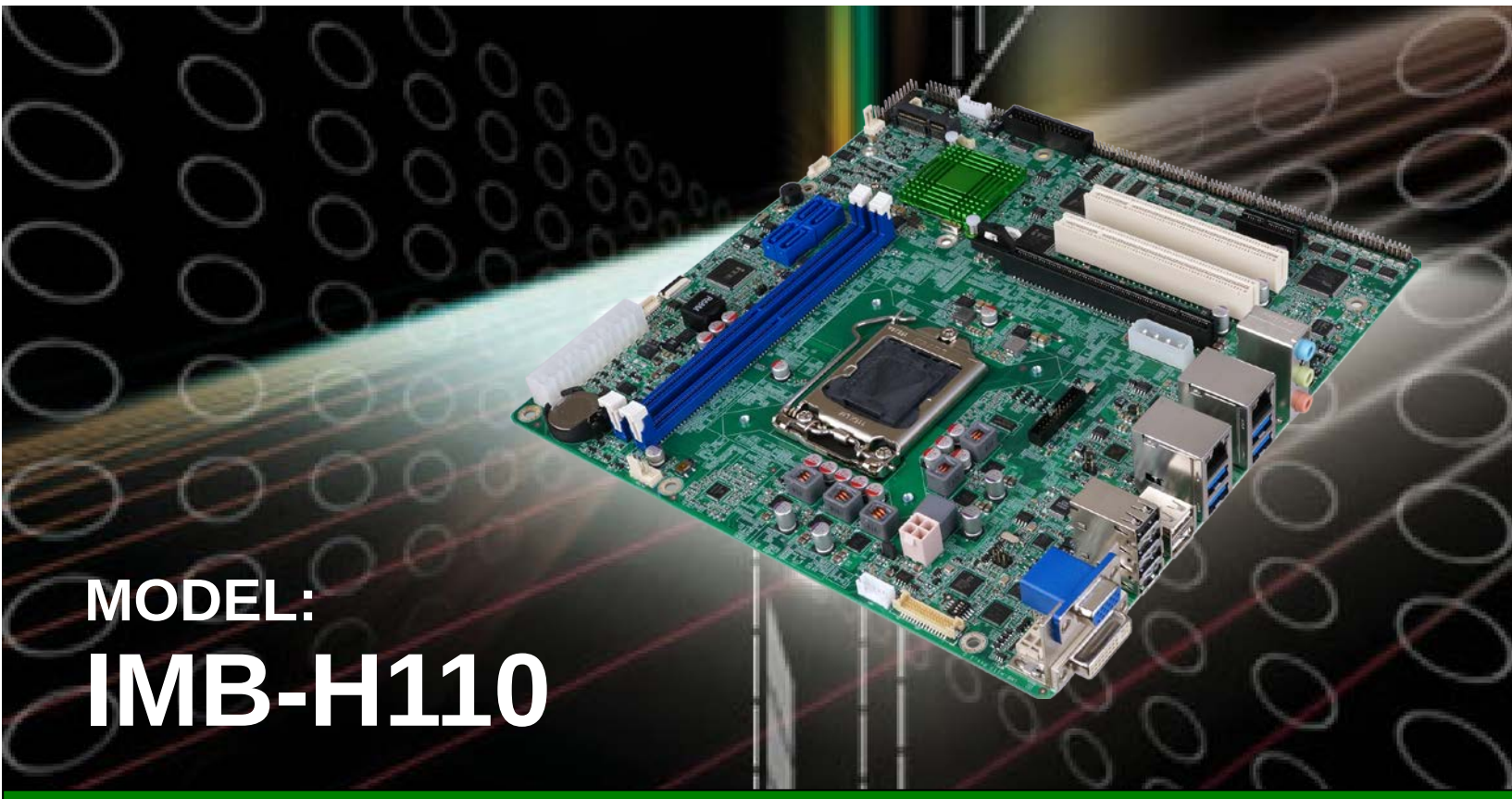
IEI Integration Corp.



MODEL:

IMB-H110

microATX Motherboard Supports 6th Generation LGA1151 Intel® Core™ i7/i5/i3, Pentium® or Celeron® CPU, Intel® H110 Chipset, DDR4, VGA, DVI-I, LVDS, iDP, Dual GbE LAN, USB, SATA 6Gb/s, 12 COM Ports, 12 USB Ports, HD Audio and RoHS

User Manual

Rev. 1.01 – June 10, 2021

RoHS Lead Free

Revision

Date	Version	Changes
June 10, 2021	1.01	Updated Section 2.3: Packing List Updated Section 4.11: Available Drivers Changed audio IC to ALC888S
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.

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1

Introduction

1.1 Introduction

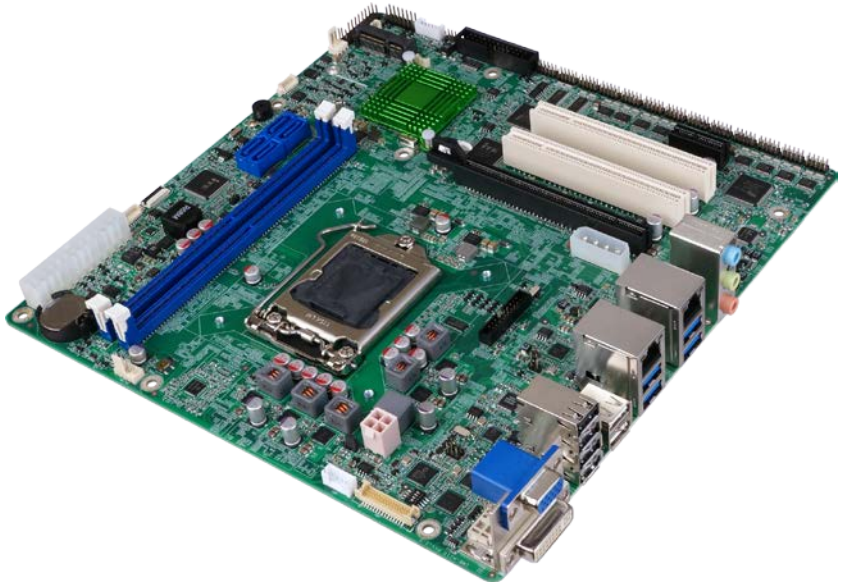


Figure 1-1: IMB-H110

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 3.2 Gen 1 (5Gb/s) 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 3.2 Gen 1 (5Gb/s) 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.

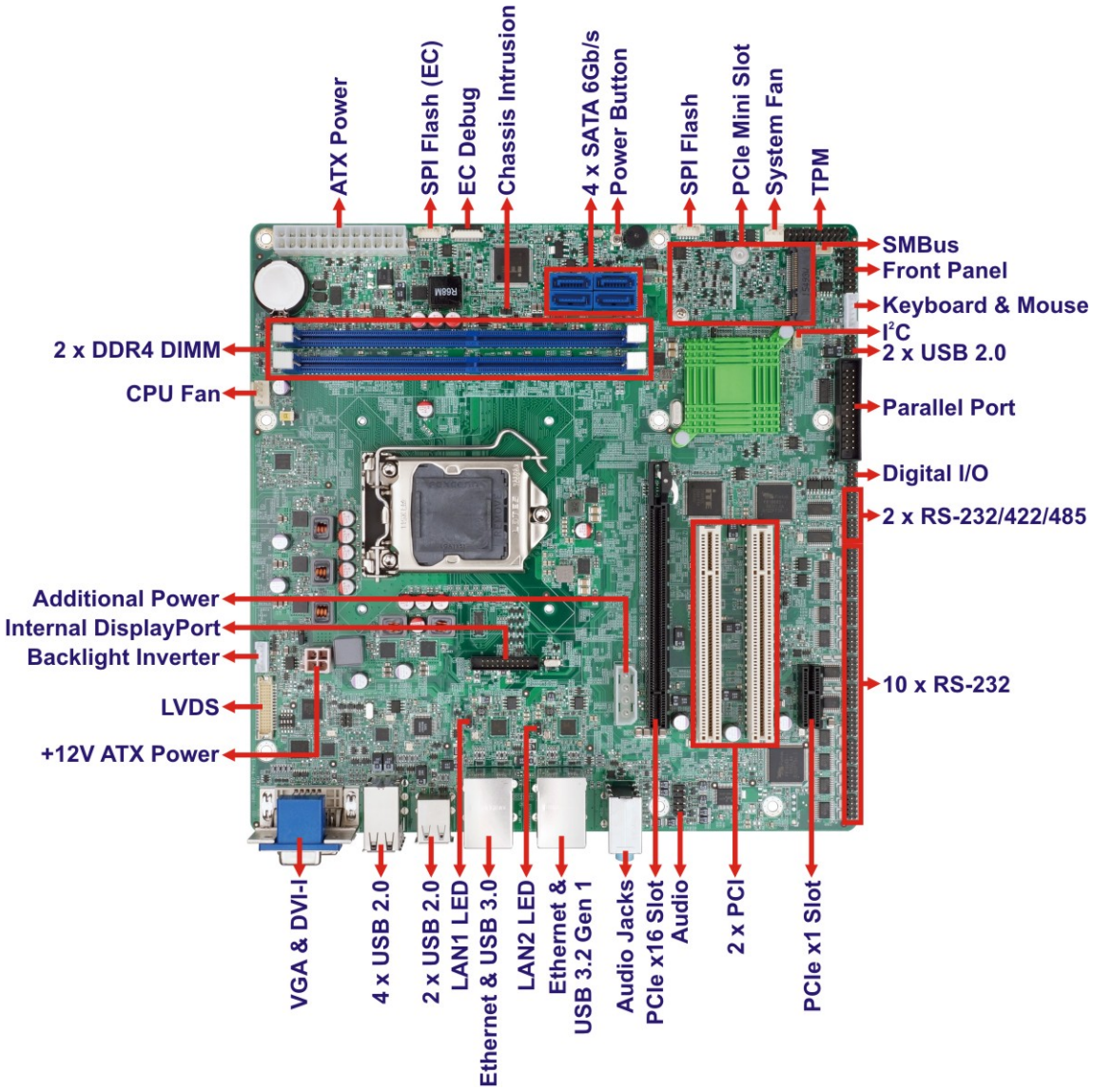


Figure 1-2: Connectors

1.4 Dimensions

The main dimensions of the IMB-H110 are shown in the diagram below.

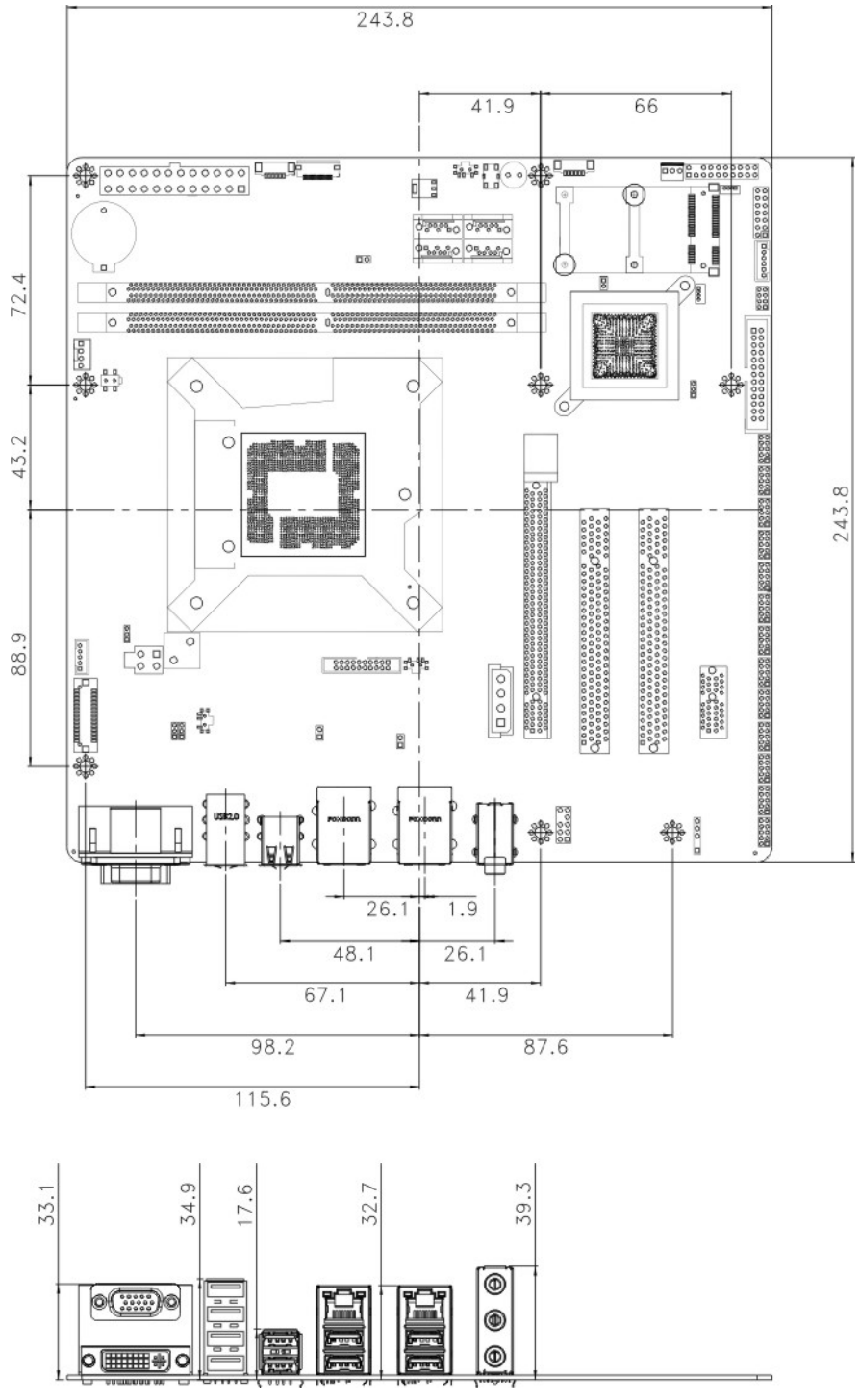


Figure 1-3: IMB-H110 Dimensions (mm)

1.5 Data Flow

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

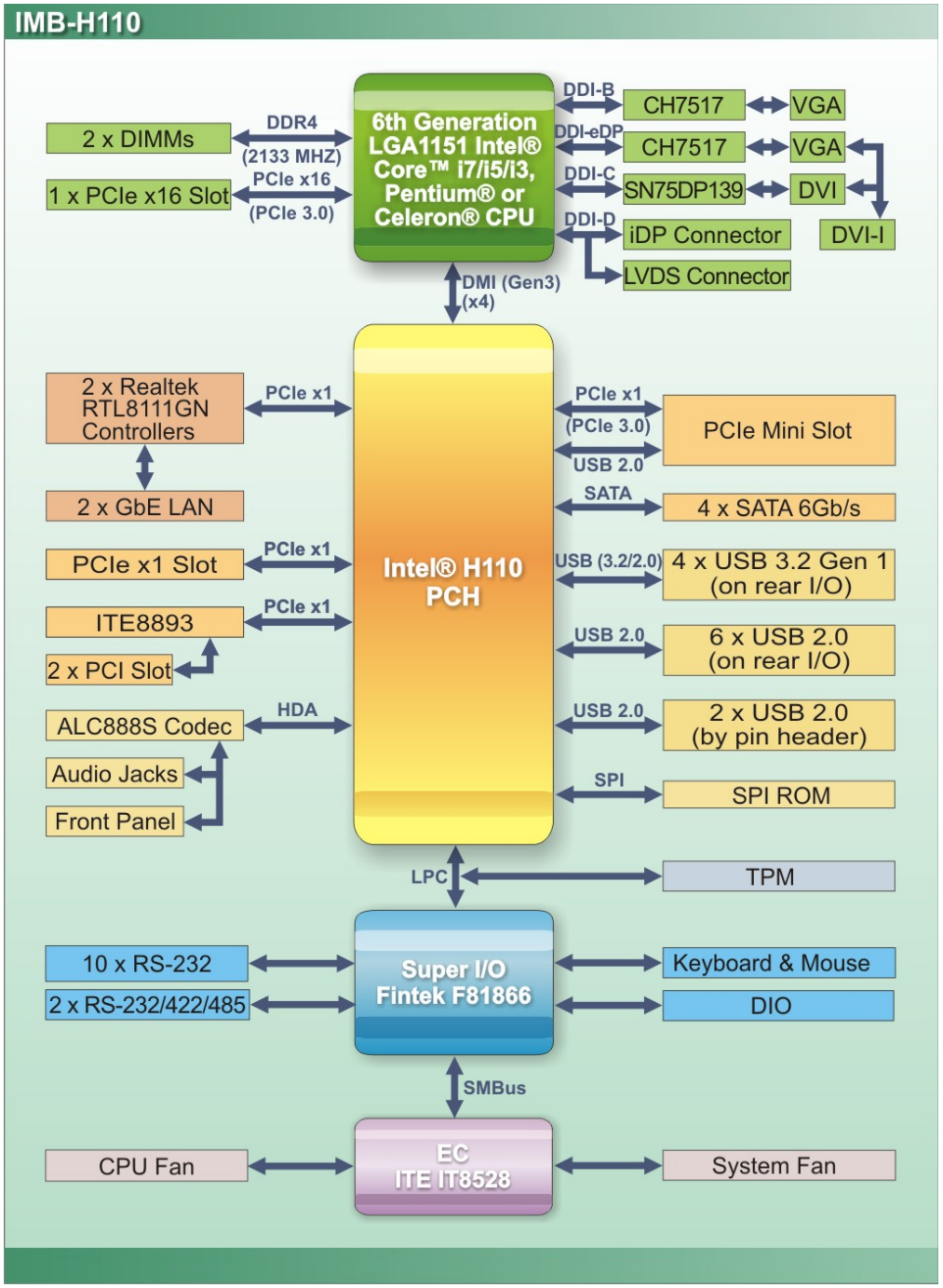


Figure 1-4: Data Flow Diagram

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 ALC888S 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^2C	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 3.2 Gen 1	Four USB 3.2 Gen 1 (5Gb/s) ports on rear panel *** The Windows® 7 installation media does not include native driver support for USB 3.2 Gen 1. In order to use the USB keyboard or mouse connected to a USB 3.2 Gen 1 port during OS installation, the user has to update the Windows® 7 installation image so that it contains USB 3.2 Gen 1 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	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**: 19800-000200-100-RS)	
SATA power cable (**P/N**: 32102-000100-200-RS)	
High-performance LGA1155/LGA1156 cooler kit (1U chassis compatible, 73W) (**P/N**: CF-115XA-R10)	
High-performance LGA1155/LGA1156 cooler kit (95W) (**P/N**: CF-115XE-R10)	
DisplayPort to HDMI converter board (for IEI iDP connector) (**P/N**: DP-HDMI-R10)	
DisplayPort to LVDS converter board (for IEI iDP connector) (**P/N**: DP-LVDS-R10)	

Item and Part Number	Image
DisplayPort to VGA converter board (for IEI iDP connector) (**P/N**: DP-VGA-R10)	
DisplayPort to DVI-D converter board (for IEI iDP connector) (**P/N**: DP-DVI-R10)	
DisplayPort to DisplayPort converter board (for IEI iDP connector) (**P/N**: DP-DP-R10)	
20-pin Infineon TPM module, software management tool, firmware v5.5 (**P/N**: TPM-IN02-R20)	

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.

