IEI Integration Corp.

MODEL:

IMBA-Q470

ATX motherboard supports LGA1200 Intel® 10th/11th Generation Core™ i9/i7/i5/i3, Celeron® and Pentium® processor, DDR4, triple independent displays, dual 2.5GbE LAN, M.2, USB 3.2, SATA 6Gb/s, HD Audio and RoHS

User Manual

Rev. 1.02 – January 31, 2023

RoHS Lead Free

Revision

Date	Version	Changes
January 31, 2023	1.02	Remove the IAMT function
July 27,2022	1.01	1.update BIOS content 2.Add M.2 module install mode
January 31, 2023	1.00	Initial release

Copyright

COPYRIGHT NOTICE

The information in this document is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer.

In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation, even if advised of the possibility of such damages.

TRADEMARKS

All registered trademarks and product names mentioned herein are used for identification purposes only and may be trademarks and/or registered trademarks of their respective owners.

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.

Table of Contents

List of Figures

List of Tables

Chapter

1

Introduction

1.1 Introduction

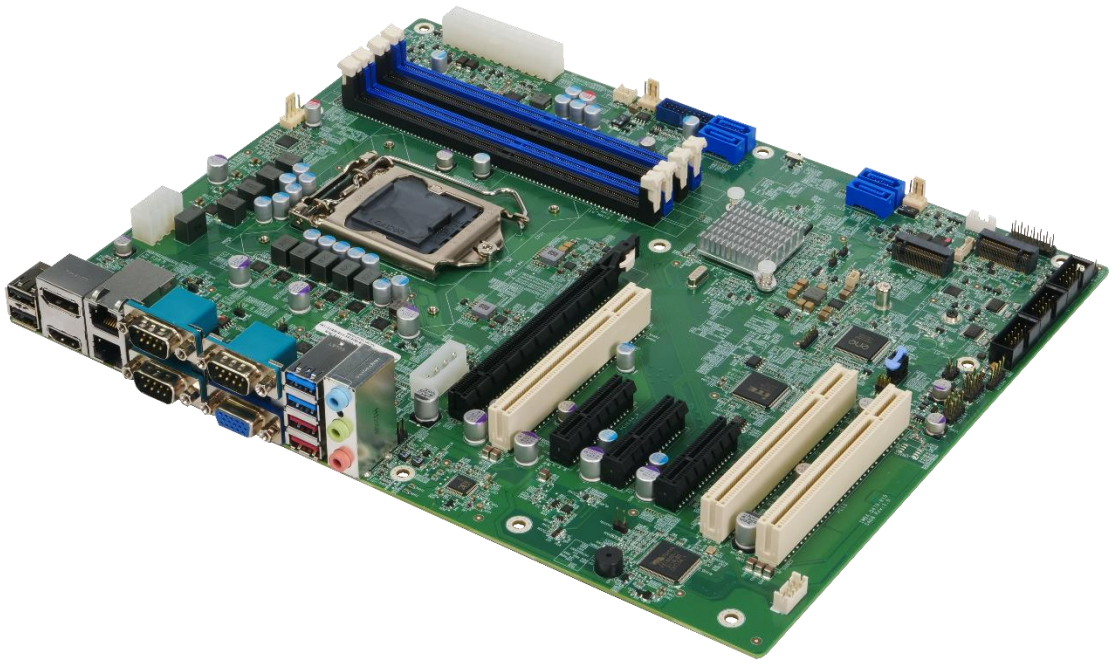


Figure 1-1: IMBA-Q470

The IMBA-Q470 is an ATX motherboard. It accepts a Socket LGA1200 Intel® 10/11th Generation Core™ i9/i7/i5/i3, Pentium® or Celeron® processor and supports four 288-pin 2933MHz dual-channel DDR4 SDRAM DIMM modules up to 128 GB. The integrated Intel® Q470/Q470E chipset supports four SATA 6Gb/s drives. Moreover, the IMBA-Q470 includes DP, HDMI and VGA interfaces for triple independent display.

The IMBA-Q470 provides two 2.5GbE interfaces through the Intel® I225V controllers. Expansion and I/O include three PCI slots, one PCIe x16 slot, three PCIe x4 slots, two M.2 slots, three COM ports, two USB 3.2 Gen 1, two USB 3.2 Gen 2 and two USB 2.0 on the rear panel, five USB 2.0 via internal pin headers, two USB 3.2 Gen 1 via internal box header and three COM ports via internal pin headers.

1.2 Features

Some of the IMBA-Q470 motherboard features are listed below:

- ATX form factor
- 10th/11th generation LGA1200 Intel® Core™ i9/i7/i5/i3, Pentium® or Celeron® processor supported
- Intel® Q470/Q470E chipset
- Four 288-pin 2933MHz dual-channel DDR4 DIMMs support up to 128 GB
- Two Intel® I225V 2.5GbE controller
- Supports PCI Express Generation 3.0
- Triple independent display by DP, HDMI and VGA interfaces
- Four SATA 6Gb/s connectors support RAID 0, 1, 5, 10
- Two USB 3.2 Gen 2 ports and two USB 3.2 Gen 1 ports on the rear panel
- One M.2 A-key slot for WLAN expansion; one M.2 M-key slot with PCIe x4 signal
- One PCIe x16 slots
- Three PCIe x4 slots
- Three PCI slots
- Six serial ports (three on rear panel，the others via internal pin header)
- The optional expansion cards provide more choices to meet user's demand
- TPM 2.0 security function supported by PTT (Plateform Trust Technology)，based on BIOS setting
- High Definition Audio
- RoHS compliant

1.3 Connectors

The connectors on the IMBA-Q470 are shown in the figure below.

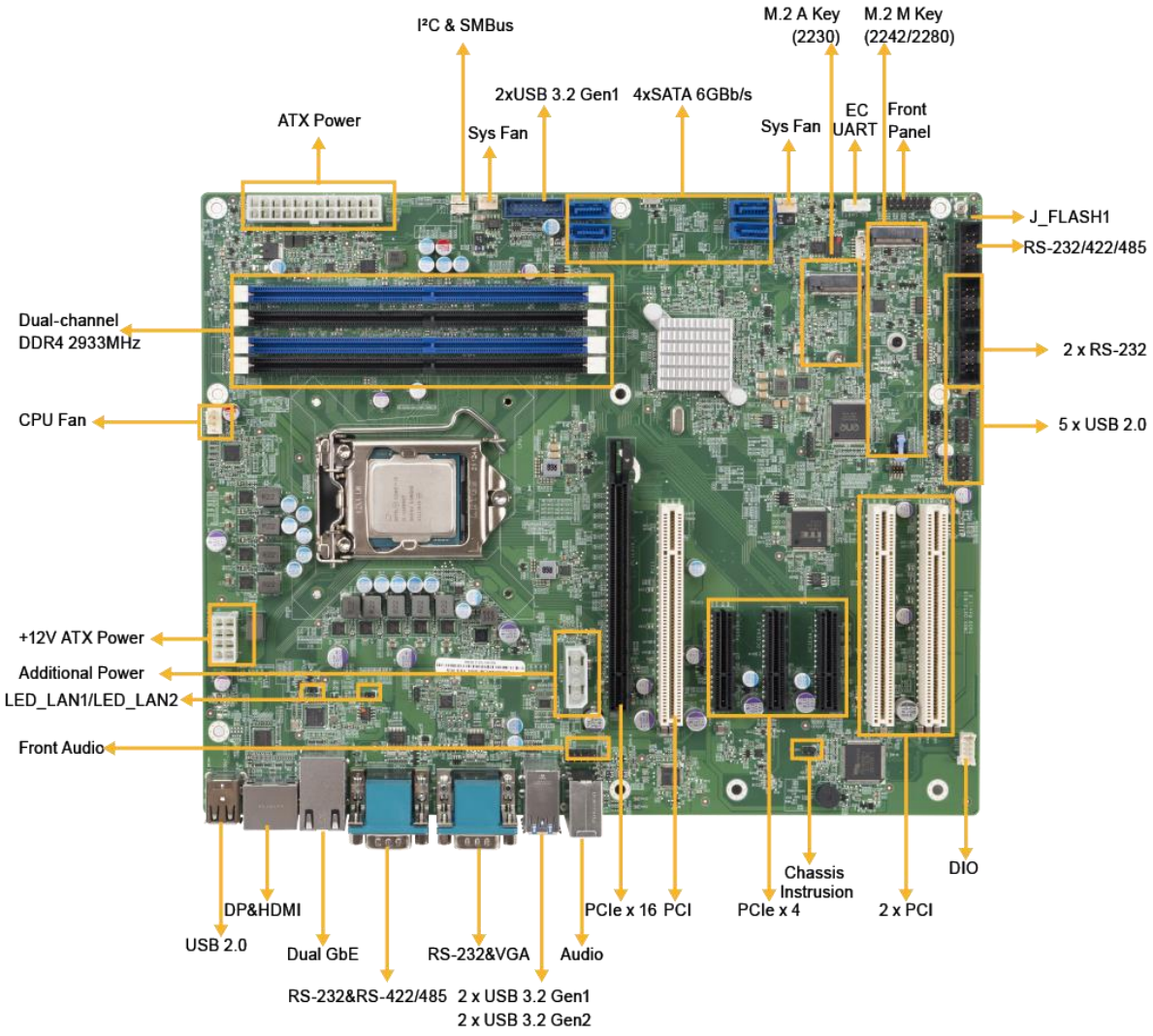


Figure 1-2: Connectors

1.4 Dimensions

The main dimensions of the IMBA-Q470 are shown in the diagram below.

