IEi®
IEI Integration Corp.

MODEL:

IMB-H110

User Manual

Rev. 1.00 – August 23, 2016

RoHS Lead Free

Revision

Date	Version	Changes
August 23, 2016	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.

HOT SURFACE

This symbol indicates a hot surface that should not be touched without taking care.

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Introduction

1.1 Introduction
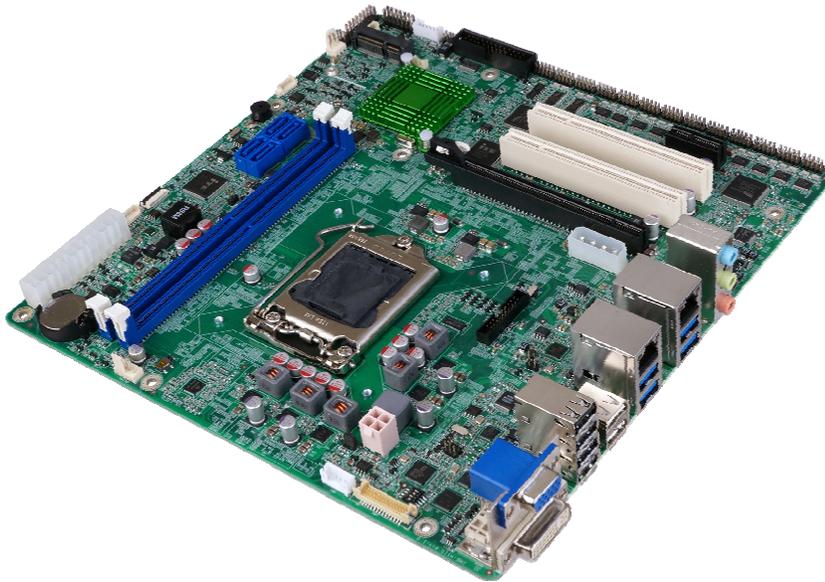
Figure 1-1: IMB-H110

The IMB-H110 is a microATX motherboard. It accepts a Socket LGA1151 Intel® Core™ i7/i5/i3, Pentium® or Celeron® processor and supports two 288-pin 2133 MHz dual-channel DDR4 DIMM modules up to 64 GB.

The IMB-H110 provides two GbE interfaces through the Realtek RTL8111GN controllers. The integrated Intel® H110 chipset supports four SATA 6Gb/s drives. In addition, the IMB-H110 includes VGA, DVI-I and LVDS/iDP interfaces for dual independent display.

Expansion and I/O include one PCIe x16 slot, one PCIe x1 slot, two PCI slots, one PCIe Mini slot, four USB 3.0 on the rear panel, six USB 2.0 on the rear panel, two USB 2.0 by pin headers, ten RS-232 and two RS-232/422/485. High Definition Audio (HDA) support ensures HDA devices can be easily implemented on the IMB-H110.

1.2 Features

Some of the IMB-H110 motherboard features are listed below:

- microATX form factor
- 6th generation LGA1151 Intel® Core™ i7/i5/i3, Pentium® or Celeron® processor supported
- Intel® H110 chipset
- Two 288-pin 2133 MHz dual-channel unbuffered DDR4 DIMMs supported (system max. 32 GB)
- Two GbE connectors via Realtek RTL8111GN controllers
- Dual independent display by VGA, DVI-I and LVDS/iDP interfaces
- Four SATA 6Gb/s connectors
- One PCIe x16 slot
- One PCIe x1 slot
- Two PCI slots
- One full-size/half-size PCIe Mini slot
- Four USB 3.0 ports on the rear I/O
- Six USB 2.0 ports on the rear I/O
- Two USB 2.0 ports via internal pin headers
- Ten RS-232 serial ports
- Two RS-232/422/485 serial ports
- TPM V1.2 hardware security function supported by TPM module
- High Definition Audio
- RoHS compliant

1.3 Connectors

The connectors on the IMB-H110 are shown in the figure below.
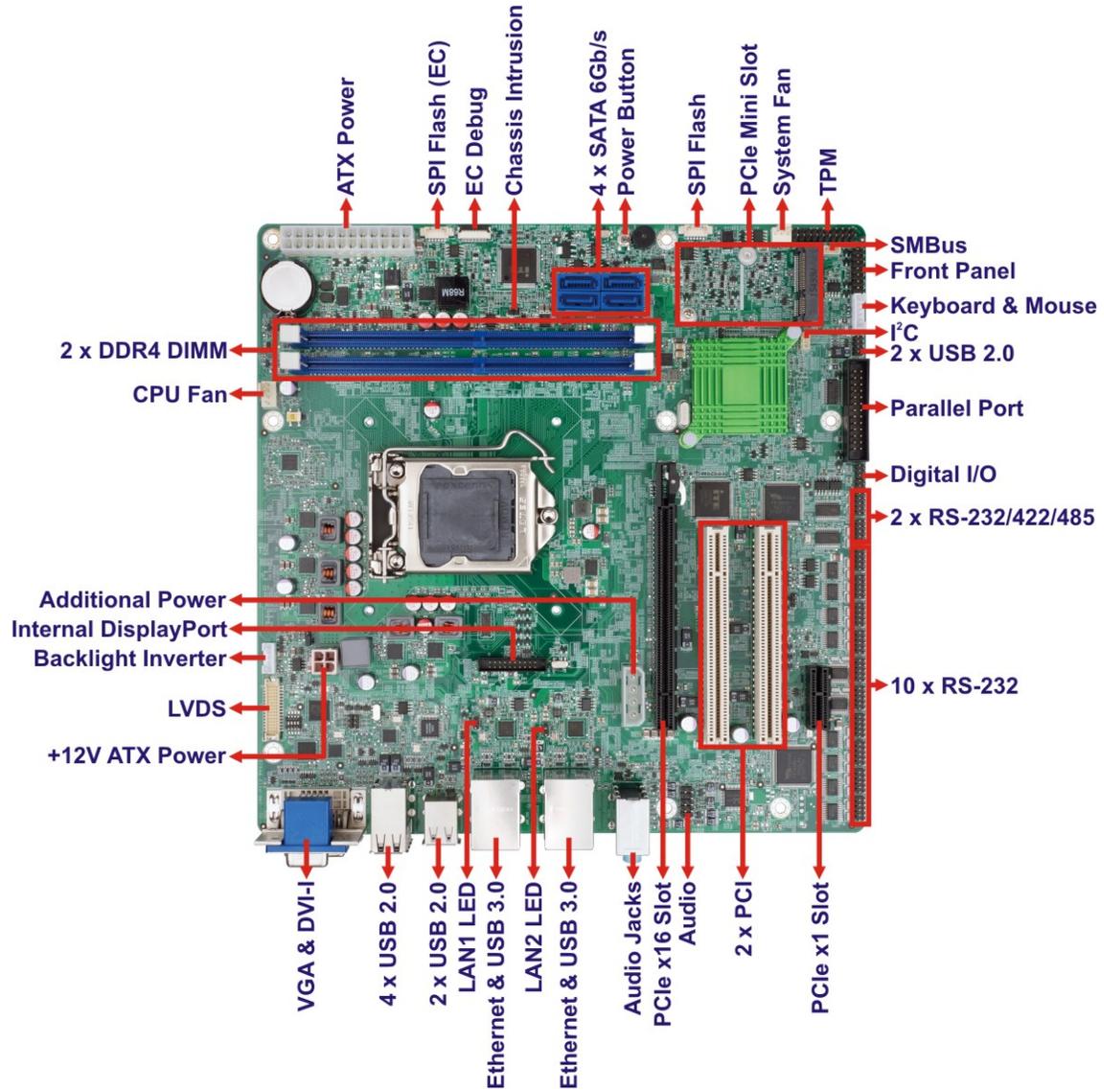
Figure 1-2: Connectors

1.4 Dimensions

The main dimensions of the IMB-H110 are shown in the diagram below.
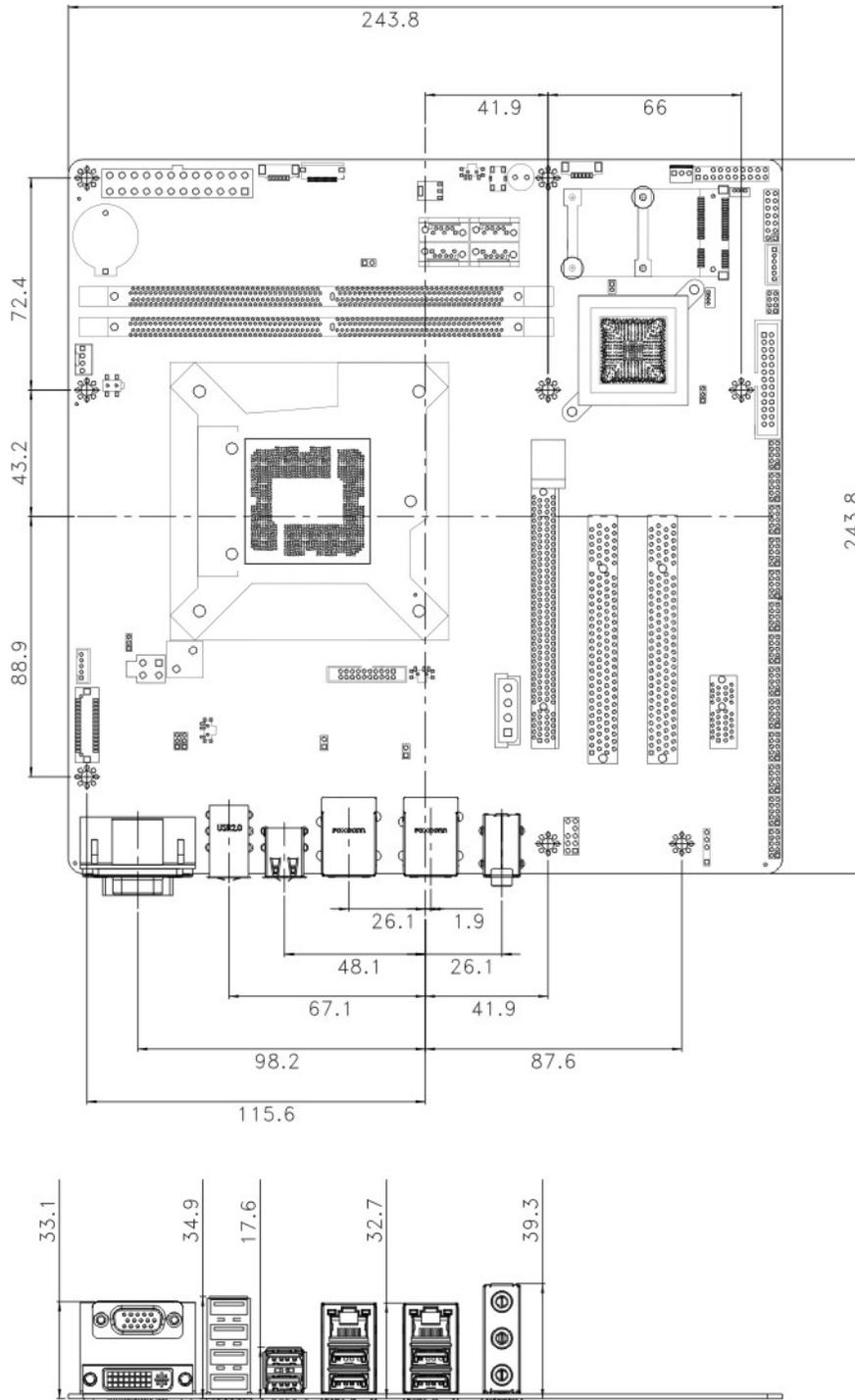
Figure 1-3: IMB-H110 Dimensions (mm)

1.5 Data Flow

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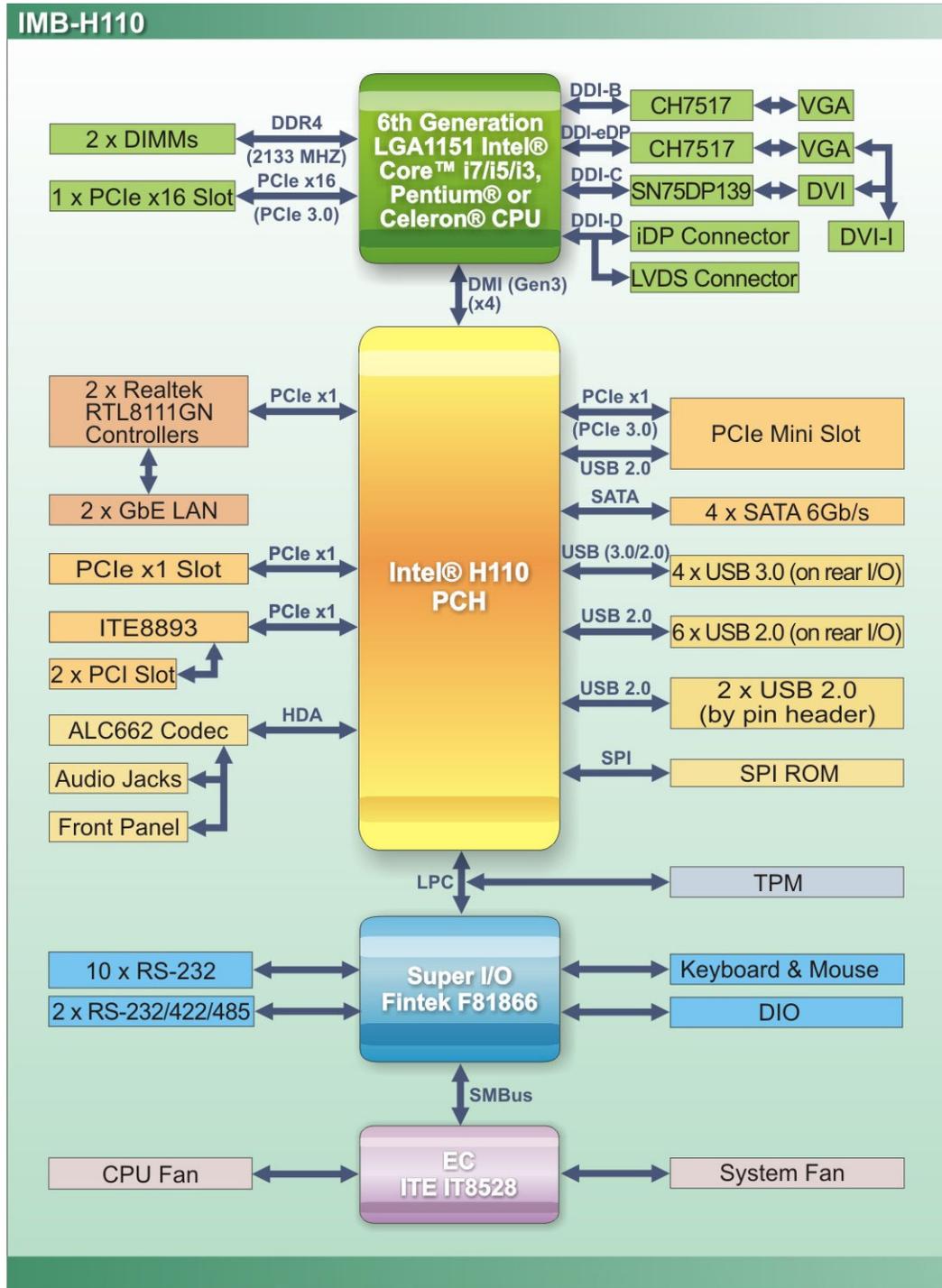
Figure 1-4: Data Flow Diagram

1.6 Technical Specifications

The IMB-H110 technical specifications are listed below.

Specification/Model	IMB-H110
Form Factor	microATX
CPU Supported	6th generation LGA1151 Intel® Core™ i7/i5/i3, Pentium® or Celeron® CPU
PCH	Intel® H110
Memory	Two 288-pin 2133 MHz dual-channel unbuffered DDR4 SDRAM DIMMs supported (system max. 64 GB)
Graphics Engine	Intel® HD Graphics Gen9 engine with 16 low-power execution units, supporting DX2015, OpenGL 5.x, OpenCL 2.x and ES 2.0
Display Output	Supports dual independent display One VGA (Chrontel CH7517) One DVI-I (TI SN75DP139, Chrontel CH7517) One LVDS (Chrontel CH7511) One iDP interface for HDMI, LVDS, VGA, DVI and DisplayPort
Ethernet Controllers	Dual Realtek RTL 8111GN GbE controller
Audio	Realtek ALC662 HD Audio codec supports 5.1 channels
BIOS	AMI UEFI BIOS
Super I/O Controller	Fintek F81866
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Expansions	One PCIe x16 slot (Gen3) One PCIe x1 slot (Gen2) Two PCI slots One full-size/half-size PCIe Mini card slot

I/O Interface Connectors	
Audio Connectors	Line-in, line-out and mic-in audio jacks on rear panel One internal front panel audio connector (10-pin header)
Chassis Intrusion	One 2-pin header
Digital I/O	8-bit digital I/O
Ethernet	Two RJ-45 GbE ports
Fan	One 4-pin CPU smart fan connector One 3-pin system smart fan connector
Front Panel	One 14-pin header (power LED, HDD LED, speaker, power button, reset button)
I^{2}C	One 4-pin wafer connector
Internal DisplayPort	One 20-pin box header
Keyboard and Mouse	One internal keyboard and mouse connector (6-pin wafer)
LAN LED	Two 2-pin headers for LAN1 LED and LAN2 LED
Parallel Port	One parallel port via internal 26-pin box header
Serial ATA	Four SATA 6Gb/s connectors
Serial Ports	Ten RS-232 via internal 10-pin headers Two RS-232/422/485 via internal 10-pin headers
SMBus	One 4-pin wafer connector
TPM	One via 20-pin header
USB 2.0	Six USB 2.0 ports on rear panel Two USB 2.0 ports via internal pin headers
USB 3.0	Four USB 3.0 ports on rear panel *** The Windows® 7 installation media does not include native driver support for USB 3.0. In order to use the USB keyboard or mouse connected to a USB 3.0 port during OS installation, the user has to update the Windows® 7 installation image so that it contains USB 3.0 drivers. Please refer to Section 4.10 for detailed installation procedures.**

Environmental and Power Specifications	
Power Supply	AT/ATX power support
Power Consumption	3.3V@0.93A, 5V@2.99A, 12V@6.88A, 5VSB@0.02A (4.0 GHz Intel® Core™ i7-6700K CPU with two 8 GB 2133 MHz DDR4 memory)
Operating Temperature	-20ºC ~ 60ºC
Storage Temperature	-30ºC ~ 70ºC
Operating Humidity	5% ~ 95% (non-condensing)
Physical Specifications	
Dimensions	244 mm x 244 mm
Weight (GW/NW)	1200 g / 700 g

Table 1-1: IMB-H110 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 IMB-H110 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 IMB-H110 was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The IMB-H110 is shipped with the following components:

Quantity	Item and Part Number	Image
1	IMB-H110 single board computer	
2	SATA cable	
1	I/O shielding	
1	Utility CD	
1	One Key Recovery CD	
1	Quick installation guide	

Table 2-1: Packing List

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
LPT cable (**P/N**: 19800-000049-RS)	
PS/2 KB/MS Y-cable with bracket (**P/N**: 19800-000075-RS)	
RS-232/422/485 cable, 300 mm, p=2.00 mm (**P/N**: 19800-000112-RS)	
SATA power cable (**P/N**: 32102-000100-200-RS)	
High-performance LGA1155/LGA1156 cooler kit (1U chassis compatible, 73W) (**P/N**: CF-1156A-RS-R11)	
High-performance LGA1155/LGA1156 cooler kit (95W) (**P/N**: CF-1156E-R11)	
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)	
20-pin Infineon TPM module, software management tool, firmware v3.17 (**P/N**: TPM-IN01-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 IMB-H110 Layout

