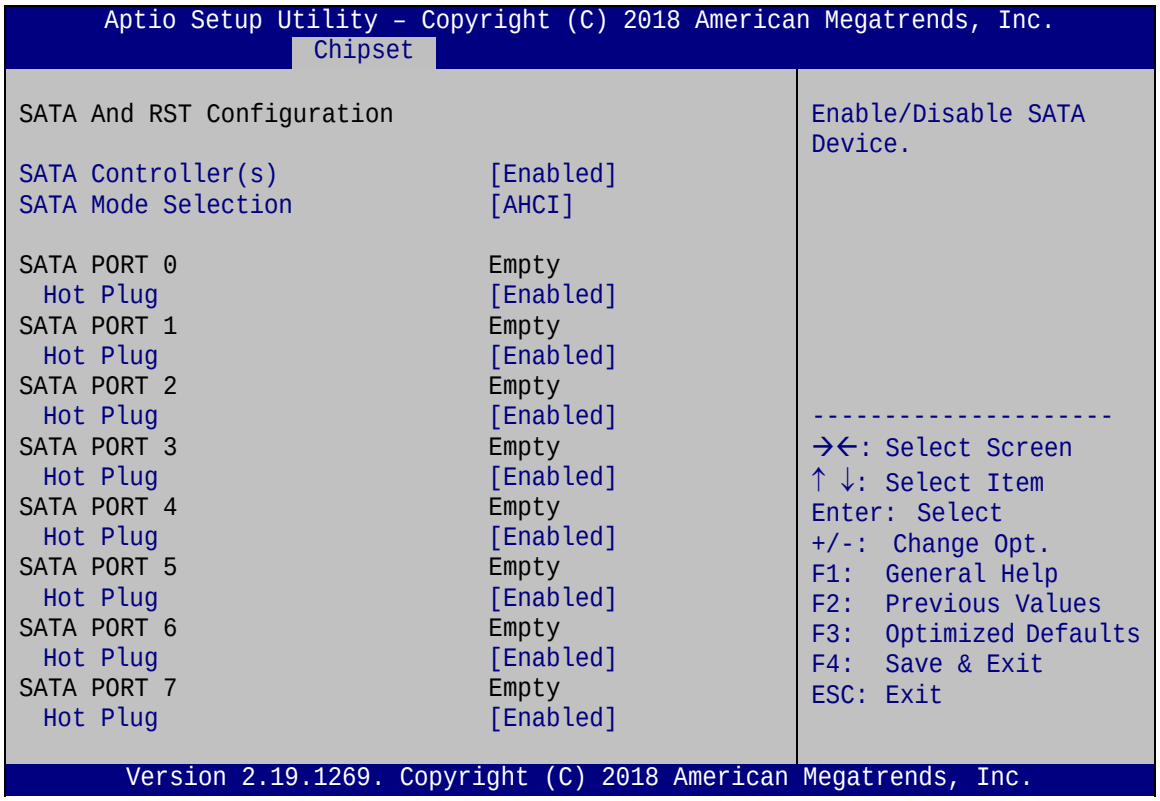
➔ **Detect Non-Compliance Device [Disabled]**

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 slot.

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

5.4.1.2 SATA And RST Configuration

Use the **SATA And RST Configuration** menu (**BIOS Menu 19**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 19: SATA And RST Configuration

➔ **SATA Controller(s) [Enabled]**

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

➔ **Enabled** **DEFAULT** Enables the on-board SATA controller(s).

➔ **Disabled** Disables the on-board SATA controller(s).

➔ **SATA Mode Selection [AHCI]**

Use the **SATA Mode Selection** option to determine how the SATA devices operate.

➔ **AHCI**	**DEFAULT**	Configures SATA devices as AHCI device.
➔ **RAID**		Configures SATA devices as RAID device.