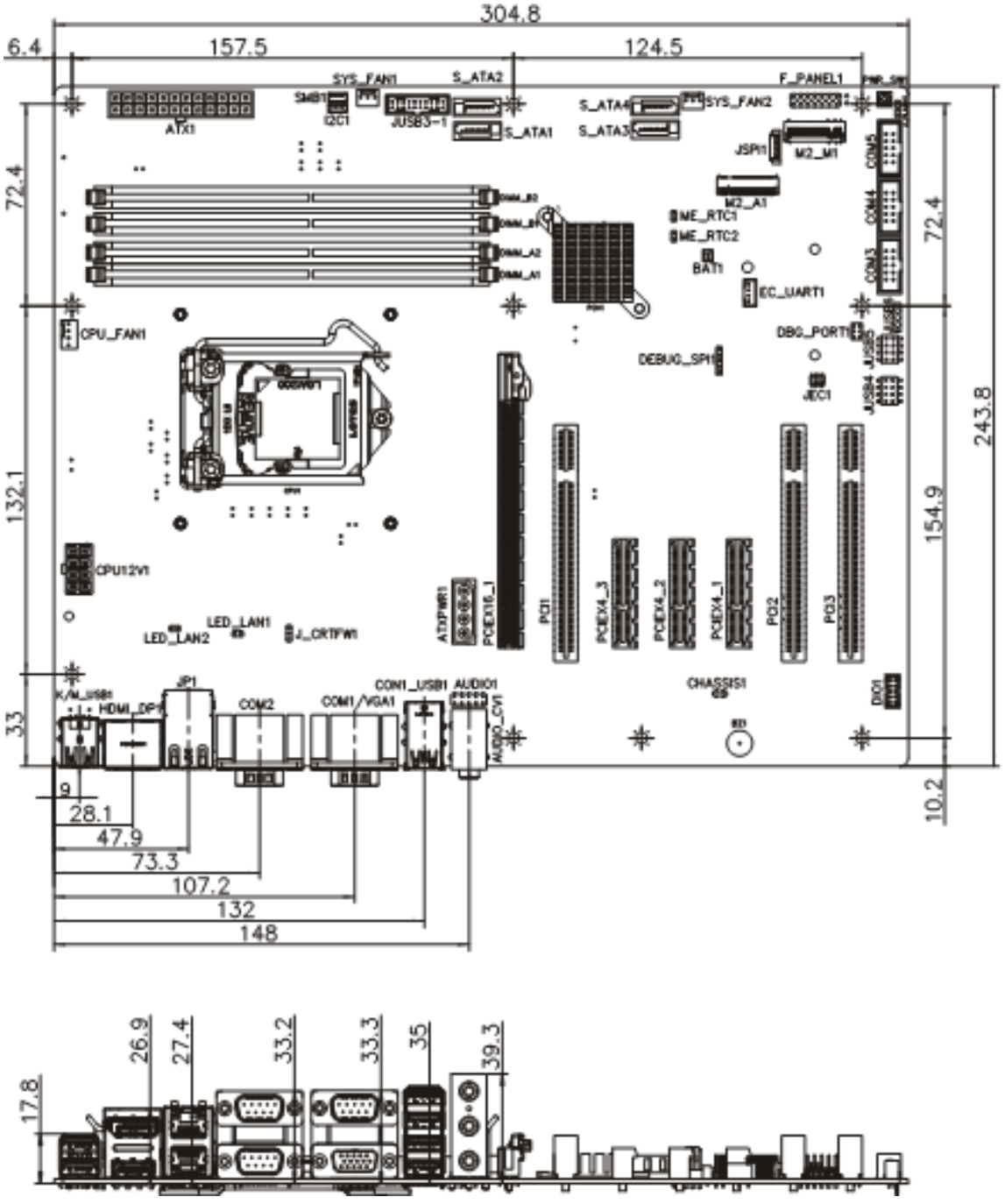


Figure 1-3: IMBA-Q470 Dimensions (mm)

1.5 Data Flow

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

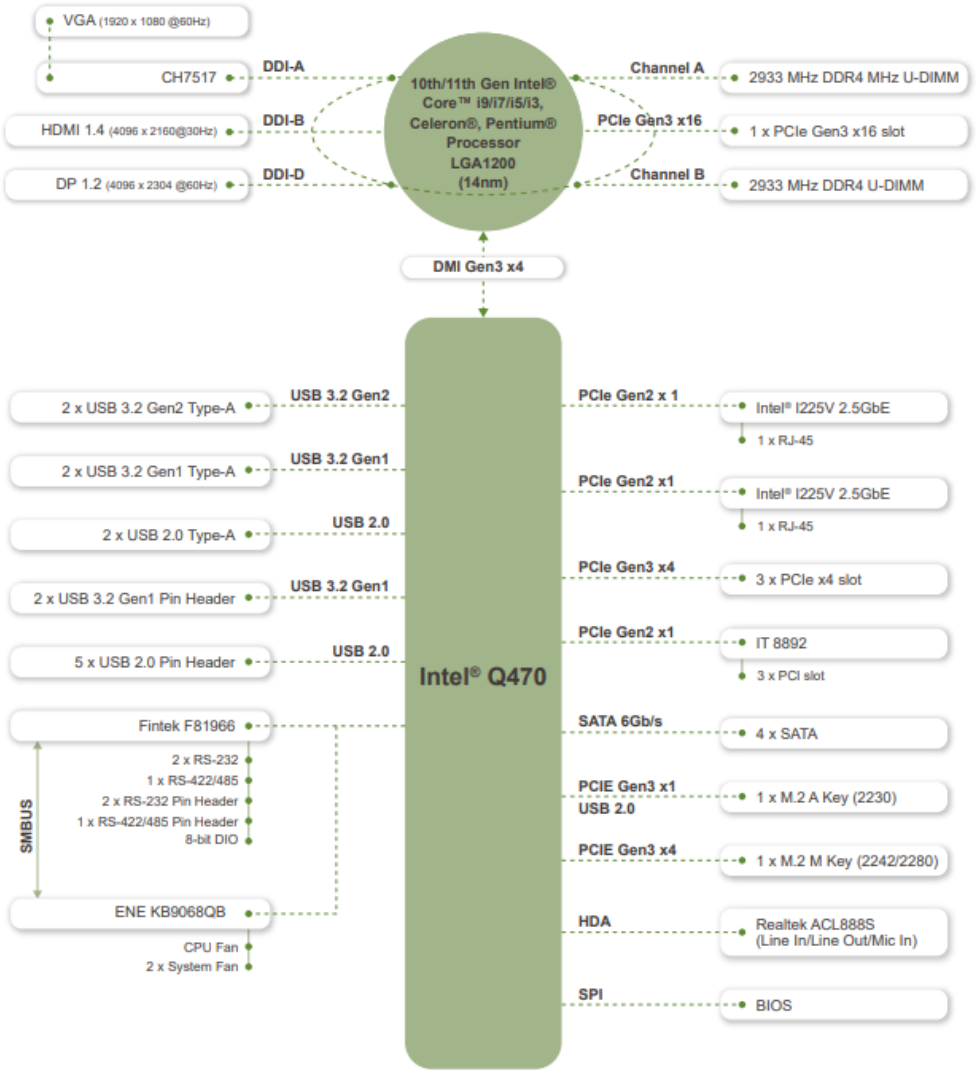


Figure 1-4: Data Flow Diagram

1.6 Technical Specifications

The IMBA-Q470 technical specifications are listed below.

Specification/Model	IMBA-Q470
Form Factor	ATX
CPU Supported	10th/11th generation LGA1200 Intel® Core™ i9/i7/i5/i3, Pentium® or Celeron® CPU
Chipset	Intel® Q470/Q470E
Memory	Four 288-pin 2933 MHz dual-channel unbuffered DDR4 SDRAM DIMMs supported (system max. 128 GB)
Graphics Engine	Up to Intel® UHD Graphics 630; Intel® HD Graphics Gen 9 Engines with 16 low-power execution units, supporting DX2015, OpenGL 5.x, OpenCL2.x and ES 2.0
Display Output	Triple independent display One VGA (up to 1920x1200@60Hz) One DP (up to 4096x2304@60Hz) One HDMI (up to 4096x2160@30Hz)
Ethernet Controllers	**LAN1**: Intel® I225V 2.5GbE controller **LAN2**: Intel® I225V 2.5GbE controller
Audio	Realtek ALC888S HD Audio codec supports 7.1-channel
BIOS	AMI UEFI BIOS
Super I/O Controller	Fintek F81966D
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Expansions	1 x PCIe x16 slot 3 x PCIe x4 slots 3 x PCI slots 1 x M.2 M-key 2242/2280 (PCIe x4, support NVMe SSD) 1 x M.2 A-key 2230 (PCIe x1 / USB 2.0)

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 (SYS_FAN1) One 3-pin system fan connector
Front Panel	One 14-pin header (power LED, HDD LED, speaker, power button, reset button)
I^2C	One 4-pin wafer connector
LAN LED	Two 2-pin headers for LAN1 LED and LAN2 LED
Serial ATA	Four SATA 6Gb/s connectors (support RAID 0, 1, 5, 10)
Serial Ports	Two RS-232 via DB-9 One RS-422/485 DB-9 (support Auto Flow Control over RS-485) 2 x RS-232 via internal box header 1 x RS-232/422/485 via internal box header (support Auto Flow Control over RS-485)
SMBus	One 4-pin wafer connector
USB Ports	Two USB 3.2 Gen 2 (10Gb/s) ports (Type A) on rear panel Two USB 3.2 Gen 1 (5Gb/s)ports (Type A) on rear panel Two USB 2.0 ports (Type A) on rear panel Five USB 2.0 ports via internal pin header Two USB 3.2 Gen 1 ports via internal box header
Environmental and Power Specifications	
Power Supply	AT/ATX power supply

Power Consumption	3.3V@1.36A, 5V@14.16A, 12V@7.5A (Intel® Core™ i9-10900E CPU with four 32 GB 3200 MHz DDR4 memory)
Operating Temperature	0ºC ~ 60ºC
Storage Temperature	-30ºC ~ 70ºC
Operating Humidity	5% ~ 95% (non-condensing)
Physical Specifications	
Dimensions	244 mm x 305 mm
Weight (GW/NW)	1200 g/700 g

Table 1-1: IMBA-Q470 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 IMBA-Q470 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 IMBA-Q470 was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The IMBA-Q470 is shipped with the following components:

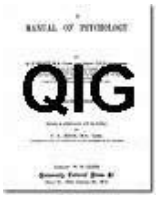
Quantity	Item and Part Number	Image
1	IMBA-Q470 single board computer	
2	SATA cable	
1	I/O shielding	
1	Quick installation guide	

Table 2-1: Packing List

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
Dual-port USB cable with bracket (**P/N**: 19800-003100-100-RS)	
USB 3.2 cable with bracket, 457 mm (**P/N**: 19800-010500-200-RS)	
SATA power cable (**P/N**: 32102-000100-200-RS)	
RS-232 cable,230mm，P=2.54 (**P/N**: 19800-020100-100-RS)	
High-performance LGA1155/LGA1156 cooler kit (1U chassis compatible, 45W) (**P/N**: CF-1156C-R20)	
High-performance LGA1155/1156 cooler kit, 1U chassis compatible 73W (**P/N**: CF-115XA-R10)	
High-performance LGA1155/LGA1156 cooler kit (1U chassis compatible, 65W) (**P/N**: CF-1156D-R30)	

Item and Part Number	Image
High-performance LGA1155/LGA1156 cooler kit (95W) (**P/N**: CF-115XE-R10)	

Table 2-2: Optional Items

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the peripheral interface connectors.·

3.1.1 IMBA-Q470 Layout

The figures below show all the peripheral interface connectors.