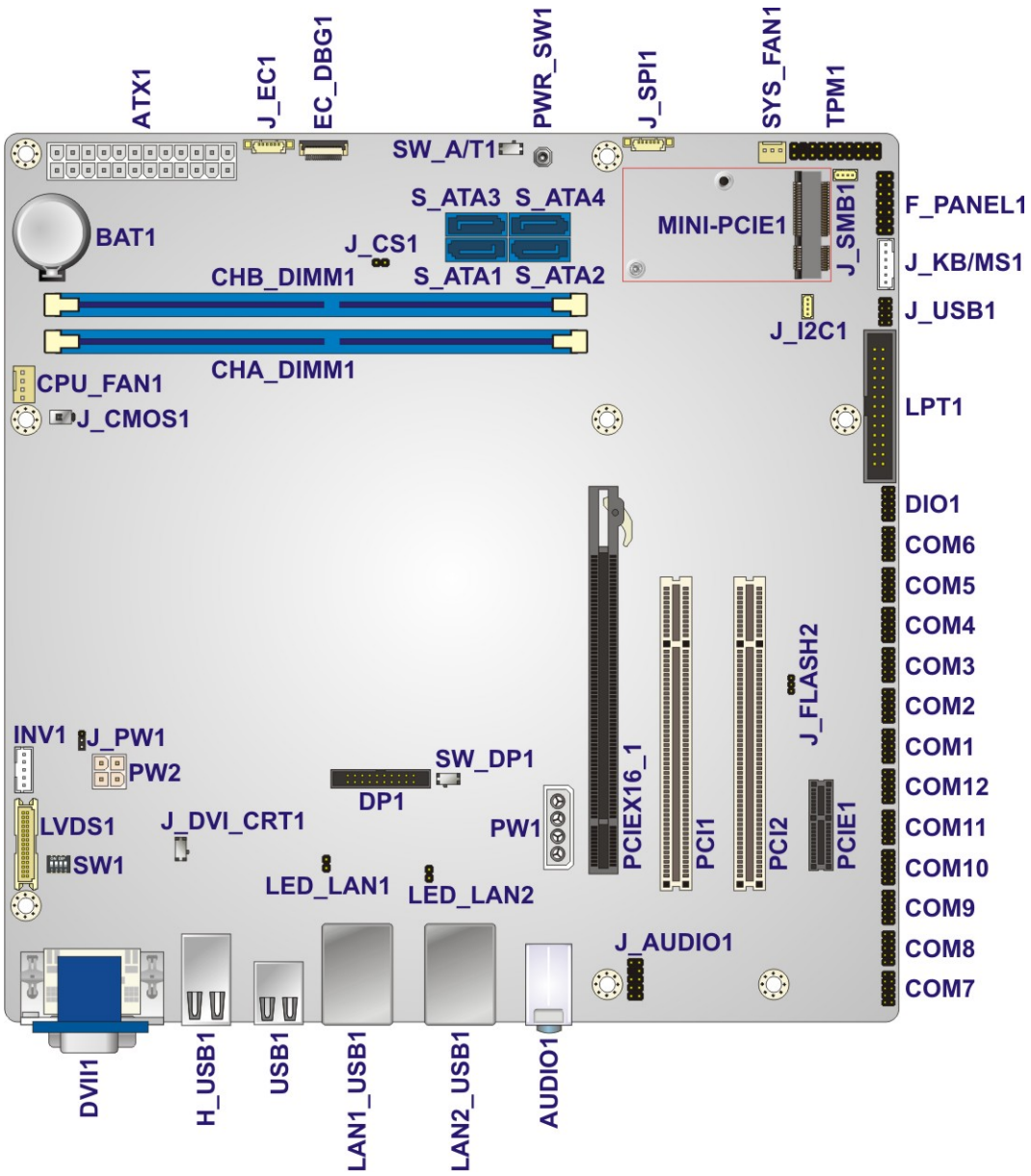


Figure 3-1: Peripheral Interface Connectors

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 3.2 Gen 1 ports	RJ-45, USB Type-A	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.

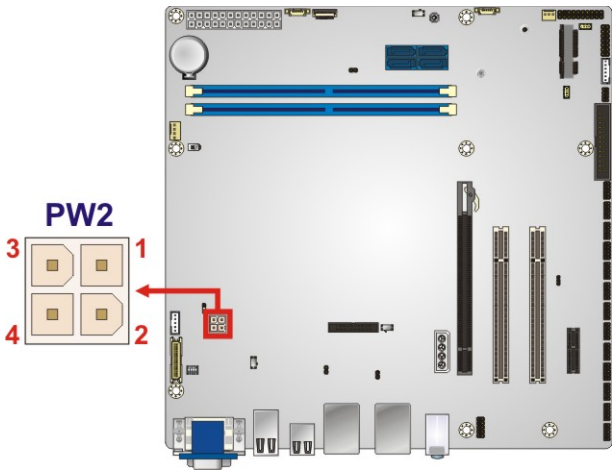


Figure 3-2: +12V ATX Power Connector Pinout Location

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.

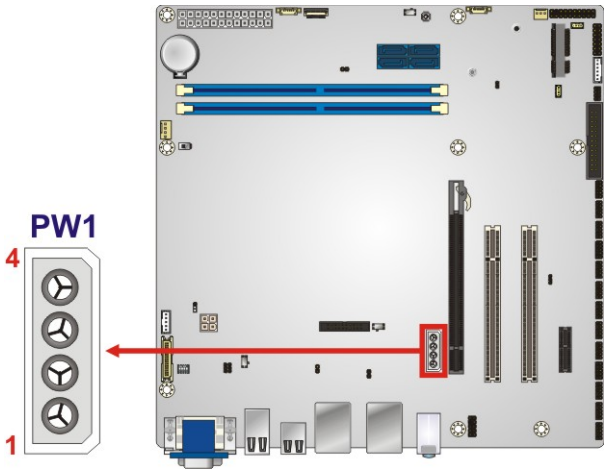


Figure 3-3: Additional Power Connector Location

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.

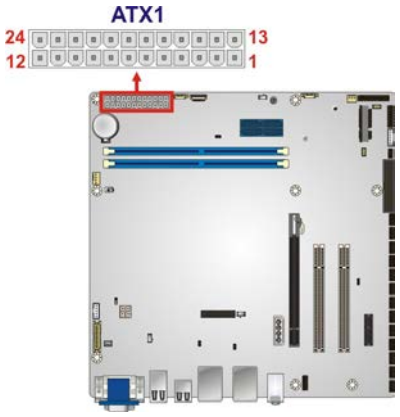


Figure 3-4: ATX Power Connector Location

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.

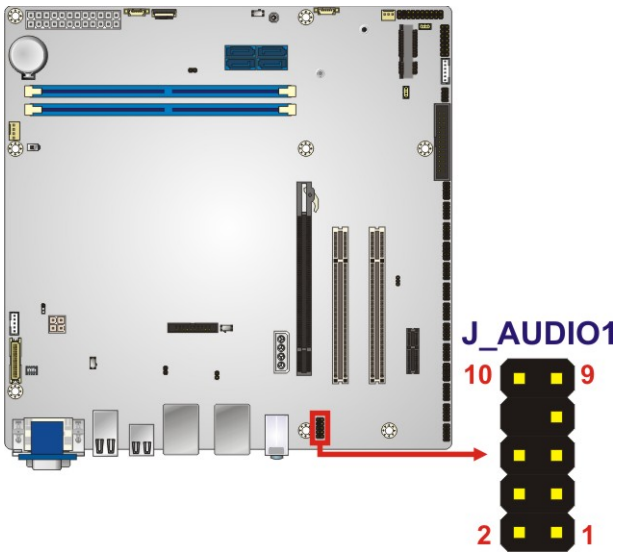


Figure 3-5: Audio Connector Location

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.

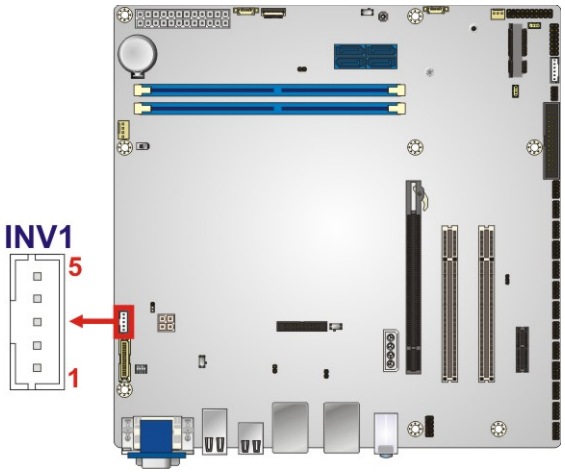


Figure 3-6: Backlight Inverter Connector Location

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.

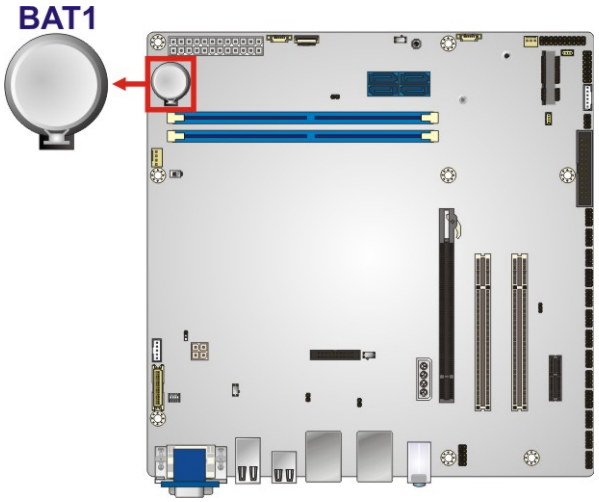


Figure 3-7: Battery Connector Location

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.

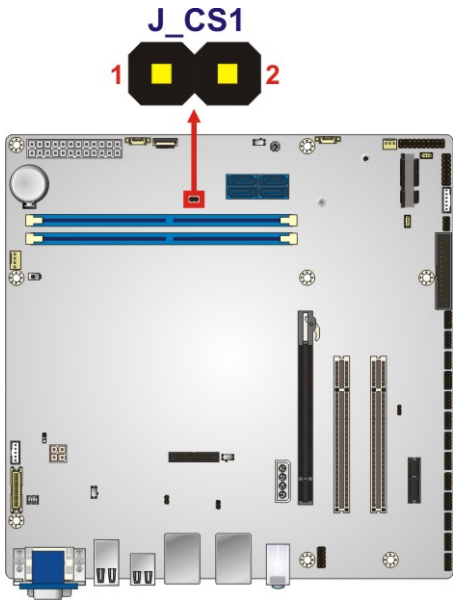


Figure 3-8: Chassis Intrusion Connector Location

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.

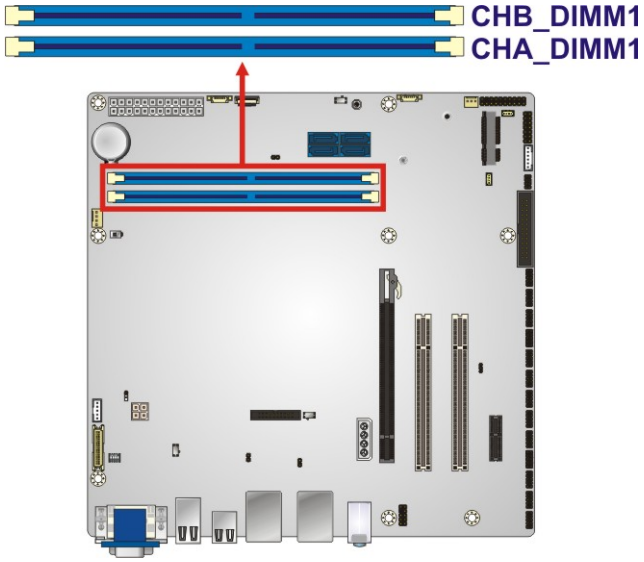


Figure 3-9: DDR4 DIMM Socket Locations

CAUTION:

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

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.

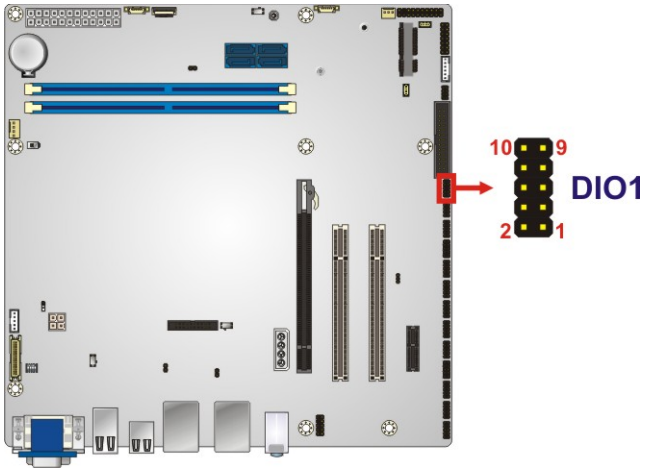


Figure 3-10: Digital I/O Connector Location

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.

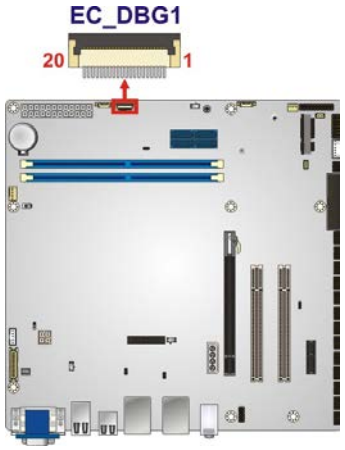


Figure 3-11: EC Debug Connector Location

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.

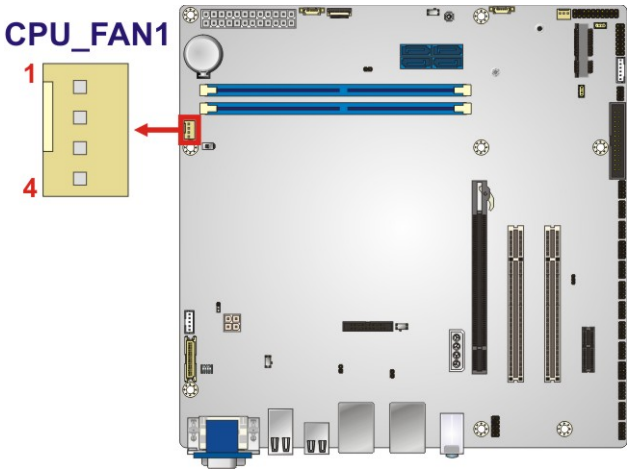


Figure 3-12: CPU Fan Connector Location

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.

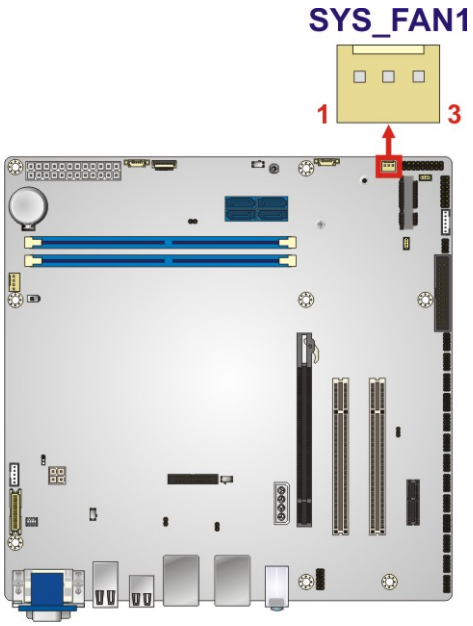


Figure 3-13: System Fan Connector Location

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.

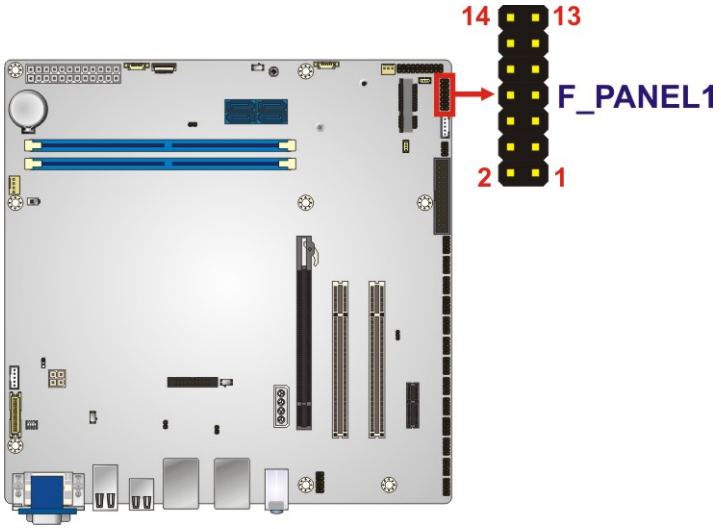


Figure 3-14: Front Panel Connector Location

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 I²C 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 I²C connector is used to connect I²C-bus devices to the motherboard.

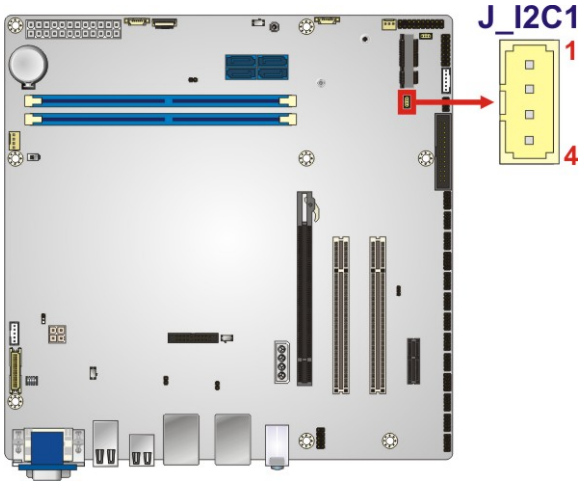


Figure 3-15: I²C Connector Location

Pin	Description
1	GND
2	I2C_DATA
3	I2C_CLK
4	VCC5V

Table 3-14: I²C 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.

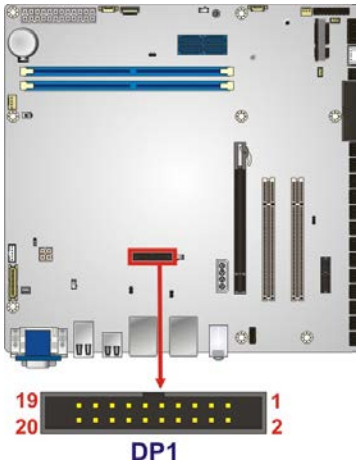


Figure 3-16: Internal DisplayPort Connector Location

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.

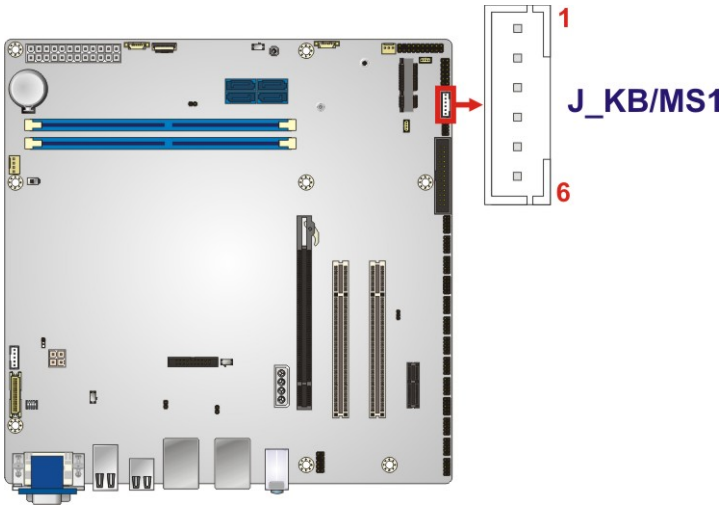


Figure 3-17: Keyboard and Mouse Connector Location

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.

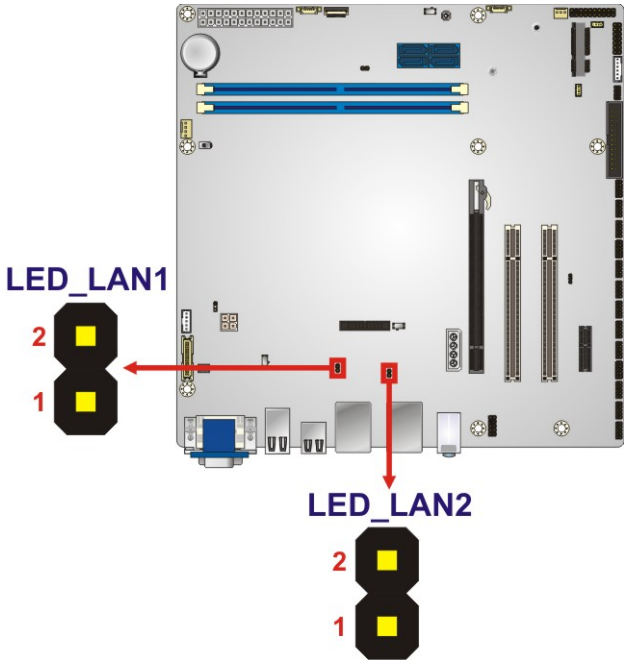


Figure 3-18: LAN LED Connector Locations

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.