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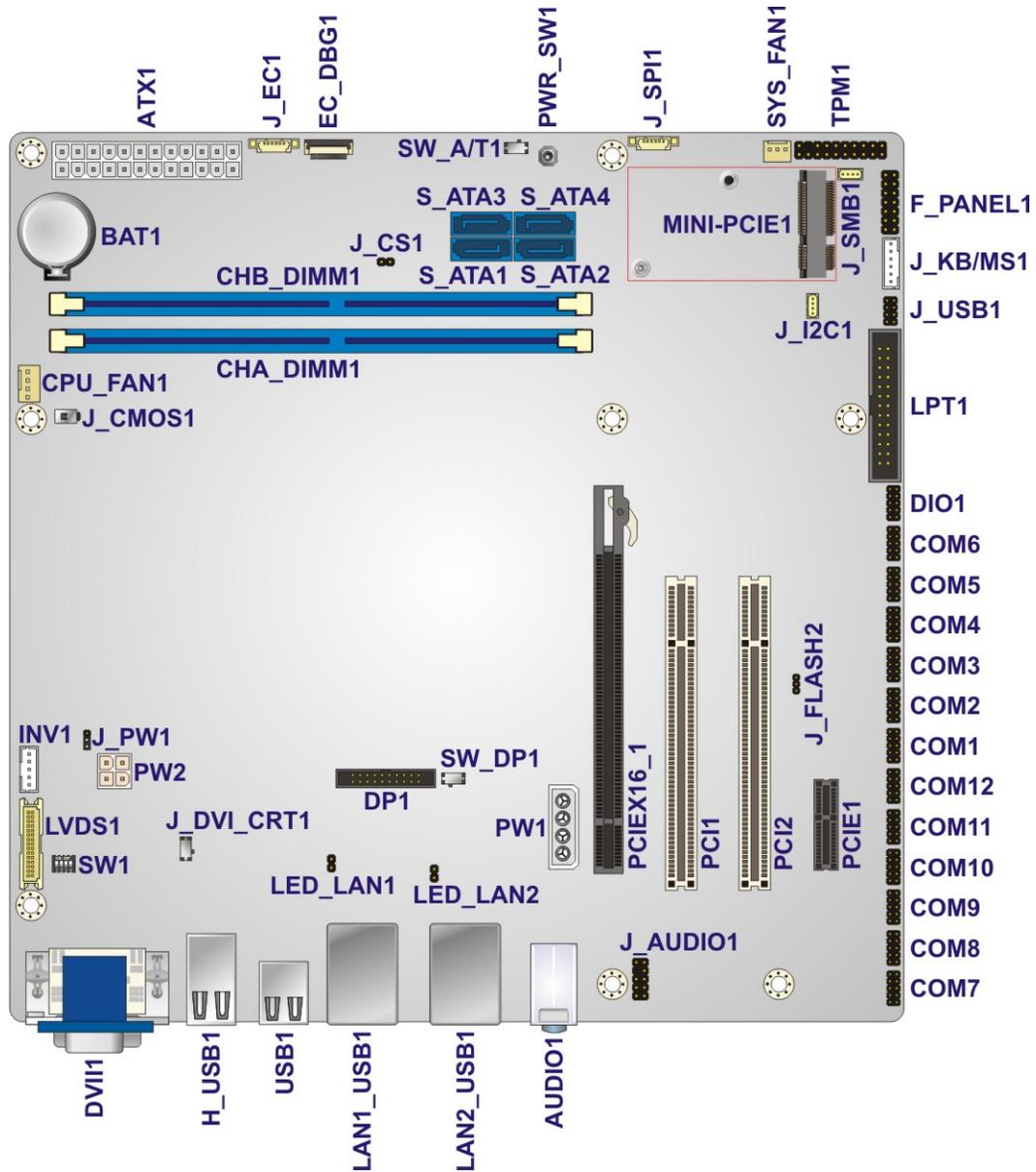
Figure 3-1: Peripheral Interface Connectors

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
+12V ATX power connector	4-pin Molex power connector	PW2
Additional power connector	4-pin connector	PW1
ATX power connector	24-pin connector	ATX1
Audio connector	10-pin header	J_AUDIO1
Backlight inveter connector	5-pin wafer	INV1
Battery connector	Battery holder	BAT1
Chassis intrusion connector	2-pin header	J_CS1
DDR4 DIMM sockets	288-pin DDR4 DIMM socket	CHA_DIMM1, CHB_DIMM1
Digital I/O connector	10-pin header	DIO1
EC debug connector	20-pin wafer	EC_DBG1
Fan connector (CPU)	4-pin wafer	CPU_FAN1
Fan connector (system)	3-pin wafer	SYS_FAN1
Front panel connector	14-pin header	F_PANEL1
I^2C connector	4-pin wafer	J_I2C1
Internal DisplayPort connector	20-pin box header	DP1
Keyboard and mouse connector	6-pin wafer	J_KB/MS1
LAN LED connectors	2-pin header	LED_LAN1, LED_LAN2
LVDS connector	30-pin crimp	LVDS1
Parallel port connector	26-pin box header	LPT1
PCI slots	PCI slot	PCI1, PCI2
PCIe x1 slot	PCIe x1 slot	PCIE1
PCIe x16 slot	PCIe x16 slot	PCIEX16_1

Connector	Type	Label
PCIe Mini slot	PCIe Mini slot	MINI-PCIE1
Power button	Push button	PWR_SW1
RS-232 serial ports	10-pin header	COM1 ~ COM4, COM7 ~ COM12
RS-232/422/485 serial ports	10-pin header	COM5, COM6
SATA 6Gb/s drive connector	7-pin SATA connector	S_ATA1, S_ATA2, S_ATA3, S_ATA4
SMBus connector	4-pin wafer	J_SMB1
SPI flash connector	6-pin wafer	J_SPI1
SPI flash connector, EC	6-pin wafer	J_EC1
TPM connector	20-pin header	TPM1
USB 2.0 connector	8-pin header	J_USB1

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
Audio connector	Audio jacks	AUDIO1
Ethernet and USB 3.0 ports	RJ-45, USB 3.0	LAN1_USB1, LAN2_USB1
Ethernet ports	RJ-45	LAN1, LAN2
USB 2.0 ports	USB 2.0	USB1, H_USB1
VGA and DVI-I connectors	15-pin female, 24-pin female	VIDEO1

Table 3-2: External Peripheral Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the IMB-H110.

3.2.1 +12V ATX Power Connector

CN Label: **CPU12V1**

CN Type: 4-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.
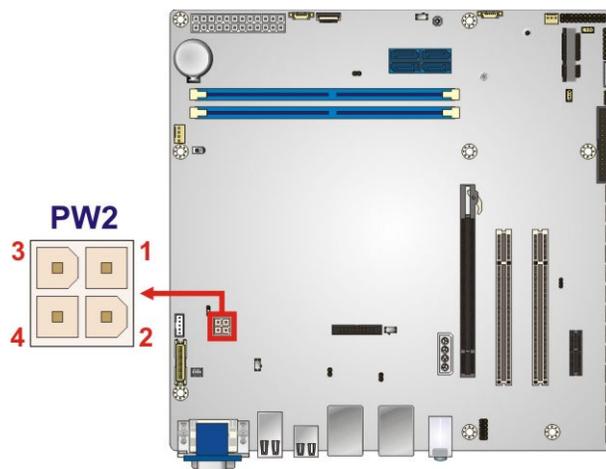
Figure 3-2: +12V ATX Power Connector Pinout Location

Pin	Description	Pin	Description
1	GND	2	GND
3	VCC12V	4	VCC12V

Table 3-3: +12V ATX Power Connector Pinouts

3.2.2 Additional Power Connector

CN Label: **PW1**

CN Type: 4-pin connector, p=5.08 mm

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

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

The additional power connector provides extra +12V and +5V power to the system.
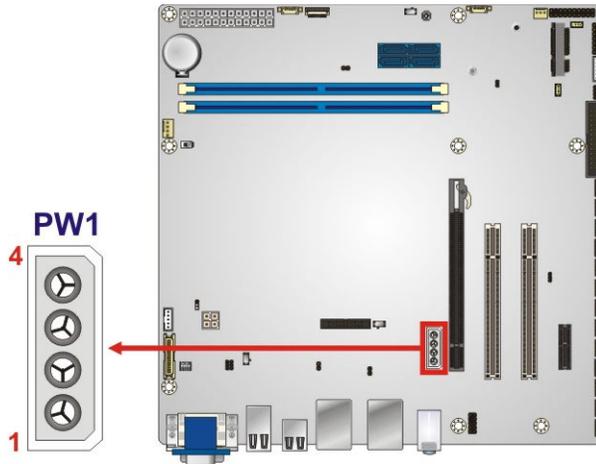
Figure 3-3: Additional Power Connector Location

Pin	Description
1	VCC12V
2	GND
3	GND
4	VCC5V

Table 3-4: Additional Power Connector Pinouts

3.2.3 ATX Power Connector

CN Label: **ATX1**

CN Type: 24-pin connector, p=4.2 mm

CN Location: See **Figure 3-4**

CN Pinouts: See **Table 3-5**

The ATX power connector connects to an ATX power supply.

ATX1
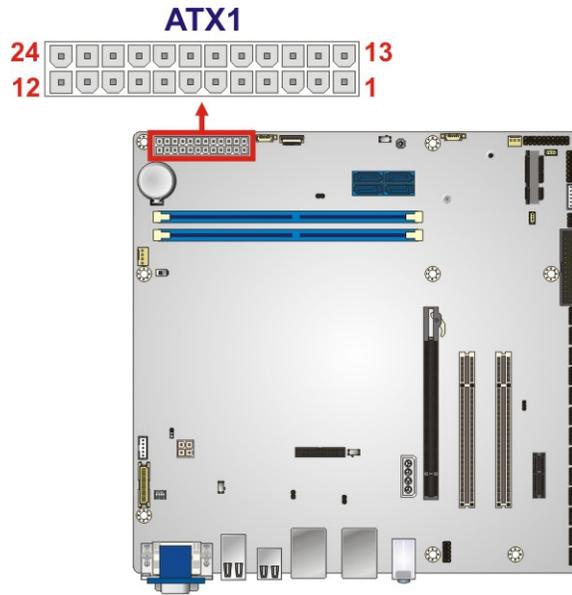
Figure 3-4: ATX Power Connector Location

Pin	Description	Pin	Description
1	VCC3V	13	VCC3V
2	VCC3V	14	-VCC12V
3	GND	15	GND
4	VCC5V	16	PS_ON
5	GND	17	GND
6	VCC5V	18	GND
7	GND	19	GND
8	PWR-OK	20	NC
9	SB5V	21	VCC5V
10	VCC12V	22	VCC5V
11	VCC12V	23	VCC5V
12	VCC3V	24	GND

Table 3-5: ATX Power Connector Pinouts

3.2.4 Audio Connector

CN Label:	**J_AUDIO1**
CN Type:	10-pin header, p=2.54 mm
CN Location:	See **Figure 3-5**
CN Pinouts:	See **Table 3-6**

This connector connects to speakers, a microphone and an audio input.
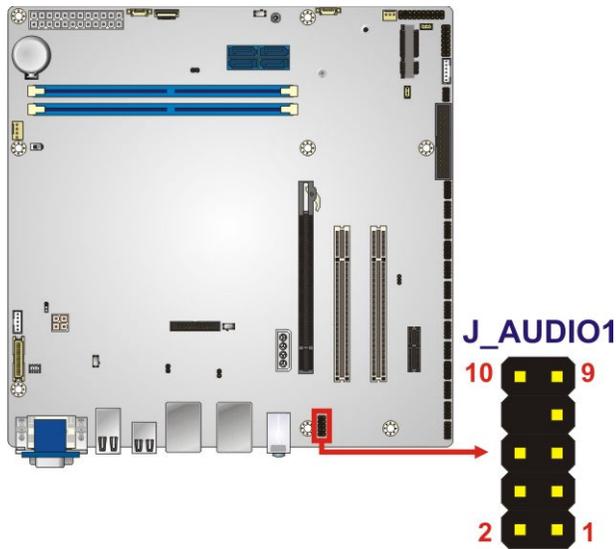
Figure 3-5: Audio Connector Location

Pin	Description	Pin	Description
1	MIC2-L	2	GND
3	MIC2-R	4	PRESENCE
5	LINE2-R	6	MIC2-JD
7	SENSE	8	NC
9	LINE2-L	10	LINE2-JD

Table 3-6: Audio Connector Pinouts

3.2.5 Backlight Inverter Connector

CN Label: INV1

CN Type: 5-pin wafer, p=2.00 mm

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

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

The backlight inverter connector provides power to an LCD panel.
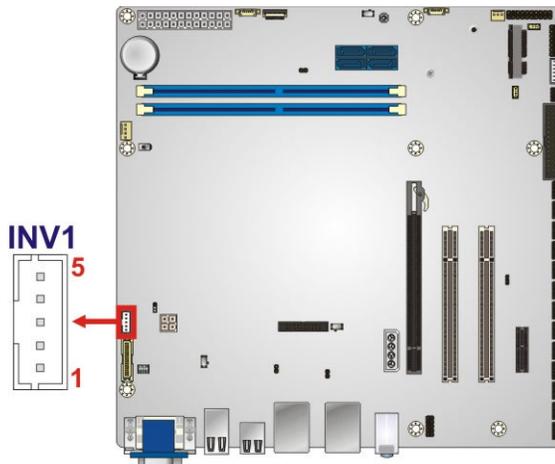
Figure 3-6: Backlight Inverter Connector Location

Pin	Description
1	LCD_ADJ
2	GND
3	VCC12V
4	GND
5	BL_ON/OFF

Table 3-7: Backlight Inverter Connector Pinouts

3.2.6 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: Battery holder

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

A system battery is placed in the battery holder. The battery provides power to the system clock to retain the time when power is turned off.
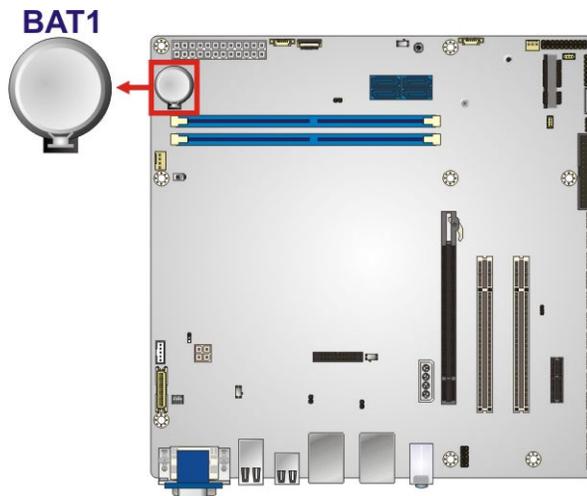
Figure 3-7: Battery Connector Location

3.2.7 Chassis Intrusion Connector

CN Label:	**J_CS1**
CN Type:	2-pin header, p=2.54 mm
CN Location:	See **Figure 3-8**
CN Pinouts:	See **Table 3-8**

The chassis intrusion connector is for a chassis intrusion detection sensor or switch that detects if a chassis component is removed or replaced.
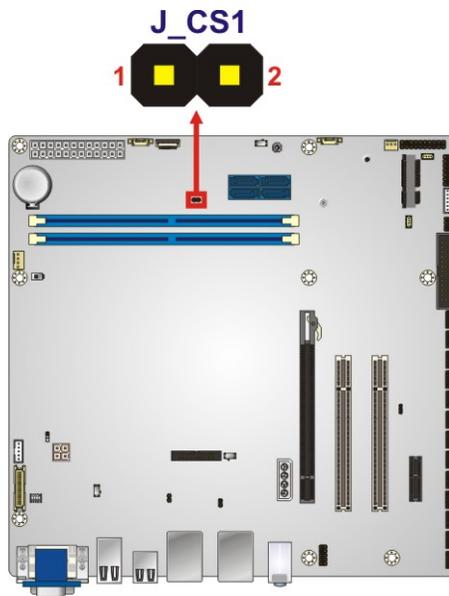
Figure 3-8: Chassis Intrusion Connector Location

Pin	Description
1	VCC3V
2	CHASSIS

Table 3-8: Chassis Intrusion Connector Pinouts

3.2.8 DDR4 DIMM Sockets

CN Label:	**CHA_DIMM1, CHB_DIMM1**
CN Type:	288-pin DDR4 DIMM socket
CN Location:	See **Figure 3-9**

The DIMM slots are for installing the DDR4 DIMMs.
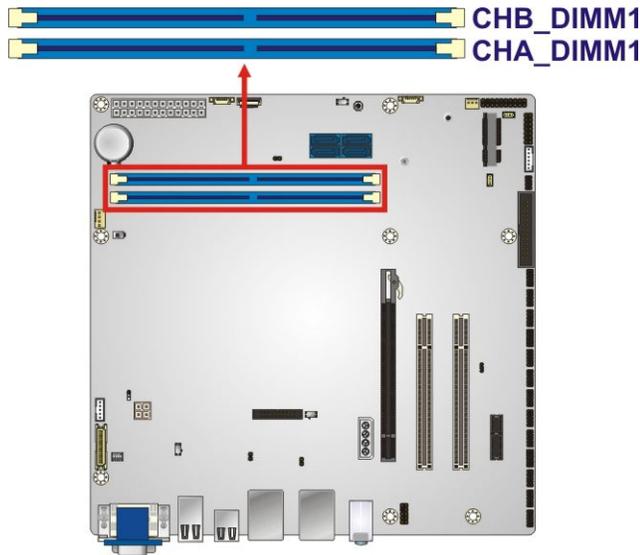
Figure 3-9: DDR4 DIMM Socket Locations

3.2.9 Digital I/O Connector

CN Label: DIO1

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

CN Location: See **Figure 3-10**

CN Pinouts: See **Table 3-9**

The digital I/O connector provides programmable input and output for external devices.
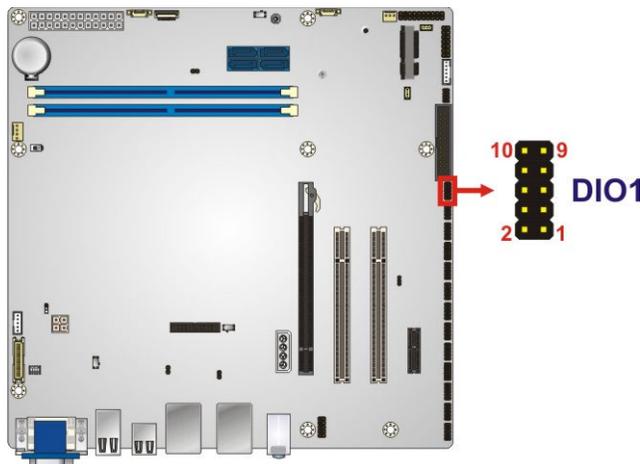
Figure 3-10: Digital I/O Connector Location

Pin	Description	Pin	Description
1	GND	2	VCC5V
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 3-9: Digital I/O Connector Pinouts

3.2.10 EC Debug Connector

CN Label: **EC_DBG1**

CN Type: 20-pin wafer, p=0.5 mm

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

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

The EC debug connector is used for EC debug.
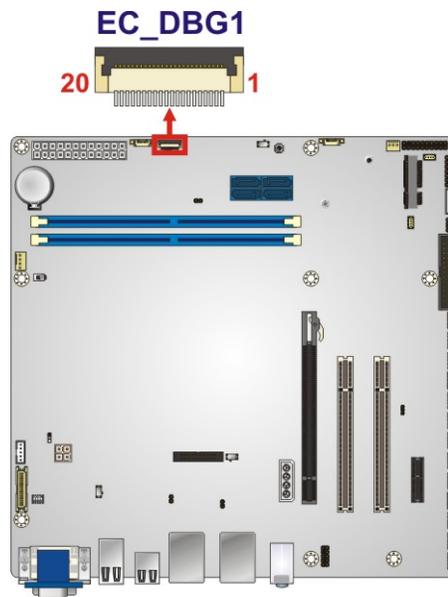
Figure 3-11: EC Debug Connector Location

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 3-10: EC Debug Connector Pinouts