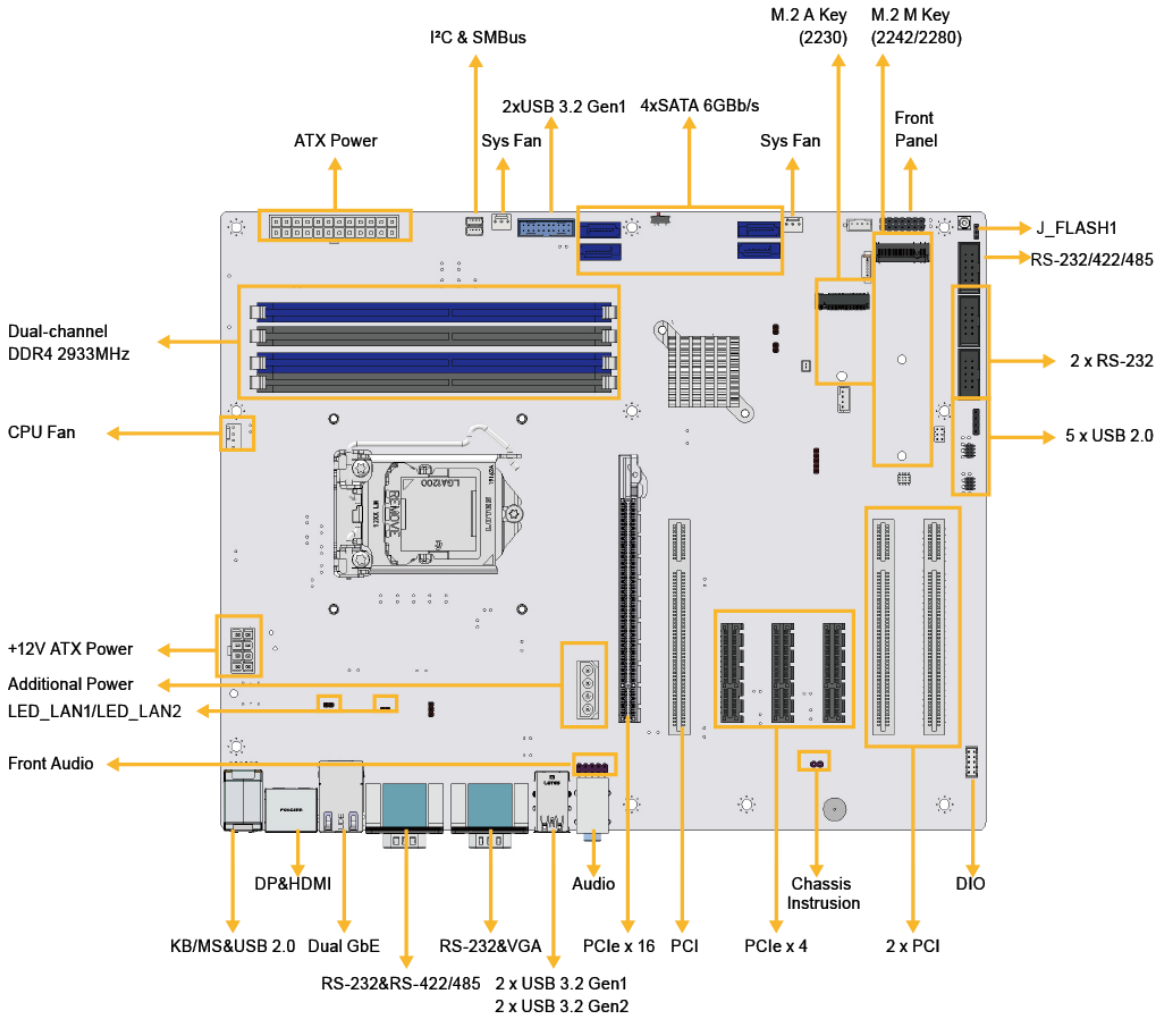


Figure 3-1: Peripheral Interface Connectors

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
ATX CPU 12V power connector	8-pin Molex power connector	CPU12V1
PCIe power connector	4-pin connector	ATXPWR1
ATX power connector	24-pin connector	ATX1
Battery connector	2-pin header	BAT1
Chassis intrusion connector	2-pin header	CHASSIS1
AT/ATX power mode setting	3-pin switch	J_ATX_AT1
Digital I/O connector	10-pin header	DIO1
EC UART debug connector	4-pin header	EC_UART1
EC debug connector	5-pin header	DEBUG_SPI1
Debug connector	6-pin header	DBG_PORT1
Clear CMOS jumper	2-pin header	ME_RTC2
Clear ME jumper	2-pin header	ME_RTC1
Flash escriptor security override jumper	3-pin header	J_FLASH1
Fan connector (CPU)	4-pin wafer	CPU_FAN1
Fan connectors (system)	3-pin wafer	SYS_FAN1, SYS_FAN2
Front panel audio connector	10-pin header	AUDIO1
Front panel connector	14-pin header	F_PANEL1
I²C connector	4-pin wafer	I2C1
SMBUS connector	4-pin wafer	SMB1
LAN1 link LED connector	2-pin header	LED_LAN1
LAN2 link LED connector	2-pin header	LED_LAN2
M.2 2230 slot	A-key slot	M2_A1

Connector	Type	Label
M.2 2280 slot	M-key slot	M2_M1
PCI slots	PCI slot	PCI1, PCI2,PCI3
PCIe x4 slots	PCIe x4 slot	PCIEX4_1, PCIEX4_2, PCIEX4_3
PCIe x16 slots	PCIe x16lot	PCIEX16_1
Onboard power button	Push button	PWR_SW1
DDR4 DIMM sockets	288-pin socket	CHA_DIMM0, CHA_DIMM1, CHB_DIMM0, CHB_DIMM1
SATA 6Gb/s connectors	7-pin SATA connector	S_ATA1, S_ATA2, S_ATA3, S_ATA4,
Serial ports, RS-232	10-pin box header	COM3, COM4
Serial ports, RS-232/422/485	10-pin box header	COM5
Flash SPI ROM connector	6-pin wafer	JSPI1
Flash EC ROM connector	8-pin header	JEC2
Internal USB 2.0 connectors	8-pin header	JUSB4, JUSB5,
Internal USB 2.0 connectors	4-pin header	JUSB6
Internal USB 3.2 Gen 1 connector	19-pin box header	USB3-1

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
External HD Audio jack	Audio jacks	AUDIO_CV1

Connector	Type	Label
External USB 2.0 connector	USB 2.0	USB1
External HDMI and DP combo connector	DisplayPort, HDMI	HDMI_DP1
External dual 2.5GbE RJ-45 connector	Dual RJ45	JP1
External RS-232 and RS-422/485 combo connector	Dual DB-9	COM2
External RS-232 and VGA combo connector	DB-9 (9-pin male) VGA (15-pin female)	COM1/VGA
External dual USB 3.2 Gen 1 and dual USB 3.2 Gen 2 connector	USB 3.2 Gen1&USB 3.2 Gen 2 Type A	CON1_USB1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the IMBA-Q470.

3.2.1 CPU 12V Power Connector

CN Label: **CPU12V1**

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

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

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

This connector provides power to the CPU.

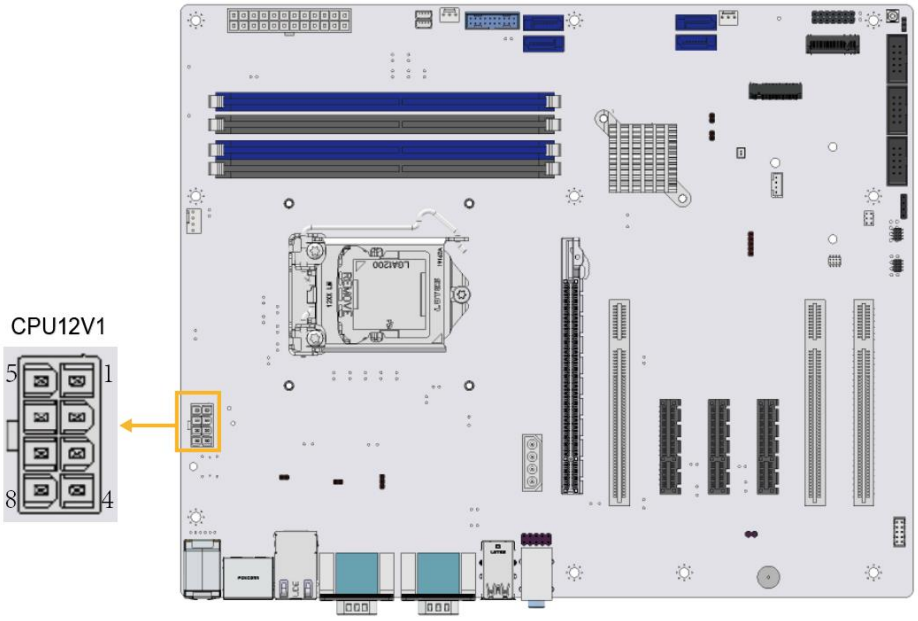


Figure 3-2: ATX CPU 12V Power Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V

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

3.2.2 PCIe Power Connector

CN Label: **ATXPWR1**

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.

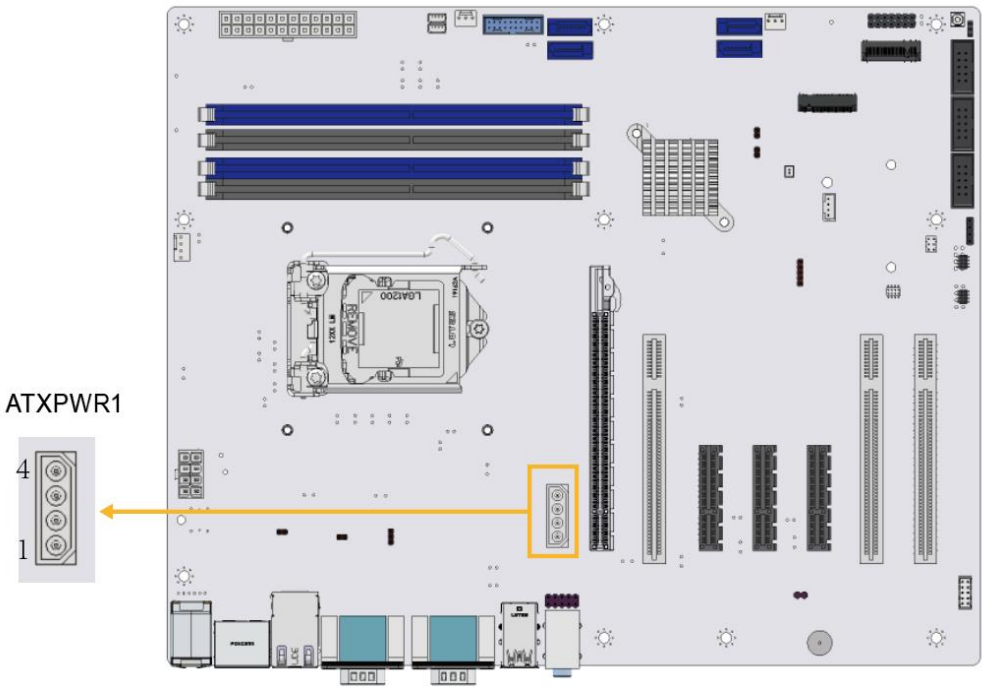


Figure 3-3: PCIe Power Connector Location

Pin	Description
1	+12V
2	GND
3	GND
4	+5V

Table 3-4: PCIe 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.