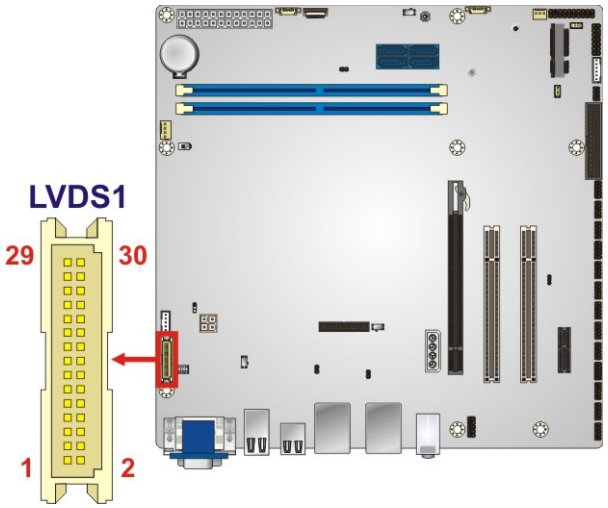


Figure 3-19: LVDS Connector Location

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

Pin	Description	Pin	Description
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.

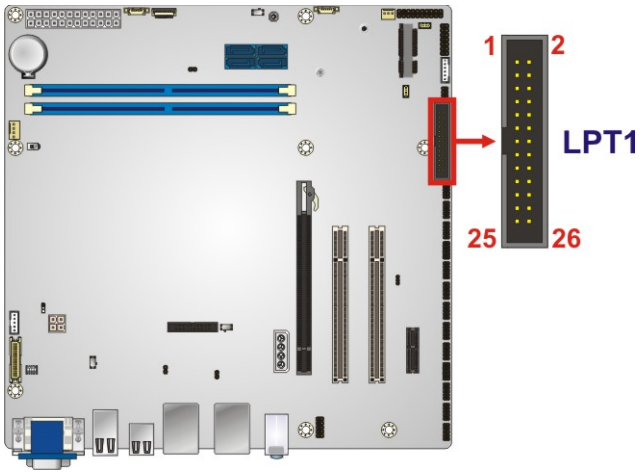


Figure 3-20: Parallel Port Connector Location

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.

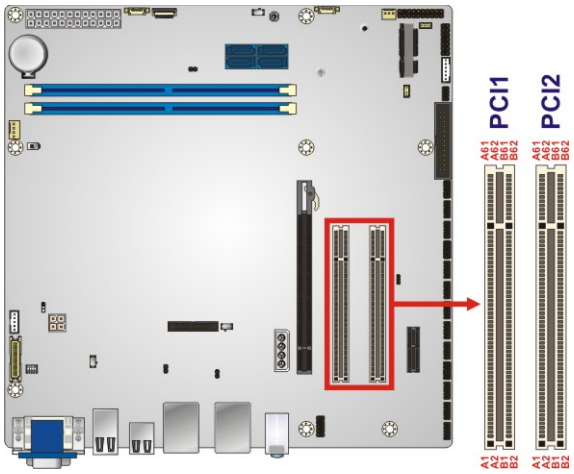


Figure 3-21: PCI Slot Locations

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.

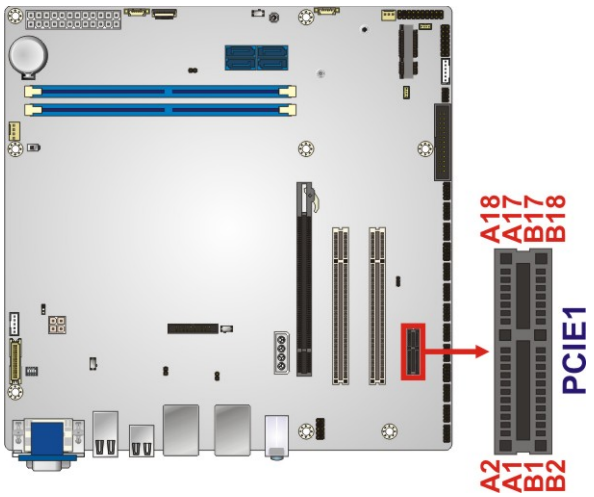


Figure 3-22: PCIe x1 Slot Location

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.

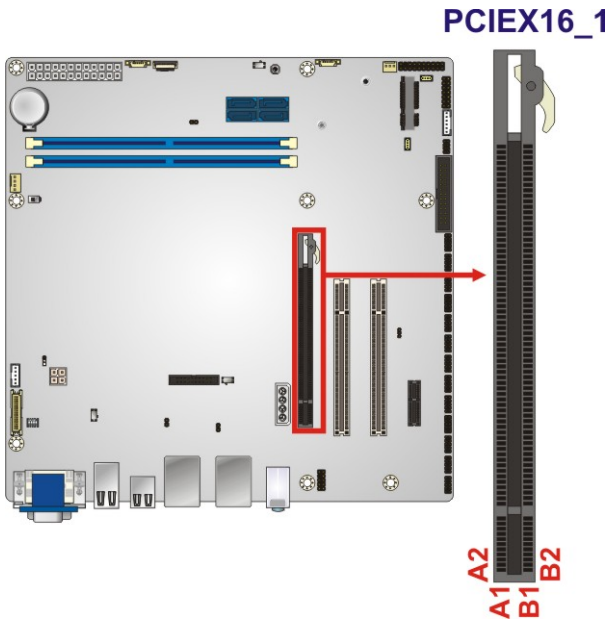


Figure 3-23: PCIe x16 Slot Location

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.

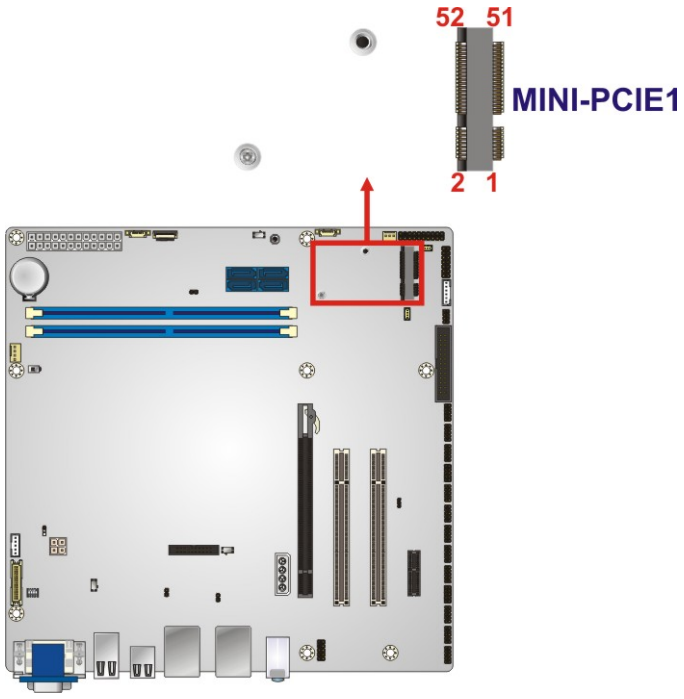


Figure 3-24: PCIe Mini Slot Location

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.

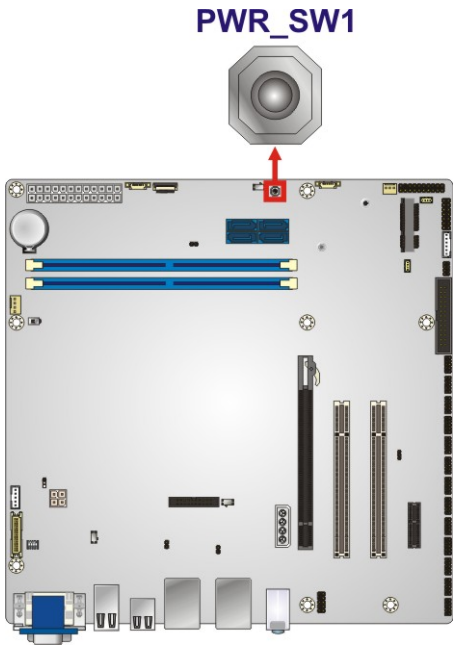


Figure 3-25: Power Button Location

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.

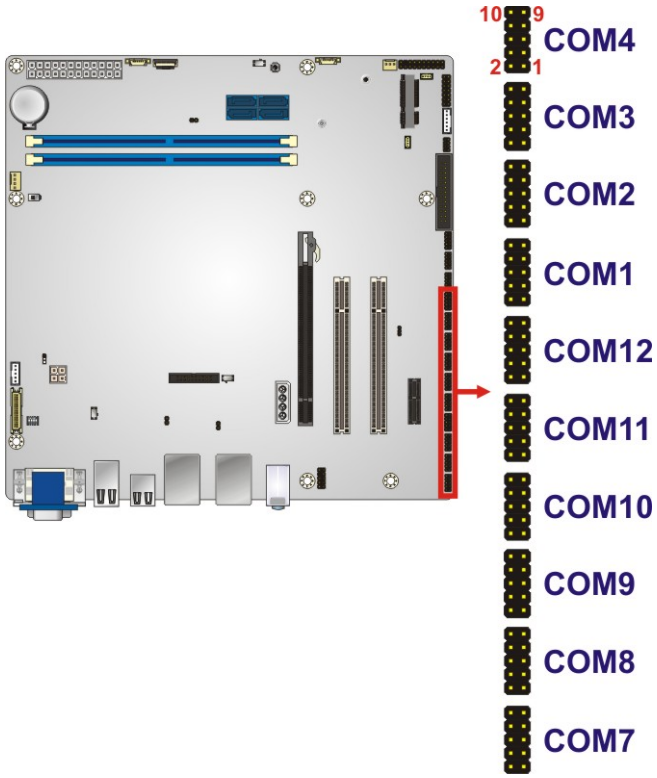


Figure 3-26: RS-232 Serial Port Connector Locations

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:

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).

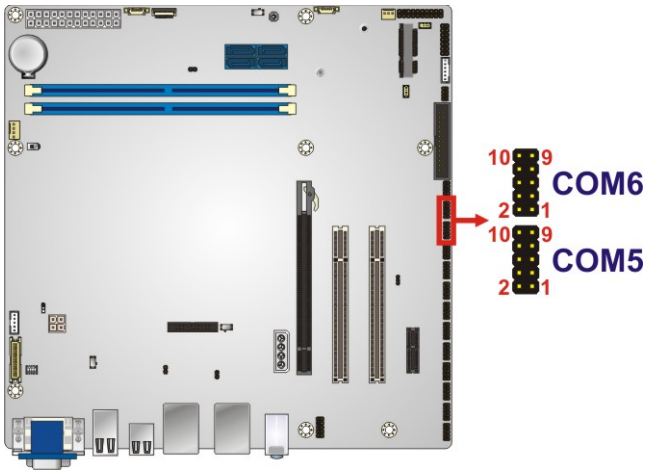


Figure 3-27: RS-232/422/485 Serial Port Connector Locations

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.

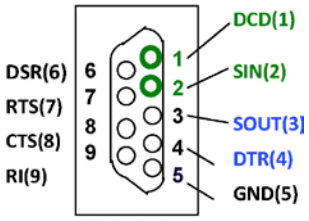
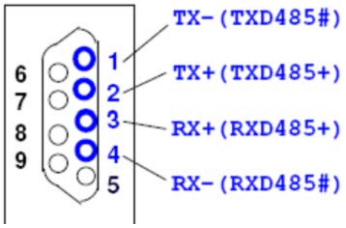
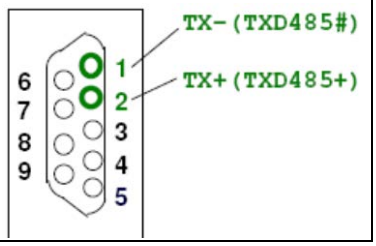
RS-232 Pinouts	RS-422 Pinouts	RS-485 Pinouts
		

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.

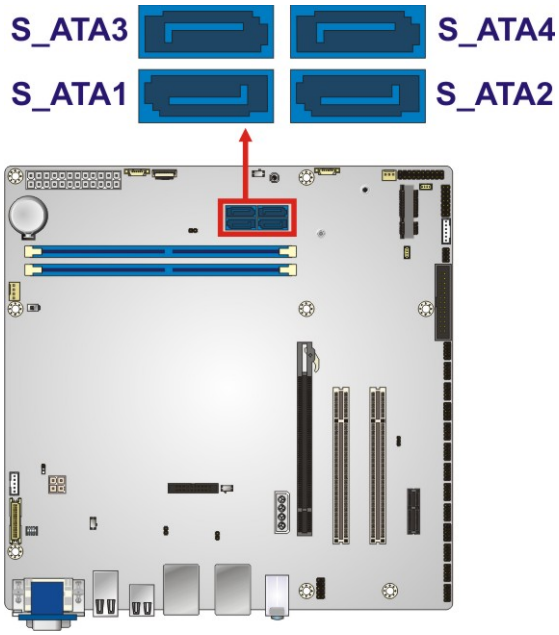


Figure 3-28: SATA 6Gb/s Drive Connector Locations

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.

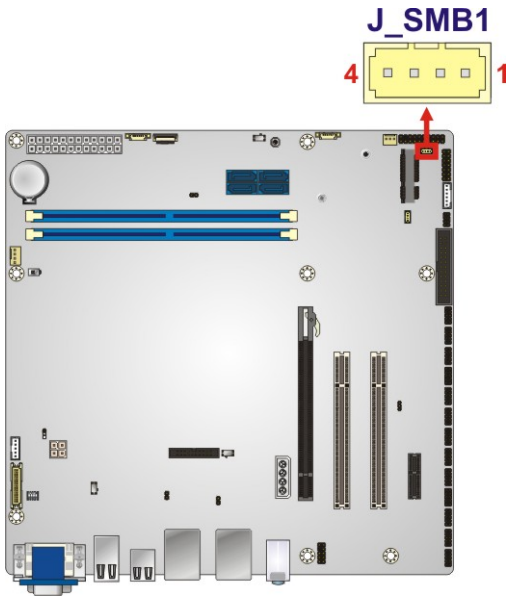


Figure 3-29: SMBus Connector Location

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.

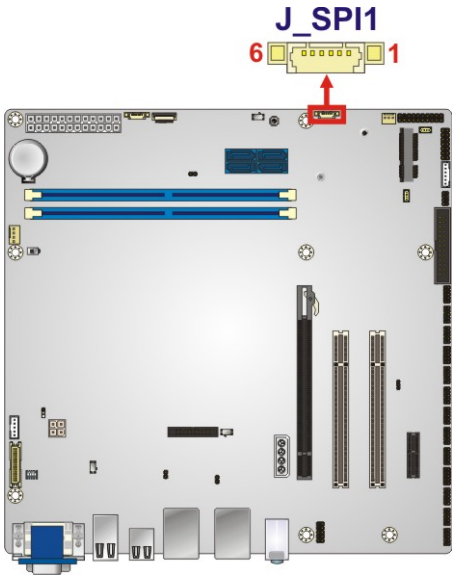


Figure 3-30: SPI Flash Connector Location

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.

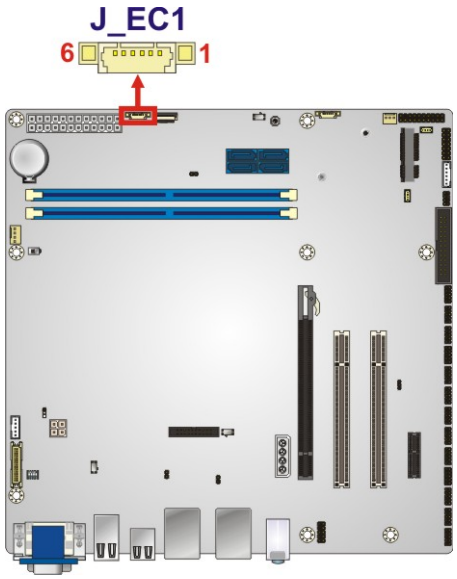


Figure 3-31: SPI EC Flash Connector Location

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.

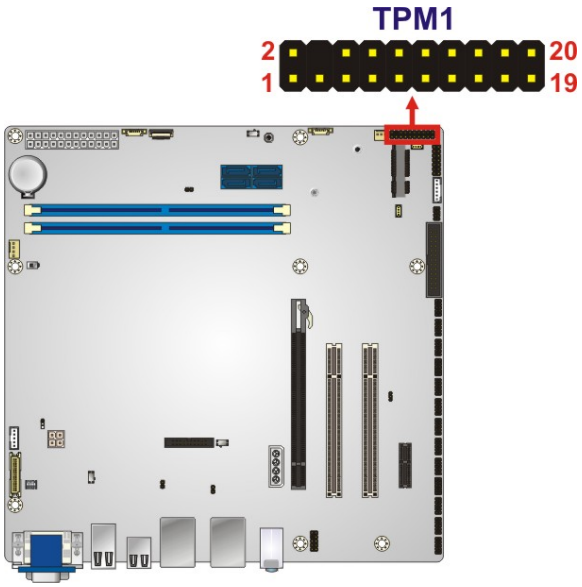


Figure 3-32: TPM Connector Location

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.

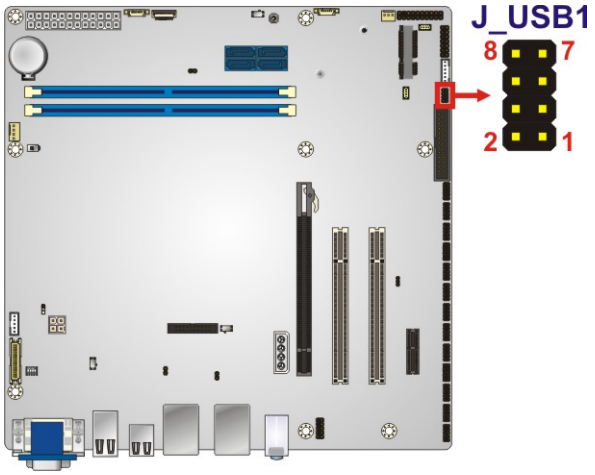


Figure 3-33: USB 2.0 Connector Locations

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:

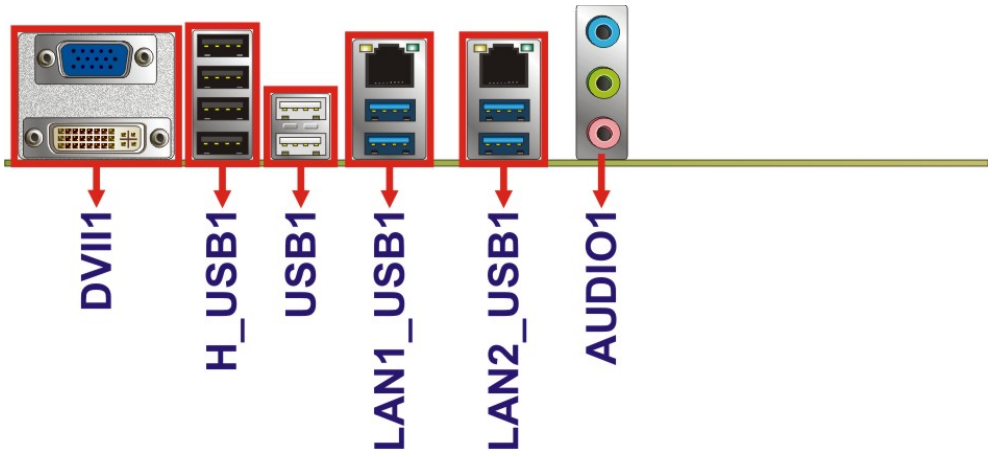


Figure 3-34: External Peripheral Interface Connector

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.

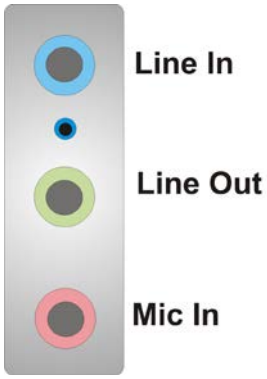


Figure 3-35: Audio Connector

3.3.2 Ethernet and USB 3.2 Gen 1 Connectors

CN Label: **LAN1_USB1, LAN2_USB1**

CN Type: RJ-45, USB Type-A

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

CN Pinouts: See **Table 3-30** and **Table 3-31**

There are four external USB 3.2 Gen 1 (5Gb/s) 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 3.2 Gen 1 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

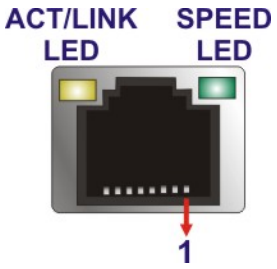


Figure 3-36: LAN Connector

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

3.3.4 VGA and DVI-I Connectors

CN Label: **DVII1**

CN Type: 15-pin VGA, 24-pin DVI-I

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

CN Pinouts: See **Table 3-33** and **Table 3-34**

The 24-pin Digital Visual Interface (DVI) connector connects to a high-speed, high-resolution digital display. The DVI-I connector supports both digital and analog signals.

NOTE:

To connect a CRT monitor to the DVI-I connector, the user has to set the DVI/CRT selection switch to CRT position. Please refer to **Section 4.8.3** for detailed information.