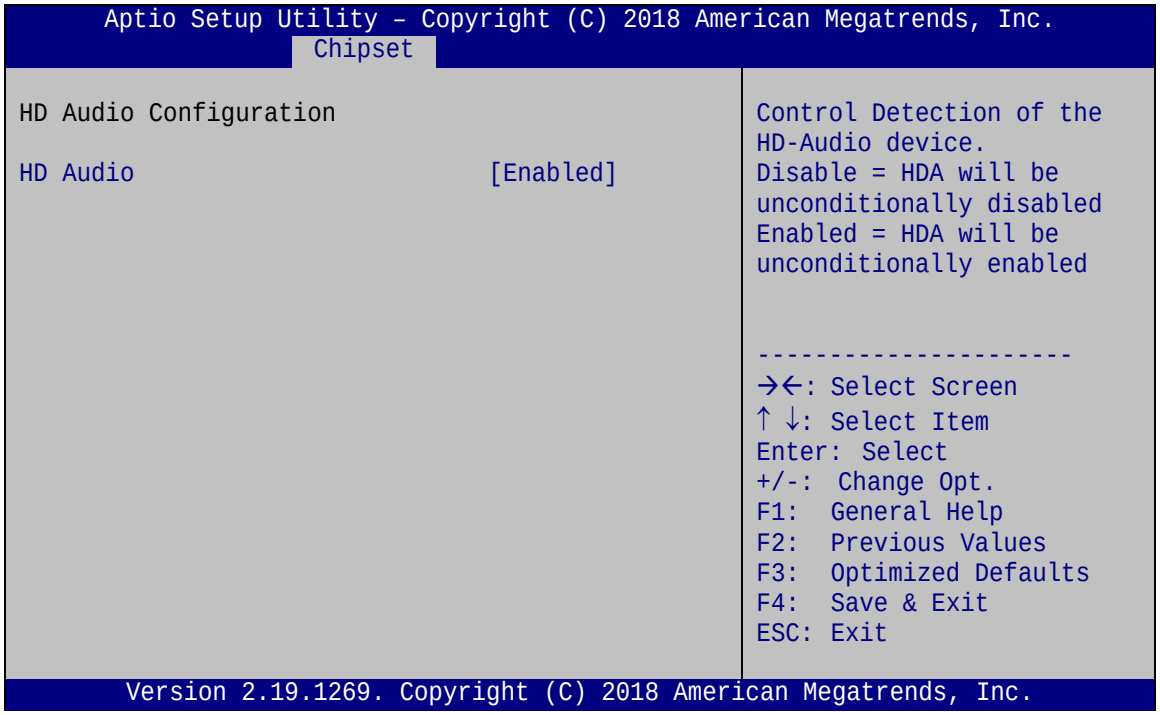
➔ **Hot Plug [Enabled]**

Use the **Hot Plug** option to enable or disable the hot plug function.

➔ **Disabled**		Disables the hot plug function.
➔ **Enabled**	**DEFAULT**	Enables the hot plug function.

5.4.1.3 HD Audio Configuration

Use the **HD Audio Configuration** menu (**BIOS Menu 20**) to configure the PCH Azalia settings.



BIOS Menu 20: HD Audio Configuration

➔ **HD Audio [Enabled]**

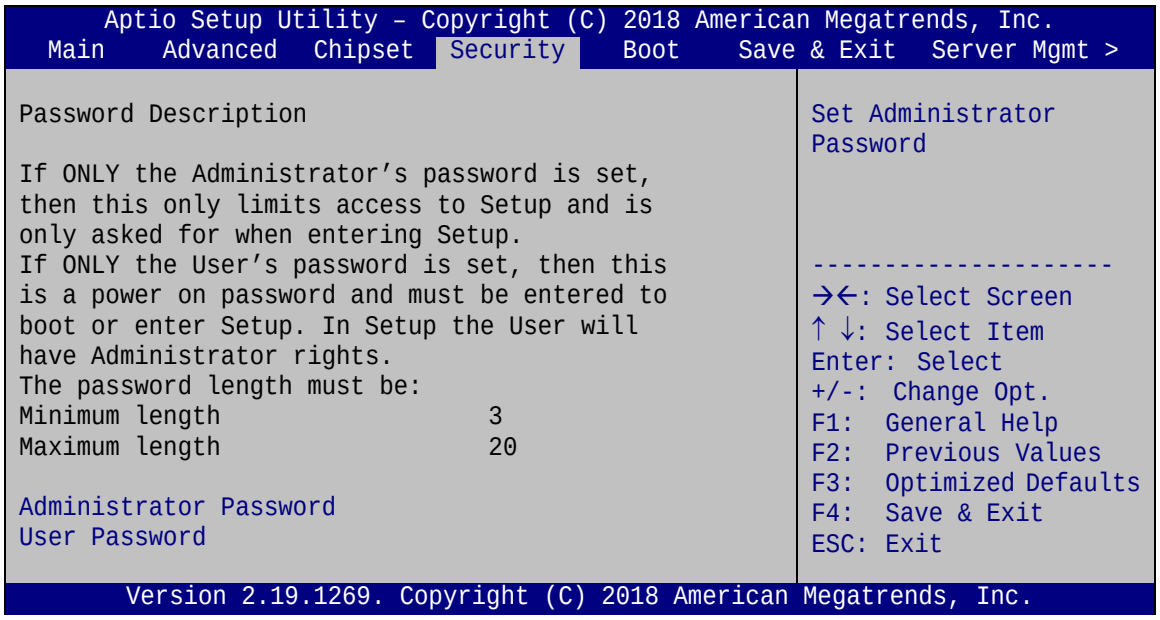
Use the **HD Audio** option to enable or disable the High Definition Audio controller.