3.2.11 Fan Connector (CPU)

CN Label: **CPU_FAN1**

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

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

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

The fan connector attaches to a CPU cooling fan.
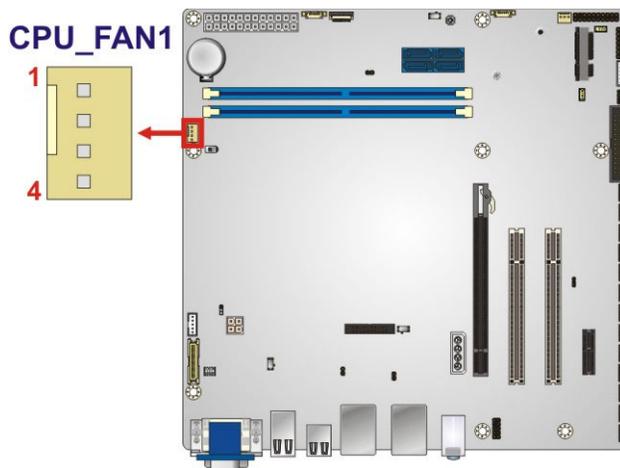
Figure 3-12: CPU Fan Connector Location

Pin	Description
1	GND
2	VCC12V
3	FANIO
4	PWM

Table 3-11: CPU Fan Connector Pinouts

3.2.12 Fan Connector (System)

CN Label: **SYS_FAN1**

CN Type: 3-pin wafer, p=2.54 mm

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

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

The fan connector attaches to a system cooling fan.
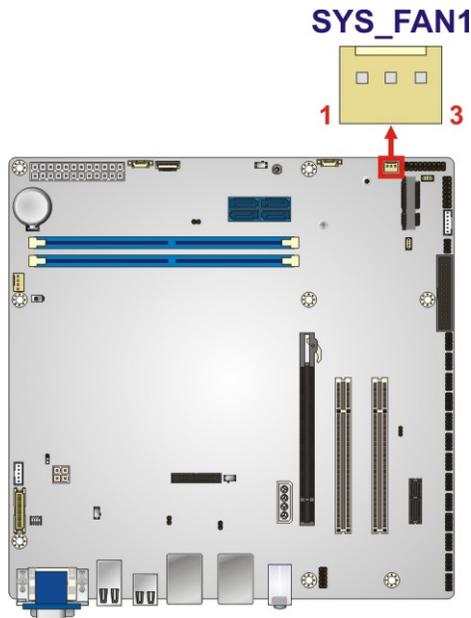
Figure 3-13: System Fan Connector Location

Pin	Description
1	FANIO
2	PWM/VCC12V
3	GND

Table 3-12: System Fan Connector Pinouts

3.2.13 Front Panel Connector

CN Label:	F_PANEL1
CN Type:	14-pin header, p=2.54 mm
CN Location:	See **Figure 3-14**
CN Pinouts:	See **Table 3-13**

The front panel connector connects to the indicator LEDs and buttons on the computer's front panel.
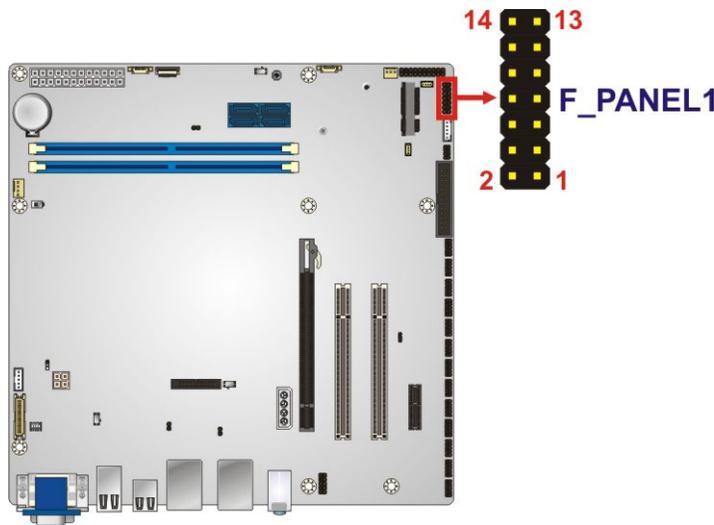
Figure 3-14: Front Panel Connector Location

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

Table 3-13: Front Panel Connector Pinouts

3.2.14 I^{2}C Connector

CN Label: J_I2C1

CN Type: 4-pin wafer, p=1.25 mm

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

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

The I^{2}C connector is used to connect I^{2}C-bus devices to the motherboard.
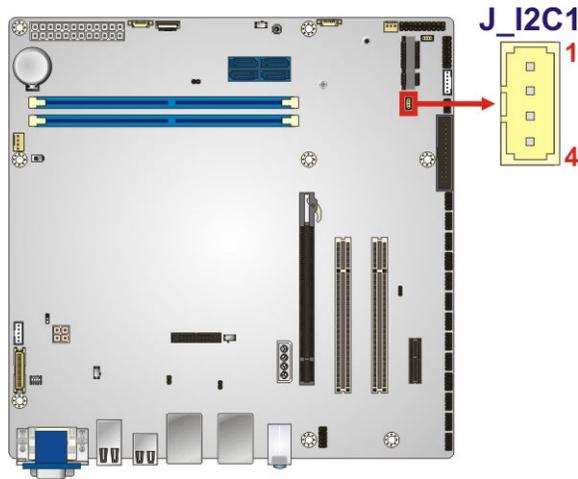
Figure 3-15: I^{2}C Connector Location

Pin	Description
1	GND
2	I2C_DATA
3	I2C_CLK
4	VCC5V

Table 3-14: I^{2}C Connector Pinouts

3.2.15 Internal DisplayPort Connector

NOTE:

The user can select either to use the LVDS connector or the internal
DisplayPort connector. Use the LVDS/iDP selection switch to configure
the settings. Please refer to **Section 4.8.5** for detailed information.

CN Label: DP1

CN Type: 20-pin box header, p=2.00 mm

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

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

The internal DisplayPort connector supports HDMI, LVDS, VGA, DVI and DisplayPort
graphics interfaces.
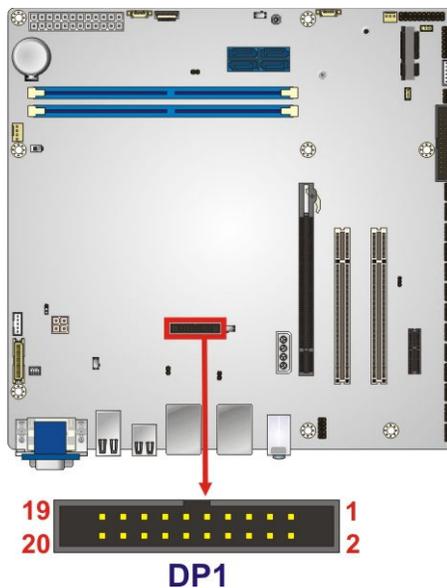
Figure 3-16: Internal DisplayPort Connector Location

Pin	Description	Pin	Description
1	HPD	2	AUX_P
3	GND	4	AUX_N
5	AUX_ DET	6	GND
7	GND	8	LANE2P
9	LANE3P	10	LANE2N
11	LANE3N	12	GND
13	GND	14	LANE0P
15	LANE1P	16	LANE0N
17	LANE1N	18	VCC3V
19	VCC5V	20	NC

Table 3-15: Internal DisplayPort Connector Pinouts

3.2.16 Keyboard and Mouse Connector

CN Label: J_KB/MS1

CN Type: 6-pin wafer, p=2.00 mm

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

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

The keyboard and mouse connector connects to a PS/2 Y-cable that can be connected to a PS/2 keyboard and mouse.
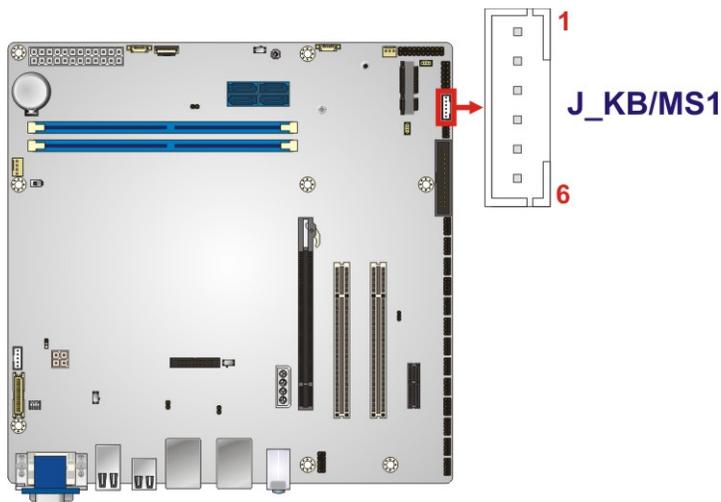
Figure 3-17: Keyboard and Mouse Connector Location

Pin	Description
1	VCC5V
2	Mouse Data
3	Mouse Clock
4	Keyboard Data
5	Keyboard Clock
6	GND

Table 3-16: Keyboard and Mouse Connector Pinouts

3.2.17 LAN LED Connectors

CN Label: **LED_LAN1, LED_LAN2**

CN Type: 2-pin header, p=2.54 mm

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

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

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.
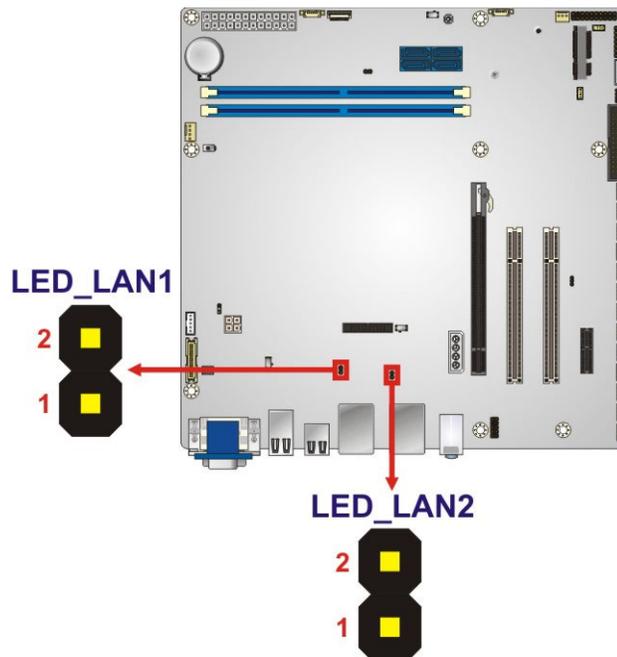
Figure 3-18: LAN LED Connector Locations

Pin	Description
1	VCC3V
2	ACT

Table 3-17: LAN LED Connector Pinouts

3.2.18 LVDS Connector

NOTE:

The user can select either to use the LVDS connector or the internal DisplayPort connector. Use the LVDS/iDP selection switch to configure the settings. Please refer to **Section 4.8.5** for detailed information.

CN Label: **LVDS1**

CN Type: 30-pin crimp, p=1.25 mm

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

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

The LVDS connector is for an LCD panel to connect to the board.
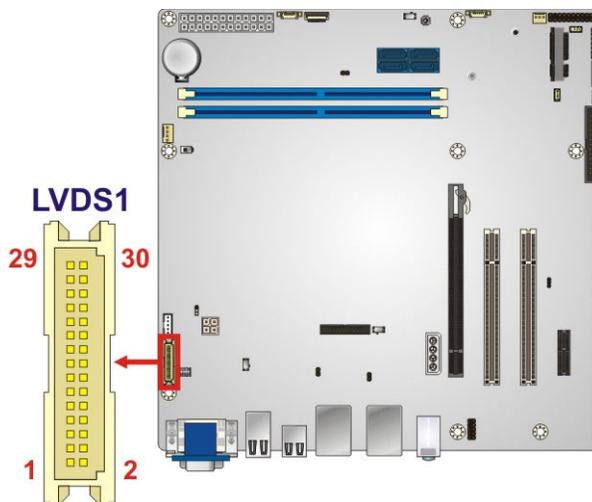
Figure 3-19: LVDS Connector Location

Pin	Description	Pin	Description
1	GROUND	2	GROUND
3	LVDS_A_TX0-P	4	LVDS_A_TX0-N
5	LVDS_A_TX1-P	6	LVDS_A_TX1-N
7	LVDS_A_TX2-P	8	LVDS_A_TX2-N
9	LVDS_A_TXCLK-P	10	LVDS_A_TXCLK-N
11	LVDS_A_TX3-P	12	LVDS_A_TX3-N
13	GROUND	14	GROUND
15	LVDS_B_TX0-P	16	LVDS_B_TX0-N
17	LVDS_B_TX1-P	18	LVDS_B_TX1-N
19	LVDS_B_TX2-P	20	LVDS_B_TX2-N
21	LVDS_B_TXCLK-P	22	LVDS_B_TXCLK-N
23	LVDS_B_TX3-P	24	LVDS_B_TX3-N
25	GROUND	26	GROUND
27	+LCD VCC	28	+LCD VCC
29	+LCD VCC	30	+LCD VCC

Table 3-18: LVDS Connector Pinouts

3.2.19 Parallel Port Connector

CN Label: **LPT1**

CN Type: 26-pin box header, p=2.54 mm

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

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

The parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.
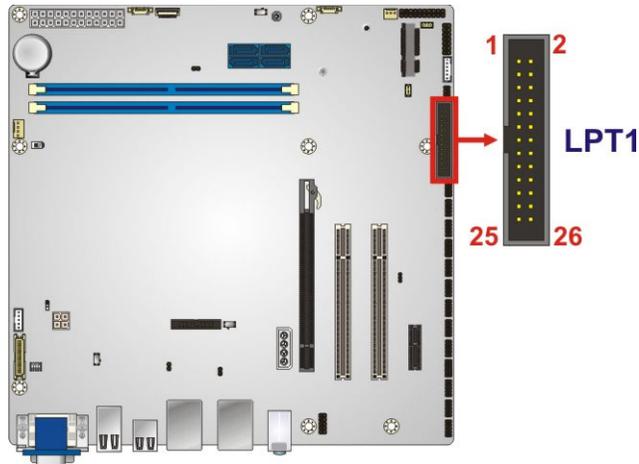
Figure 3-20: Parallel Port Connector Location

Pin	Description	Pin	Description
1	STB	2	AFD
3	PPD0	4	ERROR
5	PPD1	6	INIT
7	PPD2	8	SLIN
9	PPD3	10	GND
11	PPD4	12	GND
13	PPD5	14	GND
15	PPD6	16	GND
17	PPD7	18	GND
19	ACK	20	GND
21	BUSY	22	GND,
23	PE	24	GND
25	SLCT	26	NC

Table 3-19: Parallel Port Connector Pinouts

3.2.20 PCI Slots

CN Label: **PCI1, PCI2**

CN Type: PCI Slot

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

The PCI slot enables a PCI expansion module to be connected to the board.
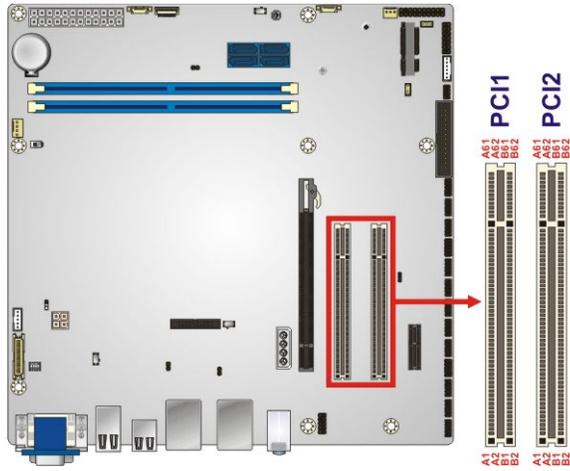
Figure 3-21: PCI Slot Locations

3.2.21 PCIe x1 Slot

CN Label:	**PCIE1**
CN Type:	PCIe x1 slot
CN Location:	See **Figure 3-22**

The PCIe x1 expansion card slot is for PCIe x1 expansion card.
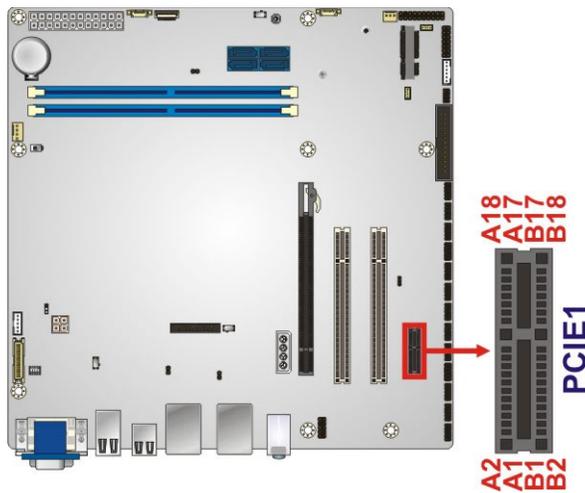
Figure 3-22: PCIe x1 Slot Location

3.2.22 PCIe x16 Slot

CN Label:	**PCIEX16_1**
CN Type:	PCIe x8 slot
CN Location:	See **Figure 3-23**

The PCIe x16 expansion card slot is for PCIe x16 expansion card.
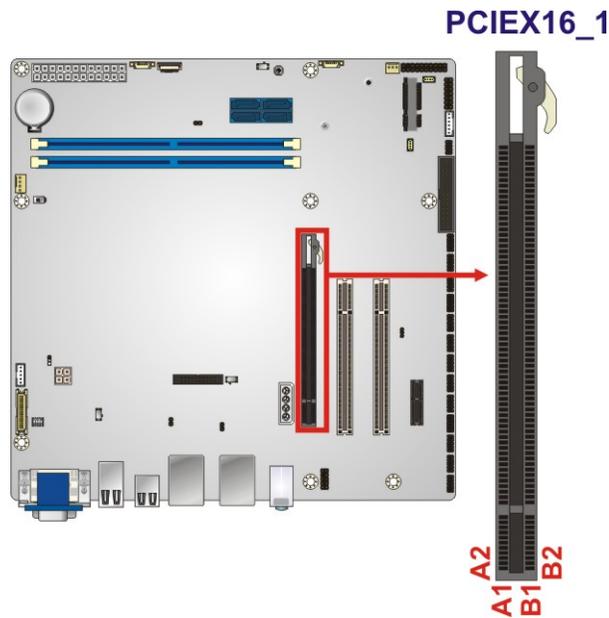
Figure 3-23: PCIe x16 Slot Location

3.2.23 PCIe Mini Slot

CN Label:	**MINI-PCIE1**
CN Type:	PCIe Mini slot
CN Location:	See **Figure 3-24**
CN Pinouts:	See **Table 3-20**

The PCIe Mini slot is for installing a full-size/half-size PCIe Mini expansion card, such as a wireless LAN card.
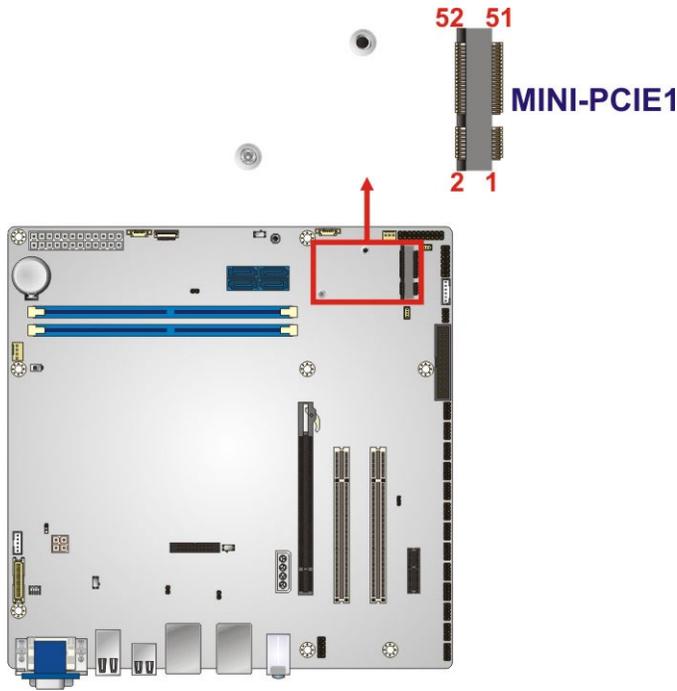
Figure 3-24: PCIe Mini Slot Location

Pin	Description	Pin	Description
1	NC	2	VCC3V
3	NC	4	GND
5	NC	6	VCC1.5V
7	CLKREQ	8	NC
9	GND	10	NC
11	CLKN	12	NC
13	CLKP	14	NC
15	GND	16	NC
17	NC	18	GND
19	NC	20	VCC3V
21	GND	22	RESET
23	PCIE_RXN	24	SB3V
25	PCIE_RXP	26	GND
27	GND	28	VCC1.5V
29	GND	30	SMB_CLK
31	PCIE_TXN	32	SMB_DATA
33	PCIE_TXP	34	GND

Pin	Description	Pin	Description
35	GND	36	USB_N
37	NC	38	USB_P
39	NC	40	GND
41	NC	42	NC
43	NC	44	NC
45	NC	46	NC
47	NC	48	VCC1.5V
49	NC	50	GND
51	NC	52	VCC3V

Table 3-20: PCIe Mini Slot Pinouts

3.2.24 Power Button

CN Label: **PWR_SW1**

CN Type: Push button

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

The on-board power button controls system power.