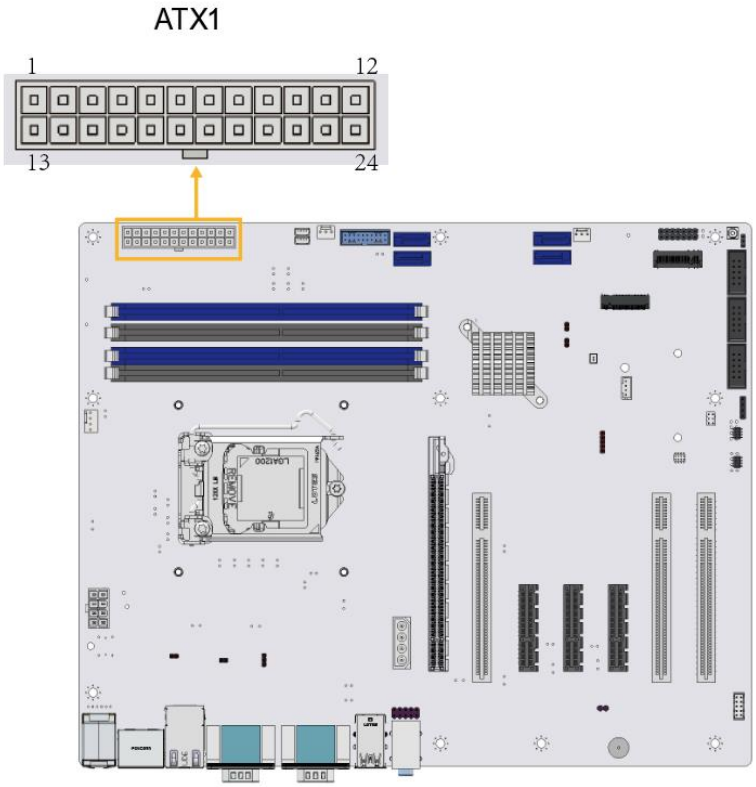


Figure 3-4: ATX Power Connector Location

Pin	Description	Pin	Description
1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	Power good	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

Table 3-5: ATX Power Connector Pinouts

3.2.4 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.

NOTE:

It is recommended to attach the RTC battery onto the system chassis in which the IMBA-Q470 is installed.

CN Label:	**BAT1**
CN Type:	2-pin header
CN Location:	See **Figure 3-5**

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.

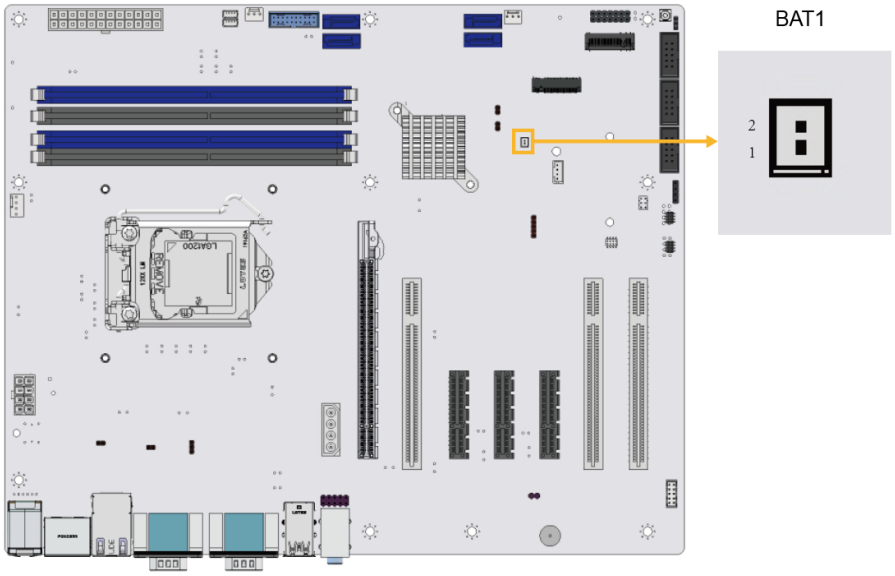


Figure 3-5: Battery Connector Location

3.2.5 Chassis Intrusion Connector

CN Label:	**CHASSIS1**
CN Type:	2-pin header, p=2.54 mm
CN Location:	See **Figure 3-6**
CN Pinouts:	See **Table 3-6**

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

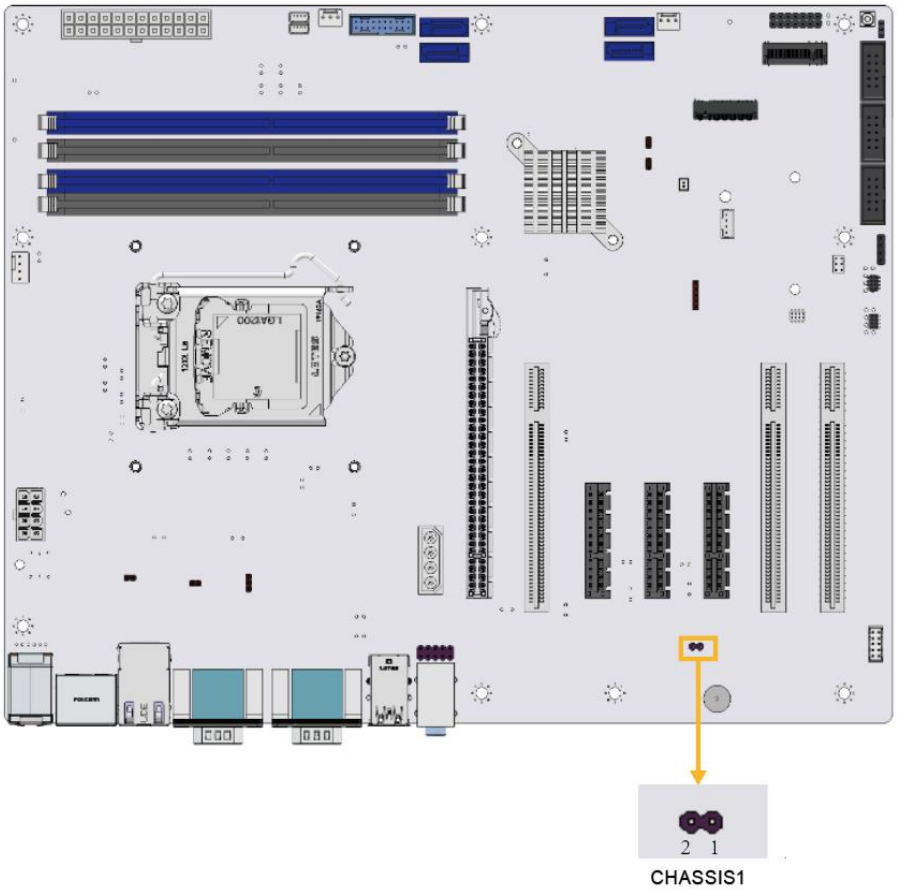


Figure 3-6: Chassis Intrusion Connector Location

Pin	Description
1	+3.3VSB
2	CHASSIS_OPEN

Table 3-6: Chassis Intrusion Connector Pinouts

3.2.6 AT/ATX Power Mode Setting

CN Label:	**J_ATX_AT1**
CN Type:	3-pin switch
CN Location:	See **Figure 3-7**
CN Pinouts:	See **Table 3-7**

The AT/ATX power mode selection is made through the AT/ATX power mode switch which is shown in Figure3-6.

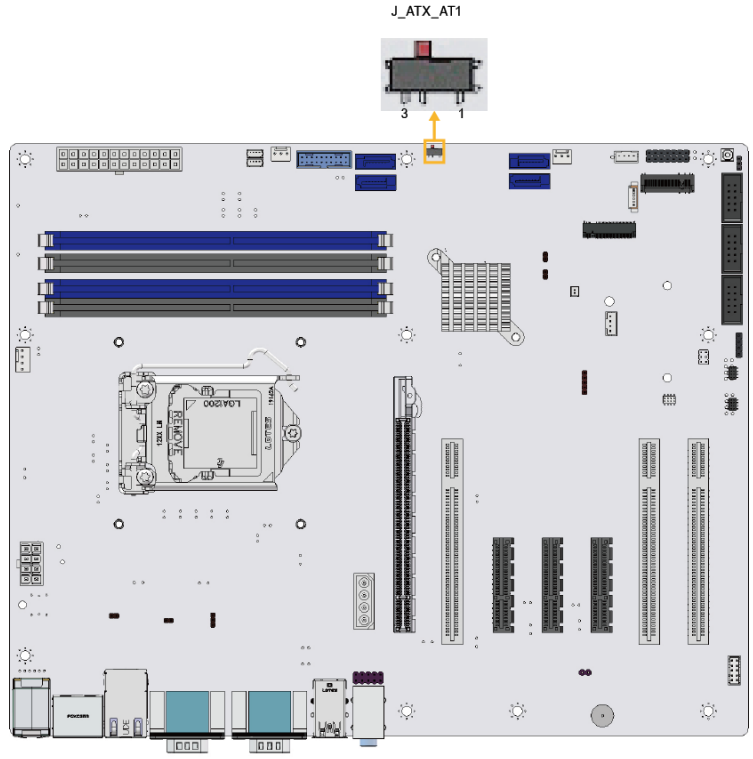


Figure 3-7: AT/ATX Power Mode Switch Locations

Pin	Description	Pin	Description
Short 1 - 2	ATX Power Mode (default)	Short 2 - 3	AT Power Mode

Table 3-7: AT/ATX Power Mode Switch Settings

3.2.7 Digital I/O Connector

CN Label: **DIO1**

CN Type: 10-pin header, p=2.0 mm

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

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

The Digital I/O connector provides programmable input and output for external devices.