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

➔ **Enabled** **DEFAULT** The onboard High Definition Audio controller is enabled.

5.5 Security

Use the **Security** menu (**BIOS Menu 21**) to set system and user passwords.



BIOS Menu 21: Security

➔ **Administrator Password**

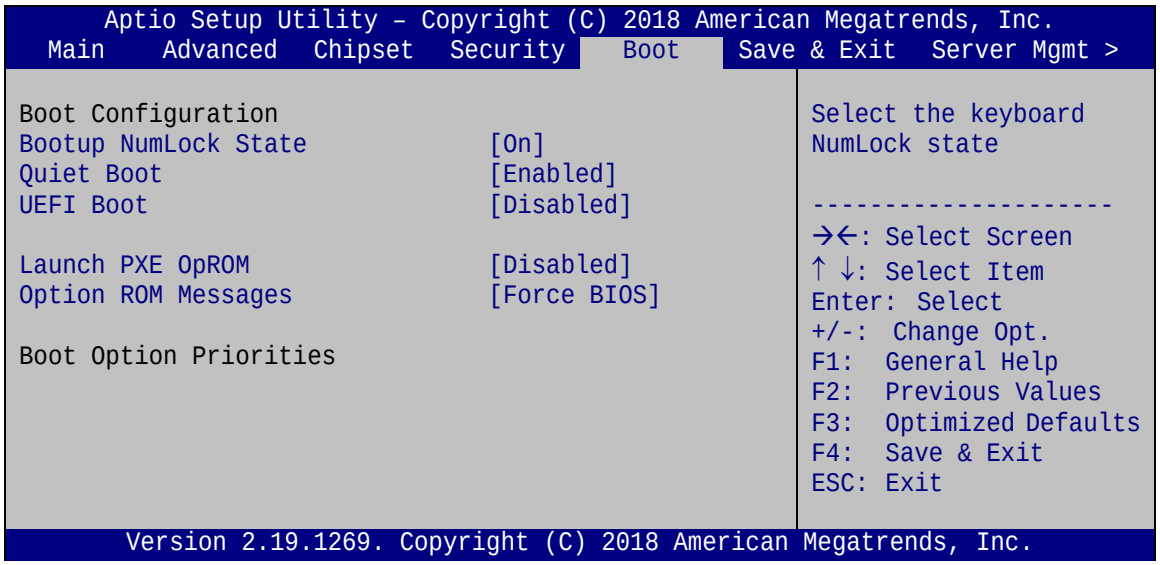
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 22**) to configure system boot options.



BIOS Menu 22: 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

➔ **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.

➔ **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.