Figure 3-25: Power Button Location

3.2.25 RS-232 Serial Port Connectors

CN Label: **COM1, COM2, COM3, COM4, COM7, COM8, COM9, COM10, COM11, COM12**

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

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

CN Pinouts: See **Table 3-22**

Each of these connectors provides RS-232 connections.
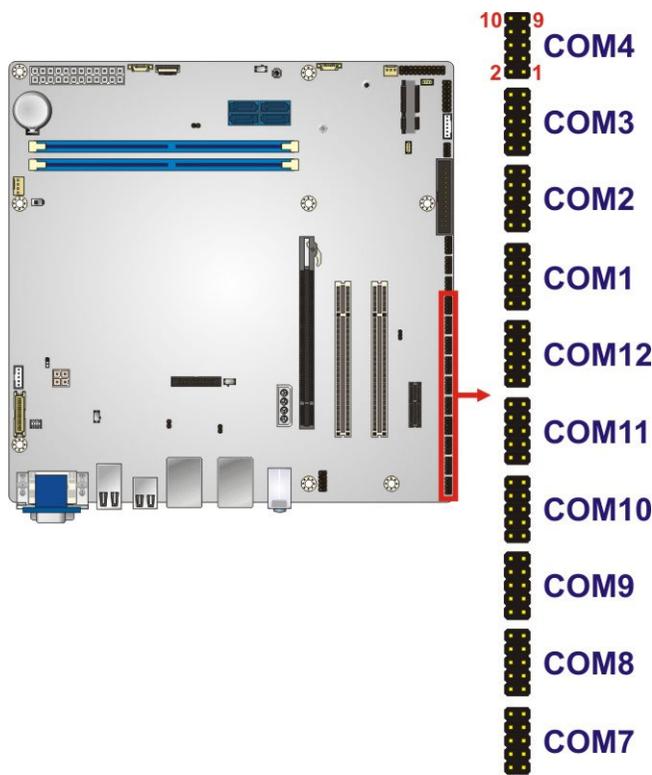
Figure 3-26: RS-232 Serial Port Connector Locations

Pin	Description	Pin	Description
1	DCD	2	DSR
3	RX	4	RTS
5	TX	6	CTS
7	DTR	8	RI
9	GND	10	GND

Table 3-21: RS-232 Serial Port Connector Pinouts

3.2.26 RS-232/422/485 Serial Port Connectors

CN Label: **COM5, COM6**

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

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

CN Pinouts: See **Table 3-22**

Each of these connectors provides RS-232/422/485 connections.

![NOTE icon] **NOTE:**

The communication protocol of the serial ports is set through the BIOS menu in "Advanced → Super IO Configuration → Serial Port 5/6 Configuration". Use the **Transfer Mode** BIOS option to configure the correspondent serial ports (refer to **Sections 5.3.3.4.2** and **5.3.3.4.3** for detailed information).
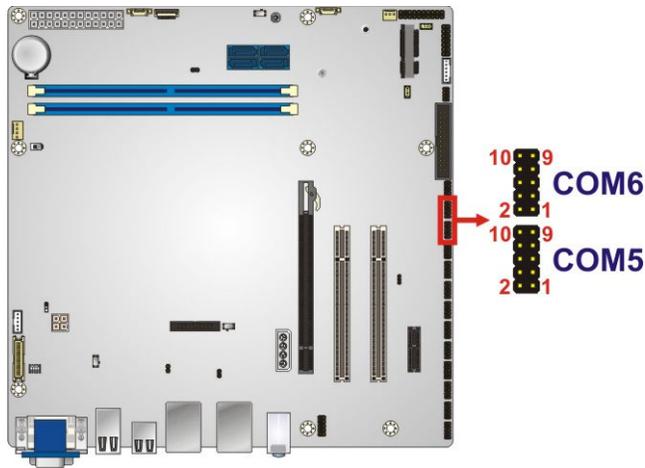
Figure 3-27: RS-232/422/485 Serial Port Connector Locations

Pin	Description	Pin	Description
1	DCD/TX-/D-	2	DSR
3	RX/TX+/D+	4	RTS
5	TX/RT+	6	CTS

Pin	Description	Pin	Description
7	DTR/RX-	8	RI
9	GND	10	GND

Table 3-22: RS-232/422/485 Serial Port Connector Pinouts

Use the optional RS-232/422/485 cable to connect to a serial device. The pinouts of the DB-9 connector are listed below.

Table 3-23: DB-9 RS-232/422/485 Pinouts

3.2.27 SATA 6Gb/s Drive Connector

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

    CN Type: 7-pin SATA drive connector

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

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

The SATA drive connectors can be connected to SATA drives and supports up to 6Gb/s data transfer rate.
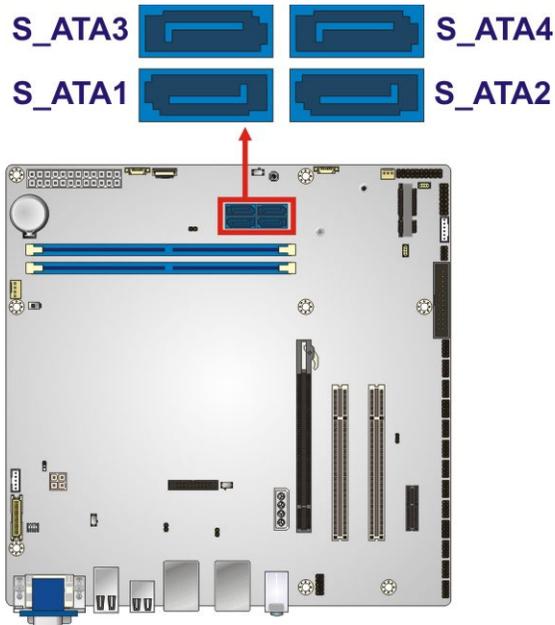
Figure 3-28: SATA 6Gb/s Drive Connector Locations

Pin	Description	Pin	Description
1	GND	2	SATA_TXP
3	SATA_TXN	4	GND
5	SATA_RXN	6	SATA_RXP
7	GND		

Table 3-24: SATA 6Gb/s Drive Connector Pinouts

3.2.28 SMBus Connector

CN Label:	**J_SMB1**
CN Type:	4-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-29**
CN Pinouts:	See **Table 3-25**

The SMBus (System Management Bus) connector provides low-speed system management communications.
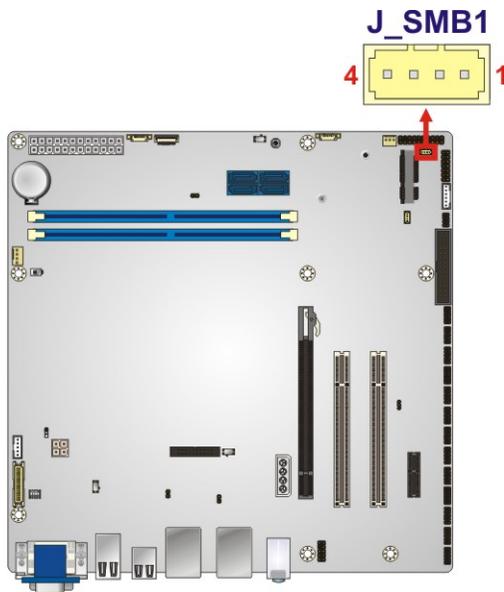
Figure 3-29: SMBus Connector Location

Pin	Description
1	GND
2	SMB_DATA
3	SMB_CLK
4	VCC5V

Table 3-25: SMBus Connector Pinouts

3.2.29 SPI Flash Connector

CN Label:	**J_SPI1**
CN Type:	6-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-30**
CN Pinouts:	See **Table 3-26**

The SPI flash connector is used to flash the SPI ROM.
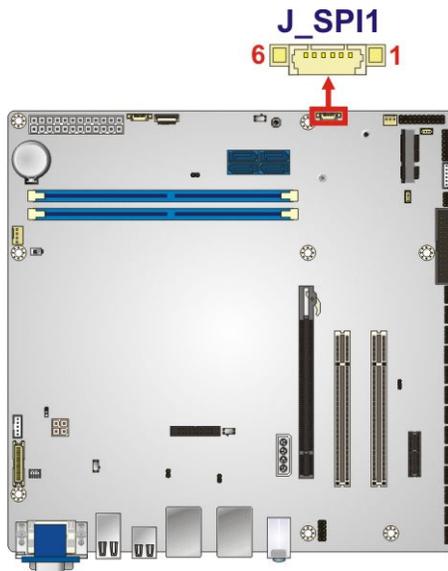
Figure 3-30: SPI Flash Connector Location

Pin	Description
1	VCC3V
2	CS
3	MISO
4	CLK
5	MOSI
6	GND

Table 3-26: SPI Flash Connector Pinouts

3.2.30 SPI Flash Connector, EC

CN Label: J_EC1

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

CN Location: See **Figure 3-31**

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

The SPI flash connector is used to flash the EC ROM.
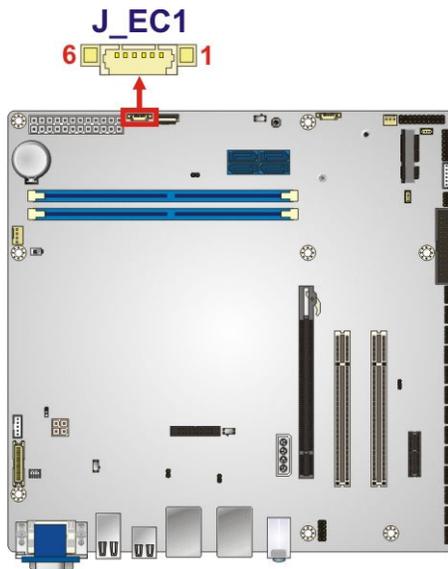
Figure 3-31: SPI EC Flash Connector Location

Pin	Description
1	VCC3V
2	CS
3	MISO
4	CLK
5	MOSI
6	GND

Table 3-27: SPI EC Flash Connector Pinouts

3.2.31 TPM Connector

CN Label:	**TPM1**
CN Type:	20-pin header, p=2.54 mm
CN Location:	See **Figure 3-32**
CN Pinouts:	See **Table 3-28**

The TPM connector connects to a TPM module.
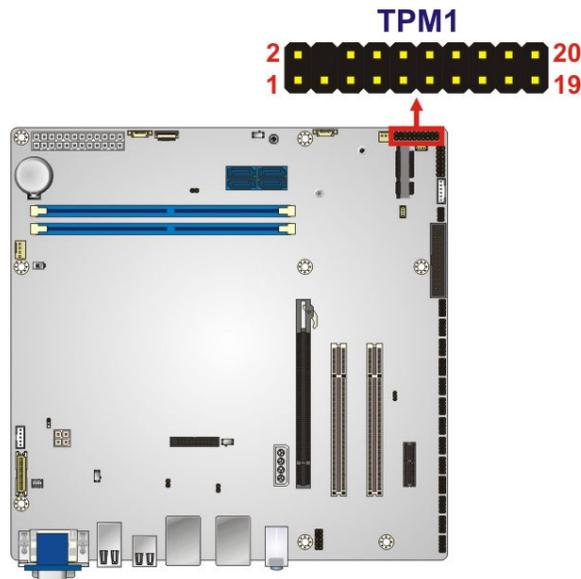
Figure 3-32: TPM Connector Location

Pin	Description	Pin	Description
1	CLOCK	2	GND
3	FRAME	4	NC
5	RESET	6	VCC5V
7	LAD3	8	LAD2
9	VCC3V	10	LAD1
11	LAD0	12	GND
13	SMB_CLK	14	SMB_DATA
15	SB3V	16	SERIRQ
17	GND	18	CLKRUN
19	LPCPD	20	DRQ

Table 3-28: TPM Connector Pinouts

3.2.32 USB 2.0 Connector

CN Label: J_USB1

CN Type: 8-pin header, p=2.00 mm

CN Location: See **Figure 3-33**

CN Pinouts: See **Table 3-29**

The USB 2.0 connectors connect to USB 2.0/1.1 devices. Each pin header provides two USB 2.0 ports.
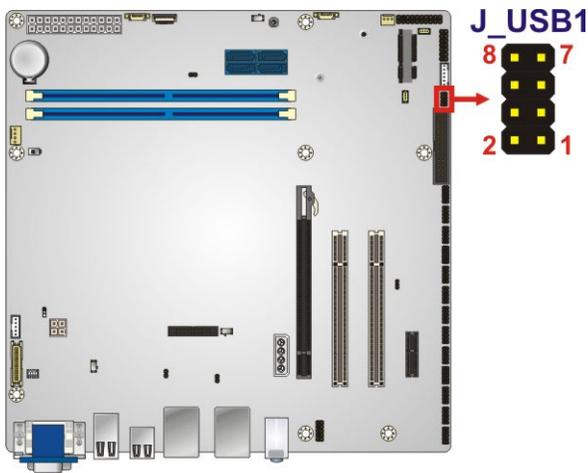
Figure 3-33: USB 2.0 Connector Locations

Pin	Description	Pin	Description
1	SB5V	2	GND
3	DATA-	4	DATA+
5	DATA+	6	DATA-
7	GND	8	SB5V

Table 3-29: USB 2.0 Connector Pinouts

3.3 External Peripheral Interface Connector Panel

The figure below shows the external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:
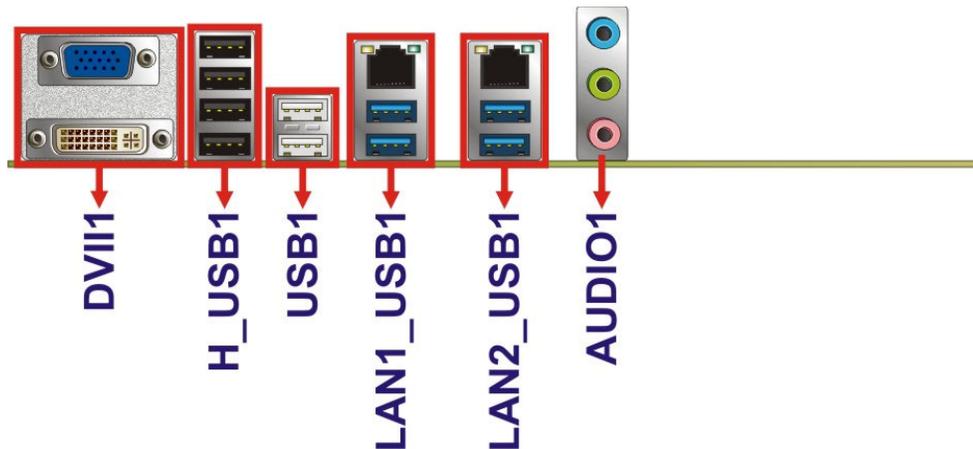
Figure 3-34: External Peripheral Interface Connector

3.3.1 Audio Connector

CN Label:	**AUDIO1**
CN Type:	Audio jack
CN Location:	See **Figure 3-34**

The audio jacks connect to external audio devices.

- **Line In port (Light Blue):** Connects a CD-ROM, DVD player, or other audio devices.
- **Line Out port (Lime):** Connects to a headphone or a speaker. With multi-channel configurations, this port can also connect to front speakers.
- **Microphone (Pink):** Connects a microphone.
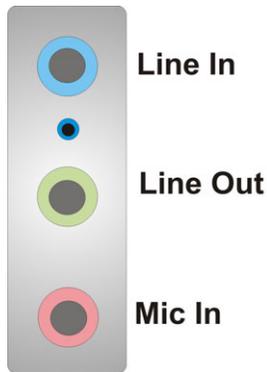
Figure 3-35: Audio Connector

3.3.2 Ethernet and USB 3.0 Connectors

CN Label:	**LAN1_USB1, LAN2_USB1**
CN Type:	RJ-45, USB 3.0
CN Location:	See **Figure 3-34**
CN Pinouts:	See **Table 3-30** and **Table 3-31**

There are four external USB 3.0 connectors on the IMB-H110.

Pin	Description	Pin	Description
1	VCC	10	VCC
2	USB_DATA-	11	USB_DATA-
3	USB_DATA+	12	USB_ DATA+
4	GND	13	GND
5	USB3_RX-	14	USB3_RX-
6	USB3_RX+	15	USB3_ RX+
7	GND	16	GND
8	USB3_TX-	17	USB3_TX-
9	USB3_TX+	18	USB3_TX+

Table 3-30: USB 3.0 Port Pinouts

Each LAN connector connects to a local network.

Pin	Description	Pin	Description
1	LAN_MDI0P	5	LAN_MDI2P
2	LAN_MDI0N	6	LAN_MDI2N
3	LAN_MDI1P	7	LAN_MDI3P
4	LAN_MDI1N	8	LAN_MDI3N

Table 3-31: LAN Pinouts
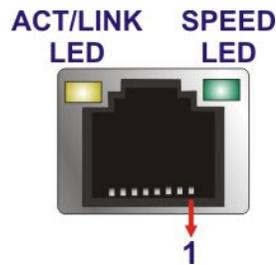
Figure 3-36: LAN Connector

3.3.3 USB 2.0 Connectors

CN Label: **USB1, H_USB1**

CN Type: USB 2.0

CN Location: See **Figure 3-34**

CN Pinouts: See **Table 3-32**

The USB 2.0 connector can be connected to a USB 2.0/1.1 device.

Pin	Description
1	SB5V
2	DATA-
3	DATA+
4	GND

Table 3-32: USB 2.0 Port Pinouts

Figure 3-37: DVI-I Connector

The 15-pin VGA connector connects to a monitor that accepts a standard VGA input.

 NOTE:

The user has to connect the VGA connector to the monitor before system booting as the VGA output function is supported via the eDP to VGA converter.