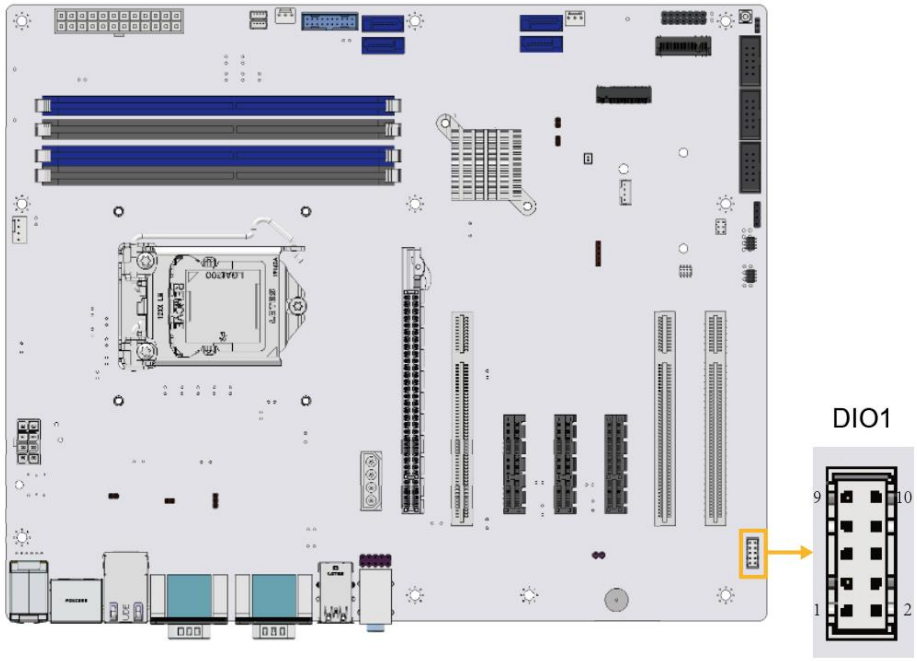


Figure 3-8: Digital I/O Connector Location

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

Table 3-8: Digital I/O Connector Pinouts

3.2.8 EC UART Debug Connector

CN Label: **EC_UART1**

CN Type: 4-pin header

CN Location: See **Figure 3-9**

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

The EC UART debug connector is used for EC debug (with UART protocol).

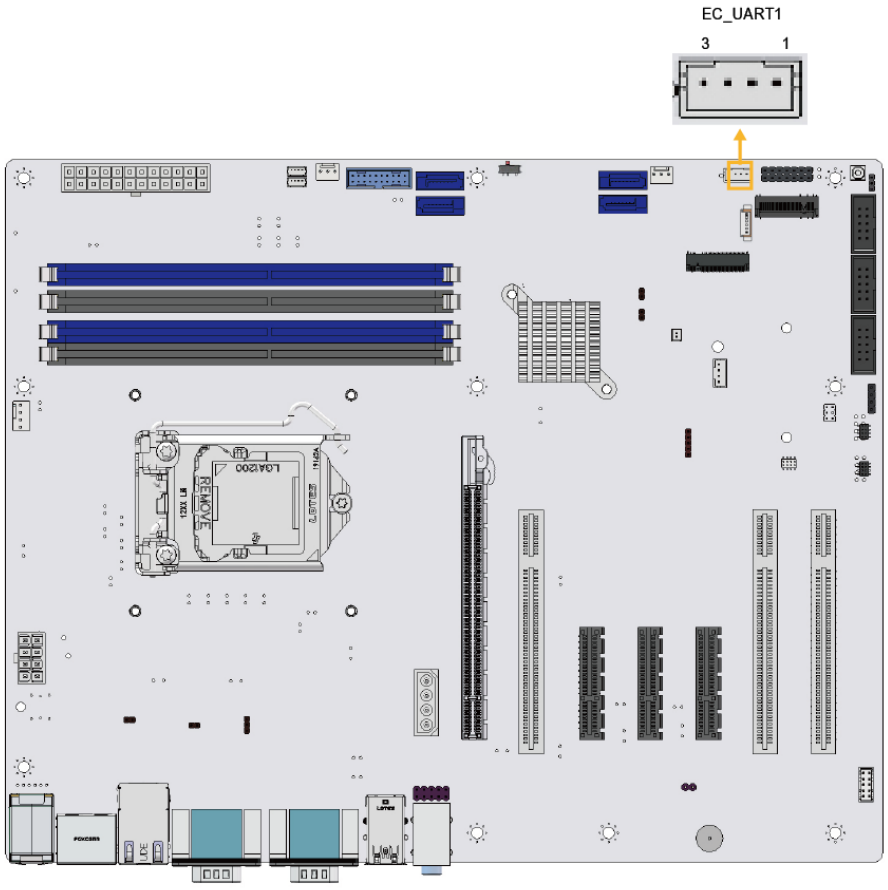


Figure 3-9: EC UART Debug Connector Location

Pin	Description	Pin	Description
1	UART_TX	2	VCC3.3
3	UART_RX	4	GND

Table 3-9: EC UART Debug Connector Pinouts

3.2.9 EC debug Connector

CN Label: **DEBUG_SPI1**

CN Type: 5-pin header, p=2 mm

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

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

The DEBUG_SPI1 connector is used for EC debug (with SPI protocol).

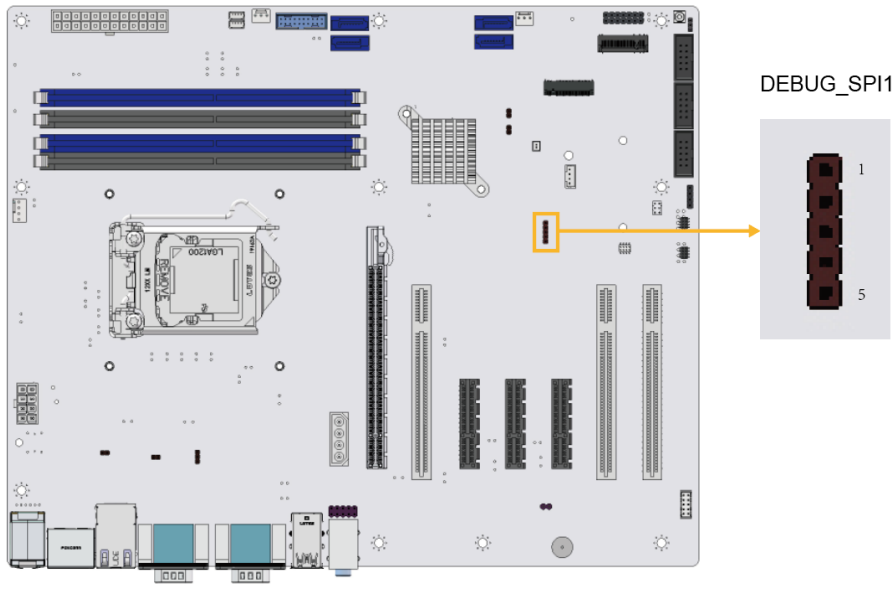


Figure 3-10: EC Debug Connector Location

Pin	Description	Pin	Description
1	GND	2	EDICS
3	EDICLK	4	EDIDI
5	EDIDO		

Table 3-10: EC Debug Connector Pinouts

3.2.10 Debug Connector

CN Label: **DBG_PORT1**

CN Type: 6-pin header, p=2 mm

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

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

The DBG_PORT1 is used for monitoring the motherboard startup process with debug card .

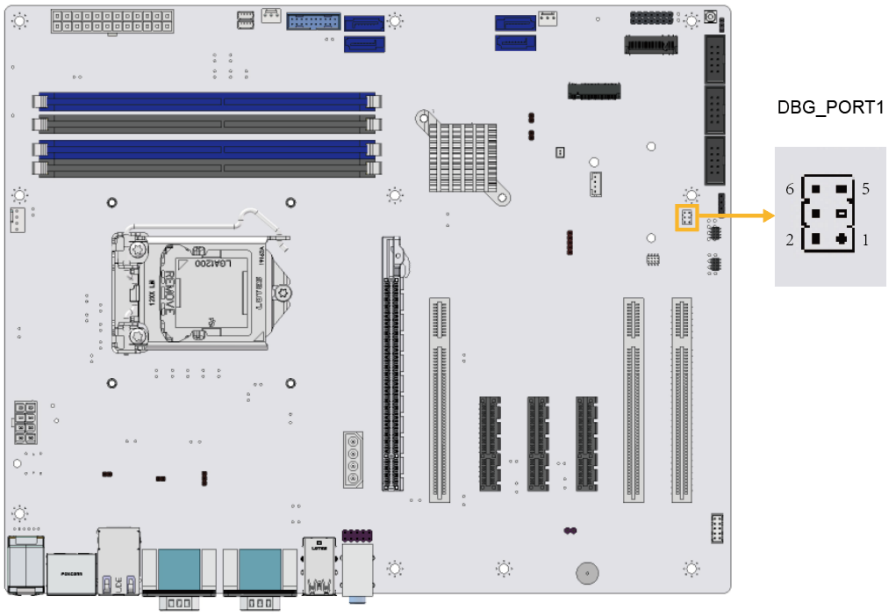


Figure 3-11: Debug Connector Location

Pin	Description	Pin	Description
1	+5V	2	SMCLK1_EC
3	NC	4	SMDAT1_EC
5	GND	6	PLTRST_N

Table 3-11: Debug Connector Pinouts

3.2.11 Clear CMOS Jumper

CN Label:	**ME_RTC2**
CN Type:	2-pin wafer, P=2.00 mm
CN Location:	See **Figure 3-12**
CN Pinouts:	See **Table 3-12**

The ME_RTC2 is used for reset PCH registers in the RTC WELL to their default value.