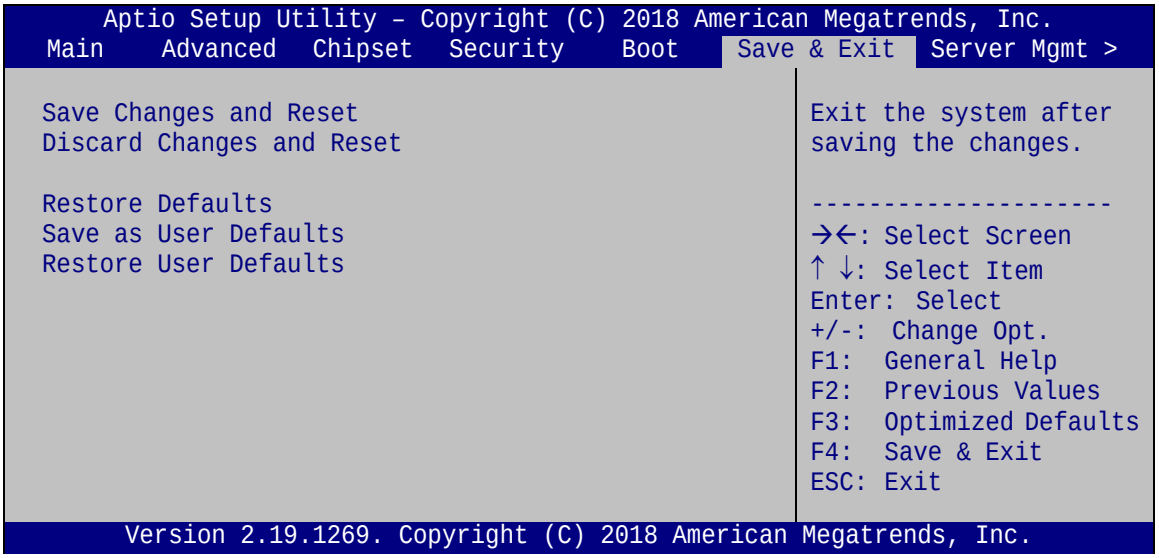
➔ **Option ROM Messages [Force BIOS]**

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.

5.7 Save & Exit

Use the **Safe & Exit** menu (**BIOS Menu 23**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 23: 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**

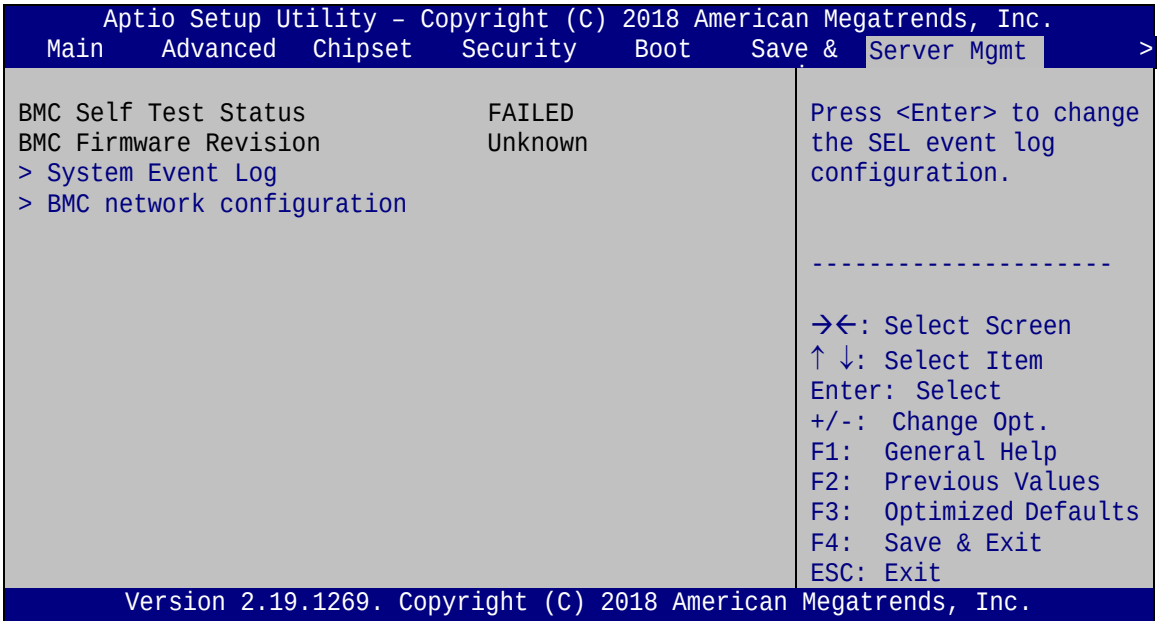
Use the **Save as User Defaults** option to save the changes done so far as user defaults.