Pin	Description	Pin	Description
1	RED	2	GREEN
3	BLUE	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC5V	10	GND
11	NC	12	DDCDATA
13	HSYNC	14	VSYNC
15	DDCCLK		

Table 3-34: VGA Connector Pinouts
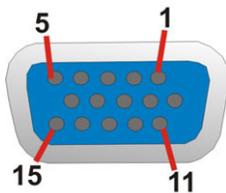
Figure 3-38: VGA Connector

Chapter

4

Installation

4.1 Anti-static Precautions

> **WARNING:**
>
> Failure to take ESD precautions during the installation of the IMB-H110
> may result in permanent damage to the IMB-H110 and severe injury to
> the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IMB-H110. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IMB-H110 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 IMB-H110, place it on an anti-static pad. This reduces the possibility of ESD damaging the IMB-H110.
- *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 icon] **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 IMB-H110 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 IMB-H110 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 IMB-H110 off:
  - When working with the IMB-H110, 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 IMB-H110, **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 LGA1151 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**.
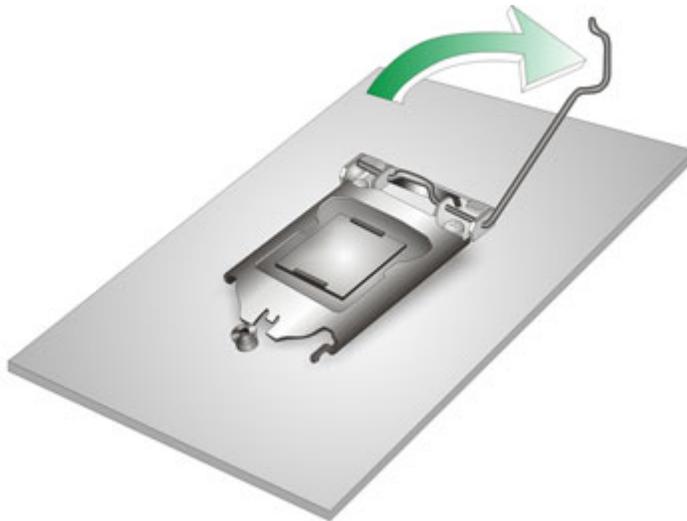
Figure 4-1: Disengage the CPU Socket Load Lever

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**.
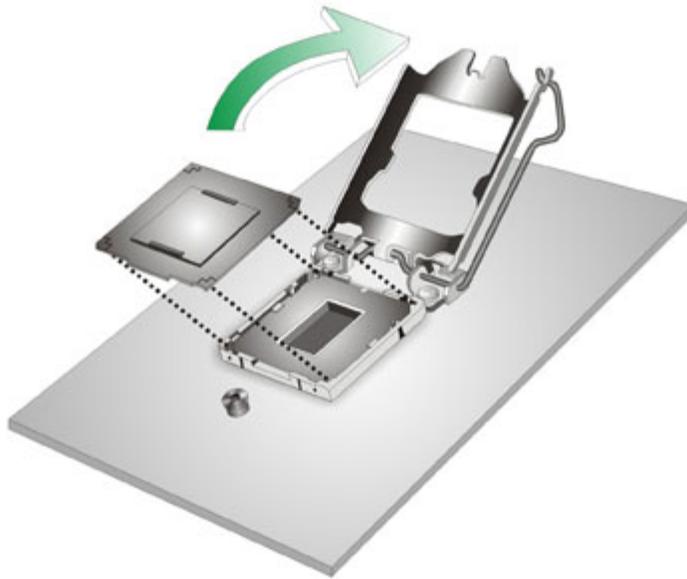
Figure 4-2: Remove Protective Cover

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 icon] **WARNING:**

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

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

Step 6: **Align the CPU pins.** Locate pin 1 and the two orientation notches on the CPU. Carefully match the two orientation notches on the CPU with the socket alignment keys.

Step 7: **Insert the CPU.** Gently insert the CPU into the socket. If the CPU pins are properly aligned, the CPU should slide into the CPU socket smoothly. See **Figure 4-3**.
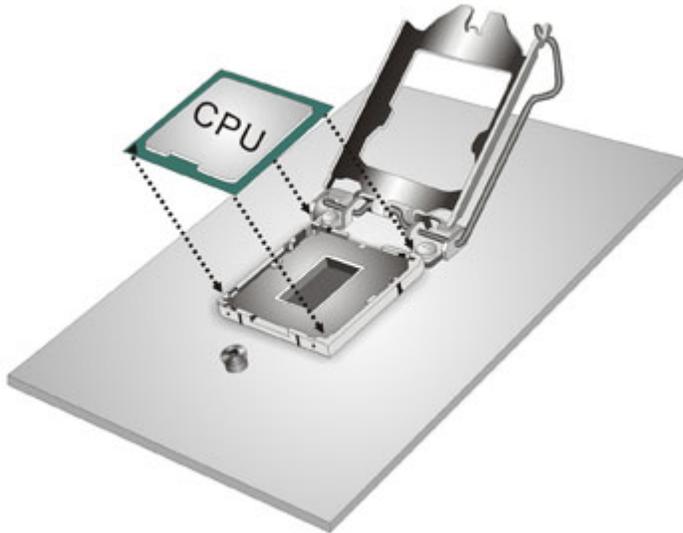
Figure 4-3: Insert the Socket LGA1151 CPU

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.
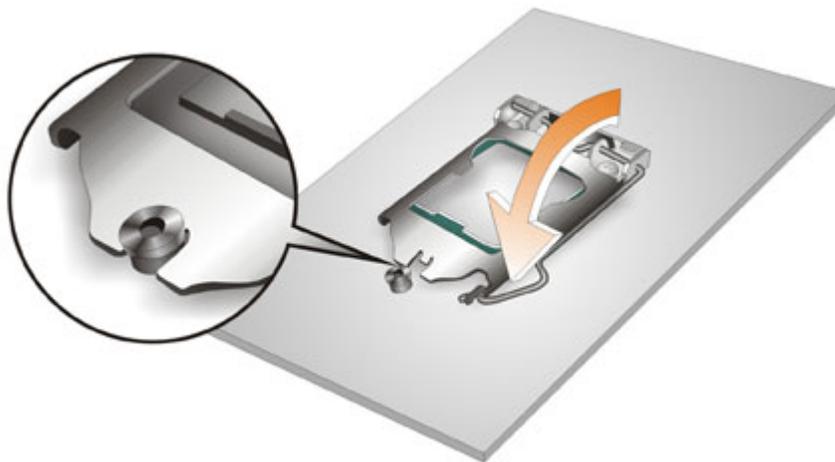
Figure 4-4: Close the Socket LGA1151

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

4.4 Socket LGA1151 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.**
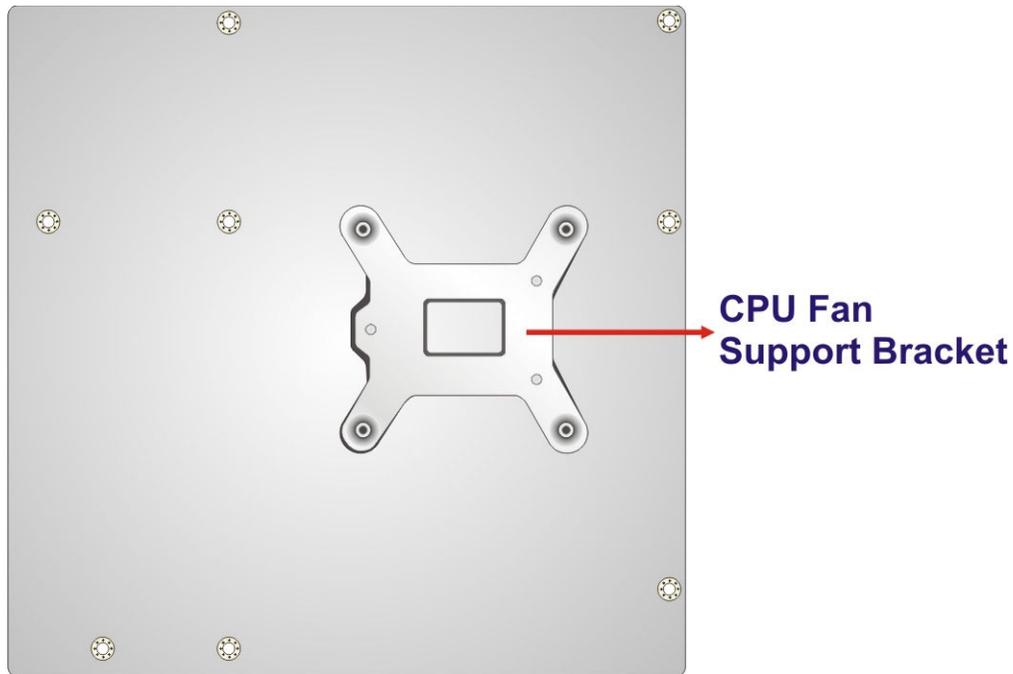
Figure 4-5: Cooling Kit Support Bracket

Step 2: **Place the cooling kit onto the socket LGA1151 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: **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 5: **Connect the fan cable**. Connect the cooling kit fan cable to the CPU fan connector on the IMB-H110. 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 4-6**.
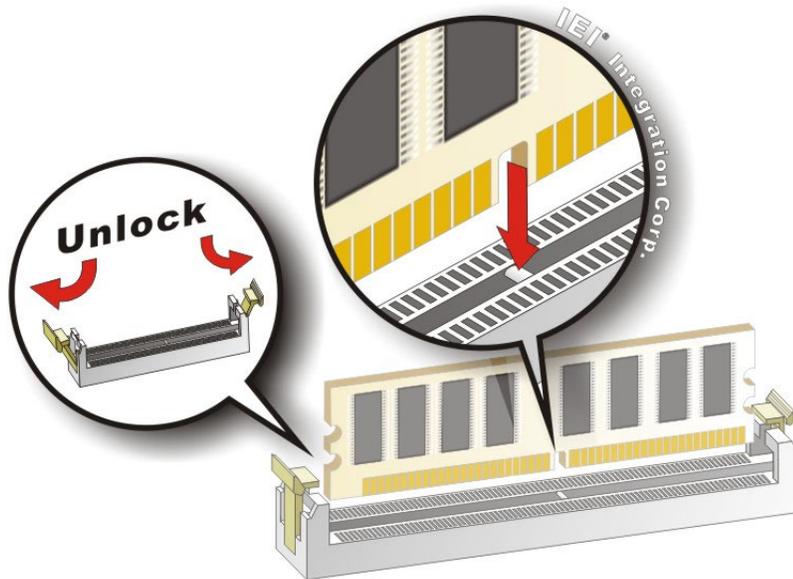
Figure 4-6: DIMM Installation

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

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

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

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

4.6 Full-size PCIe Mini Card Installation

The PCIe Mini card slot allows installation of either a full-size or half-size PCIe Mini card. To install a full-size PCIe Mini card, please follow the steps below.

Step 1: **Locate the PCIe Mini card slot**. See **Chapter 3**.

Step 2: **Remove the retention screw**. Remove the retention screw as shown in **Figure 4-7**.
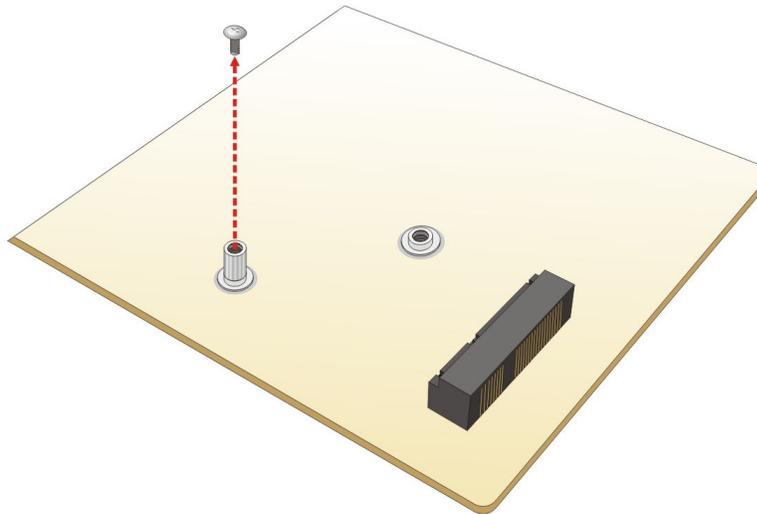
Figure 4-7: Removing the Retention Screw

Step 3: **Insert into the socket at an angle**. Line up the notch on the card with the notch on the slot. Slide the PCIe Mini card into the socket at an angle of about 20º (**Figure 4-8**).
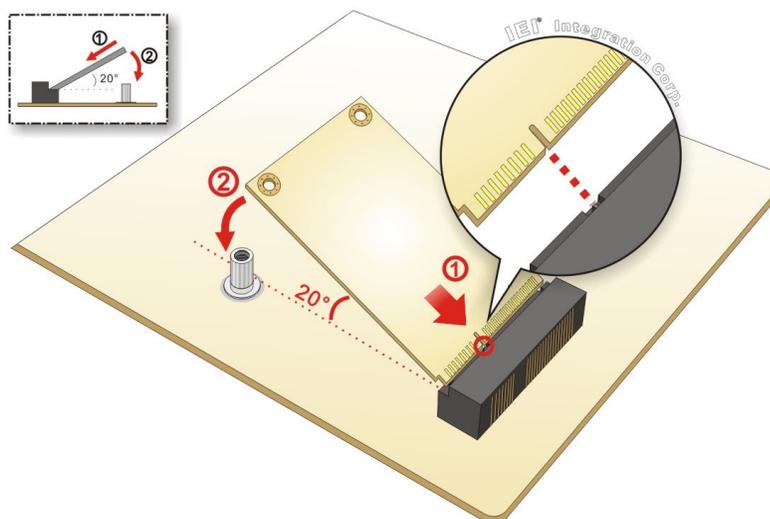
Figure 4-8: Inserting the Full-size PCIe Mini Card into the Slot at an Angle

Step 4: **Secure the full-size PCIe Mini card**. Secure the full-size PCIe Mini card with the retention screw previously removed (**Figure 4-9**).
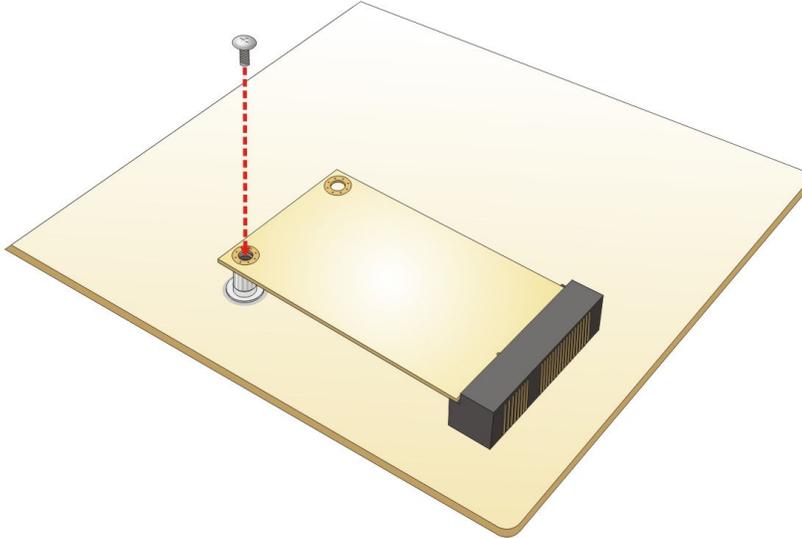
Figure 4-9: Securing the Full-size PCIe Mini Card

4.7 Half-size PCIe Mini Card Installation

The PCIe Mini card slot allows installation of either a full-size or half-size PCIe Mini card. To install a half-size PCIe Mini card, please follow the steps below.

Step 1: **Locate the PCIe Mini card slot**. See **Chapter 3**.

Step 2: **Remove the retention screw**. Remove the retention screw as shown in **Figure 4-7**.

Step 3: **Remove the standoff**. Unscrew and remove the standoff secured on the motherboard as shown in **Figure 4-10**.
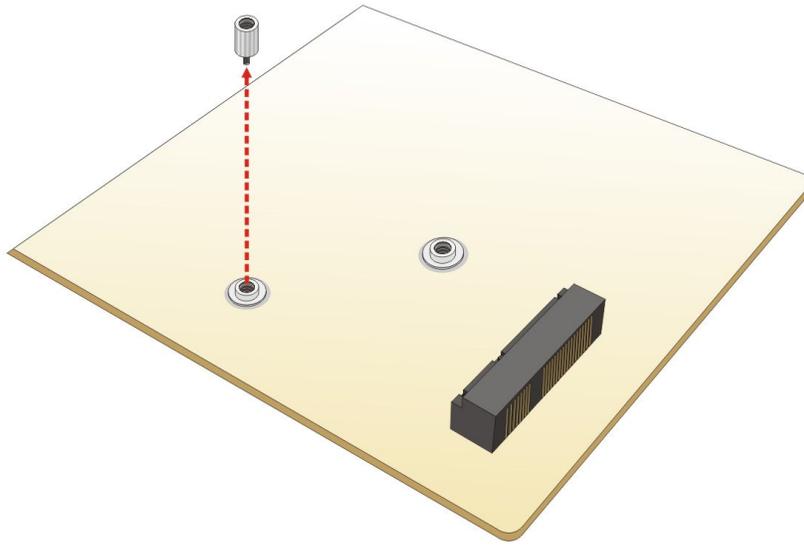
Figure 4-10: Removing the Standoff

Step 4: **Install the standoff to the screw hole for the half-size PCIe Mini card**. Install the previously removed standoff to the screw hole for the half-size PCIe Mini card (**Figure 4-11**).
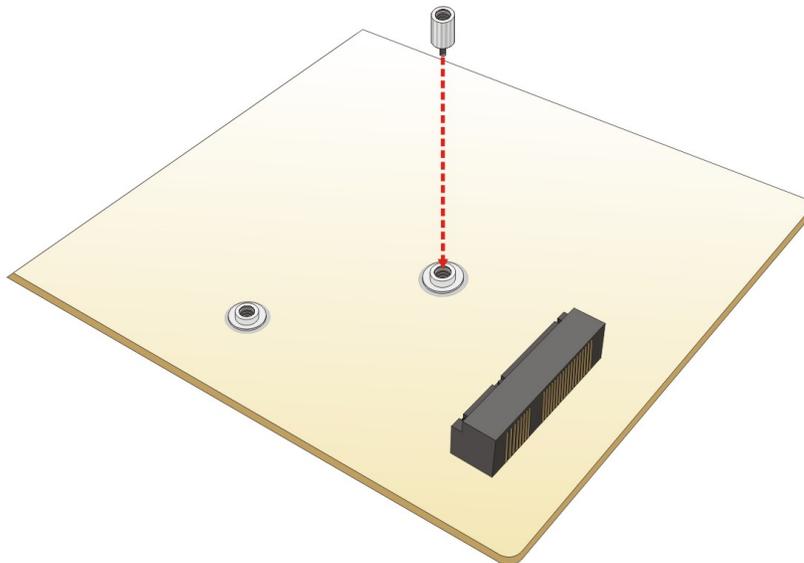
Figure 4-11: Installing the Standoff

Step 5: **Insert into the socket at an angle**. Line up the notch on the card with the notch on the slot. Slide the PCIe Mini card into the slot at an angle of about 20º (**Figure 4-12**).
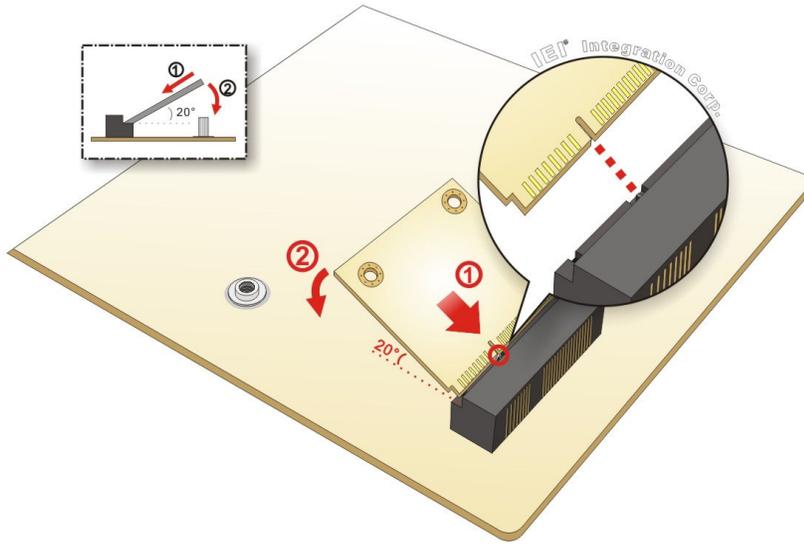
Figure 4-12: Inserting the Half-size PCIe Mini Card into the Slot at an Angle

Step 6: **Secure the half-size PCIe Mini card**. Secure the half-size PCIe Mini card with

the retention screw previously removed (**Figure 4-13**).
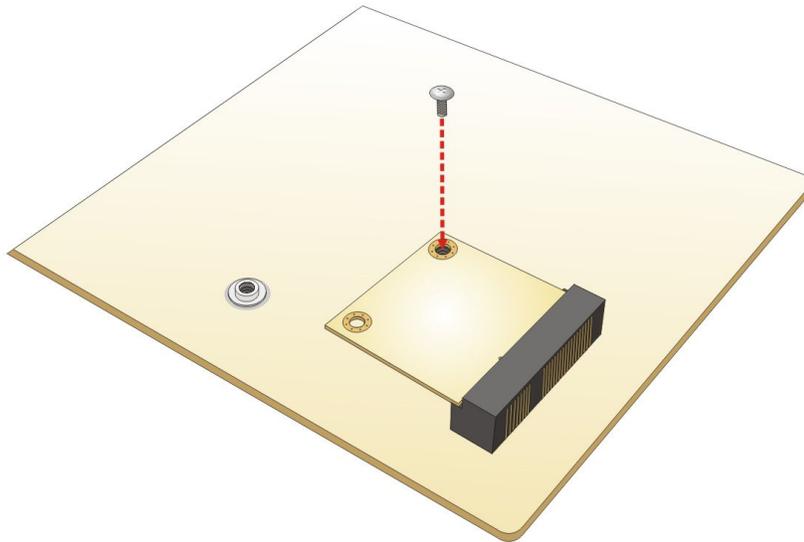
Figure 4-13: Securing the Half-size PCIe Mini Card

4.8 System Configuration

The system configuration should be performed before installation.