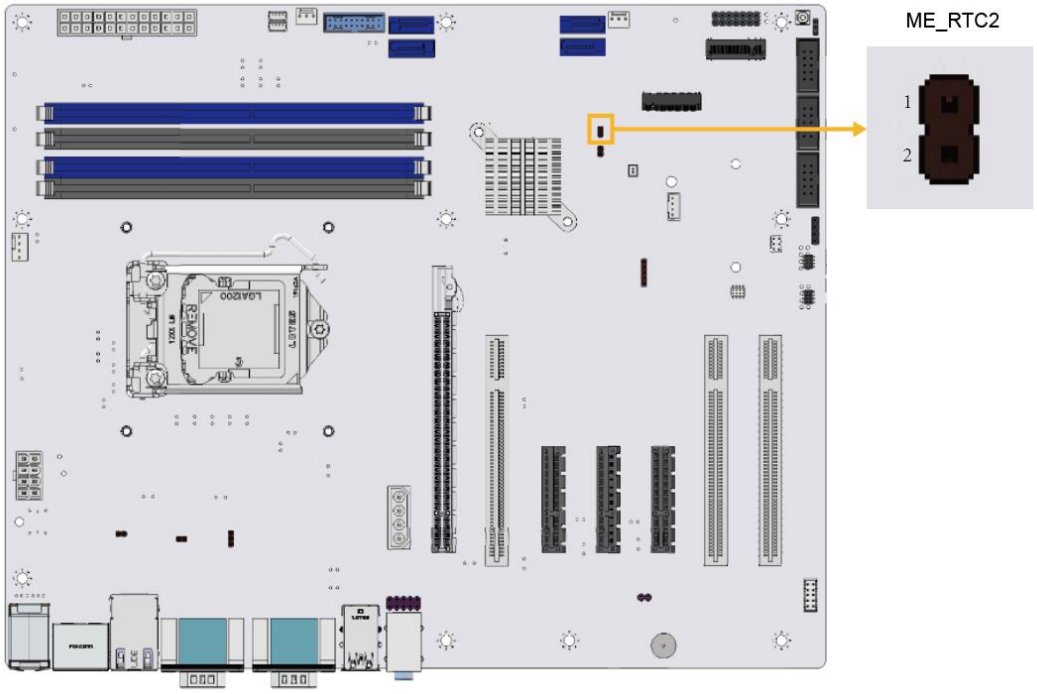


Figure 3-12: Clear CMOS Jumper Location

Pin	Description
Open (default)	Keep CMOS Setup (Normal Operation)
Short	Clear CMOS Setup

Table 3-12: Clear CMOS Jumper Pinouts

3.2.12 Clear ME Jumper

CN Label:	**ME_RTC1**
CN Type:	2-pin wafer, p=2.00 mm
CN Location:	See **Figure 3-13**
CN Pinouts:	See **Table 3-13**

The ME_RTC1 is used to reset protions of the Intel Converged Security and Management Engine.

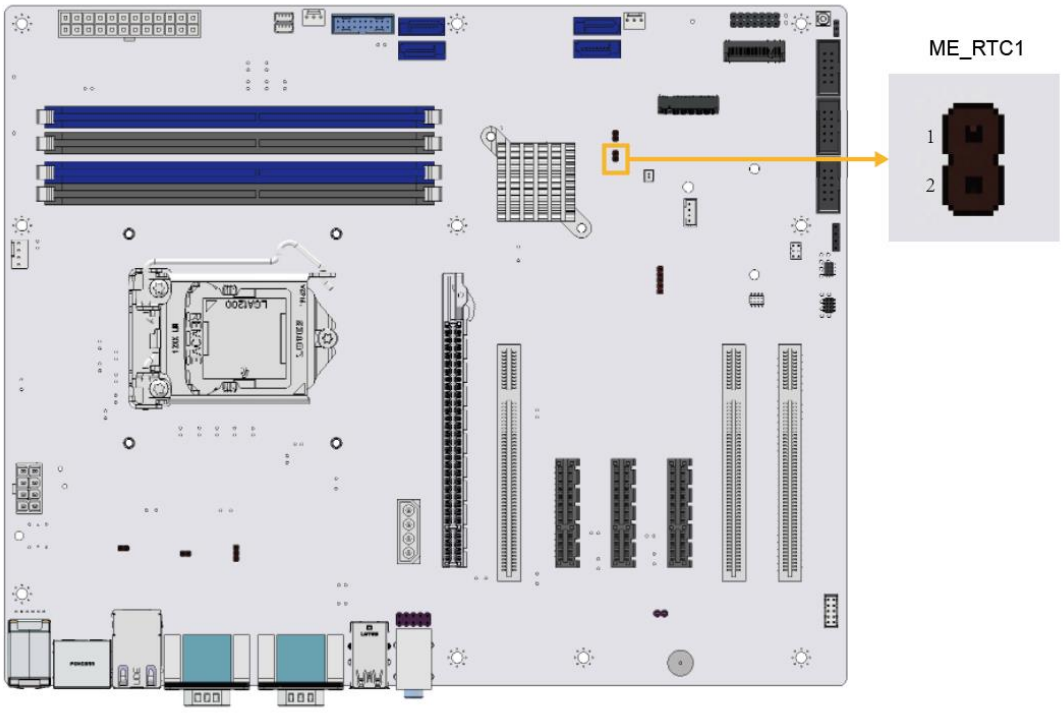


Figure 3-13: Clear ME Jumper Location

Pin	Description
Open	Keep RTC (default)
Short	Clear RTC

Table 3-13: Clear ME Jumper Pinouts

3.2.13 Flash Descriptor Security Override Jumper

CN Label:	**J_FLASH1**
CN Type:	3-pin header, p=2.00 mm
CN Location:	See **Figure 3-14**
CN Pinouts:	See **Table 3-14**

The J_FLASH1 connector is used for Flash escriptor security override jumper .

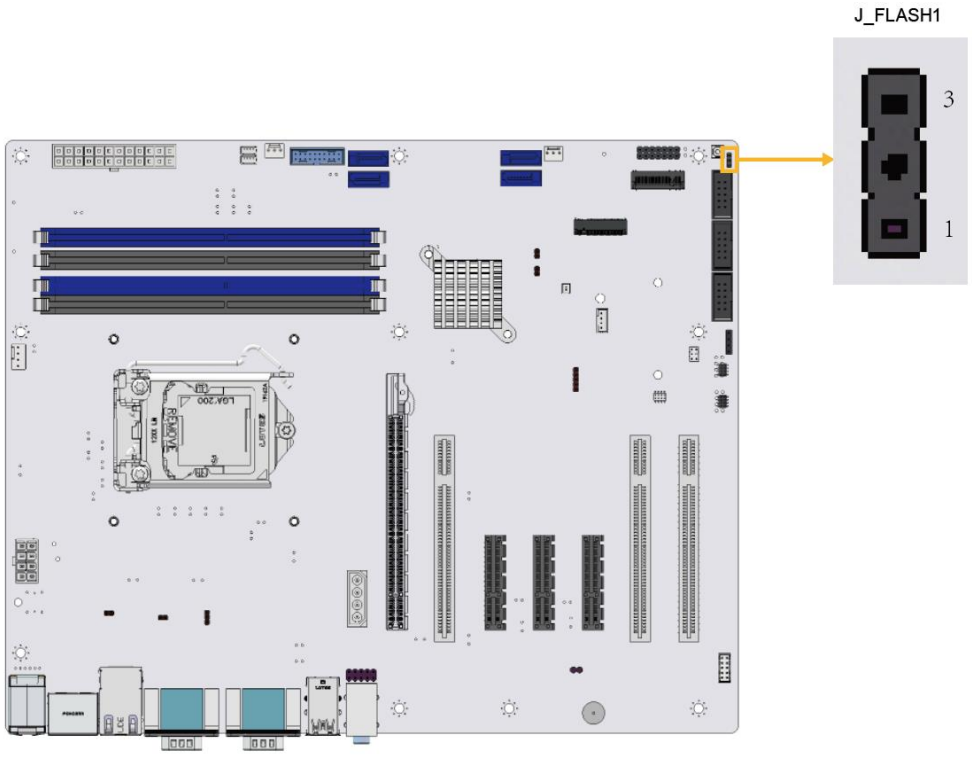


Figure 3-14: Flash Descriptor Security Override Jumper Location

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

Table 3-14: Flash Descriptor Security Override Jumper Pinouts

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.

3.2.14 Fan Connector (CPU)

CN Label:	**CPU_FAN1**
CN Type:	4-pin wafer, p=2.54 mm
CN Location:	See **Figure 3-15**
CN Pinouts:	See **Table 3-15**

The fan connector attaches to a CPU cooling fan.

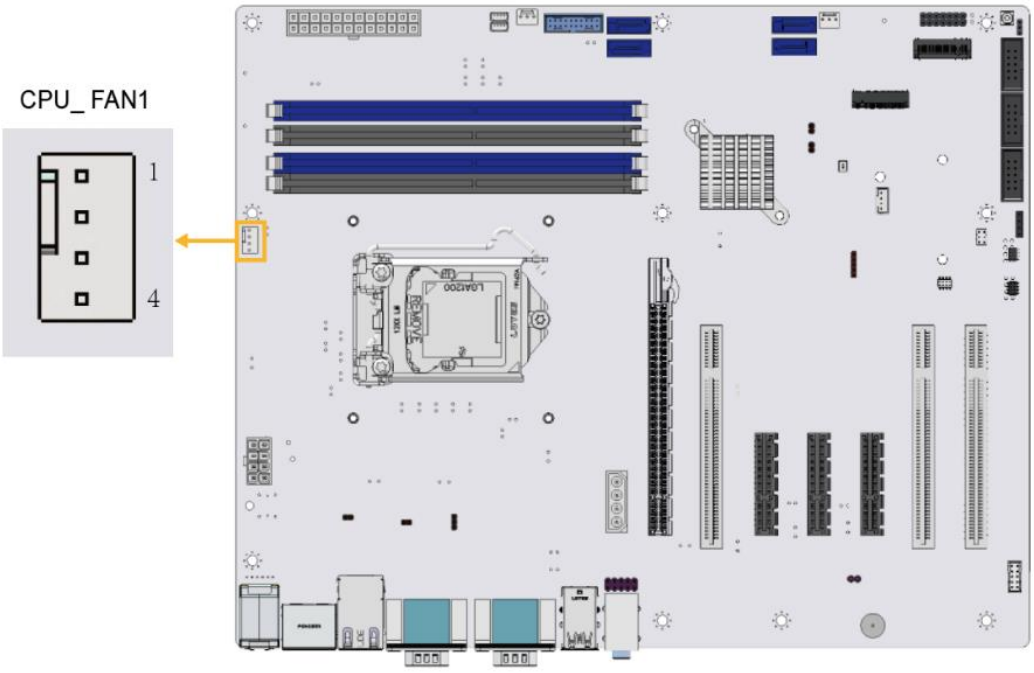


Figure 3-15: CPU Fan Connector Location

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

Table 3-15: CPU Fan Connector Pinouts

3.2.15 Fan Connectors (System)

CN Label:	**SYS_FAN1, SYS_FAN2**
CN Type:	3-pin wafer, p=2.54 mm
CN Location:	See **Figure 3-16**
CN Pinouts:	See **Table 3-16** and **Table 3-17**

Each fan connector attaches to a system cooling fan. The SYS_FAN1 provides smart fan function.