➔ **Restore User Defaults**

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

5.8 Server Management

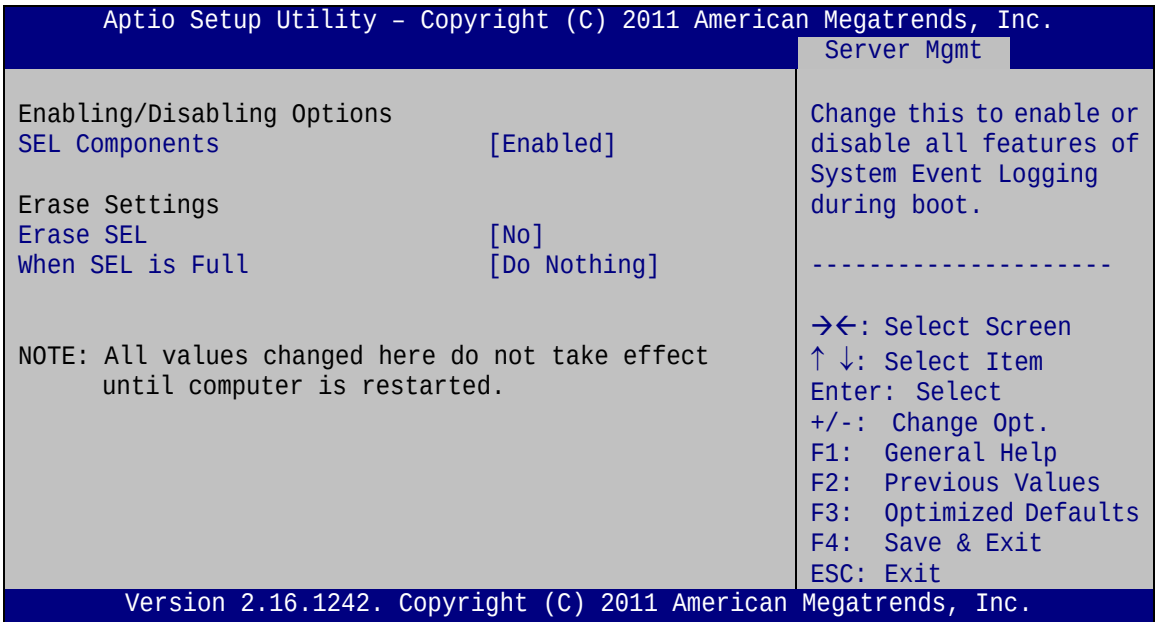
Use the **Server Management** menu (**BIOS Menu 24**) to display the server management status and change the settings.



BIOS Menu 24: Server Management

5.8.1 System Event Log

Use the **System Event Log** menu (**BIOS Menu 25**) to configure the System Event Log (SEL) options.



BIOS Menu 25: System Event Log

➔ **SEL Components [Enabled]**

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

➔ **Disabled** Disables SEL

➔ **Enabled** **DEFAULT** Enables SEL

➔ **Erase SEL [No]**

Use the **Erase SEL** option to determine whether to erase SEL or not. The following options are available:

- No **Default**
- Yes, On next reset
- Yes, On every reset

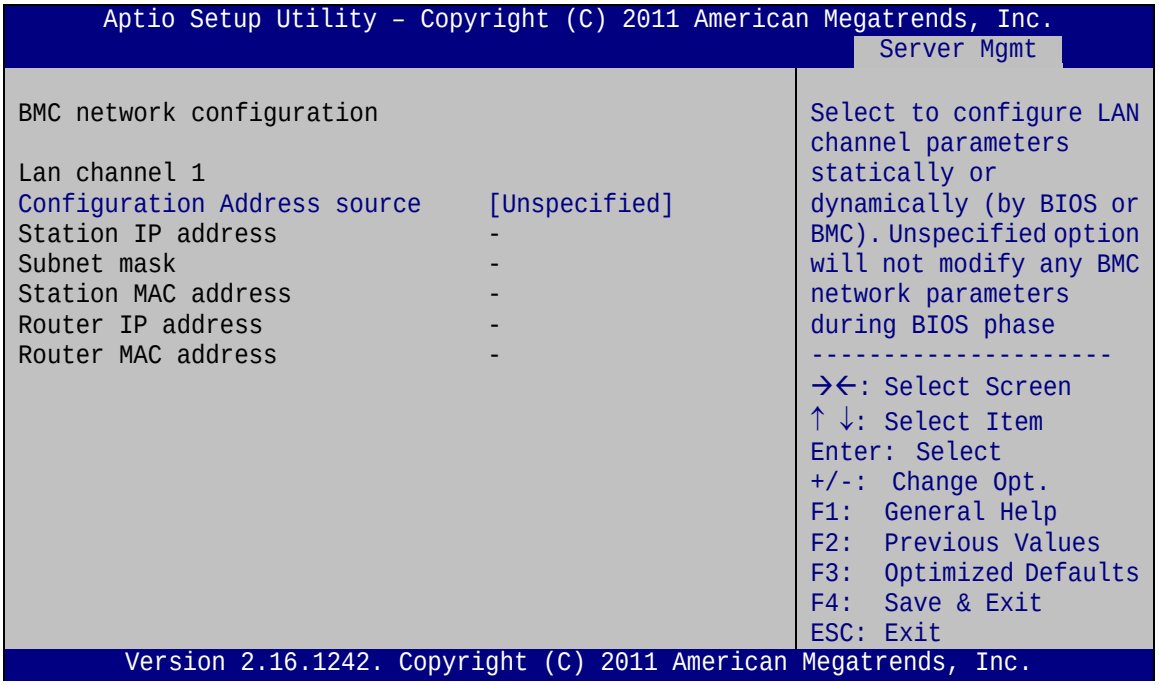
➔ **When SEL is full [Do Nothing]**

Use the **When SEL is Full** option to determine the action to be taken when SEL is full. The following options are available:

- Do Nothing **Default**
- Erase Immediately

5.8.2 BMC Network Configuration

Use the **BMC Network Configuration** menu (**BIOS Menu 26**) to configure the BMC network parameters.



BIOS Menu 26: BMC Network Configuration

➔ **Configuration Address Source [Unspecified]**

Use the **Configuration Address Source** option to select the BMC network address source.

➔ **Unspecified** **DEFAULT** Does not modify any BMC network parameters during BIOS phase

➔ **Static**	Manually sets the BMC network parameters. If this option is selected, the following items will be configurable: *Station IP address *Subnet mask *Station MAC address *Router IP address *Router MAC address
➔ **DynamicBmcDhcp**	Obtains BMC network parameters by BMC dynamically.
➔ **DynamicBmcNonDhcp**	Loads BMC network parameters by BIOS.

5.9 Socket Configuration

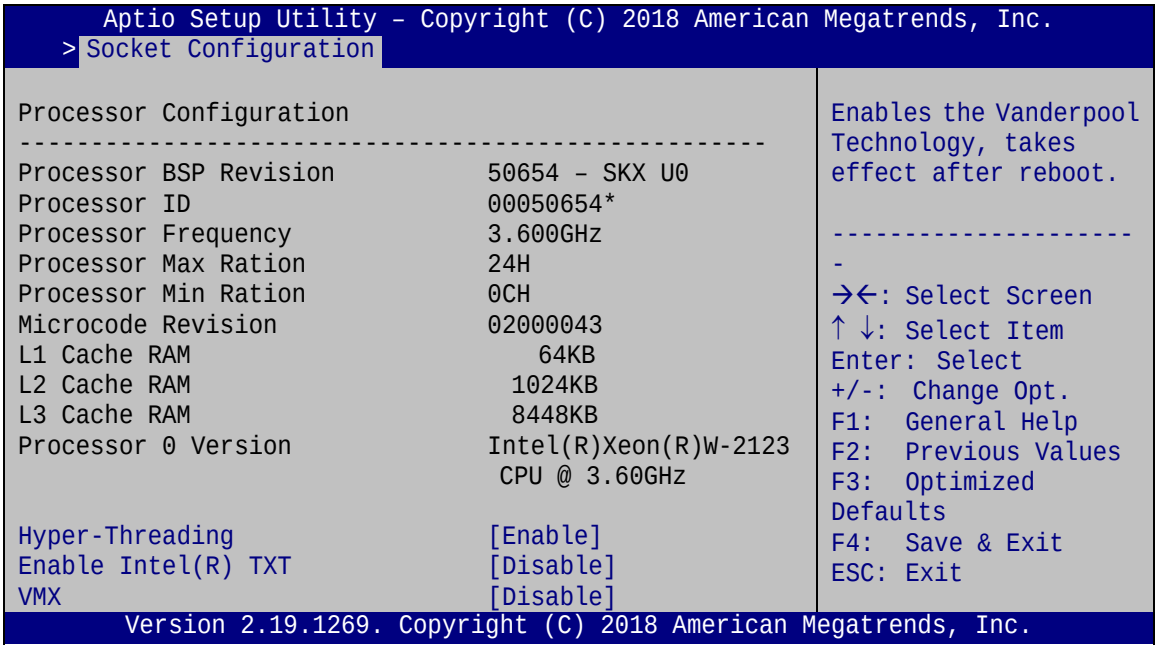
The **PCH-FW Configuration** menu (**BIOS Menu 27**) allows Intel® Active Management Technology (AMT) options to be configured.

```
      Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
   < Socket Configuration

> Processor Configuration                  Display and provides
> IIO Configuration                        option to change the
                                           Processor Settings

                                           ---------------------
                                           ←→: Select Screen
                                           ↑ ↓: Select Item
                                           EnterSelect
                                           F1   General Help
                                           F2   Previous Values
                                           F3    Optimized
                                           Defaults
                                           F4    Save
                                           ESC   Exit
       Version 2.19.1269. Copyright (C) 2018 American Megatrends, Inc.
```