Pin	Description	Pin	Description
1	DATA2-	2	DATA2+
3	GND	4	NC
5	NC	6	DDC CLK
7	DDC DATA	8	VSYNC
9	DATA1-	10	DATA1+
11	GND	12	NC
13	NC	14	VCC5V
15	GND	16	HPDET
17	DATA0-	18	DATA0+
19	GND	20	NC
21	NC	22	GND
23	CLK+	24	CLK-
C1	RED	C2	GREEN
C3	BLUE	C4	HSYNC
C5	GND		

Table 3-33: DVI-I Connector Pinouts

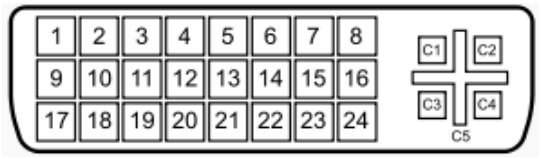


Figure 3-37: DVI-I Connector

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

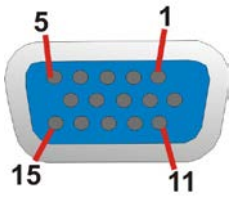


Figure 3-38: VGA Connector

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:

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**.

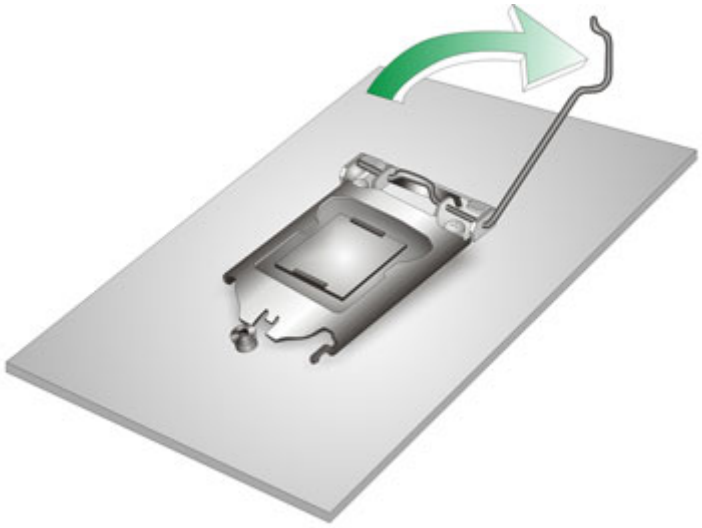


Figure 4-1: Disengage the CPU Socket Load Lever

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**.

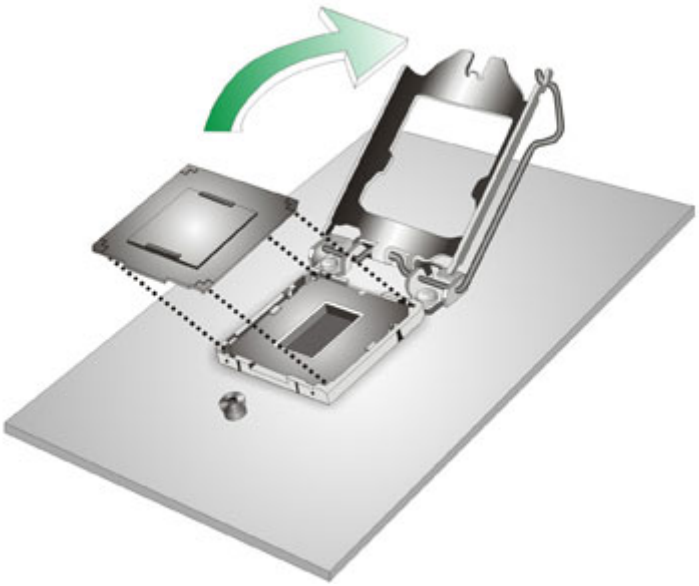


Figure 4-2: Remove Protective Cover

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:

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**.

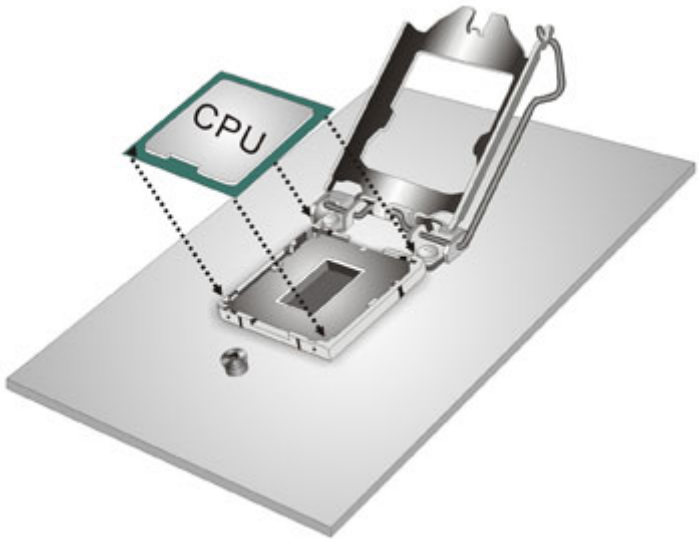


Figure 4-3: Insert the Socket LGA1151 CPU

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.**

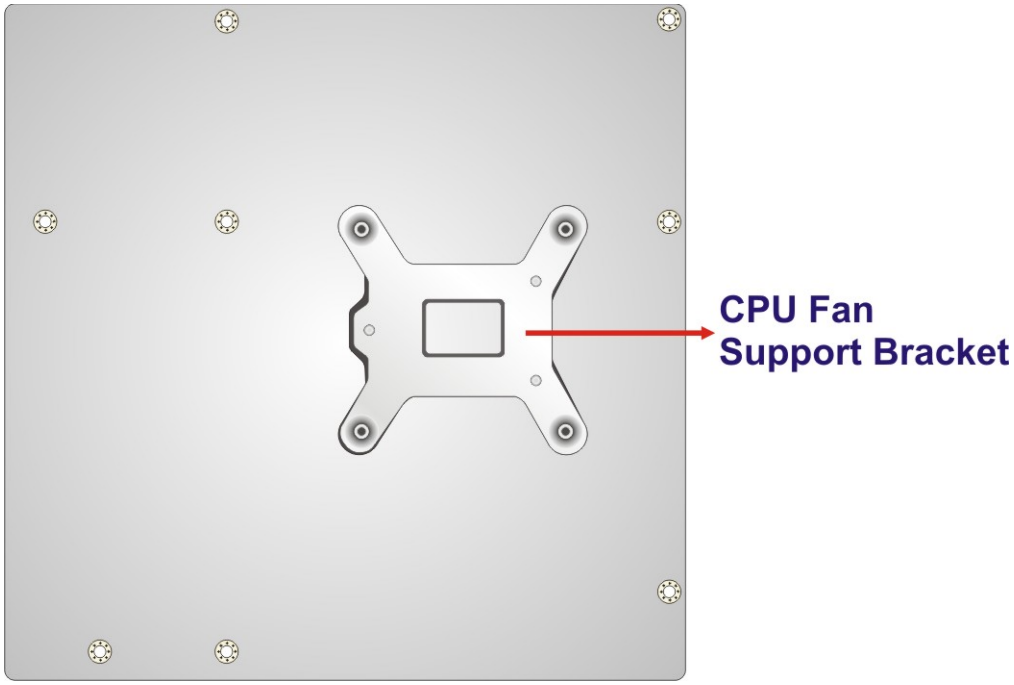


Figure 4-5: Cooling Kit Support Bracket

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**.

CAUTION:

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

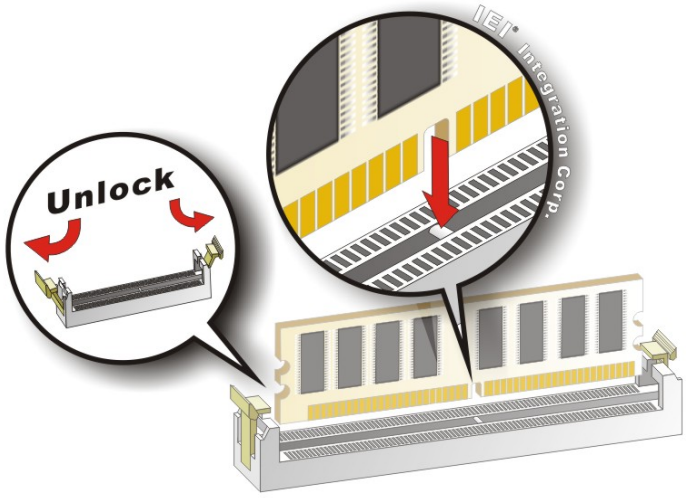


Figure 4-6: DIMM Installation

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

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

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

Step 4: 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**.

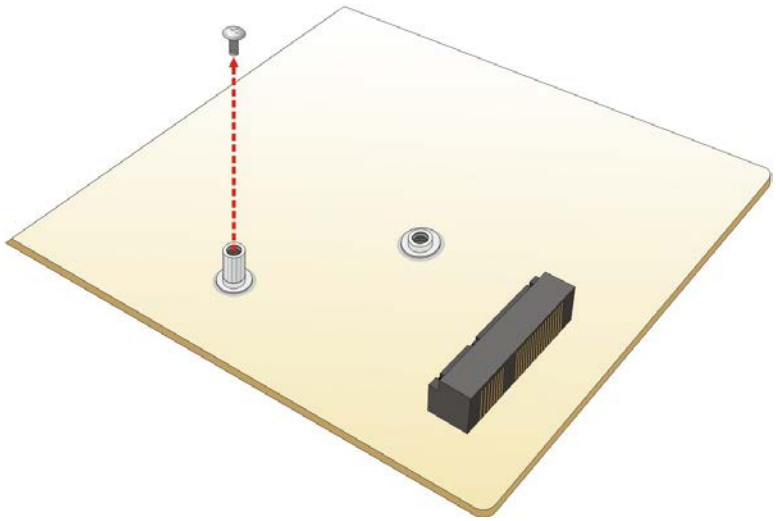


Figure 4-7: Removing the Retention Screw

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**).

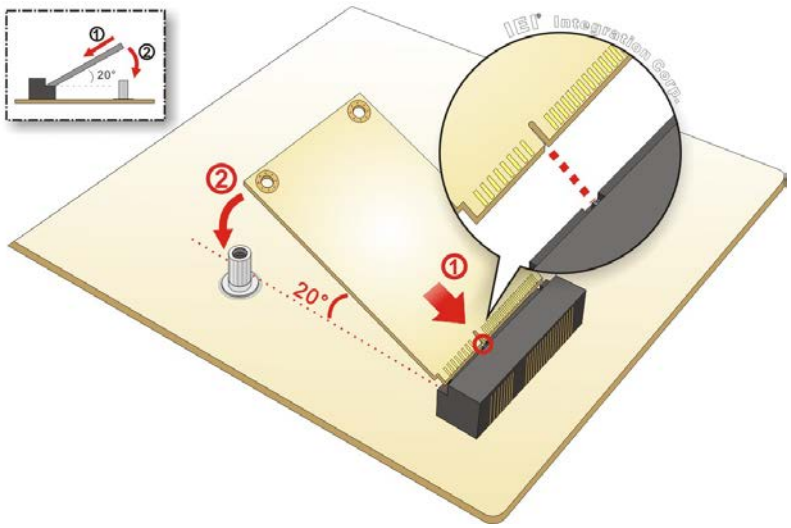


Figure 4-8: Inserting the Full-size PCIe Mini Card into the Slot at an Angle

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**).

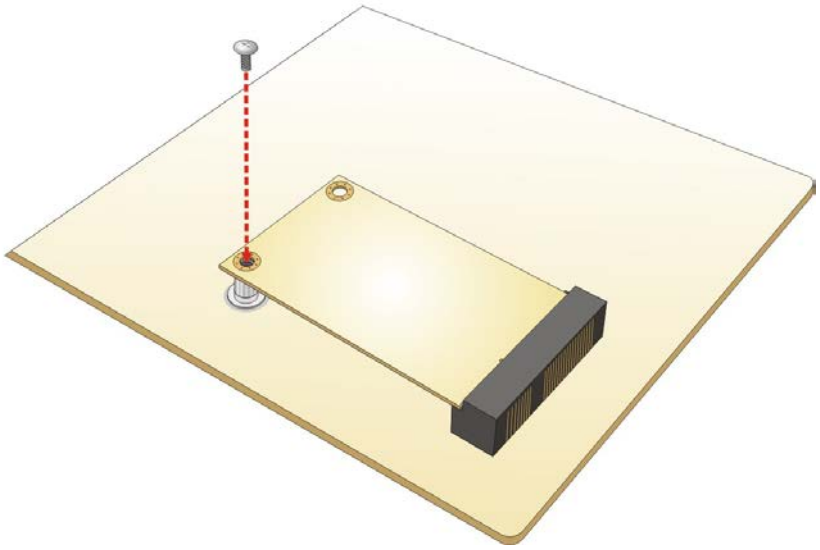


Figure 4-9: Securing the Full-size PCIe Mini Card

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**.

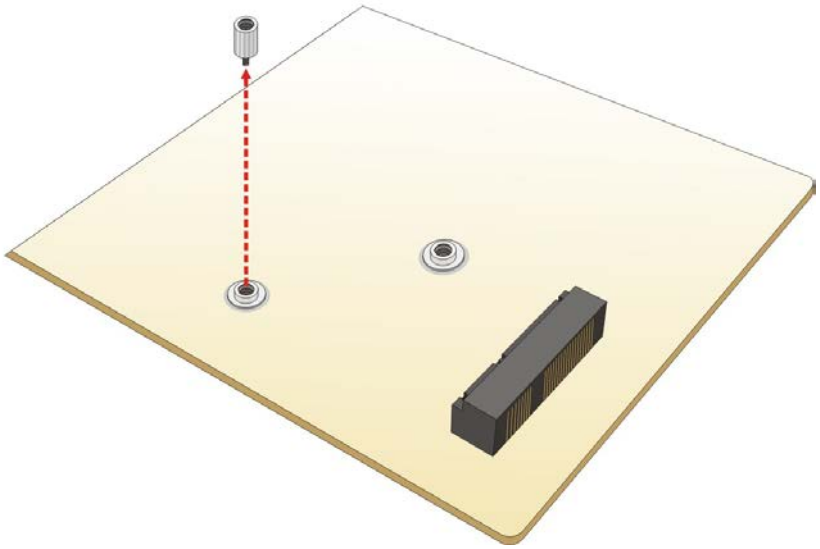


Figure 4-10: Removing the Standoff

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**).

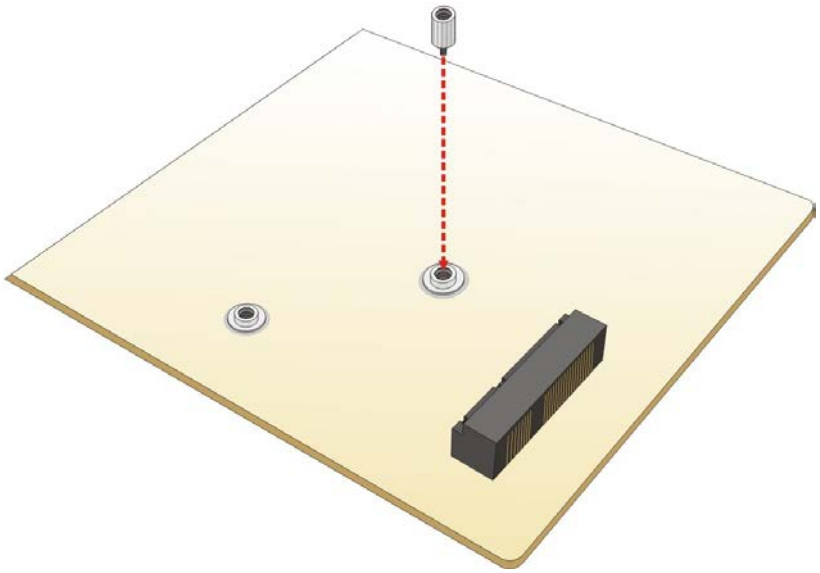


Figure 4-11: Installing the Standoff

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**).

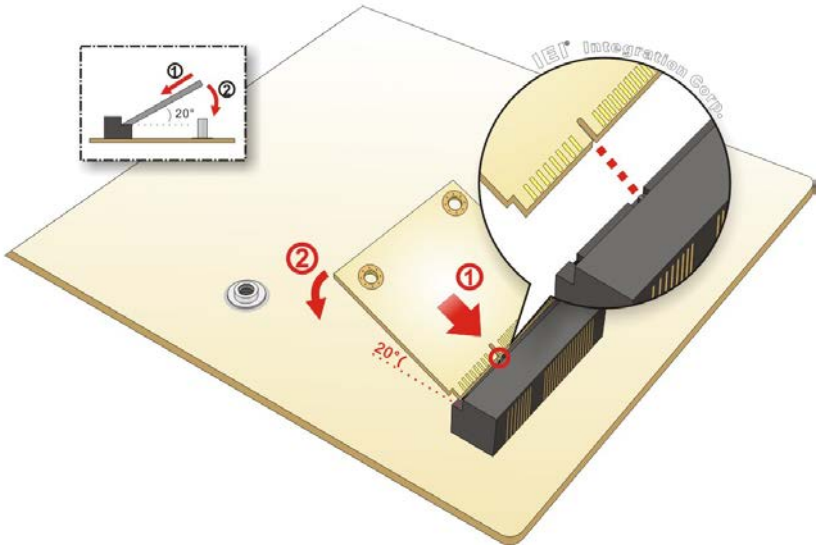


Figure 4-12: Inserting the Half-size PCIe Mini Card into the Slot at an Angle

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**).

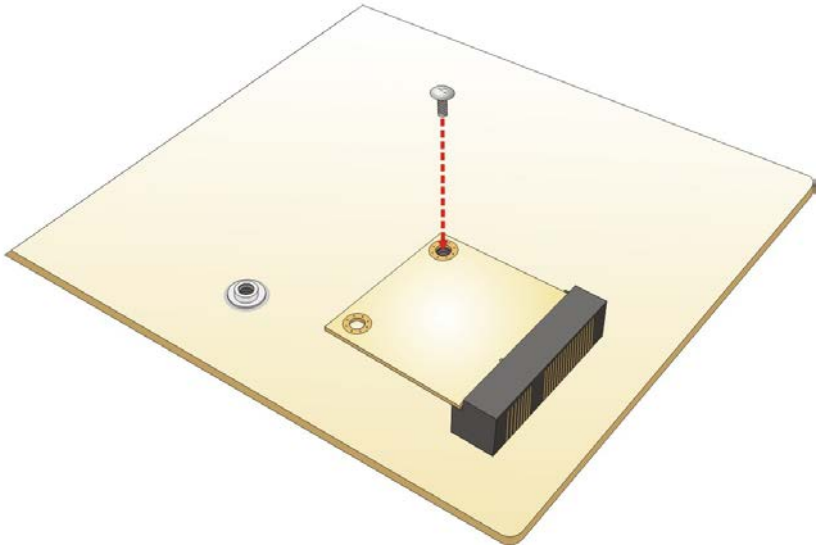


Figure 4-13: Securing the Half-size PCIe Mini Card

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**.

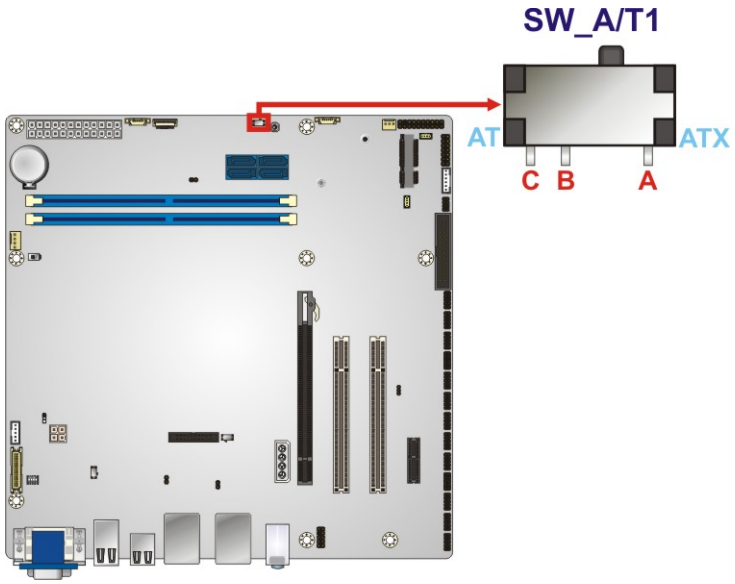


Figure 4-14: AT/ATX Power Mode Switch Location

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**.