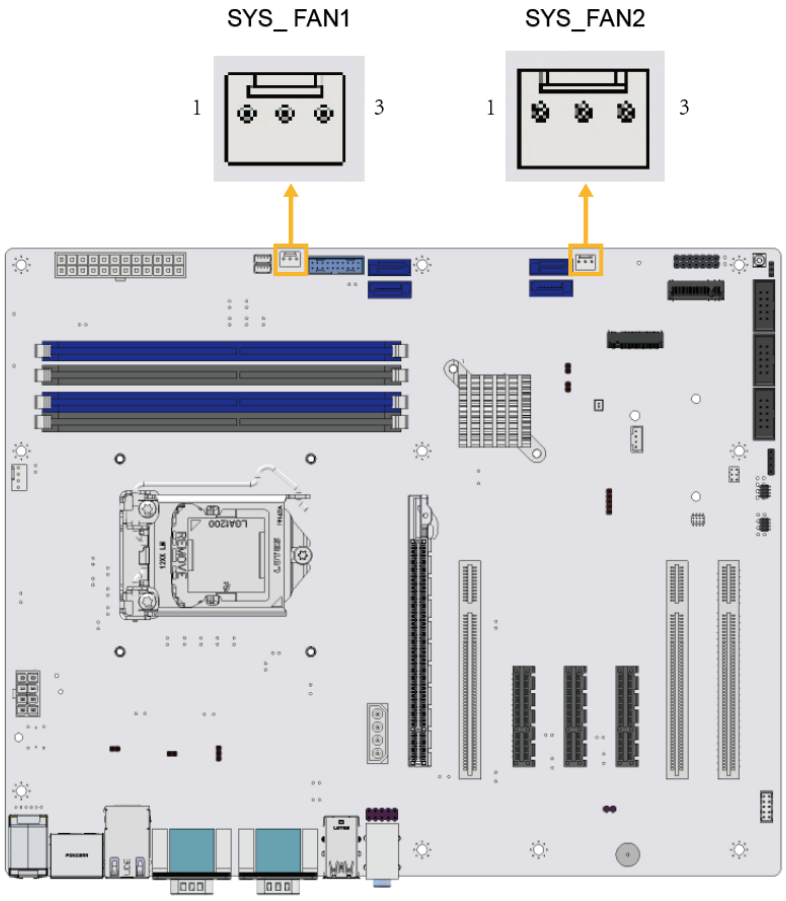


Figure 3-16: System Fan Connector Locations

Pin	Description
1	FANIO
2	PWM
3	GND

Table 3-16: System Fan (SYS_FAN1) Connector Pinouts

Pin	Description
1	NC
2	+12V
3	GND

Table 3-17: System Fan (SYS_FAN2) Connector Pinouts

3.2.16 Front Panel Audio Connector

CN Label:	**AUDIO1**
CN Type:	10-pin header, p=2.54 mm
CN Location:	See **Figure 3-17**
CN Pinouts:	See **Table 3-18**

This connector connects to speakers, a microphone and an audio input.

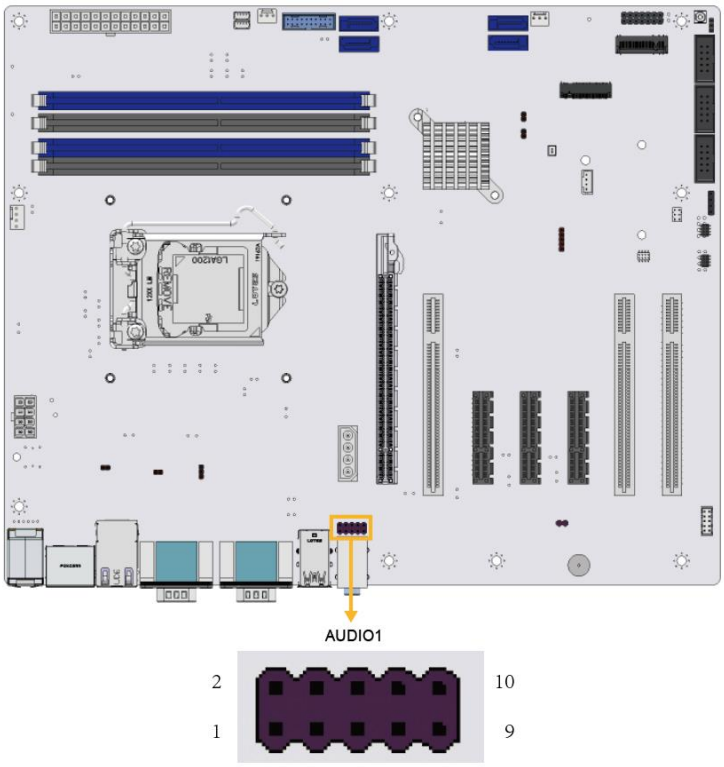


Figure 3-17: AUDIO1 Location

Pin	Description	Pin	Description
1	LMIC2-L	2	AUD_GND
3	LMIC2-R	4	PRESENCE#
5	LLINE2-R	6	MIC2-JD
7	FRONT-IO	8	NC
9	LLINE2-L	10	LINE2-JD

Table 3-18: AUDIO1 Pinouts

3.2.17 Front Panel Connector

CN Label:	**F_PANEL1**
CN Type:	14-pin header, p=2.54 mm
CN Location:	See **Figure 3-18**
CN Pinouts:	See **Table 3-19**

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

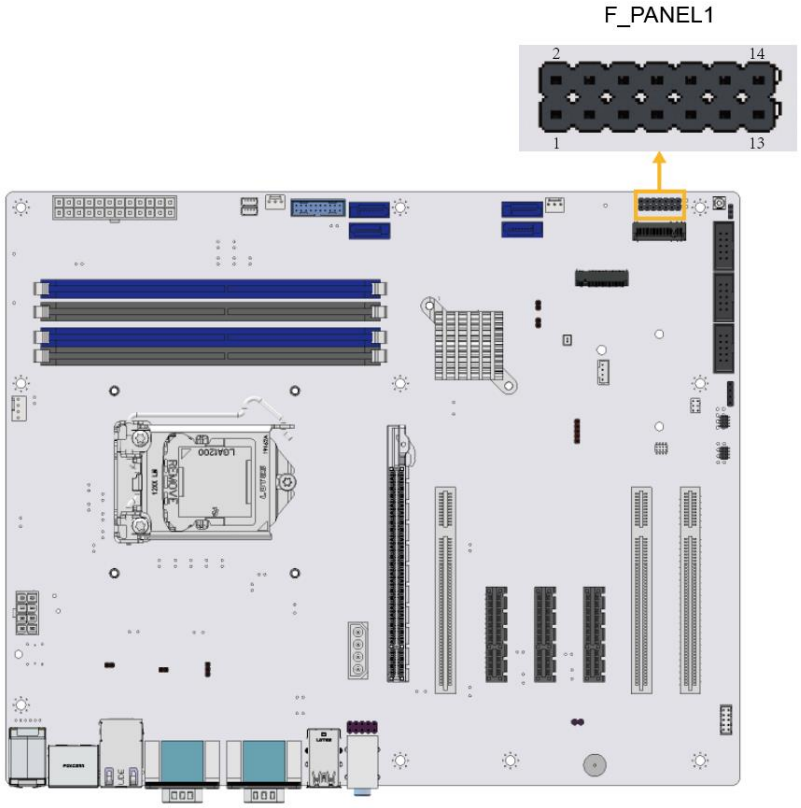


Figure 3-18: Front Panel Connector Location

Function	Pin	Description	Pin	Description	
PWR LED	1	PWR_LED+	2	BEEP_PWR	SPKR
	3	NC	4	NC	
	5	PWR_LED-	6	NC	
PWR BTN	7	PWR_BTN+	8	PC_BEEP	
	9	PWR_BTN-	10	NC	
HDD LED	11	HDD_LED+	12	RESET+	RESET
	13	HDD_LED-	14	RESET-	

Table 3-19: Front Panel Connector Pinouts

3.2.18 I²C Connector

CN Label: **I2C1**

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

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

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

The I²C connector is used to connect I²C-bus devices to the mainboard.

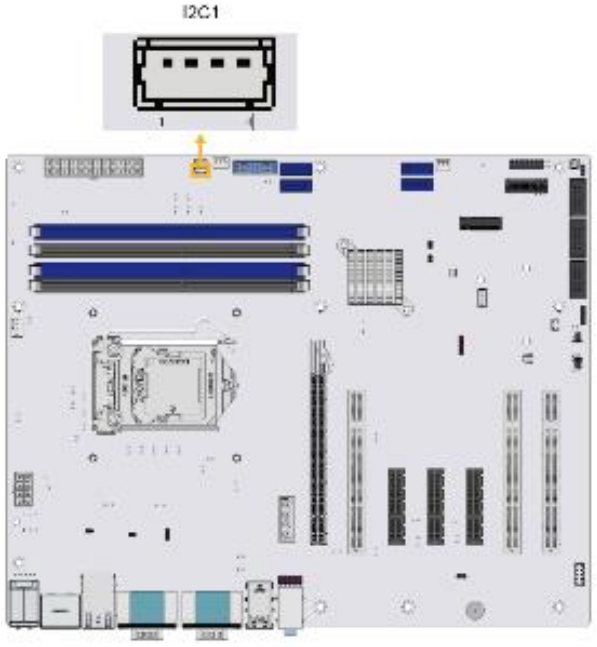


Figure 3-19: I²C Connector Location

Pin	Description	Pin	Description
1	GND	3	I2C_CLK
2	I2C_DAT	4	+5V

Table 3-20: I²C Connector Pinouts

3.2.19 SMBus Connector

CN Label: **SMB1**

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

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

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

The SMBus (System Management Bus) connector provides low-speed system management communications.

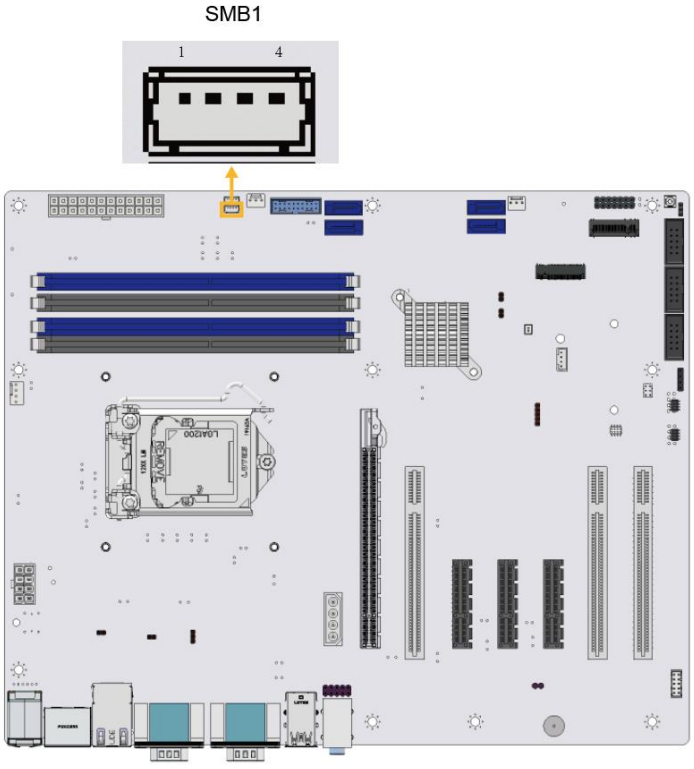


Figure 3-20: SMBus Connector Location

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

Table 3-21: SMBus Connector Pinouts

3.2.20 LAN Link LED connector

CN Label: **LED_LAN1, LED_LAN2**

CN Type: 2-pin header, p=2.00 mm

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

CN Pinouts: See **Table 3-22** and **Table 3-23**

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.