BIOS Menu 27: Socket Configuration

5.9.1 Processor Configuration

Use the **Processor Configuration** menu (**BIOS Menu 28**) to view detailed CPU specifications or enable the Intel Virtualization Technology.



BIOS Menu 28: Processor Configuration

➔ **Hyper-threading [Enabled]**

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

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

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

➔ **Enable Intel(R) TXT [Disable]**

Use the **Enable Intel(R) TXT** option to enable or disable the Intel® Trusted Execution Technology.

➔ **Disable** **DEFAULT** Disable Intel® Trusted Execution Technology

➔ **Enable** Enable Intel® Trusted Execution Technology

➔ **VMX [Disable]**

Use the **VMX** 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.

➔	**Disable**	**DEFAULT**	Disables Intel Virtualization Technology.
➔	**Enable**		Enables Intel Virtualization Technology.

5.9.2 IIO Configuration

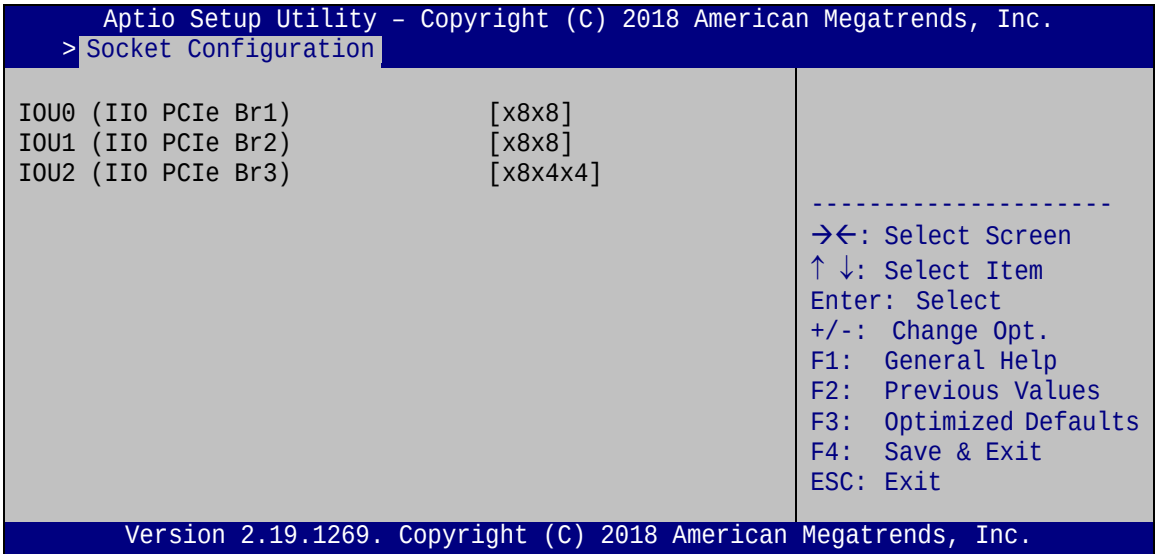
The **IIO Configuration** menu (**BIOS Menu 29**) configures Intel® Virtualization Technology functions.

```
      Aptio Setup Utility – Copyright (C) 2018 American Megatrends, Inc.
   >Socket Configuration

IIO Configuration
-----------------------------------------------------

> Socket0 Configuration
> Intel® VT for Directed I/O (VT-d)

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

                                                      →←: Select Screen
                                                      ↑ ↓: Select Item
                                                      Enter:  Select
                                                      +/-:  Change Opt.
                                                      F1:   General Help
                                                      F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC:  Exit
      Version 2.19.1269. Copyright (C) 2018 American Megatrends, Inc.
```