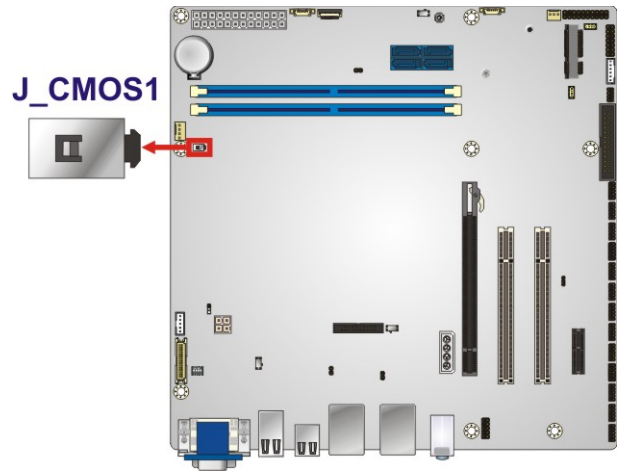


Figure 4-15: Clear CMOS Button Location

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

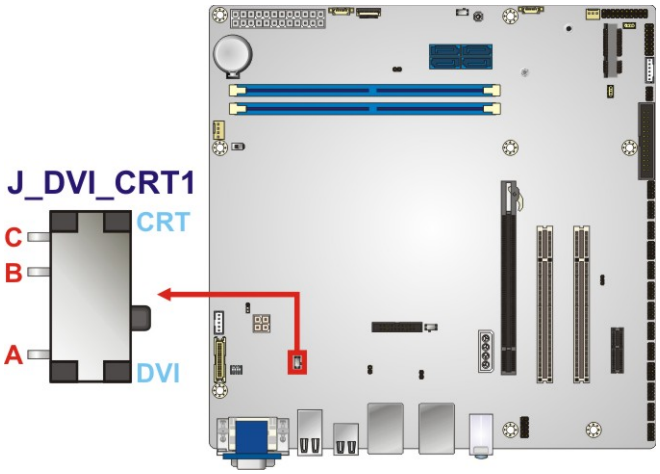


Figure 4-16: DVI/CRT Selection Switch Location

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

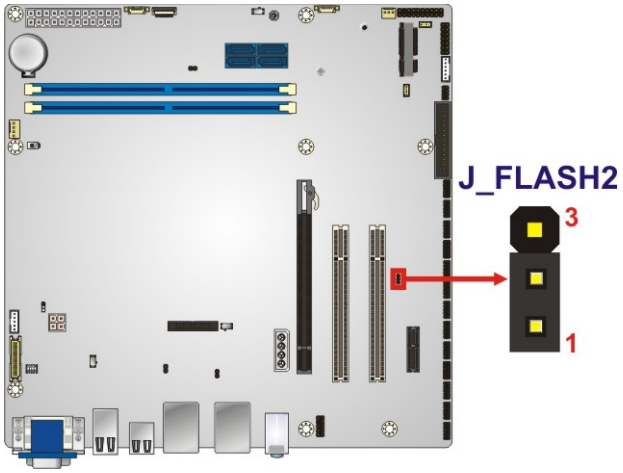


Figure 4-17: Flash Descriptor Security Override Jumper Location

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

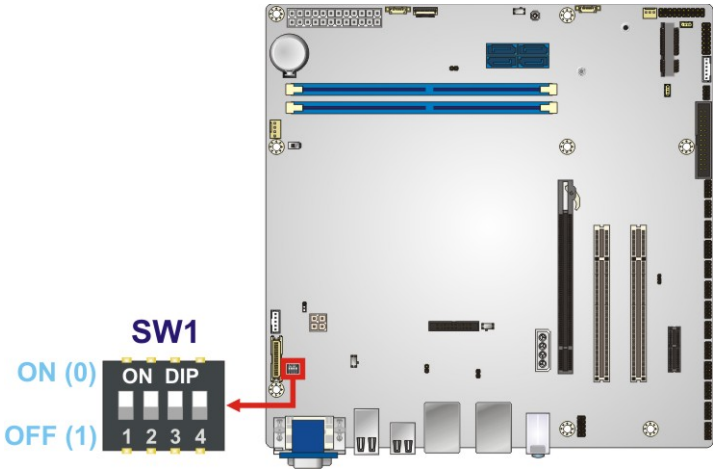


Figure 4-18: LVDS Panel Resolution Selection Switch Location

4.8.6 LVDS Voltage Selection Jumper

WARNING:

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

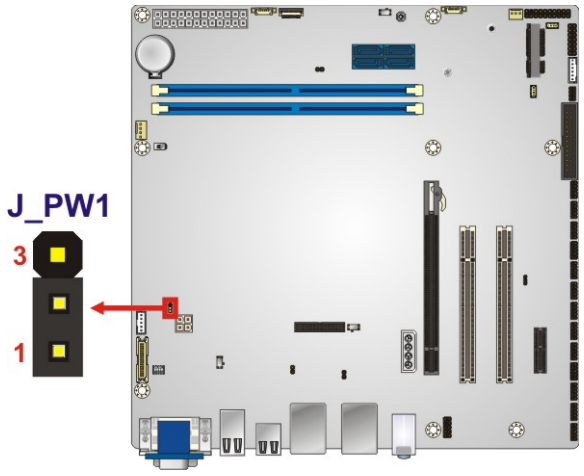


Figure 4-19: LVDS Voltage Selection Jumper Location

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

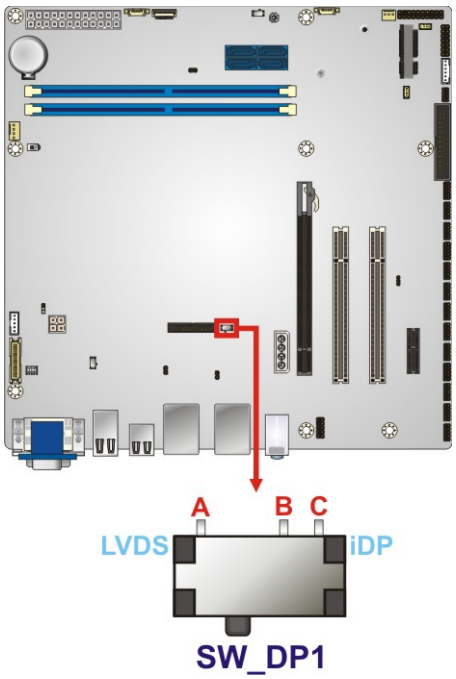


Figure 4-20: LVDS/iDP Selection Switch Location

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 3.2 Gen 1 ports) LAN2_USB1 (external USB 3.2 Gen 1 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**.

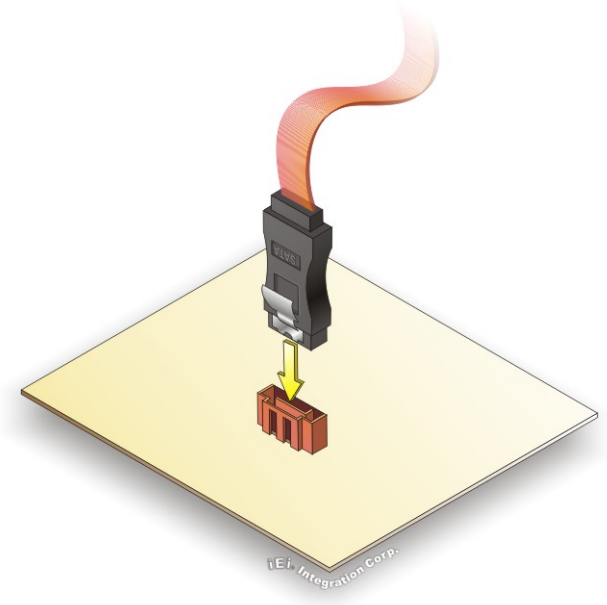


Figure 4-21: SATA Drive Cable Connection

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**.

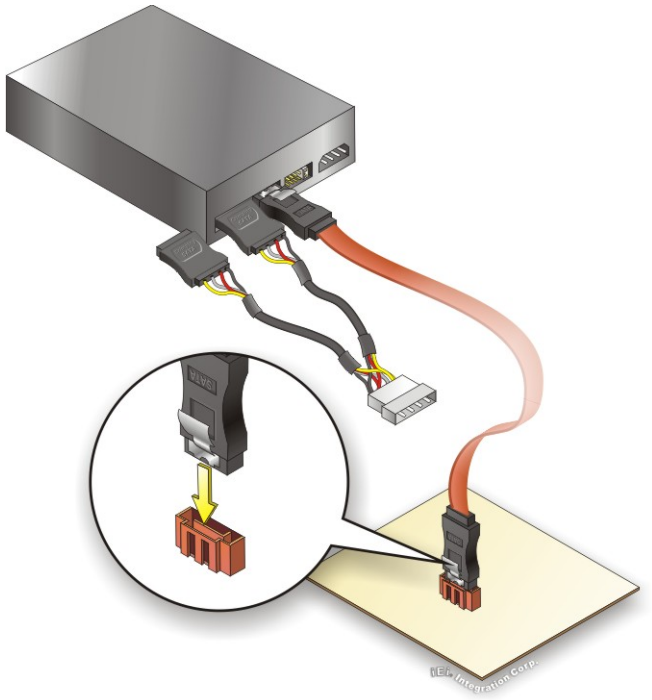


Figure 4-22: SATA Power Drive Connection

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

4.10 Adding USB 3.2 Gen 1 Drivers to a Windows 7 Installation Image

The Windows 7 installation media does not include native driver support for USB 3.2 Gen 1. In order to use the USB keyboard or mouse connected to a USB 3.2 Gen 1 port during OS installation, the user has to update the Windows 7 installation image so that it contains USB 3.2 Gen 1 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:

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.

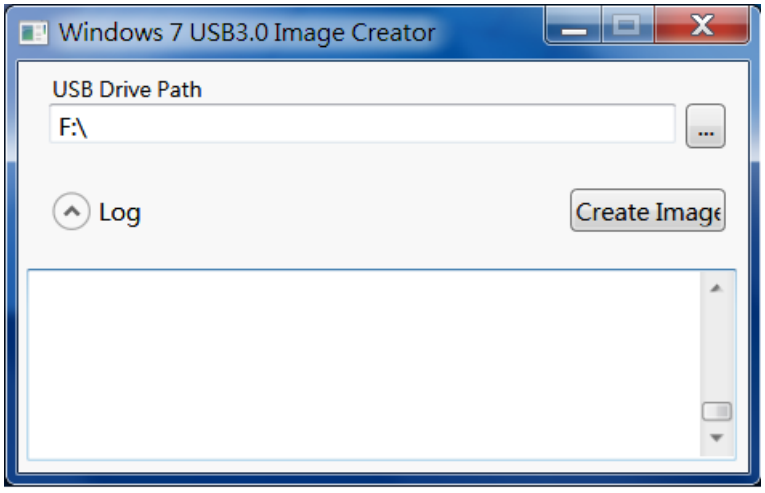


Figure 4-23: Windows 7 USB 3.0 Creator Utility

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.

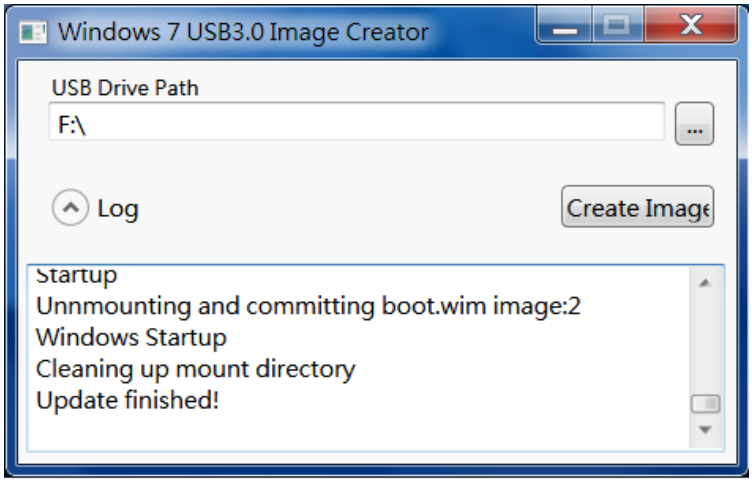


Figure 4-24: Update Process is Complete

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

4.11 Available Drivers

All the drivers for the IMB-H110 are available on IEI Resource Download Center (https://download.ieiworld.com). Type IMB-H110 and press Enter to find all the relevant software, utilities, and documentation.

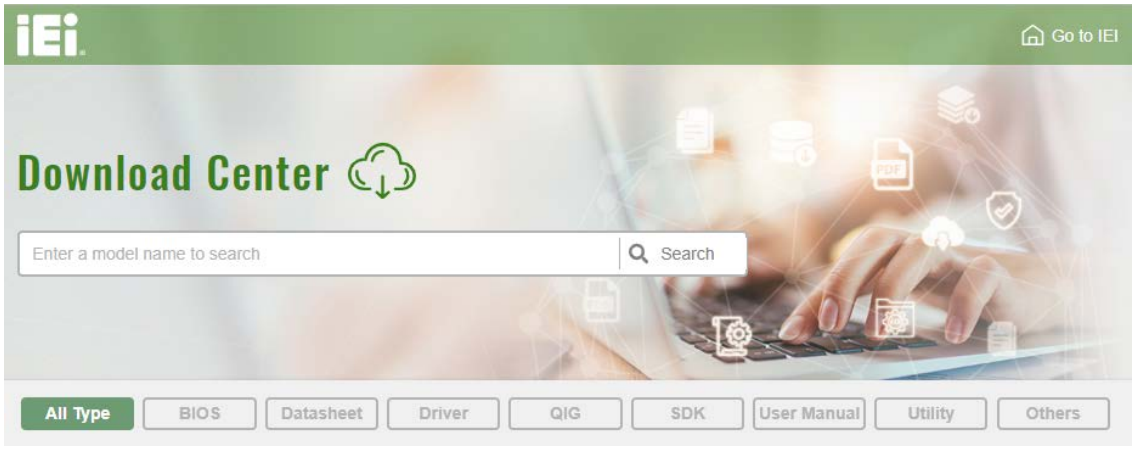
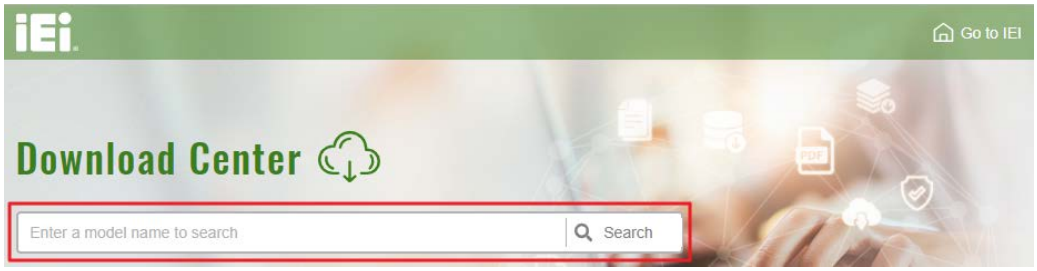


Figure 4-25: IEI Resource Download Center

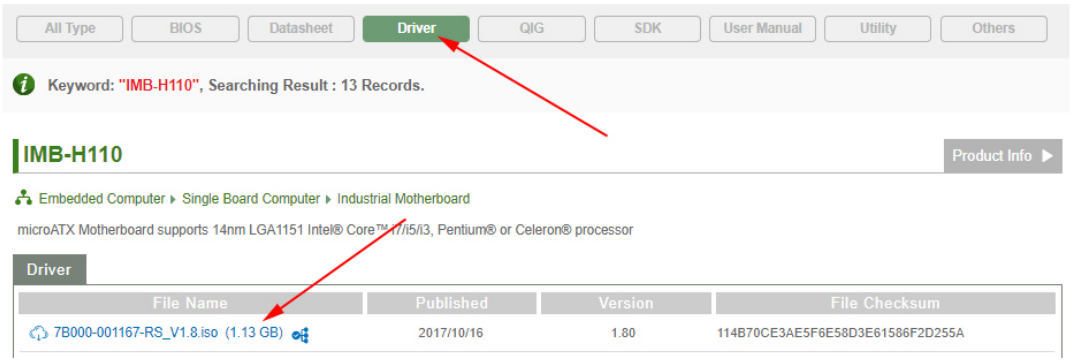
4.11.1 Driver Download

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

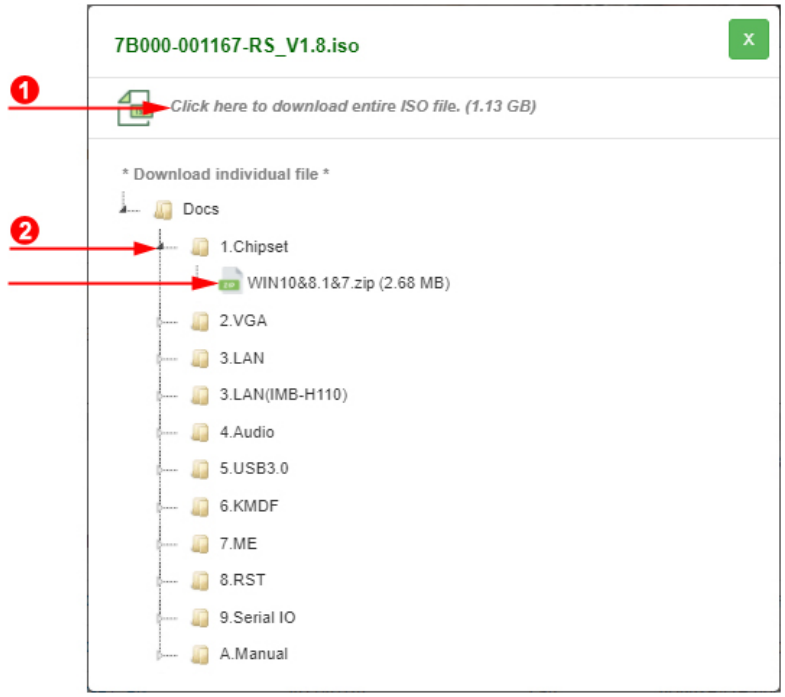
Step 1: Go to https://download.ieiworld.com. Type IMB-H110 and press Enter.



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



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



NOTE:

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

Chapter

5

BIOS

5.1 Introduction

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

NOTE:

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

5.1.1 Starting Setup

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

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

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

5.1.2 Using Setup

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

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

Key	Function
Esc	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2	Load previous values
F3	Load optimized defaults
F4	Save changes and Exit BIOS

Table 5-1: BIOS Navigation Keys

5.1.3 Getting Help

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

5.1.4 Unable to Reboot after Configuration Changes

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

5.1.5 BIOS Menu Bar

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

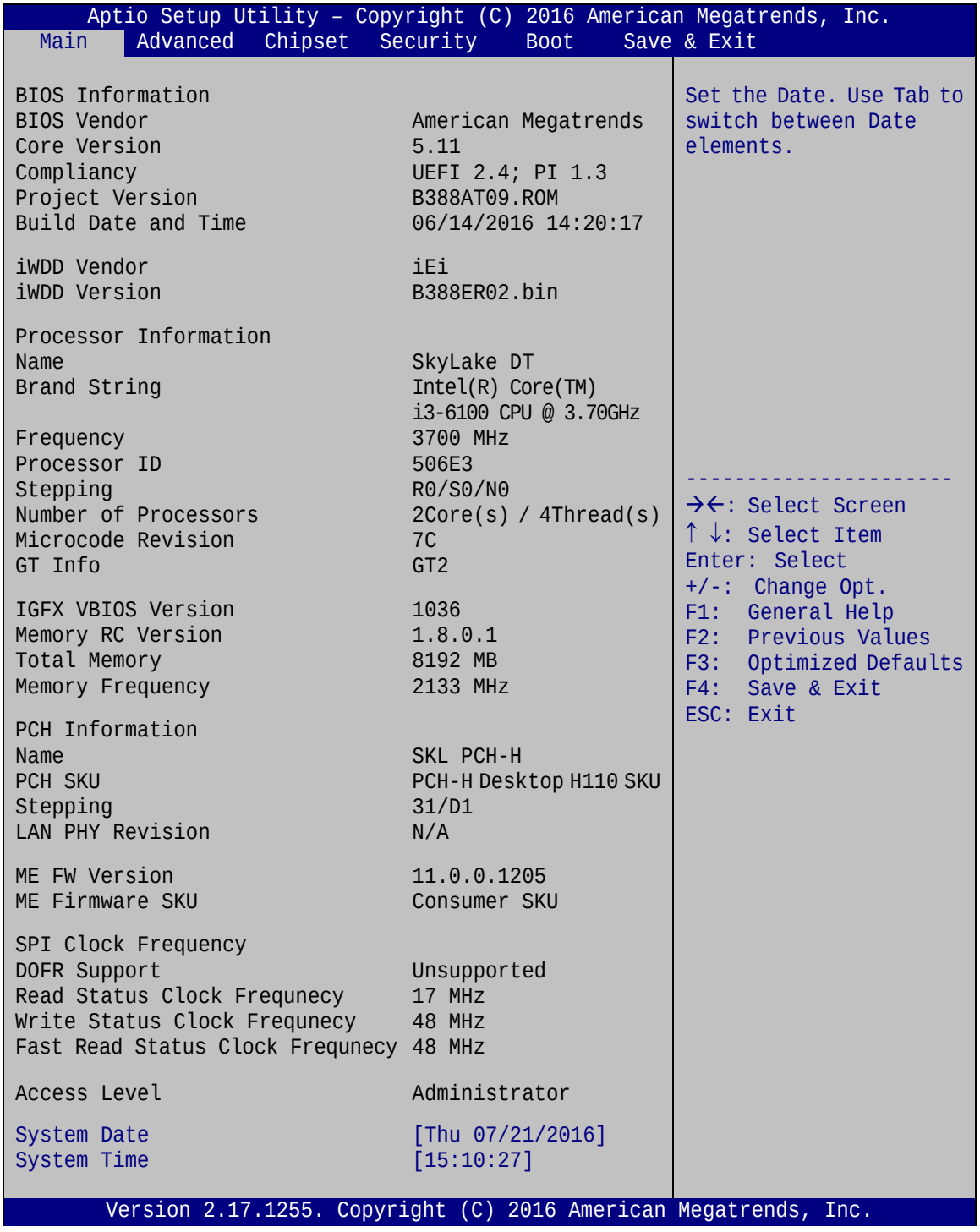
- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Security – Sets User and Supervisor Passwords.
- Boot – Changes the system boot configuration.
- Save & Exit – Selects exit options and loads default settings

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

5.2 Main

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

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



BIOS Menu 1: Main

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

➔ **System Date [xx/xx/xx]**

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

➔ **System Time [xx:xx:xx]**

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

5.3 Advanced

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

WARNING!