4.8.1 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 4-14**.
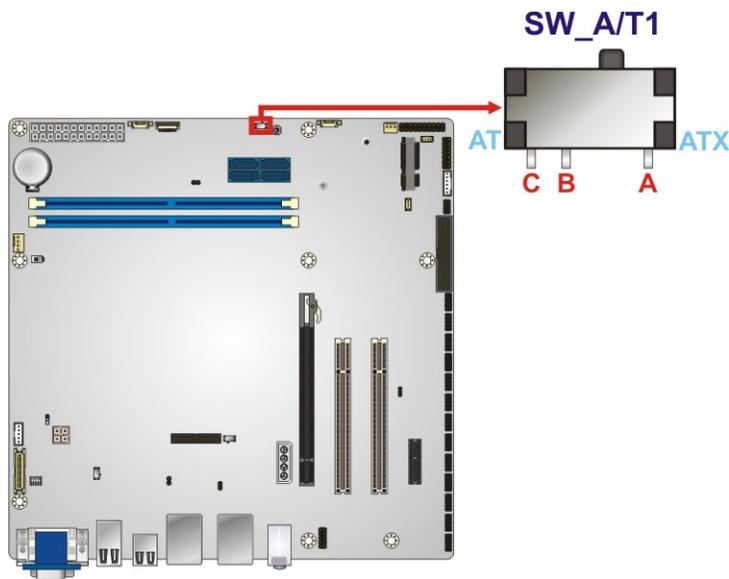
Figure 4-14: AT/ATX Power Mode Switch Location

Setting	Description
Short A-B	ATX power mode (default)
Short B-C	AT power mode

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

4.8.2 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 4-15**.
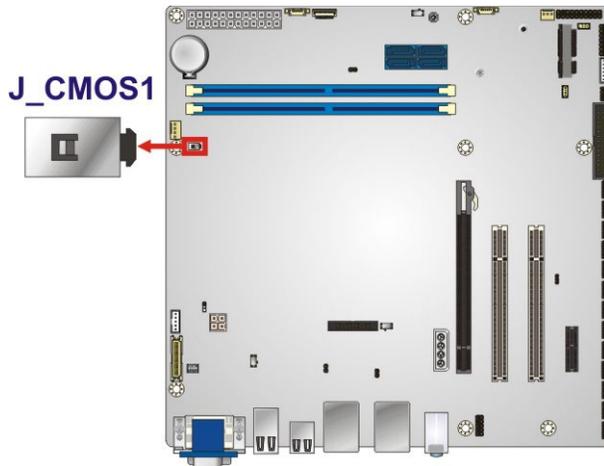
Figure 4-15: Clear CMOS Button Location

4.8.3 DVI/CRT Selection Switch

The DVI-I connector on the rear panel supports both digital and analog signals. To connect a CRT monitor to the DVI-I connector, the user has to set the DVI/CRT selection switch to CRT position. Refer to **Figure 4-16** and **Table 4-2** for the switch location and settings.

Setting	Description
Short A-B	DVI monitor (Default)
Short B-C	CRT monitor

Table 4-2: DVI/CRT Selection Switch Settings
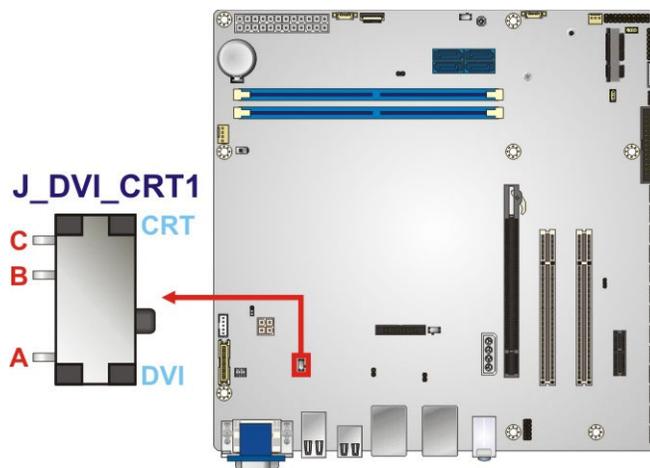
Figure 4-16: DVI/CRT Selection Switch Location

4.8.4 Flash Descriptor Security Override Jumper

The flash descriptor security override jumper (J_FLASH2) allows to enable or disable the ME firmware update. Refer to **Table 4-3** and **Figure 4-17** for the jumper location and settings.

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

Table 4-3: Flash Descriptor Security Override Jumper Settings
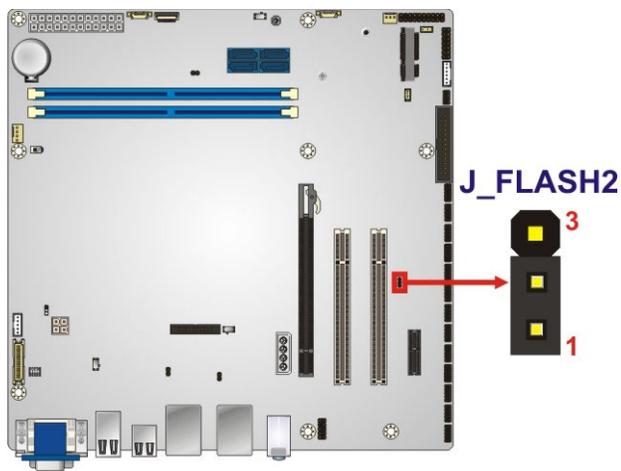
Figure 4-17: Flash Descriptor Security Override Jumper Location

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.

4.8.5 LVDS Panel Resolution Selection Switch

Use the LVDS panel resolution selection switch to select the resolution of the LCD panel connected to the LVDS connector.

* ON=0, OFF=1; Single=S, Dual=D

SW1 (4-3-2-1)	Description
0000	800x600 18-bit S (default)
0001	1024x768 18-bit S
0010	1024x768 24-bit S
0011	1280x768 18-bit S
0100	1280x800 18-bit S
0101	1280x960 18-bit S
0110	1280x1024 24-bit D
0111	1366x768 18-bit S
1000	1366x768 24-bit S
1001	1440x960 24-bit D
1010	1400x1050 24-bit D
1011	1600x900 24-bit D
1100	1680x1050 24-bit D
1101	1600x1200 24-bit D
1110	1920x1080 24-bit D
1111	1920x1200 24-bit D

Table 4-4: LVDS Panel Resolution Selection
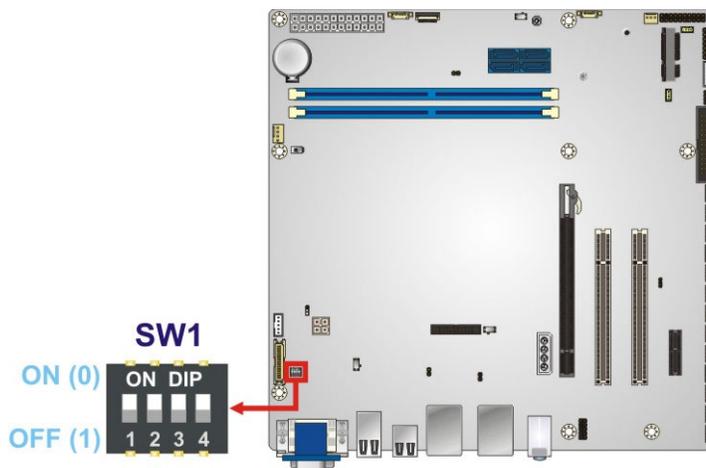
Figure 4-18: LVDS Panel Resolution Selection Switch Location

4.8.6 LVDS Voltage Selection Jumper

![WARNING icon] **WARNING:**

Permanent damage to the screen and IMB-H110 may occur if the wrong voltage is selected with this jumper. Please refer to the user guide that came with the monitor to select the correct voltage.

The LVDS voltage selection switch allows setting the voltage provided to the monitor connected to the LVDS connector. The LVDS voltage selection switch settings are shown in **Table 4-5**.

Setting	Description
Short 1-2	Keep VCC3V panel setup (Default)
Short 2-3	Keep VCC5V panel setup

Table 4-5: LVDS Voltage Selection Jumper Settings
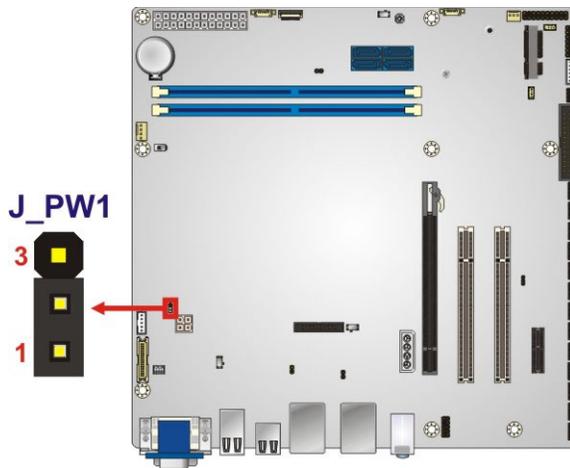
Figure 4-19: LVDS Voltage Selection Jumper Location

4.8.7 LVDS/iDP Selection Switch

The user can select either to use the LVDS connector or the internal DisplayPort connector. Use the LVDS/iDP selection switch (**Figure 4-20**) to configure the settings (**Table 4-6**).

Setting	Description
Short A-B	LVDS panel (Default)
Short B-C	iDP monitor

Table 4-6: LVDS/iDP Selection Switch Settings
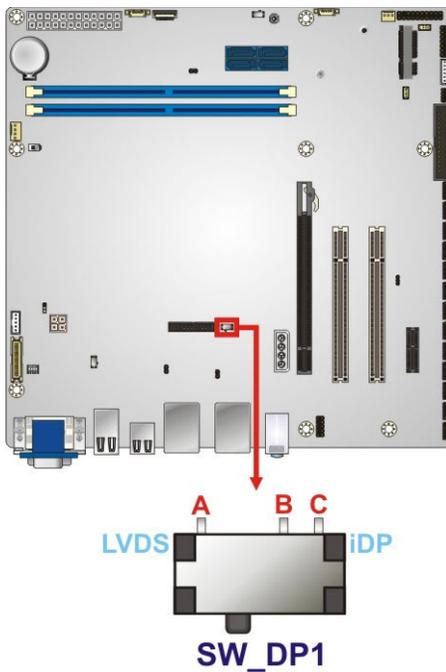
Figure 4-20: LVDS/iDP Selection Switch Location

4.8.8 USB Power Selection

The USB power selection is made through the BIOS menu in "Chipset → PCH-IO Configuration". Use the **USB Power SW1** and the **USB Power SW2** BIOS options to configure the correspondent USB ports (see **Table 4-7**) and refer to **Table 4-8** to select the USB power source.

BIOS Options	Configured USB Ports
USB Power SW1	LAN1_USB1 (external USB 3.0 ports)
	LAN2_USB1 (external USB 3.0 ports)
USB Power SW2	USB1 (External USB 2.0 ports)
	H_USB1 (External USB 2.0 ports)
	J_USB1 (internal USB 2.0 ports)

Table 4-7: BIOS Options and Configured USB Ports

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

Table 4-8: USB Power Source Setup

Please refer to **Section 5.4.2** for BIOS setup.

4.9 Internal Peripheral Device Connections

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

4.9.1 SATA Drive Connection

The IMB-H110 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 4-21**.
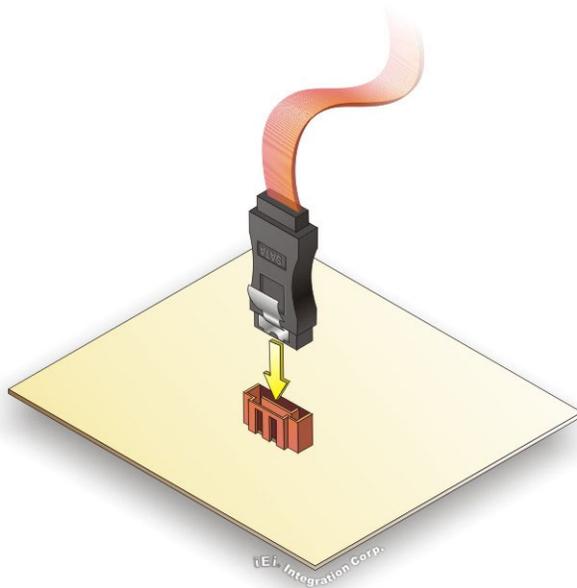
Figure 4-21: SATA Drive Cable Connection

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 4-22**.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 4-22**.
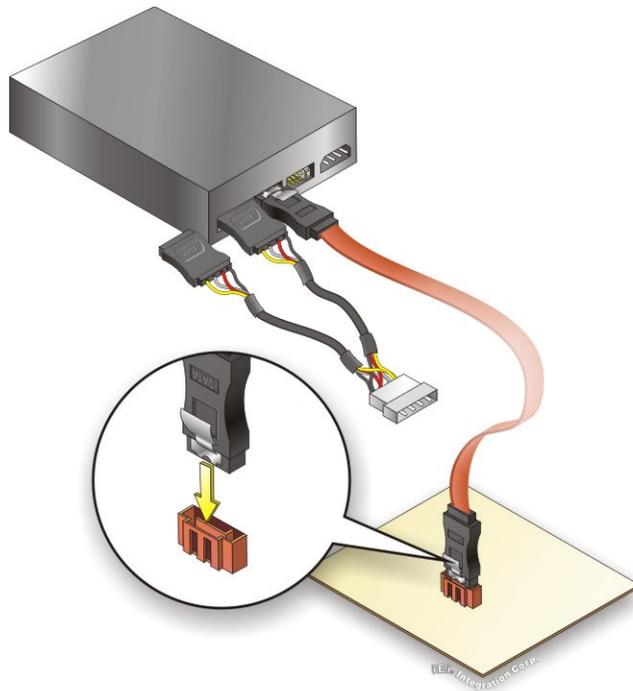
Figure 4-22: SATA Power Drive Connection

The SATA power cable can be bought from IEI. See Optional Items in Section 2.4.

4.10 Adding USB 3.0 Drivers to a Windows 7 Installation Image

The Windows 7 installation media does not include native driver support for USB 3.0. In order to use the USB keyboard or mouse connected to a USB 3.0 port during OS installation, the user has to update the Windows 7 installation image so that it contains USB 3.0 drivers. Please follow the instructions below to complete the task.

Step 1: Prepare a USB flash drive installer.

On a working computer, use your Windows 7 DVD or ISO image to create a

bootable USB flash drive.

Step 2: Download the Windows 7 USB 3.0 Creator Utility from:

https://downloadcenter.intel.com/download/25476/Windows-7-USB-3-0-Creator-

Utility.

Step 3: Extract the downloaded file to a temporary folder on a computer where the user has logged in as the administrator.

![NOTE icon] **NOTE:**

The OS version of the computer can be Windows 7, Windows 8.1 or Windows 10.

Step 4: Connect the USB drive containing the Windows 7 installation image to the computer.

Step 5: Right click on **Installer_Creator.exe** from the extracted files and select **Run as administrator**.

Step 6: The Windows 7 USB 3.0 Creator Utility screen appears (**Figure 4-23**). Click [...] to browse to the root of the USB drive containing the Windows 7 image.
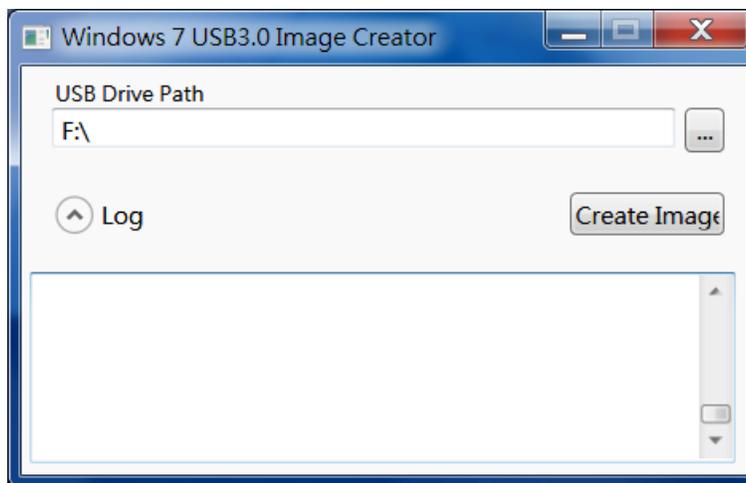
Figure 4-23: Windows 7 USB 3.0 Creator Utility

Step 7: Click **Create Image** to start the update process.

Step 8: Wait for the process to finish. It may take up to 15 minutes.
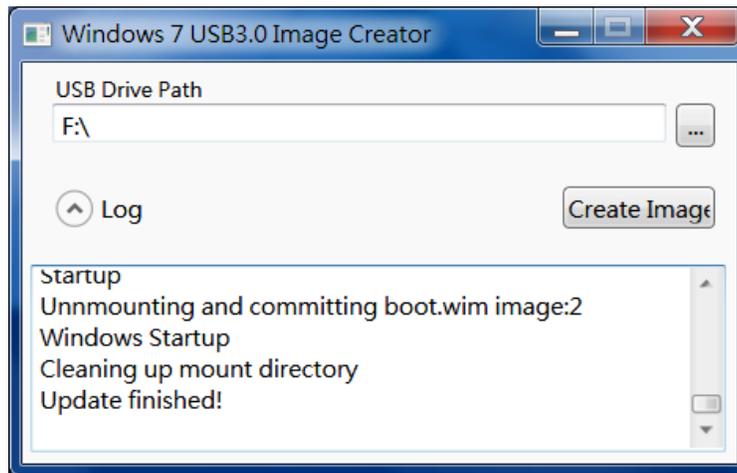
Figure 4-24: Update Process is Complete

Step 9: Now the user can proceed with the Windows 7 installation using the updated installer.

4.11 Driver Installation

All the drivers for the IMB-H110 are on the CD that came with the system. To install the drivers, please follow the steps below.

NOTE:

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

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

NOTE:

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

Step 2: The driver main menu appears. Click IMB-H110.

Step 3: A new screen with a list of available drivers appears.

Step 4: Install all of the necessary drivers in the menu.