BIOS Menu 29: IIO Configuration

5.9.2.1 Socket0 Configuration

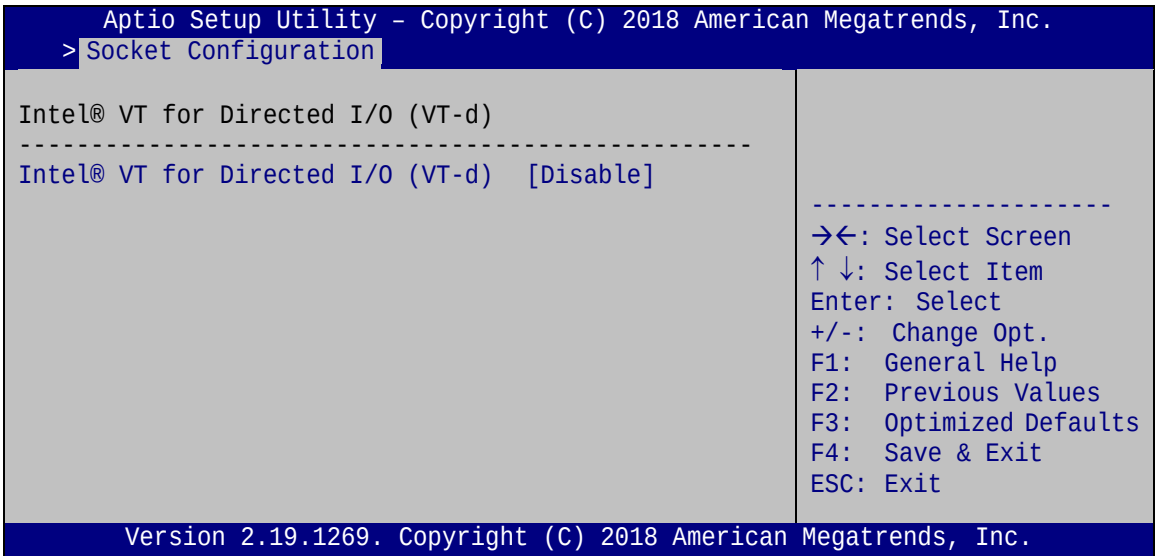
Use the **Socket0 Configuration** menu (**BIOS Menu 30**) to view the PCIe socket information.



BIOS Menu 30: Socket0 Configuration

5.9.2.1 Intel® VT for Directed I/O (VT-d)

Use the **Intel® VT for Directed I/O (VT-d)** submenu (**BIOS Menu 31**) to disable or enable Intel® Virtualization Technology for directed I/O (VT-d).



BIOS Menu 31: Intel® VT for Directed I/O (VT-d)

➔ **Intel® VT for Directed I/O (VT-d) [Disable]**

Use the **Intel® VT for Directed I/O (VT-d)** option to enable or disable VT-d capability.

➔	**Enable**		Enables VT-d capability.
➔	**Disable**	**DEFAULT**	Disables VT-d capability.

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

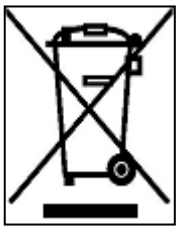
Product Disposal

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

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 D-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

E

Hazardous Materials Disclosure

The details provided in this appendix are to ensure that the product is compliant with the Peoples Republic of China (China) RoHS standards. The table below acknowledges the presences of small quantities of certain materials in the product, and is applicable to China RoHS only.

A label will be placed on each product to indicate the estimated "Environmentally Friendly Use Period" (EFUP). This is an estimate of the number of years that these substances would "not leak out or undergo abrupt change." This product may contain replaceable sub-assemblies/components which have a shorter EFUP such as batteries and lamps. These components will be separately marked.

Please refer to below 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)
Housing	O	O	O	O	O	O
Display	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O
Battery	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in SJ/T11363-2006 (now replaced by GB/T 26572-2011).

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in SJ/T11363-2006 (now replaced by GB/T 26572-2011).

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/T 11363-2006 (现由 GB/T 26572-2011 取代) 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/T 11363-2006 (现由 GB/T 26572-2011 取代) 标准规定的限量要求。