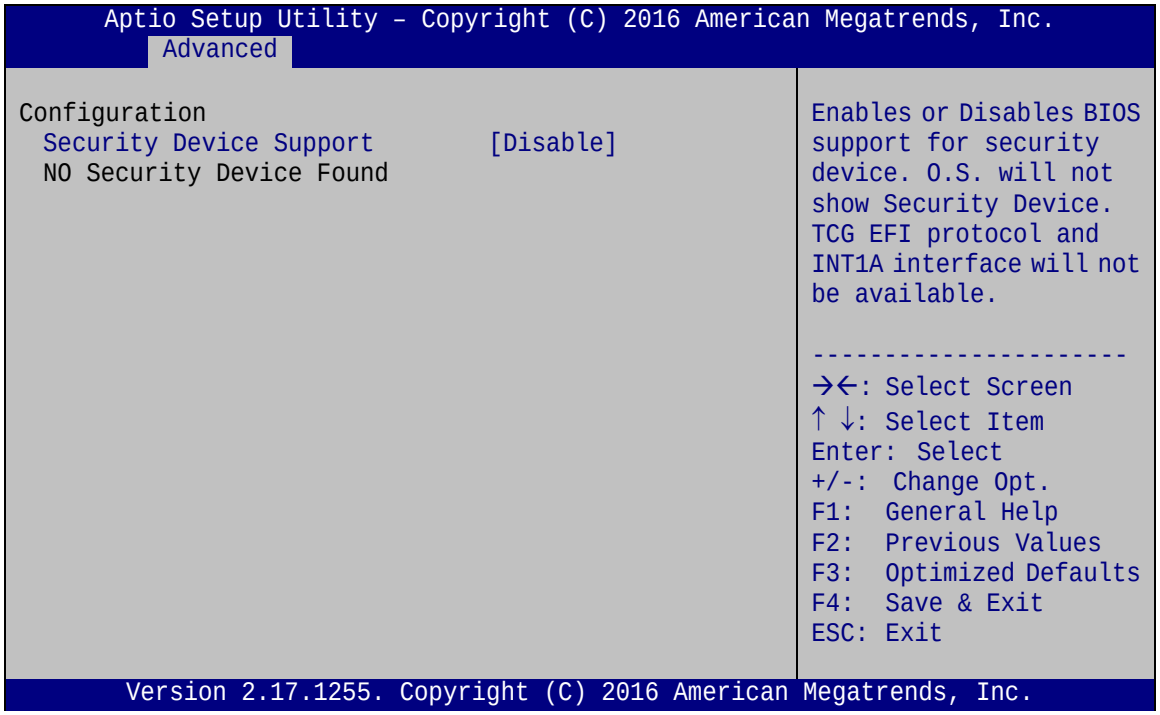
Setting the wrong values in the sections below may cause the system to malfunction. Make sure that the settings made are compatible with the hardware.

```
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).



BIOS Menu 3: Trusted Computing

➔ **Security Device Support [Disable]**

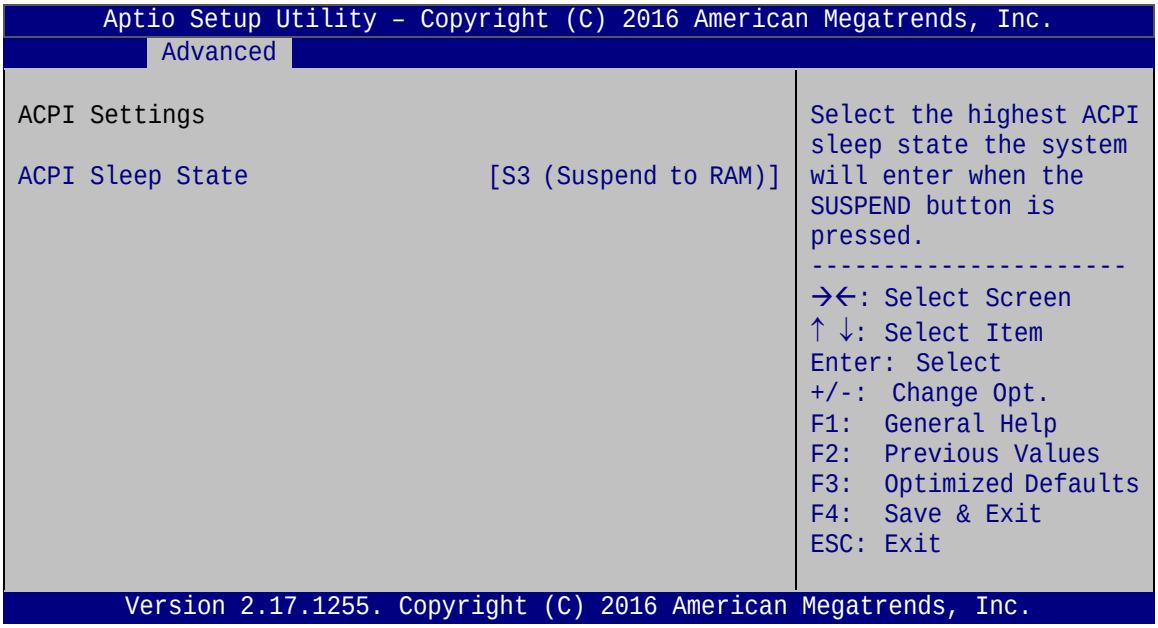
Use the **Security Device Support** option to configure support for the TPM.

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

➔ **Enable** TPM support is enabled.

5.3.2 ACPI Settings

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



BIOS Menu 4: ACPI Configuration

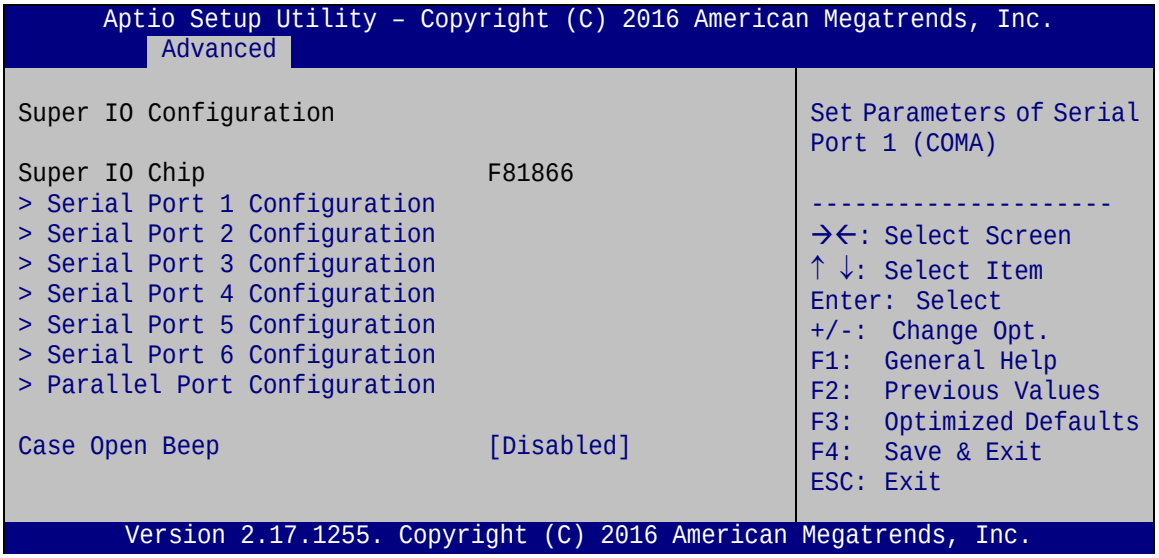
➔ **ACPI Sleep State [S3 (Suspend to RAM)]**

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.



BIOS Menu 5: Super IO Configuration

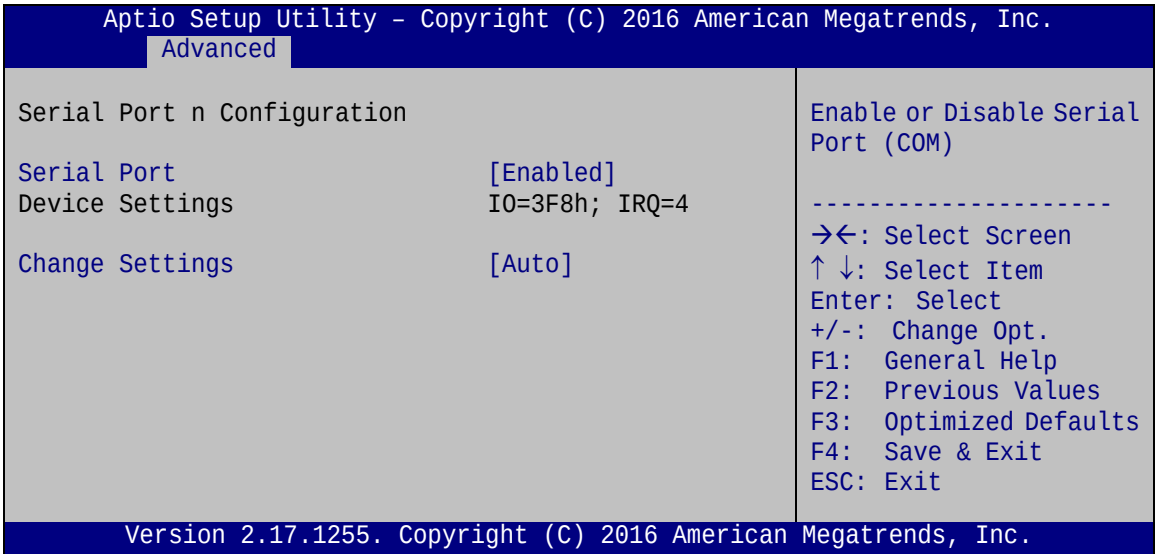
➔ **Case Open Beep [Disabled]**

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.



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; 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

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

- ➔ **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 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; IRQ=11** Serial Port I/O port address is 3E8h 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

5.3.3.4.1 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; 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

➔ **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**	**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=2E0h; IRQ=11**		Serial Port I/O port address is 2E0h 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

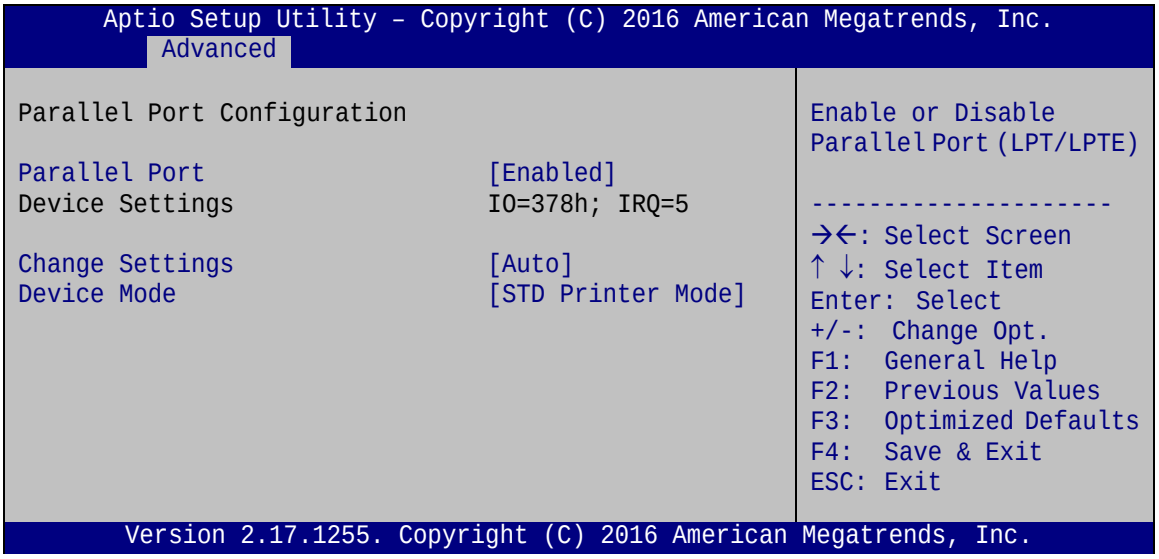
- ➔ **IO=2E8h; IRQ=3, 4, 11** — Serial Port I/O port address is 2E8h and the interrupt address is IRQ3, 4, 11
- ➔ **IO=2D0h; IRQ=3, 4, 11** — Serial Port I/O port address is 2D0h and the interrupt address is IRQ3, 4, 11
- ➔ **IO=2E0h; IRQ=3, 4, 11** — Serial Port I/O port address is 2E0h and the interrupt address is IRQ3, 4, 11

➔ **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.



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

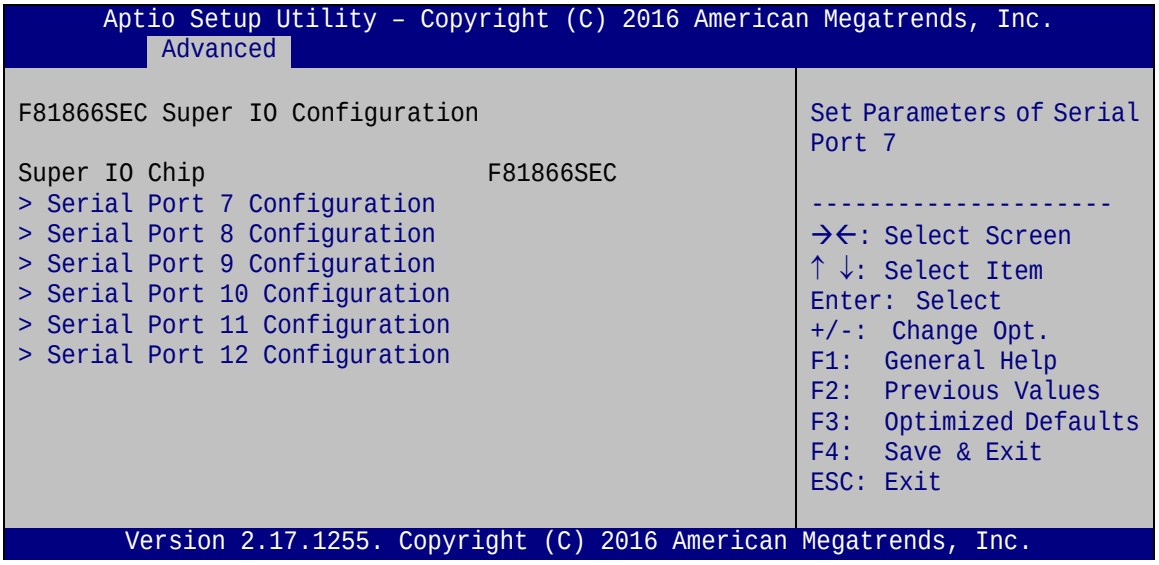
➔ **Device Mode [STD Printer Mode]**

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

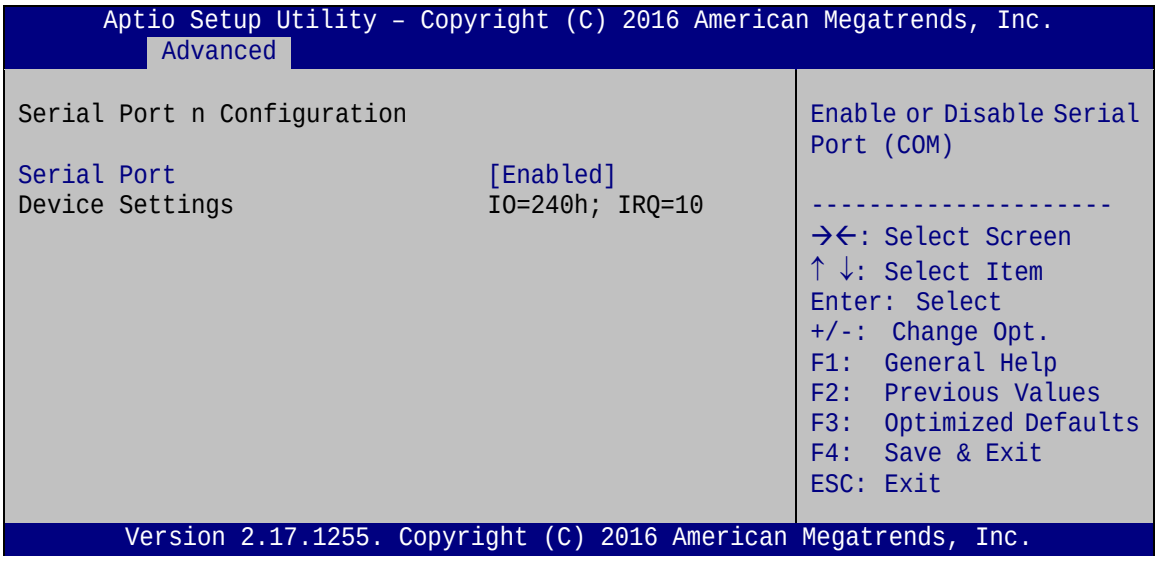
Use the **F81866SEC Super IO Configuration** menu (**BIOS Menu 8**) to set or change the configurations for the serial ports.



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.



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       ---------------------
SYS_FAN1 Speed                  : N/A           →←: Select Screen
                                                ↑ ↓: Select Item
CPU_CORE                        : +1.143 V      Enter: Select
+5V                             : +5.070 V      +/-: Change Opt.
+12V                            : +12.096 V     F1: General Help
+DDR                            : +1.202 V      F2: Previous Values
+5VSB                           : +5.052 V      F3: Optimized Defaults
+3.3V                           : +3.343 V      F4: Save & Exit
+3.3VSB                         : +3.282 V      ESC: Exit

> Smart Fan Mode Configuration
Version 2.17.1255. Copyright (C) 2016 American Megatrends, Inc.
```

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              ---------------------
Auto mode fan start PWM         30              →←: Select Screen
Auto mode fan slope PWM         1               ↑ ↓: Select Item
                                                Enter: Select
SYS_FAN1 Smart Fan Control       [Auto Mode]    +/-: Change Opt.
Auto mode fan start temperature 50              F1: General Help
Auto mode fan off temperature   40              F2: Previous Values
Auto mode fan start PWM         30              F3: Optimized Defaults
Auto mode fan slope PWM         1               F4: Save & Exit
                                                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
                                            | ↑ ↓: Select Item
  COM4                                      | Enter: Select
  Console Redirection         [Disabled]    | +/-:  Change Opt.
> Console Redirection Settings              | F1:  General Help
                                            | F2:  Previous Values
  COM5                                      | F3:  Optimized Defaults
  Console Redirection         [Disabled]    | F4:  Save & Exit
> Console Redirection Settings              | 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       |

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

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.