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

IMB-H110 microATX Motherboard

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

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

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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) 2016 American Megatrends, Inc.
    Main    Advanced   Chipset   Security    Boot    Save & Exit

BIOS Information                                             Set the Date. Use Tab to
BIOS Vendor                      American Megatrends         switch between Date
Core Version                     5.11                        elements.
Compliancy                       UEFI 2.4; PI 1.3
Project Version                  B388AT09.ROM
Build Date and Time              06/14/2016 14:20:17

iWDD Vendor                      iEi
iWDD Version                     B388ER02.bin

Processor Information
Name                             SkyLake DT
Brand String                     Intel(R) Core(TM)
                                 i3-6100 CPU @ 3.70GHz
Frequency                        3700 MHz
Processor ID                     506E3                       ----------------------
Stepping                         R0/S0/N0                    →←: Select Screen
Number of Processors             2Core(s) / 4Thread(s)       ↑↓: Select Item
Microcode Revision               7C                          Enter: Select
GT Info                          GT2                         +/-:  Change Opt.
                                                             F1:   General Help
IGFX VBIOS Version               1036                        F2:   Previous Values
Memory RC Version                1.8.0.1                     F3:   Optimized Defaults
Total Memory                     8192 MB                     F4:   Save & Exit
Memory Frequency                 2133 MHz                    ESC:  Exit

PCH Information
Name                             SKL PCH-H
PCH SKU                          PCH-H Desktop H110 SKU
Stepping                         31/D1
LAN PHY Revision                 N/A

ME FW Version                    11.0.0.1205
ME Firmware SKU                  Consumer SKU

SPI Clock Frequency
DOFR Support                     Unsupported
Read Status Clock Frequnecy      17 MHz
Write Status Clock Frequnecy     48 MHz
Fast Read Status Clock Frequnecy 48 MHz

Access Level                     Administrator

System Date                      [Thu 07/21/2016]
System Time                      [15:10:27]

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

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.

```
        Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
   Main    Advanced   Chipset   Security    Boot    Save & Exit   Server Mgmt

> Trusted Computing                           Configure Active
> ACPI Settings                               Management Technology
> Super IO Configuration                      Parameters
> F81866SEC Super IO Configuration            ---------------------
> iWDD H/M Monitor                            →←: Select Screen
> RTC Wake Settings                           ↑↓: Select Item
> Serial Port Console Redirection             Enter: Select
> CPU Configuration                           +/-:  Change Opt.
> SATA Configuration                          F1:  General Help
> NVMe Configuration                          F2:  Previous Values
> USB Configuration                           F3:  Optimized Defaults
> iEi Feature                                 F4:  Save & Exit
                                              ESC: Exit

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 2: Advanced

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).

```
        Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
          Advanced

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


                                                        ---------------------
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1:  General Help
                                                        F2:  Previous Values
                                                        F3:  Optimized Defaults
                                                        F4:  Save & Exit
                                                        ESC: Exit

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

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.

```
          Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
           Advanced

 ACPI Settings                                        Select the highest ACPI
                                                      sleep state the system
 ACPI Sleep State                  [S3 (Suspend to RAM)]  will enter when the
                                                      SUSPEND button is
                                                      pressed.
                                                      ----------------------
                                                      →←: Select Screen
                                                      ↑ ↓: Select Item
                                                      Enter: Select
                                                      +/-:  Change Opt.
                                                      F1:   General Help
                                                      F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC: Exit

          Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```
BIOS Menu 4: ACPI Configuration

➔ **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 Super IO Configuration

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

```
           Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
            Advanced

Super IO Configuration                              Set Parameters of Serial
                                                    Port 1 (COMA)
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.
> Serial Port 6 Configuration                       F1:   General Help
> Parallel Port Configuration                       F2:   Previous Values
                                                    F3:   Optimized Defaults
Case Open Beep                  [Disabled]          F4:   Save & Exit
                                                    ESC:  Exit

           Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 5: Super IO Configuration

➔ **Case Open Beep [Disabled]**

Use the **Case Open Beep** 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

5.3.3.1 Serial Port 1 ~ 6 Configuration

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

```
             Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
             Advanced

Serial Port n Configuration                                        Enable or Disable Serial
                                                                   Port (COM)
Serial Port                           [Enabled]
Device Settings                       IO=3F8h; IRQ=4               --------------------
                                                                   →←: Select Screen
Change Settings                       [Auto]                       ↑↓: Select Item
                                                                   Enter: Select
                                                                   +/-:  Change Opt.
                                                                   F1:   General Help
                                                                   F2:   Previous Values
                                                                   F3:   Optimized Defaults
                                                                   F4:   Save & Exit
                                                                   ESC: Exit

             Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 6: Serial Port 1 ~ 6 Configuration Menu

5.3.3.2 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;**   Serial Port I/O port address is 3F8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2F8h;**   Serial Port I/O port address is 2F8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=3E8h;**   Serial Port I/O port address is 3E8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2E8h;**   Serial Port I/O port address is 2E8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2D0h;**   Serial Port I/O port address is 2D0h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2E0h;**   Serial Port I/O port address is 2E0h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

5.3.3.3 Serial Port 2 Configuration

➔ **Serial Port [Enabled]**

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

➔ **Disabled**   Disable the serial port

➔ **Enabled**   DEFAULT   Enable the serial port

➔ **Change Settings [Auto]**

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

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

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

➔ **IO=3F8h;**   Serial Port I/O port address is 3F8h and the interrupt
  IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2F8h;**   Serial Port I/O port address is 2F8h and the interrupt
  IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=3E8h;**   Serial Port I/O port address is 3E8h and the interrupt
  IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2E8h;**   Serial Port I/O port address is 2E8h and the interrupt
  IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2D0h;**   Serial Port I/O port address is 2D0h and the interrupt
  IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2E0h;**   Serial Port I/O port address is 2E0h and the interrupt
  IRQ=3, 4, 11   address is IRQ3, 4, 11

5.3.3.4 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=3E8h;**   Serial Port I/O port address is 3E8h and the interrupt
  IRQ=11   address is IRQ11

➔ **IO=3F8h;**   Serial Port I/O port address is 3F8h and the interrupt
  IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2F8h;**
IRQ=3, 4, 11
Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 11

➔ **IO=3E8h;**
IRQ=3, 4, 11
Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 11

➔ **IO=2E8h;**
IRQ=3, 4, 11
Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 11

➔ **IO=2D0h;**
IRQ=3, 4, 11
Serial Port I/O port address is 2D0h and the interrupt address is IRQ3, 4, 11

➔ **IO=2E0h;**
IRQ=3, 4, 11
Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 11

5.3.3.4.1 Serial Port 4 Configuration

➔ **Serial Port [Enabled]**

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

➔ **Disabled**
Disable the serial port

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

➔ **Change Settings [Auto]**

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

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

➔ **IO=2E8h;**
IRQ=11
Serial Port I/O port address is 2E8h and the interrupt address is IRQ11

➔ **IO=3F8h;**
IRQ=3, 4, 11
Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 11

➔ **IO=2F8h;**
IRQ=3, 4, 11
Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 11

➔ **IO=3E8h;**
IRQ=3, 4, 11 Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 11

➔ **IO=2E8h;**
IRQ=3, 4, 11 Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 11

➔ **IO=2D0h;**
IRQ=3, 4, 11 Serial Port I/O port address is 2D0h and the interrupt address is IRQ3, 4, 11

➔ **IO=2E0h;**
IRQ=3, 4, 11 Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 11

5.3.3.4.2 Serial Port 5 Configuration

➔ **Serial Port [Enabled]**

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

➔ **Disabled** Disable the serial port

➔ **Enabled** DEFAULT Enable the serial port

➔ **Change Settings [Auto]**

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

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

➔ **IO=2D0h;**
IRQ=11 Serial Port I/O port address is 2D0h and the interrupt address is IRQ11

➔ **IO=3F8h;**
IRQ=3, 4, 11 Serial Port I/O port address is 3F8h and the interrupt address is IRQ3, 4, 11

➔ **IO=2F8h;**
IRQ=3, 4, 11 Serial Port I/O port address is 2F8h and the interrupt address is IRQ3, 4, 11

➔ **IO=3E8h;**
IRQ=3, 4, 11 Serial Port I/O port address is 3E8h and the interrupt address is IRQ3, 4, 11

➔ **IO=2E8h;**   Serial Port I/O port address is 2E8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2D0h;**   Serial Port I/O port address is 2D0h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2E0h;**   Serial Port I/O port address is 2E0h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **Transfer Mode [RS232]**

The serial port 5 allows setting the data transfer mode to RS-232, RS-422 or RS-485.

5.3.3.4.3 Serial Port 6 Configuration

➔ **Serial Port [Enabled]**

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

➔ **Disabled**   Disable the serial port

➔ **Enabled**   D<small>EFAULT</small>   Enable the serial port

➔ **Change Settings [Auto]**

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

➔ **Auto**   D<small>EFAULT</small>   The serial port IO port address and interrupt address
     are automatically detected.

➔ **IO=2E0h;**   Serial Port I/O port address is 2E0h and the interrupt
     IRQ=11   address is IRQ11

➔ **IO=3F8h;**   Serial Port I/O port address is 3F8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=2F8h;**   Serial Port I/O port address is 2F8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **IO=3E8h;**   Serial Port I/O port address is 3E8h and the interrupt
     IRQ=3, 4, 11   address is IRQ3, 4, 11

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

   IRQ=3, 4, 11   address is IRQ3, 4, 11

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

   IRQ=3, 4, 11   address is IRQ3, 4, 11

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

   IRQ=3, 4, 11   address is IRQ3, 4, 11

➔ **Transfer Mode [RS232]**

The serial port 6 allows setting the data transfer mode to RS-232, RS-422 or RS-485.

5.3.3.5 Parallel Port Configuration

Use the **Parallel Port Configuration** menu (**BIOS Menu 7**) to configure the parallel port.

```
        Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
          Advanced

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

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 7: 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, 6, 7, 9, 10, 11, 12** Parallel Port I/O port address is 378h and the interrupt address is IRQ5, 6, 7, 9, 10, 11, 12

➔ **IO=278h; IRQ=5, 6, 7, 9, 10, 11, 12** Parallel Port I/O port address is 278h and the interrupt address is IRQ5, 6, 7, 9, 10, 11, 12

➔ **IO=3BCh; IRQ=5, 6, 7, 9, 10, 11, 12** Parallel Port I/O port address is 3BCh and the interrupt address is IRQ5, 6, 7, 9, 10, 11, 12

➔ **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

5.3.4 F81866SEC Super IO Configuration

Use the **F81866SEC Super IO Configuration** menu (**BIOS Menu 8**) to set or change the configurations for the serial ports.

```
           Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
        Advanced

F81866SEC Super IO Configuration                          Set Parameters of Serial
                                                          Port 7
Super IO Chip                    F81866SEC
> Serial Port 7 Configuration                             --------------------
> Serial Port 8 Configuration                             →←: Select Screen
> Serial Port 9 Configuration                             ↑↓: Select Item
> Serial Port 10 Configuration                            Enter: Select
> Serial Port 11 Configuration                            +/-:  Change Opt.
> Serial Port 12 Configuration                            F1:   General Help
                                                          F2:   Previous Values
                                                          F3:   Optimized Defaults
                                                          F4:   Save & Exit
                                                          ESC: Exit

           Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 8: F81866SEC Super IO Configuration

5.3.4.1 Serial Port 7~12 Configuration

Use the **Serial Port 7~12 Configuration** menu (**BIOS Menu 9**) to configure the serial ports.

```
           Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
        Advanced

Serial Port n Configuration                               Enable or Disable Serial
                                                          Port (COM)
Serial Port                      [Enabled]
Device Settings                  IO=240h; IRQ=10          --------------------
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-:  Change Opt.
                                                          F1:   General Help
                                                          F2:   Previous Values
                                                          F3:   Optimized Defaults
                                                          F4:   Save & Exit
                                                          ESC: Exit

           Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 9: Serial Port 7~12 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

5.3.5 iWDD H/W Monitor

The **iWDD H/W Monitor** menu (**BIOS Menu 10**) contains the fan configuration submenu, and displays operating temperature, fan speeds and system voltages.

```
        Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
          Advanced

PC Health Status                                       Smart Fan Mode Select

CPU temperature                    : +49°C
SYS temperature                    : +34°C
                                                       --------------------
CPU_FAN1 Speed                     : 761 RPM           ➔←: Select Screen
SYS_FAN1 Speed                     : N/A               ↑↓: Select Item
                                                       Enter: Select
CPU_CORE                           : +1.143 V          +/-:  Change Opt.
+5V                                : +5.070 V          F1:  General Help
+12V                               : +12.096 V         F2:  Previous Values
+DDR                               : +1.202 V          F3:  Optimized Defaults
+5VSB                              : +5.052 V          F4:  Save & Exit
+3.3V                              : +3.343 V          ESC: Exit
+3.3VSB                            : +3.282 V

> Smart Fan Mode Configuration

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```

BIOS Menu 10: 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 Speed:
    - ○ CPU Fan Speed
    - ○ System Fan Speed

- Voltages:
  - ○ CPU_CORE
  - ○ +5V
  - ○ +12V
  - ○ +DDR
  - ○ +5VSB
  - ○ +3.3V
  - ○ +3.3VSB

5.3.5.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 11**) to configure the CPU/system fan temperature and speed settings.

```
         Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
           Advanced

 Smart Fan Mode Configuration                              Smart Fan Mode Select

 CPU_FAN1 Smart Fan Control        [Auto Mode]
 Auto mode fan start temperature 50                        --------------------
 Auto mode fan off temperature    40                       →←: Select Screen
 Auto mode fan start PWM           30                       ↑↓: Select Item
 Auto mode fan slope PWM           1                        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           30                        F4:   Save & Exit
 Auto mode fan slope PWM           1                         ESC: Exit

         Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 11: 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.

➔ **Auto mode fan start/off temperature**

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

➔ **Auto mode fan start PWM**

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

➔ **Auto mode fan slope PWM**

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

5.3.6 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 12**) enables the system to wake at the specified time.

```
        Aptio Setup Utility – Copyright (C) 2016 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 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 12: 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.

5.3.7 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 13**) allows the console redirection options to be configured. Console redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.

```
         Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
              Advanced

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

   COM2
   Console Redirection          [Disabled]
 > Console Redirection Settings

   COM3
   Console Redirection          [Disabled]        --------------------
 > Console Redirection Settings
                                                  →←: Select Screen
   COM4                                           ↑ ↓: Select Item
   Console Redirection          [Disabled]        Enter: Select
 > Console Redirection Settings                   +/-:  Change Opt.
                                                  F1:  General Help
   COM5                                           F2:  Previous Values
   Console Redirection          [Disabled]        F3:  Optimized Defaults
 > Console Redirection Settings                   F4:  Save & Exit
                                                  ESC: Exit
   COM6
   Console Redirection          [Disabled]
 > Console Redirection Settings

   COM7
   Console Redirection          [Disabled]
 > Console Redirection Settings

   COM8
   Console Redirection          [Disabled]
 > Console Redirection Settings

   COM9
   Console Redirection          [Disabled]
 > Console Redirection Settings

   COM10
   Console Redirection          [Disabled]
 > Console Redirection Settings

   Legacy Console Redirection
 > Legacy Console Redirection Settings

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```

BIOS Menu 13: 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.

5.3.7.1 Legacy Console Redirection Settings

```
         Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
            Advanced

Legacy Serial Redirection Port    [COM1]                    Select a COM port to
                                                            display redirection of
                                                            Legacy OS and Legacy
                                                            OPROM Messages.

                                                            ---------------------
                                                            →←: Select Screen
                                                            ↑ ↓: Select Item
                                                            Enter:  Select
                                                            +/-:  Change Opt.
                                                            F1:   General Help
                                                            F2:   Previous Values
                                                            F3:   Optimized Defaults
                                                            F4:   Save & Exit
                                                            ESC:  Exit

         Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```
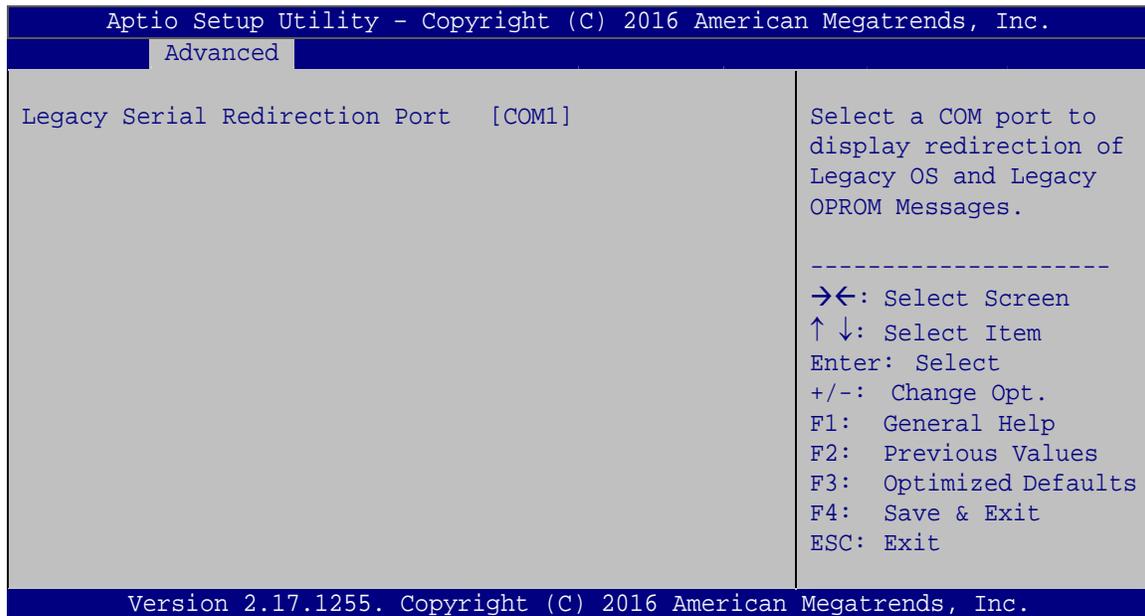
BIOS Menu 14: Legacy Console Redirection Settings

➔ **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.

5.3.8 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 15**) to view detailed CPU specifications or enable the Intel Virtualization Technology.

```
        Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
           Advanced

 CPU Configuration                                        Number of cores to enable
                                                          in each processor
 Intel(R) Core(TM) i3-6100 CPU @ 3.70GHz                  package.
 CPU Signature                   506E3
 Microcode Patch                 7C
 Max CPU Speed                   3700 MHz
 Min CPU Speed                   800 MHz                   ----------------------
 CPU Speed                       3700 MHz                  →←: Select Screen
 Processor Cores                 2                         ↑↓: Select Item
 Hyper Threading Technology      Supported                 Enter: Select
 Intel VT-x Technology           Supported                 +/-: Change Opt.
 Intel SMX Technology            Not Supported             F1:  General Help
 64-bit                          Supported                 F2:  Previous Values
 EIST Technology                 Supported                 F3:  Optimized Defaults
                                                           F4:  Save & Exit
 L1 Data Cache                   32 kB x 2                 ESC: Exit
 L1 Code Cache                   32 kB x 2
 L2 Cache                        256 kB x 2
 L3 Cache                        3 MB

 Hyper-threading                 [Enabled]
 Active Processor Cores          [All]
 Intel Virtualization Technology [Disabled]
 Intel(R) SpeedStep(tm)          [Enabled]

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```

BIOS Menu 15: 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.

➔ **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.

➔ **Intel(R) SpeedStep(tm) [Enabled]**

Use the **Intel(R) SpeedStep(tm)** option to enable or disable the Intel® SpeedStep Technology which allows more than two frequency ranges to be supported.

➔ **Disabled**   Disables Intel® SpeedStep Technology

➔ **Enabled**   DEFAULT   Enables Intel® SpeedStep Technology

5.3.9 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 16**) to change and/or set the configuration of the SATA devices installed in the system.

```
          Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
          Advanced

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

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

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```

BIOS Menu 16: SATA 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 [Disabled]**

Use the **Hot Plug** option to designate the correspondent SATA port as hot-pluggable.

➔ **Disabled** DEFAULT Disables the hot-pluggable function of the SATA port.

➔ **Enabled** Designates the SATA port as hot-pluggable.

5.3.10 NVMe Configuration

Use the **NVMe Configuration** (**BIOS Menu 17**) menu to display the NVMe controller and device information.