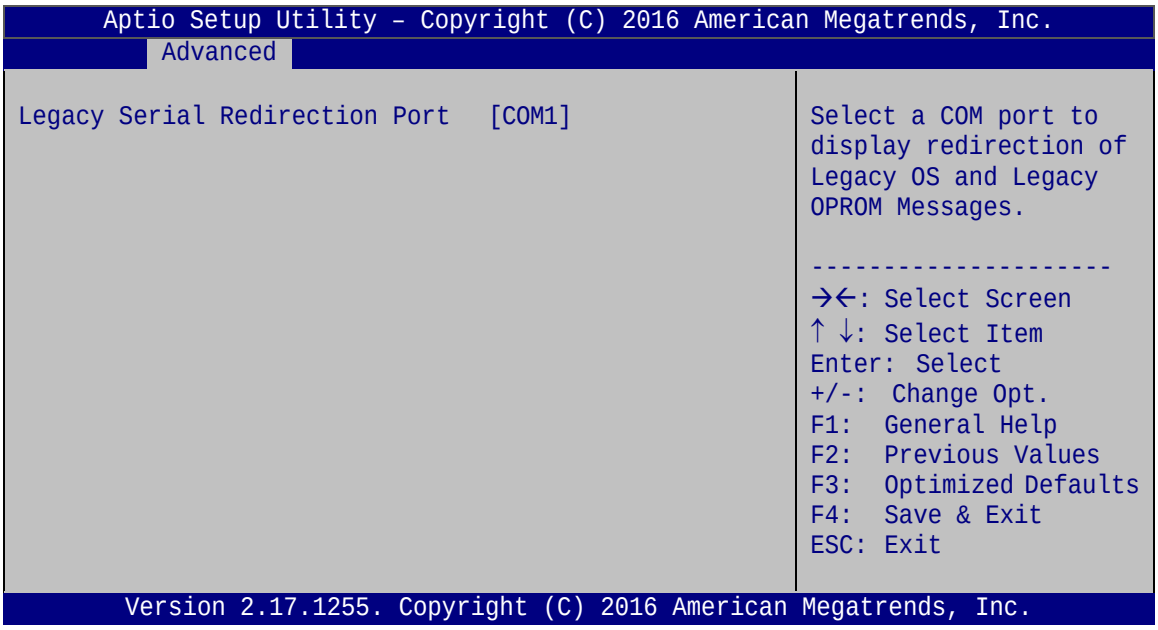
➔ **None**	**DEFAULT**	No parity bit is sent with the data bits.
➔ **Even**		The parity bit is 0 if the number of ones in the data bits is even.
➔ **Odd**		The parity bit is 0 if the number of ones in the data bits is odd.
➔ **Mark**		The parity bit is always 1. This option does not provide error detection.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



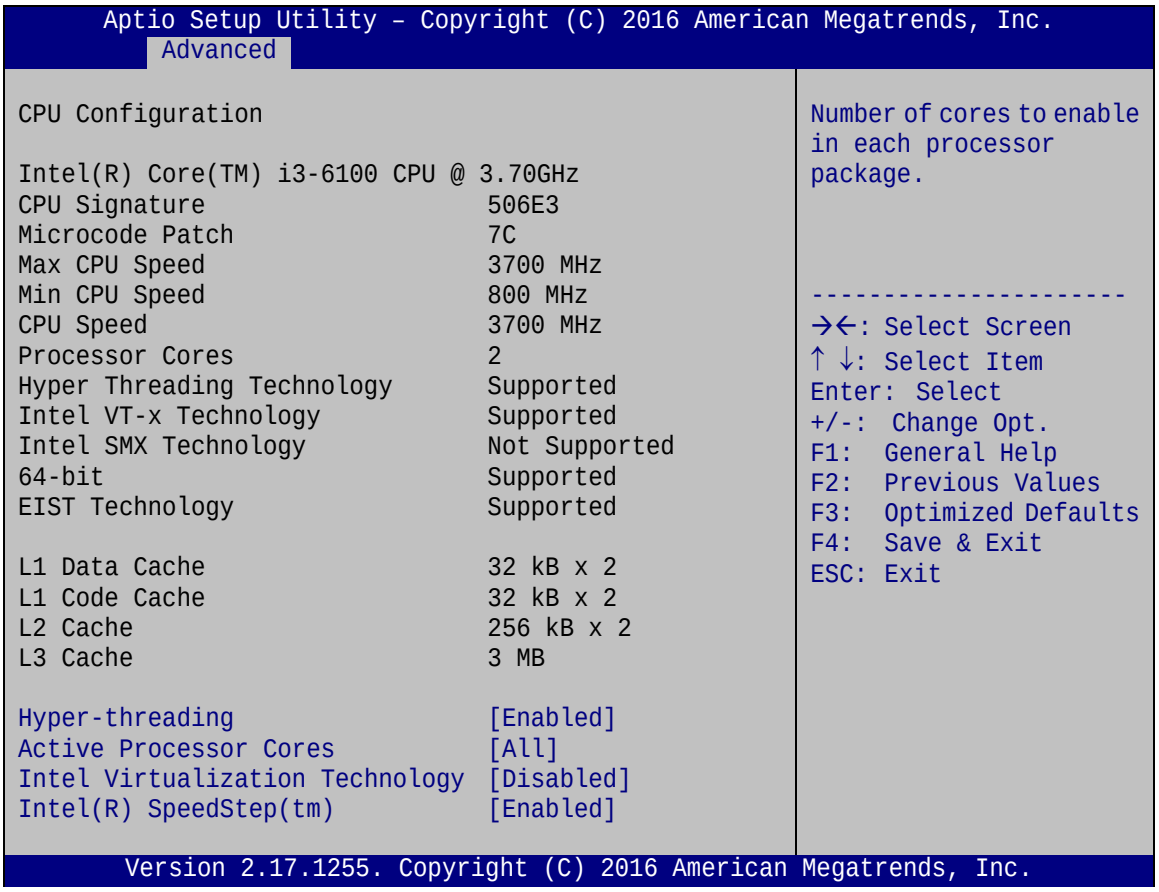
BIOS Menu 14: Legacy Console Redirection Settings

➔ **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.



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.

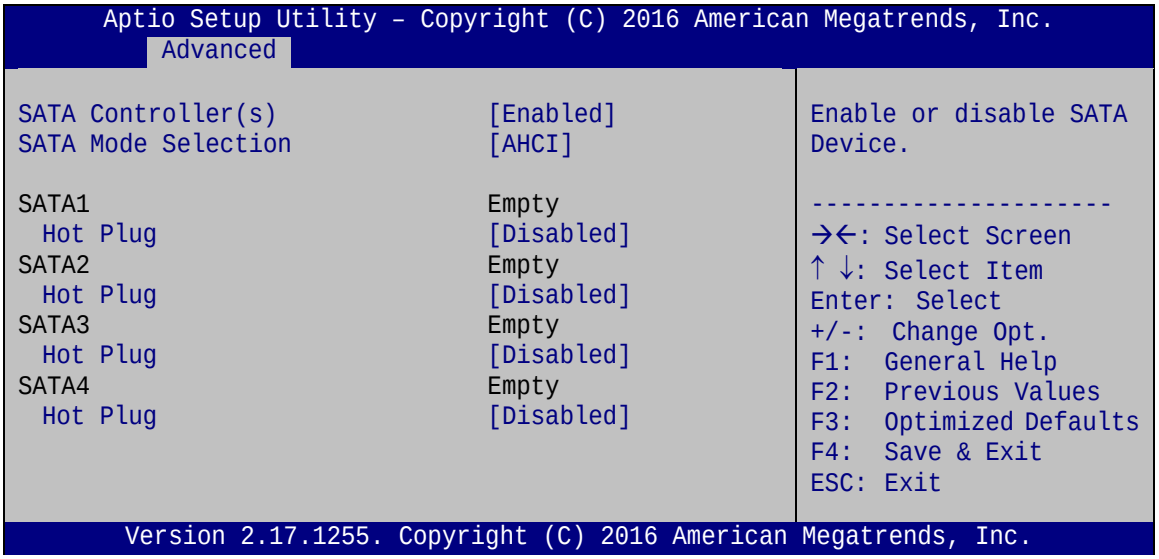
➔ **Intel(R) SpeedStep(tm) [Enabled]**

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.



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.

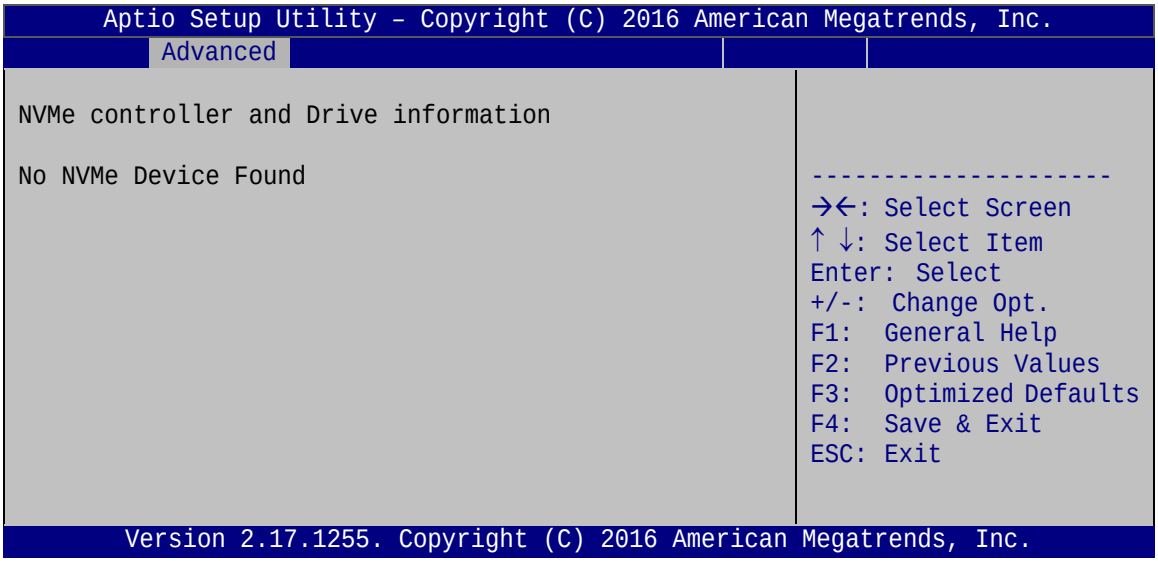
➔ **Hot Plug [Disabled]**

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

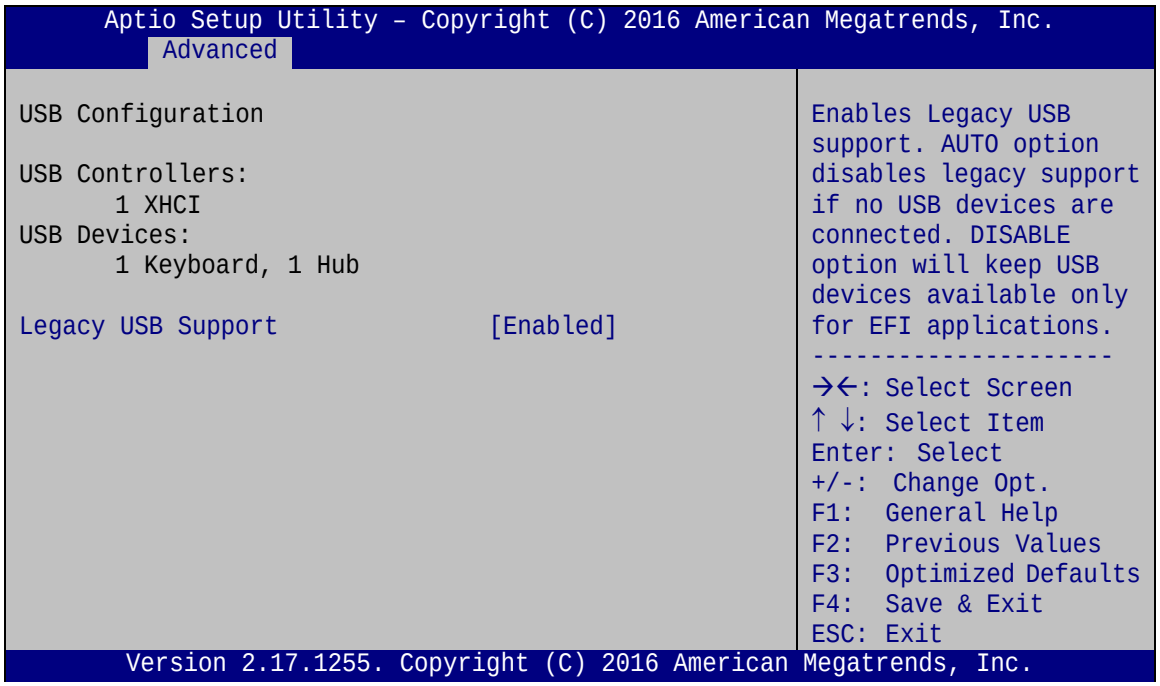
Use the **NVMe Configuration** (**BIOS Menu 17**) menu to display the NVMe controller and device information.



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.



BIOS Menu 18: USB Configuration

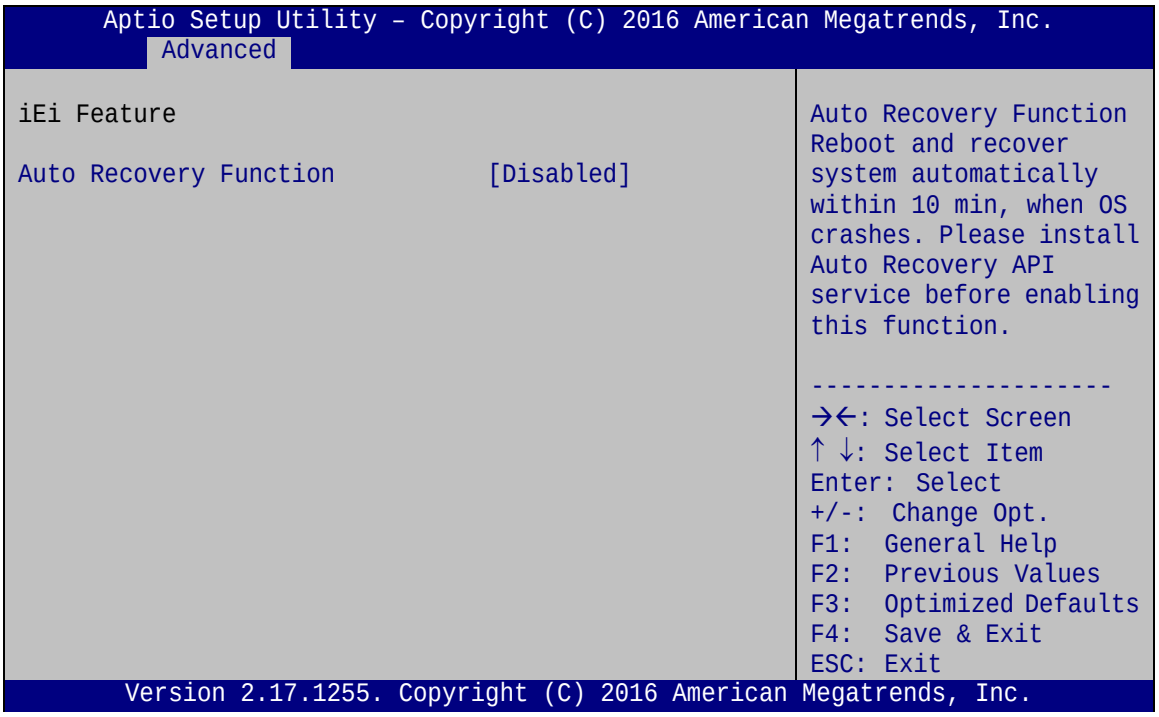
➔ **Legacy USB Support [Enabled]**

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.



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!