```
         Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
         Advanced

NVMe controller and Drive information

No NVMe Device Found                              --------------------
                                                  →←: Select Screen
                                                  ↑ ↓: Select Item
                                                  Enter: Select
                                                  +/-:  Change Opt.
                                                  F1:  General Help
                                                  F2:  Previous Values
                                                  F3:  Optimized Defaults
                                                  F4:  Save & Exit
                                                  ESC: Exit

         Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 17: NVMe Configuration

5.3.11 USB Configuration

Use the **USB Configuration** menu (**BIOS Menu 18**) to read USB configuration information and configure the USB settings.

```
Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
   Advanced

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

                                               →←: Select Screen
                                               ↑↓: Select Item
                                               Enter: Select
                                               +/-:  Change Opt.
                                               F1:   General Help
                                               F2:   Previous Values
                                               F3:   Optimized Defaults
                                               F4:   Save & Exit
                                               ESC: Exit

    Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

   BIOS Menu 18: 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

5.3.12 iEi Feature

Use the **iEi Feature** menu (**BIOS Menu 19**) to configure One Key Recovery function.

```
         Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
           Advanced

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

                                                          ---------------------
                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/-:  Change Opt.
                                                          F1:  General Help
                                                          F2:  Previous Values
                                                          F3:  Optimized Defaults
                                                          F4:  Save & Exit
                                                          ESC: Exit
         Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 19: 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 20**) to access the PCH IO and System Agent (SA) configuration menus.

![WARNING icon] **WARNING!**

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

```
        Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
   Main    Advanced   Chipset   Security    Boot    Save & Exit

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


                                                        ---------------------
                                                        →←: Select Screen
                                                        ↑ ↓: Select Item
                                                        Enter: Select
                                                        +/-:  Change Opt.
                                                        F1:   General Help
                                                        F2:   Previous Values
                                                        F3:   Optimized Defaults
                                                        F4:   Save & Exit
                                                        ESC:  Exit

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 20: Chipset

5.4.1 System Agent (SA) Configuration

Use the **System Agent (SA) Configuration** menu (**BIOS Menu 21**) to configure the System Agent (SA) parameters.

```
          Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
                    Chipset

VT-d                              Supported           VT-d capability
VT-d                              [Disabled]

> Graphics Configuration                              --------------------
> PEG Port Configuration                              →←: Select Screen
> Memory Configuration                                ↑ ↓: Select Item
                                                      Enter: Select
                                                      +/-:  Change Opt.
                                                      F1:   General Help
                                                      F2:   Previous Values
                                                      F3:   Optimized Defaults
                                                      F4:   Save & Exit
                                                      ESC: Exit

          Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 21: System Agent (SA) Configuration

➔ **VT-d [Disabled]**

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

➔ **Disabled**   D<small>EFAULT</small>   Disables VT-d capability.

➔ **Enabled**   Enables VT-d capability.

5.4.1.1 Graphics Configuration

Use the **Graphics Configuration** (**BIOS Menu 22**) menu to configure the video device connected to the system.

```
             Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
                         Chipset

Graphics Configuration                                    Select which of
                                                          IGFX/PEG/PCI Graphics
Primary Display                    [Auto]                 device should be Primary
DVMT Pre-Allocated                 [256M]                 Display Or select SG for
DVMT Total Gfx Mem                 [MAX]                  Switchable Gfx.
Primary IGFX Boot Display          [VBIOS Default]        ──────────────────────
Backlight Control Mode             [LED(PWM)]             →←: Select Screen
Backlight Control Type             [PWM]                  ↑ ↓: Select Item
                                                          Enter: Select
                                                          +/-:  Change Opt.
                                                          F1:   General Help
                                                          F2:   Previous Values
                                                          F3:   Optimized Defaults
                                                          F4:   Save & Exit
                                                          ESC:  Exit

             Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 22: 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
- PCIE
- SG

➔ **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**

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

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

- VBIOS Default   **Default**
- CRT
- DVI-VGA
- LVDS
- DVI

➔ **Backlight Control Mode [LED(PWM)]**

Use the **Backlight Control Mode** BIOS option to select the LCD backlight control mode. Configuration options are listed below.

- LED(PWM)   **DEFAULT**
- CCFL(Linear)

➔ **Backlight Control Type [PWM]**

Use this BIOS option to select the LCD backlight control type from **PWM** or **DC**.

5.4.1.2 PEG Port Configuration

```
        Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
                Chipset

PEG Port Configuration                                      Enable or Disable the
                                                            Root Port
PEG 0:1:0                       Not Present
  Enable Root Port              [Enabled]                   ----------------------
  Max Link Speed                [Auto]                      →←: Select Screen
                                                            ↑ ↓: Select Item
Detect Non-Compliance Device    [Disabled]                  Enter: Select
                                                            +/-:  Change Opt.
                                                            F1:   General Help
                                                            F2:   Previous Values
                                                            F3:   Optimized Defaults
                                                            F4:   Save & Exit
                                                            ESC: Exit

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```
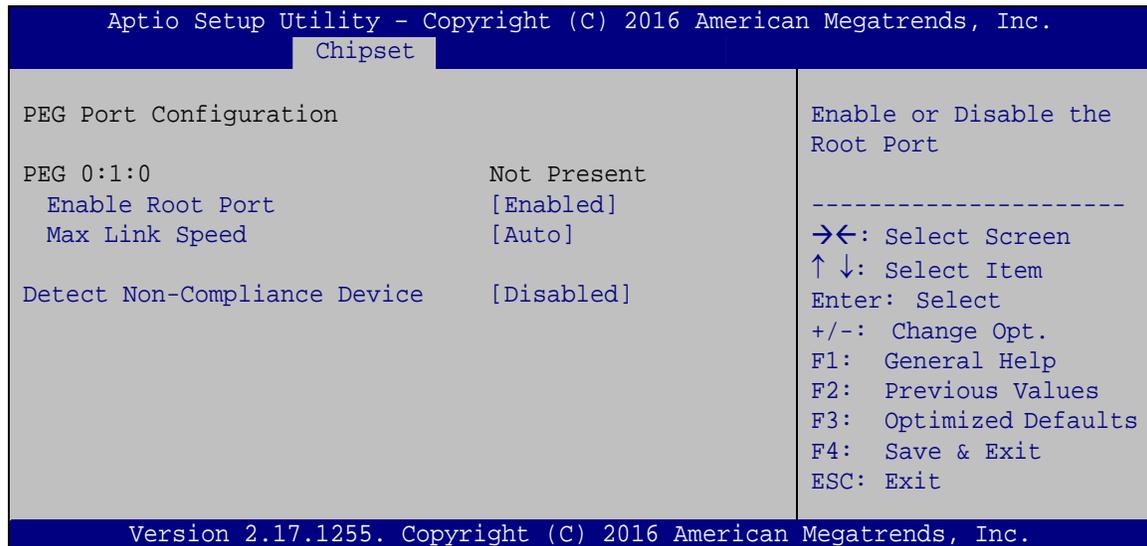
BIOS Menu 23: PEG Port Configuration

➔ **Enable Root Port [Enabled]**

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

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

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

➔ **Max Link Speed [Auto]**

Use the **Max Link Speed** option to select the maximum link speed of the PCI Express slot. 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.

5.4.1.3 Memory Configuration

Use the **Memory Configuration** submenu (**BIOS Menu 24**) to view memory information.

```
Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
                Chipset

Memory Configuration

Total Memory                    8192 MB
DIMM#1                          Not Present        --------------------
DIMM#2                          4096 MB            ➔←: Select Screen
                                                   ↑ ↓: Select Item
                                                   Enter: Select
                                                   +/-:  Change Opt.
                                                   F1:  General Help
                                                   F2:  Previous Values
                                                   F3:  Optimized Defaults
                                                   F4:  Save & Exit
                                                   ESC: Exit

      Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```
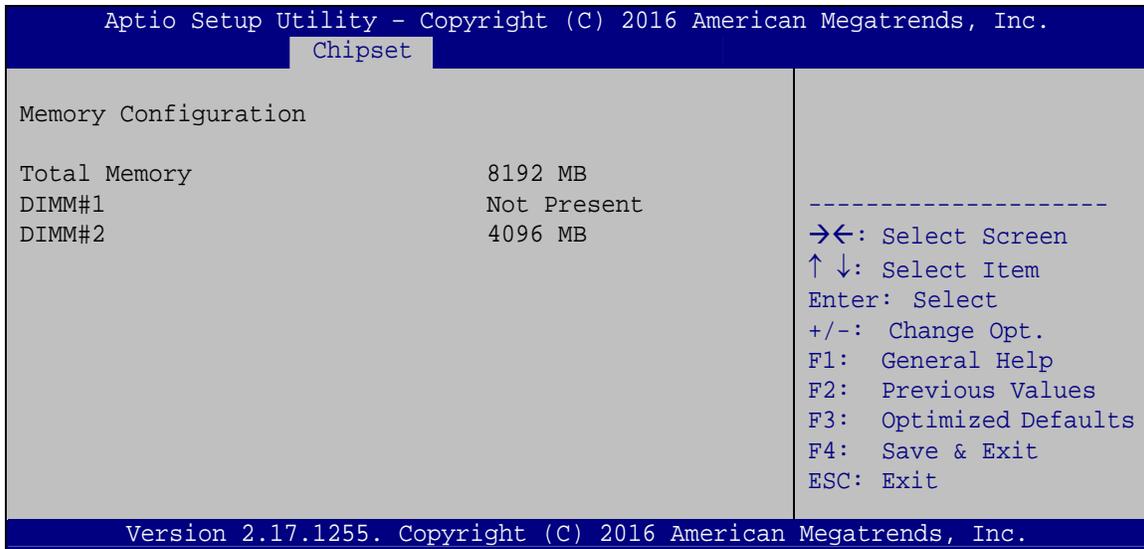
BIOS Menu 24: Memory Configuration

5.4.2 PCH-IO Configuration

Use the **PCH-IO Configuration** menu (**BIOS Menu 25**) to configure the PCH parameters.

```
           Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
                            Chipset

Auto Power Button Status           [Disable (ATX)]        Select AC power state
Restore AC Power Loss              [Last State]           when power is re-applied
                                                          after a power failure.
> PCI Express Configuration
> HD Audio Configuration                                  --------------------
                                                          →←: Select Screen
Power Saving Function(ERP)         [Disabled]             ↑ ↓: Select Item
USB Power SW1                      [+5V DUAL]             Enter: Select
USB Power SW2                      [+5V DUAL]             +/-:  Change Opt.
                                                          F1:  General Help
                                                          F2:  Previous Values
                                                          F3:  Optimized Defaults
                                                          F4:  Save & Exit
                                                          ESC: Exit

           Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 25: 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.

➔ **USB Power SW1 [+5V DUAL]**

Use the **USB Power SW1** BIOS option to configure the USB power source for the corresponding USB connectors (**Table 5-2**).

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

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

➔ **USB Power SW2 [+5V DUAL]**

Use the **USB Power SW2** BIOS option to configure the USB power source for the corresponding USB connectors (**Table 5-2**).

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

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

BIOS Options	Configured USB Ports
USB Power SW1	LAN1_USB1 (external USB 3.0 ports)
	LAN2_USB1 (external USB 3.0 ports)
USB Power SW2	USB1 (External USB 2.0 ports)
	H_USB1 (External USB 2.0 ports)
	J_USB1 (internal USB 2.0 ports)

Table 5-2: BIOS Options and Configured USB Ports

5.4.2.1 PCI Express Configuration

Use the **PCI Express Configuration** submenu (**BIOS Menu 26**) to configure the PCIe Mini slot.

```
      Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
                    Chipset

PCI Express Configuration                         MPCIE1 Slot Settings.

> MPCIE1 Slot                                     ----------------------
                                                  →←: Select Screen
                                                  ↑ ↓: Select Item
                                                  Enter: Select
                                                  +/-:  Change Opt.
                                                  F1:  General Help
                                                  F2:  Previous Values
                                                  F3:  Optimized Defaults
                                                  F4:  Save & Exit
                                                  ESC: Exit

      Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 26: PCI Express Configuration

5.4.2.1.1 MPCIE1 Slot

```
      Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
             Advanced

PCIe Speed                        [Auto]          Select PCI Express port
Detect Non-Compliance Device      [Disabled]      speed.

                                                  --------------------
                                                  →←: Select Screen
                                                  ↑ ↓: Select Item
                                                  Enter: Select
                                                  +/-:  Change Opt.
                                                  F1:  General Help
                                                  F2:  Previous Values
                                                  F3:  Optimized Defaults
                                                  F4:  Save & Exit
                                                  ESC: Exit

      Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 27: MPCIE1 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.

5.4.2.2 HD Audio Configuration

Use the **HD Audio Configuration** menu (**BIOS Menu 28**) to configure the PCH Azalia settings.

```
          Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
                        Chipset

HD Audio Configuration                                   Control Detection of the
                                                         HD-Audio device.
HD Audio                         [Auto]                  Disable = HDA will be
                                                         unconditionally
                                                         disabled
                                                         Enabled = HDA will be
                                                         unconditionally enabled
                                                         Auto = HDA will be
                                                         enabled if present,
                                                         disabled otherwise.
                                                         ---------------------
                                                         →←: Select Screen
                                                         ↑ ↓: Select Item
                                                         Enter: Select
                                                         +/-:  Change Opt.
                                                         F1:   General Help
                                                         F2:   Previous Values
                                                         F3:   Optimized Defaults
                                                         F4:   Save & Exit
                                                         ESC: Exit

          Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```
BIOS Menu 28: HD Audio Configuration

➔   **HD Audio [Auto]**

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

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

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

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

5.5 Security

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

```
        Aptio Setup Utility – Copyright (C) 2016 American Megatrends, Inc.
   Main    Advanced   Chipset   Security    Boot    Save & Exit

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

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

BIOS Menu 29: Security

➔ **Administrator Password**

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

➔ **User Password**

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 30**) to configure system boot options.

```
         Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
   Main    Advanced   Chipset   Security     Boot     Save & Exit

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

         Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

   BIOS Menu 30: 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

➔ **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.

➔ **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.

5.7 Save & Exit

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

```
        Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.
   Main    Advanced   Chipset   Security     Boot    Save & Exit

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

   Restore Defaults                                  --------------------
   Save as User Defaults                             →←: Select Screen
   Restore User Defaults                             ↑ ↓: Select Item
                                                     Enter: Select
                                                     +/-:  Change Opt.
                                                     F1:   General Help
                                                     F2:   Previous Values
                                                     F3:   Optimized Defaults
                                                     F4:   Save & Exit
                                                     ESC: Exit

        Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

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.

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.
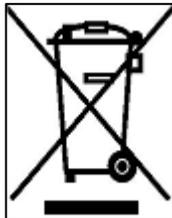
EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need 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

Terminology

AC '97	Audio Codec 97 (AC'97) refers to a codec standard developed by Intel® in 1997.
ACPI	Advanced Configuration and Power Interface (ACPI) is an OS-directed configuration, power management, and thermal management interface.
AHCI	Advanced Host Controller Interface (AHCI) is a SATA Host controller register-level interface.
ATA	The Advanced Technology Attachment (ATA) interface connects storage devices including hard disks and CD-ROM drives to a computer.
ARMD	An ATAPI Removable Media Device (ARMD) is any ATAPI device that supports removable media, besides CD and DVD drives.
ASKIR	Amplitude Shift Keyed Infrared (ASKIR) is a form of modulation that represents a digital signal by varying the amplitude ("volume") of the signal. A low amplitude signal represents a binary 0, while a high amplitude signal represents a binary 1.
BIOS	The Basic Input/Output System (BIOS) is firmware that is first run when the computer is turned on and can be configured by the end user
CODEC	The Compressor-Decompressor (CODEC) encodes and decodes digital audio data on the system.
CMOS	Complimentary metal-oxide-conductor is an integrated circuit used in chips like static RAM and microprocessors.
COM	COM refers to serial ports. Serial ports offer serial communication to expansion devices. The serial port on a personal computer is usually a male DB-9 connector.
DAC	The Digital-to-Analog Converter (DAC) converts digital signals to analog signals.
DDR	Double Data Rate refers to a data bus transferring data on both the rising and falling edges of the clock signal.
DMA	Direct Memory Access (DMA) enables some peripheral devices to bypass the system processor and communicate directly with the system memory.

DIMM

Dual Inline Memory Modules are a type of RAM that offer a 64-bit data bus and have separate electrical contacts on each side of the module.

DIO

The digital inputs and digital outputs are general control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

EHCI

The Enhanced Host Controller Interface (EHCI) specification is a register-level interface description for USB 2.0 Host Controllers.

EIDE

Enhanced IDE (EIDE) is a newer IDE interface standard that has data transfer rates between 4.0 MBps and 16.6 MBps.

EIST

Enhanced Intel® SpeedStep Technology (EIST) allows users to modify the power consumption levels and processor performance through application software. The application software changes the bus-to-core frequency ratio and the processor core voltage.

FSB

The Front Side Bus (FSB) is the bi-directional communication channel between the processor and the Northbridge chipset.

GbE

Gigabit Ethernet (GbE) is an Ethernet version that transfers data at 1.0 Gbps and complies with the IEEE 802.3-2005 standard.

GPIO

General purpose input

HDD

Hard disk drive (HDD) is a type of magnetic, non-volatile computer storage device that stores digitally encoded data.

ICH

The Input/Output Control Hub (ICH) is an Intel® Southbridge chipset.

IrDA

Infrared Data Association (IrDA) specify infrared data transmission protocols used to enable electronic devices to wirelessly communicate with each other.

L1 Cache

The Level 1 Cache (L1 Cache) is a small memory cache built into the system processor.

L2 Cache

The Level 2 Cache (L2 Cache) is an external processor memory cache.

LCD

Liquid crystal display (LCD) is a flat, low-power display device that consists of two polarizing plates with a liquid crystal panel in between.

LVDS	Low-voltage differential signaling (LVDS) is a dual-wire, high-speed differential electrical signaling system commonly used to connect LCD displays to a computer.
POST	The Power-on Self Test (POST) is the pre-boot actions the system performs when the system is turned-on.
RAM	Random Access Memory (RAM) is volatile memory that loses data when power is lost. RAM has very fast data transfer rates compared to other storage like hard drives.
SATA	Serial ATA (SATA) is a serial communications bus designed for data transfers between storage devices and the computer chipsets. The SATA bus has transfer speeds up to 1.5 Gbps and the SATA II bus has data transfer speeds of up to 3.0 Gbps.
S.M.A.R.T	Self Monitoring Analysis and Reporting Technology (S.M.A.R.T) refers to automatic status checking technology implemented on hard disk drives.
UART	Universal Asynchronous Receiver-transmitter (UART) is responsible for asynchronous communications on the system and manages the system's serial communication (COM) ports.
UHCI	The Universal Host Controller Interface (UHCI) specification is a register-level interface description for USB 1.1 Host Controllers.
USB	The Universal Serial Bus (USB) is an external bus standard for interfacing devices. USB 1.1 supports 12Mbps data transfer rates and USB 2.0 supports 480Mbps data transfer rates.
VGA	The Video Graphics Array (VGA) is a graphics display system developed by IBM.

Appendix

E

Digital I/O Interface

E.1 Introduction

The DIO connector on the IMB-H110 is interfaced to GPIO ports on the Super I/O chipset. The DIO has both 4-bit digital inputs and 4-bit digital outputs. The digital inputs and digital outputs are generally control signals that control the on/off circuit of external devices or TTL devices. Data can be read or written to the selected address to enable the DIO functions.

![NOTE icon] **NOTE:**

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

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

E.2 Assembly Language Sample 1

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

AL low byte = value

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

E.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

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Appendix

F

</div>

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 F-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

G

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。						