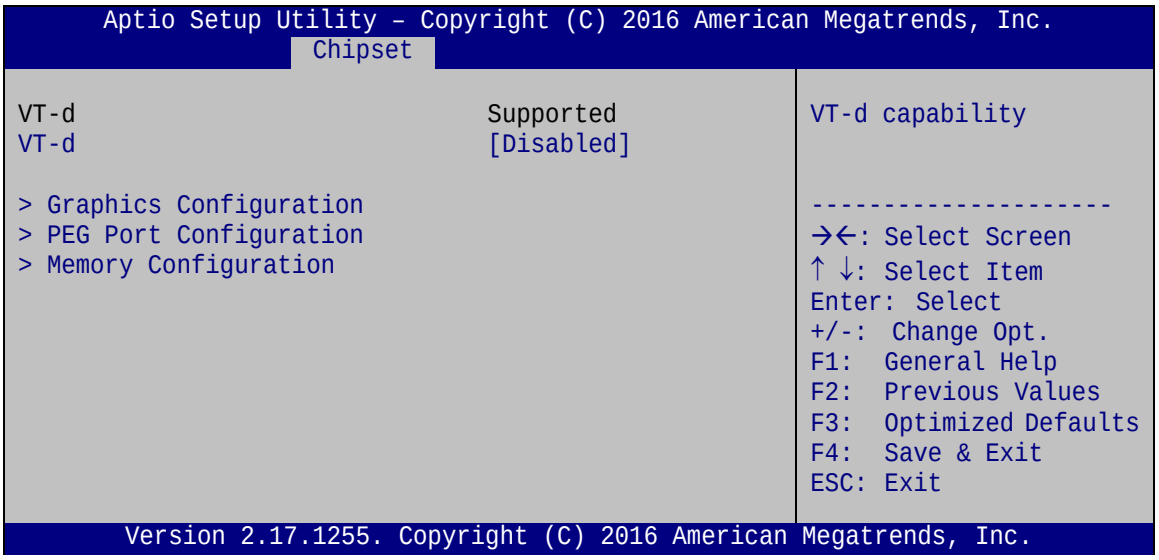
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.

```
      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.



BIOS Menu 21: System Agent (SA) Configuration

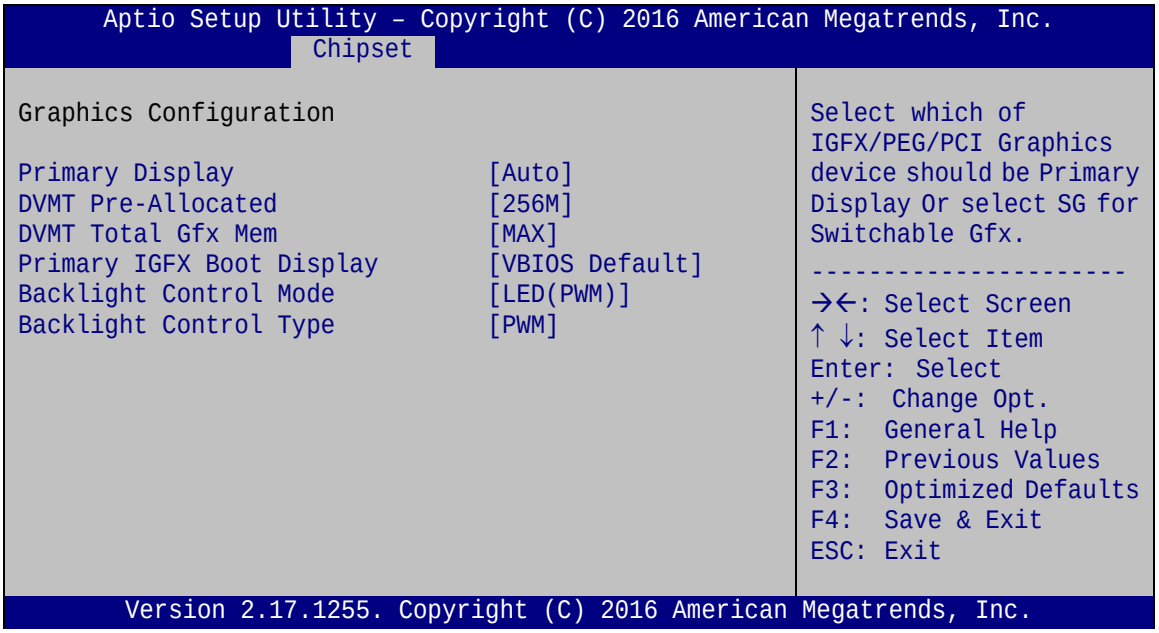
➔ **VT-d [Disabled]**

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

➔	**Disabled**	**DEFAULT**	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.



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)]**

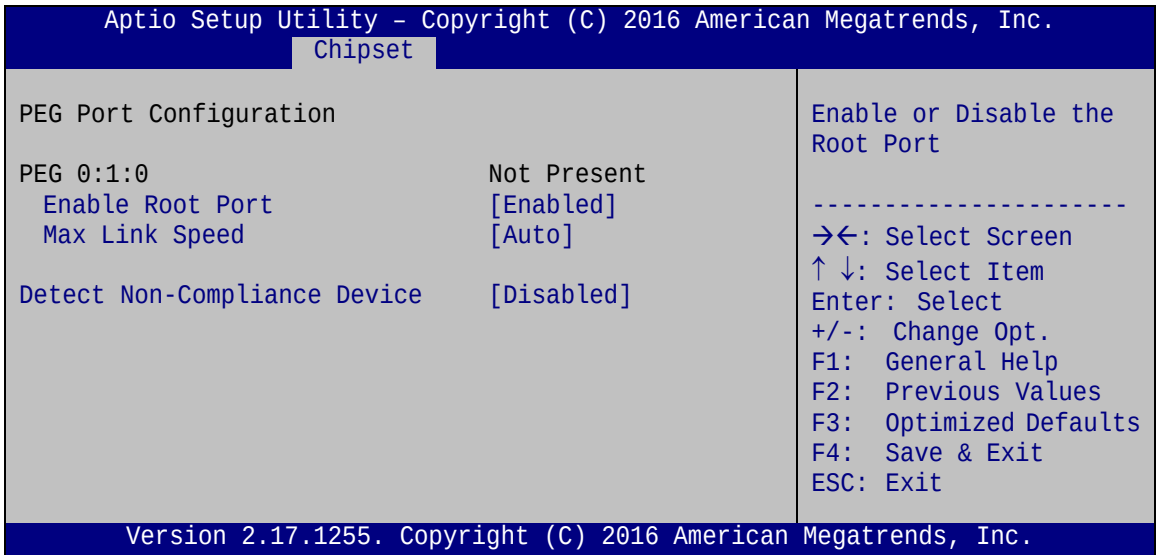
Use the **Backlight Control Mode** BIOS option to select the LCD backlight control mode. Configuration options are listed below.

- 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



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**	**DEFAULT**	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

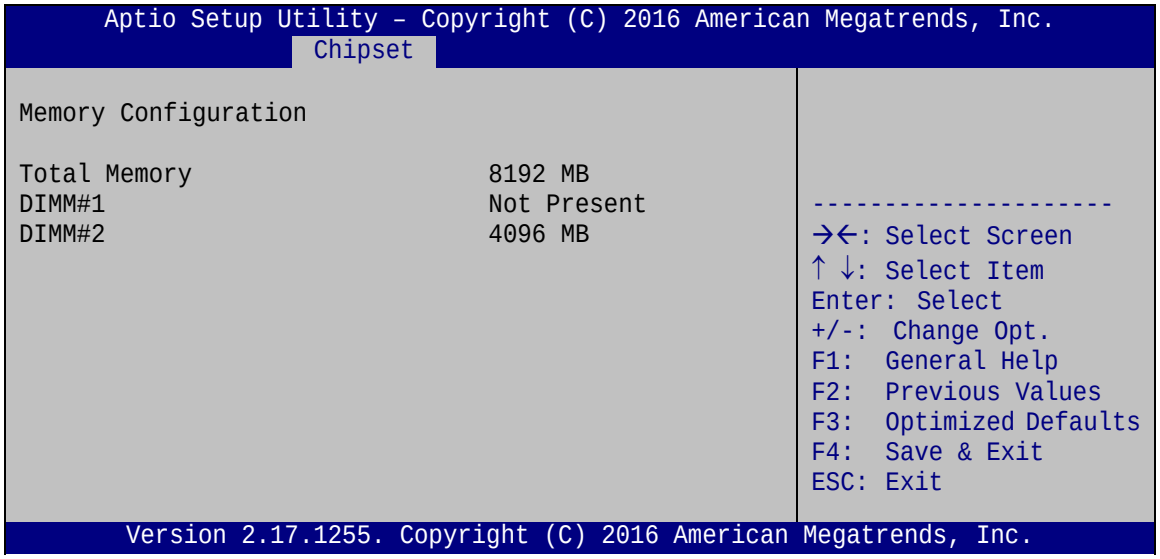
➔ **Detect Non-Compliance Device [Disabled]**

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

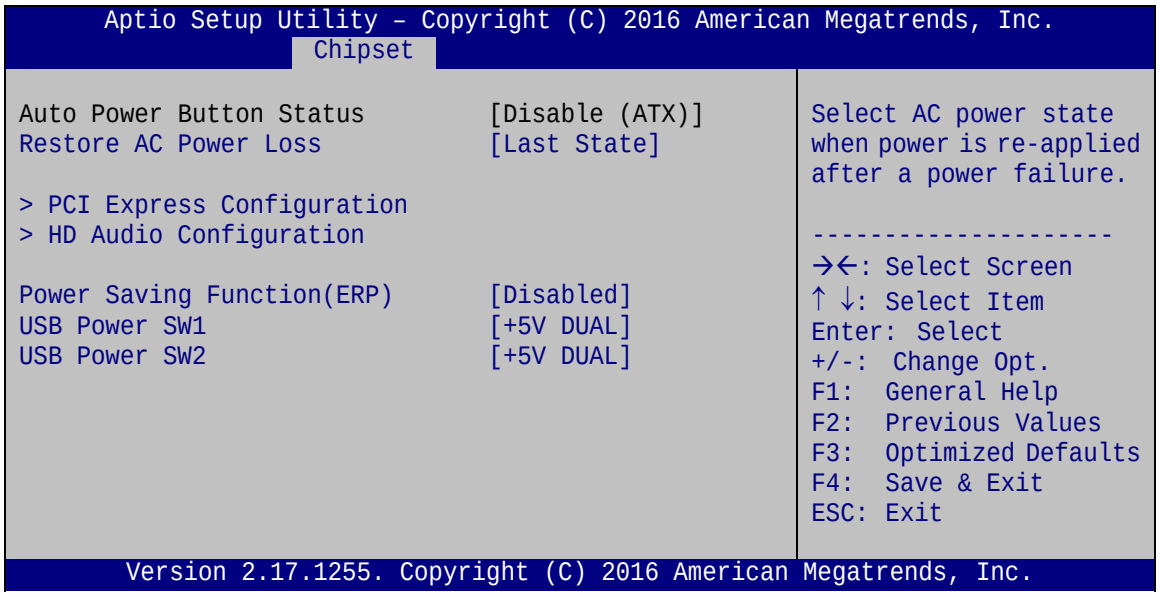
Use the **Memory Configuration** submenu (**BIOS Menu 24**) to view memory information.



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.



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

BIOS Options	Configured USB Ports
USB Power SW1	LAN1_USB1 (external USB 3.2 Gen 1 ports) LAN2_USB1 (external USB 3.2 Gen 1 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

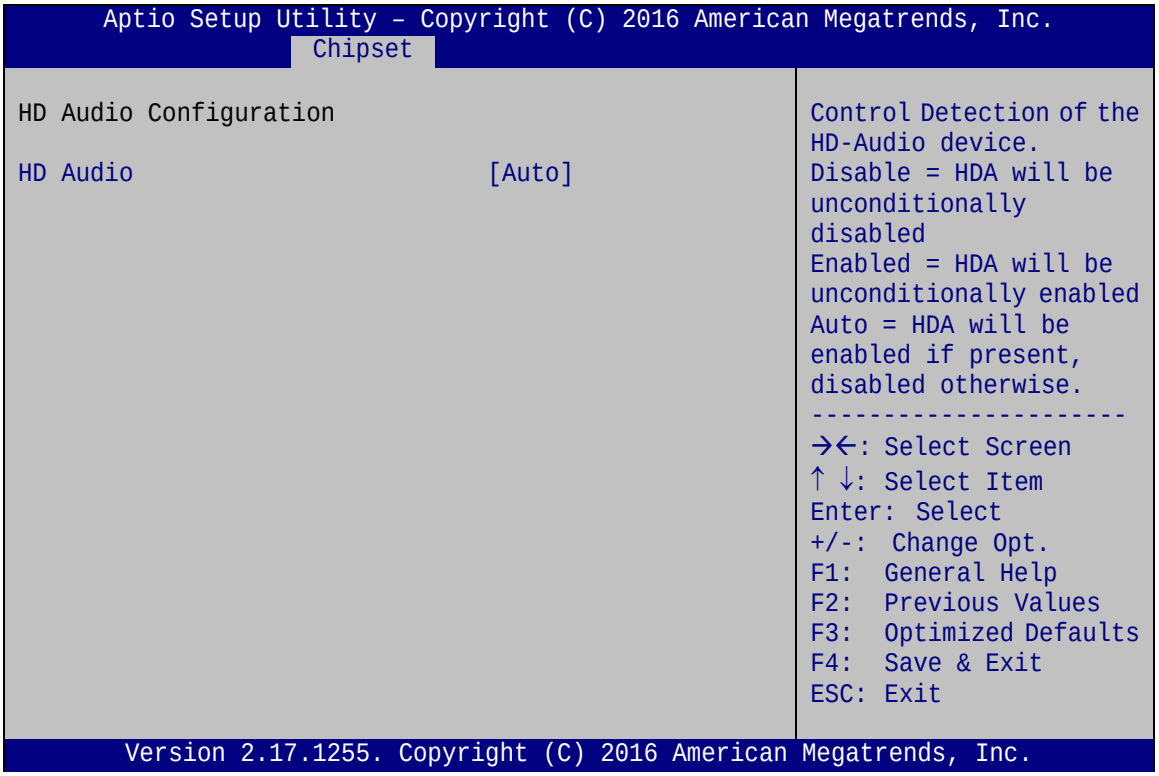
➔ **Detect Non-Compliance Device [Disabled]**

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.



BIOS Menu 28: HD Audio Configuration

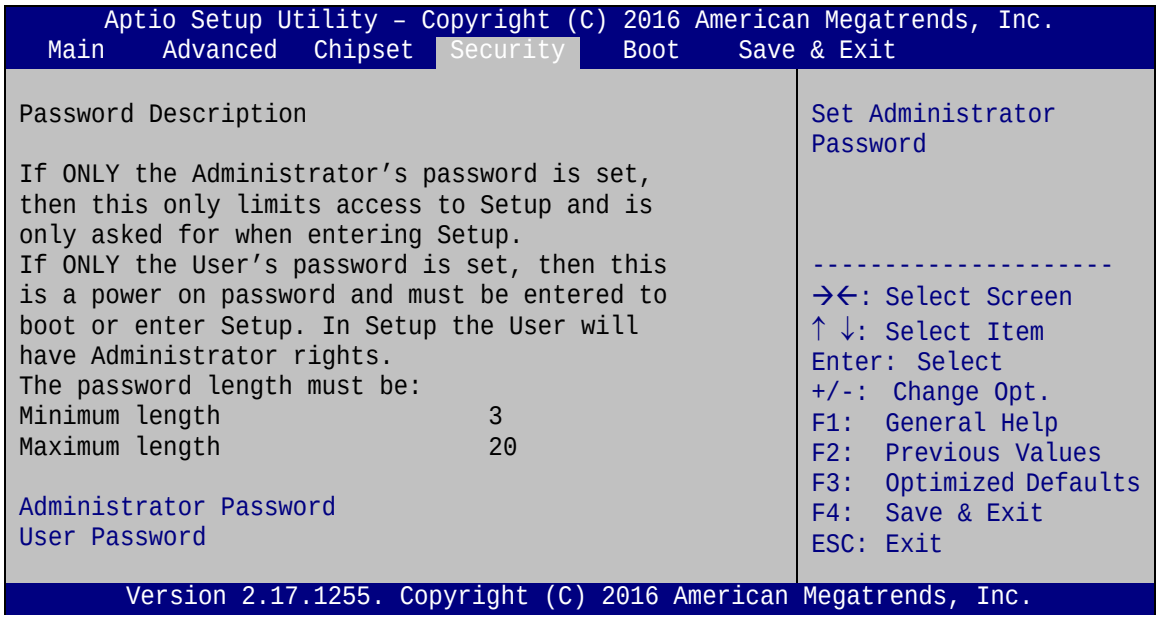
➔ **HD Audio [Auto]**

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.



BIOS Menu 29: Security

➔ **Administrator Password**

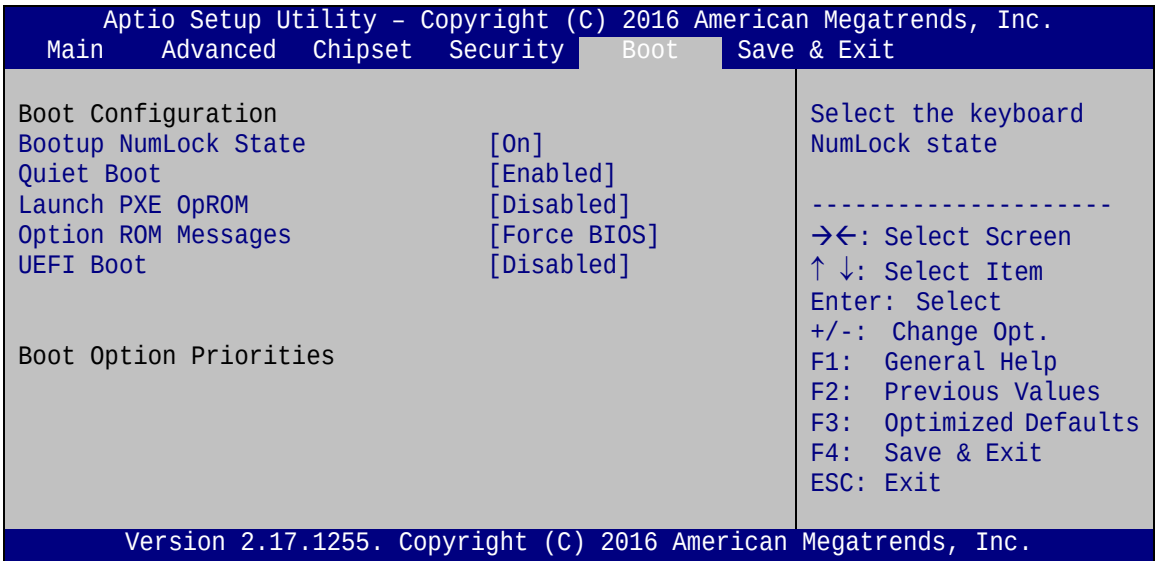
Use the **Administrator Password** to set or change a administrator password.

➔ **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.



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.

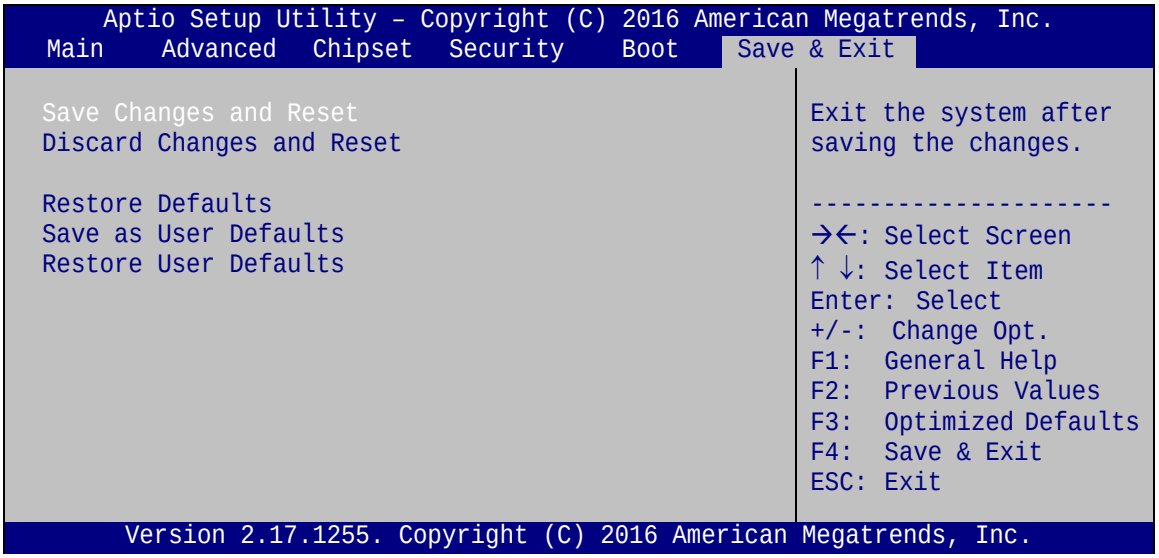
➔ **UEFI Boot [Disabled]**

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.



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

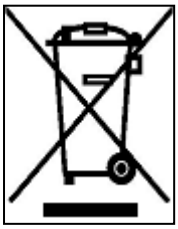
Product Disposal

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

Digital I/O Interface

D.1 Introduction

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

NOTE:

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

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

INT 15H:

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

D.2 Assembly Language Sample 1

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

AL low byte = value

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

D.3 Assembly Language Sample 2

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

Digital Output is 1001b

Appendix

E

Watchdog Timer

NOTE:

The following discussion applies to DOS environment. Contact IEI support or visit the IEI website for specific drivers for other operating systems.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMIs or a software bug. When the CPU stops working correctly, Watchdog Timer either performs a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer.

INT 15H:

AH – 6FH Sub-function:	
AL – 2:	Sets the Watchdog Timer's period.
BL:	Time-out value (Its unit-second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

Table E-1: AH-6FH Sub-function

Call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer starts counting down. When the timer value reaches zero, the system resets. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the watchdog timer is disabled if the time-out value is set to zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

NOTE:

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system resets.

EXAMPLE PROGRAM:

```
; INITIAL TIMER PERIOD COUNTER

;
W_LOOP:
;

        MOV     AX, 6F02H       ;setting the time-out value
        MOV     BL, 30          ;time-out value is 48 seconds
        INT     15H

;
; ADD THE APPLICATION PROGRAM HERE
;

        CMP     EXIT_AP, 1      ;is the application over?
        JNE     W_LOOP          ;No, restart the application

        MOV     AX, 6F02H       ;disable Watchdog Timer
        MOV     BL, 0           ;
        INT     15H

;
; EXIT ;
```

Appendix

F

Error Beep Code

F.1 PEI Beep Codes

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

F.2 DXE Beep Codes

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

NOTE:

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

Appendix

G

Hazardous Materials Disclosure

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

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

Please refer to the following table.

Part Name	Toxic or Hazardous Substances and Elements									
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (CR(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)	Bis(2-ethylhexyl) phthalate (DEHP)	Butyl benzyl phthalate (BBP)	Dibutyl phthalate (DBP)	Diisobutyl phthalate (DIBP)
Housing	O	O	O	O	O	O	O	O	O	O
Display	O	O	O	O	O	O	O	O	O	O
Printed Circuit Board	O	O	O	O	O	O	O	O	O	O
Metal Fasteners	O	O	O	O	O	O	O	O	O	O
Cable Assembly	O	O	O	O	O	O	O	O	O	O
Fan Assembly	O	O	O	O	O	O	O	O	O	O
Power Supply Assemblies	O	O	O	O	O	O	O	O	O	O
Battery	O	O	O	O	O	O	O	O	O	O

O: This toxic or hazardous substance is contained in all of the homogeneous materials for the part is below the limit requirement in Directive (EU) 2015/863.

X: This toxic or hazardous substance is contained in at least one of the homogeneous materials for this part is above the limit requirement in Directive (EU) 2015/863.

G.2 China RoHS

此附件旨在确保本产品符合中国 RoHS 标准。以下表格标示此产品中某有毒物质的含量符合中国 RoHS 标准规定的限量要求。

本产品上会附有"环境友好使用期限"的标签，此期限是估算这些物质"不会有泄漏或突变"的年限。本产品可能包含有较短的环境友好使用期限的可替换元件，像是电池或灯管，这些元件将会单独标示出来。

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (CR(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
壳体	O	O	O	O	O	O
显示	O	O	O	O	O	O
印刷电路板	O	O	O	O	O	O
金属螺帽	O	O	O	O	O	O
电缆组装	O	O	O	O	O	O
风扇组装	O	O	O	O	O	O
电力供应组装	O	O	O	O	O	O
电池	O	O	O	O	O	O

O: 表示该有毒有害物质在该部件所有物质材料中的含量均在SJ/T11364-2014與GB/T26572-2011标准规定的限量要求以下。

X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11364-2014 與 GB/T26572-2011 标准规定的限量要求。