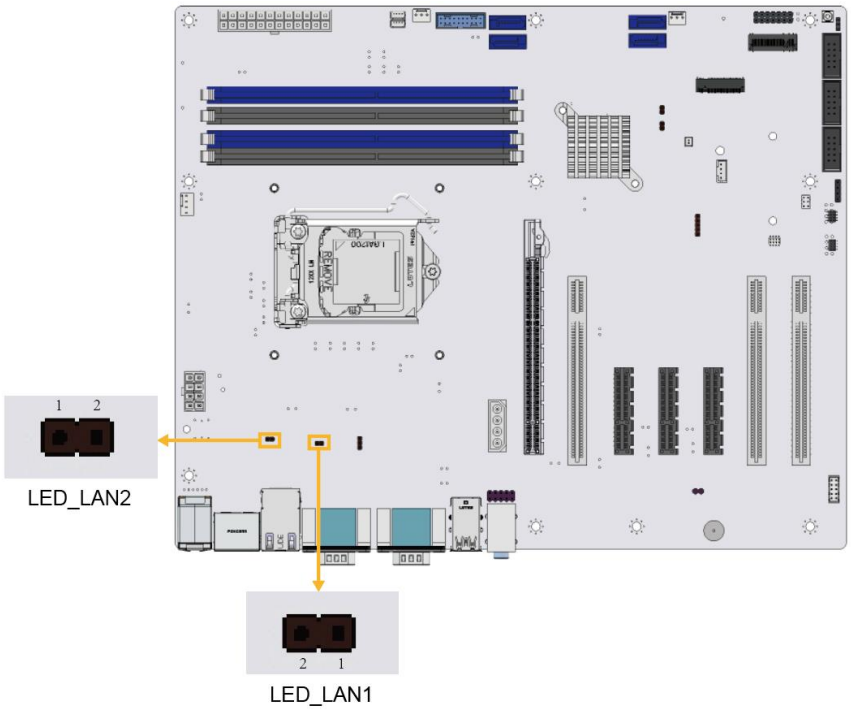


Figure 3-21: LAN LED Connector Locations

Pin	Description
1	+3.3V
2	LAN1_LED_LINK#_ACT

Table 3-22: LAN1 LED Connector (LED_LAN1) Pinouts

Pin	Description
1	+3.3V
2	LAN2_LED_LINK#_ACT

Table 3-23: LAN2 LED Connector (LED_LAN2) Pinouts

3.2.21 M.2 2230 Slot

CN Label: **M2_A1**

CN Type: A-key slot

CN Location: See **Figure 3-22**

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

The M.2 2230 slot is keyed in the A position. The M.2 slot supports PCIe x1 and USB 2.0 interfaces.

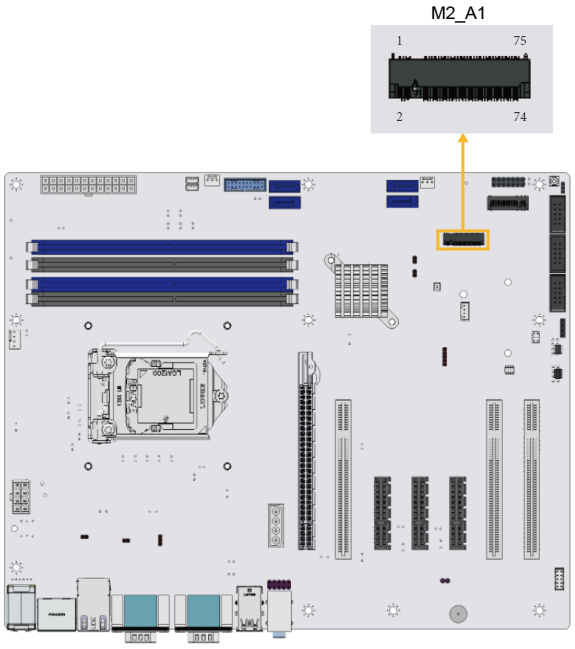


Figure 3-22: M.2 2230 Slot Location

Pin	Description	Pin	Description
1	GND	2	+3.3V
3	USB2_DP	4	+3.3V
5	USB2_DN	6	NC
7	GND	8	Module Key
9	Module Key	10	Module Key
11	Module Key	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	NC
17	NC	18	GND
19	NC	20	NC
21	NC	22	NC
23	GND	24	GND
25	NC	26	NC
27	NC	28	NC
29	GND	30	GND
31	NC	32	NC

Pin	Description	Pin	Description
33	GND	34	NC
35	PETP0	36	GND
37	PETN0	38	NC
39	GND	40	NC
41	PERP0	42	NC
43	PERN0	44	NC
45	GND	46	NC
47	PCIE_CLK+	48	NC
49	PCIE_CLK-	50	NC
51	GND	52	PLT_RST
53	CLKREQ0#	54	Pull up
55	PCIE_WAKE	56	W_DIS
57	GND	58	I2C_DAT
59	NC	60	I2C_CLK
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	+3.3V
71	NC	72	+3.3V
73	NC	74	+3.3V
75	GND		

Table 3-24: M.2 2230 Connector Pinouts

3.2.22 M.2 2280 Slot

CN Label: **M2_M1**

CN Type: M-key slot

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

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

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

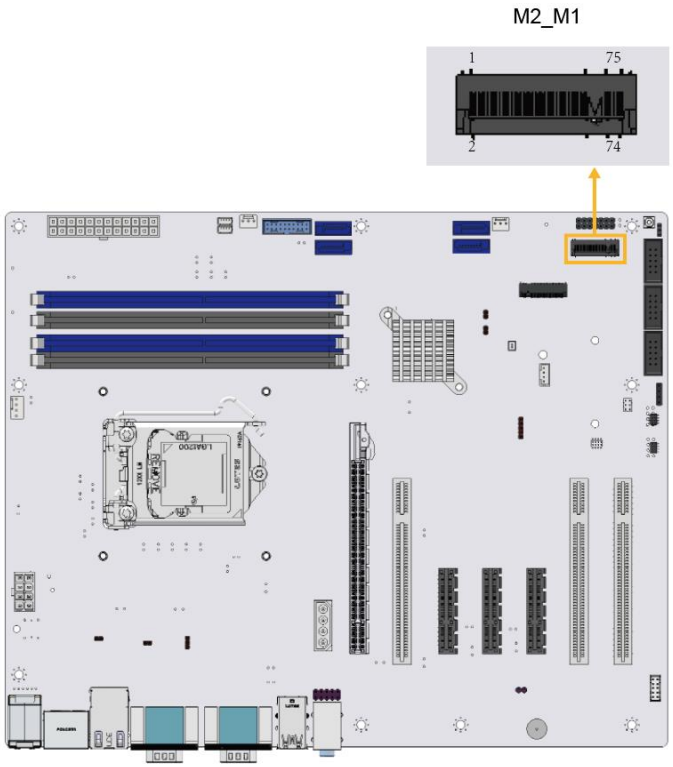


Figure 3-23: M.2 2280 Slot Location

Pin	Description	Pin	Description
1	GND	2	+3.3V
3	GND	4	+3.3V
5	PERN0	6	NC
7	PERP0	8	NC
9	GND	10	DAS/DSS#
11	PETN0	12	+3.3V
13	PETP0	14	+3.3V
15	GND	16	+3.3V
17	PERN1	18	+3.3V
19	PERP1	20	NC
21	GND	22	NC
23	PETN1	24	NC
25	PETP1	26	NC
27	GND	28	NC

Pin	Description	Pin	Description
29	PERN2	30	NC
31	PERP2	32	NC
33	GND	34	NC
35	PETN2	36	NC
37	PETP2	38	DEVSLP
39	GND	40	NC
41	PERN3	42	NC
43	PERP3	44	NC
45	GND	46	NC
47	PETN3	48	NC
49	PETP3	50	PERST#
51	GND	52	CLKREQ
53	PCIECLKN	54	PEWAKE
55	PCIECLKP	56	NC
57	GND	58	NC
59	Module Key	60	Module Key
61	Module Key	62	Module Key
63	Module Key	64	Module Key
65	Module Key	66	Module Key
67	NC	68	NC
69	PEDET	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	GND		

Table 3-25: M.2 2280 Connector Pinouts

3.2.23 PCI Slots

CN Label: **PCI1, PCI2, PCI3**

CN Type: PCI Slot

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

The PCI slot enables a PCI expansion module to be connected to the board.

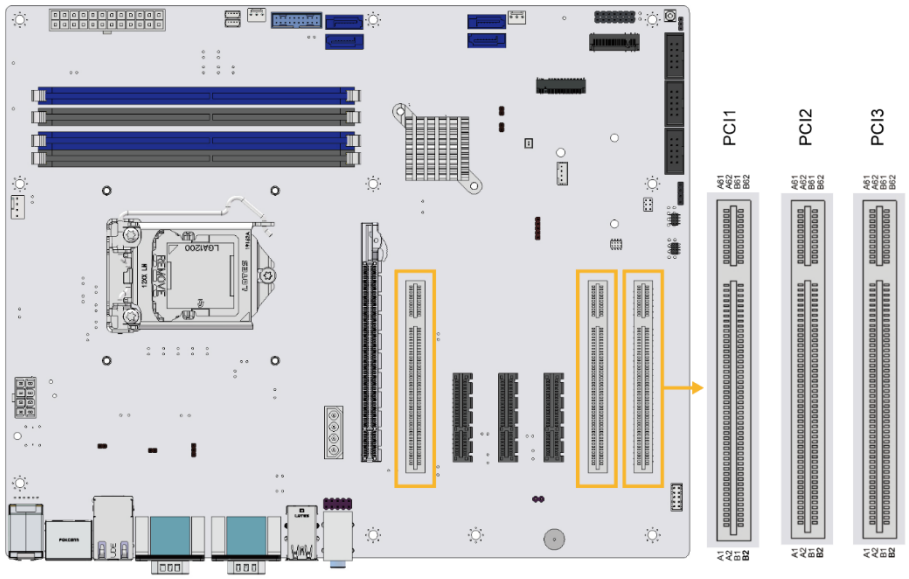


Figure 3-24: PCI Slot Locations

3.2.24 PCIe x4 Slots

CN Label: **PCIEX4_1, PCIEX4_2, PCIEX4_3**

CN Type: PCIe x4 slot

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

The PCIe x4 expansion card slots are for PCIe x4 expansion cards.

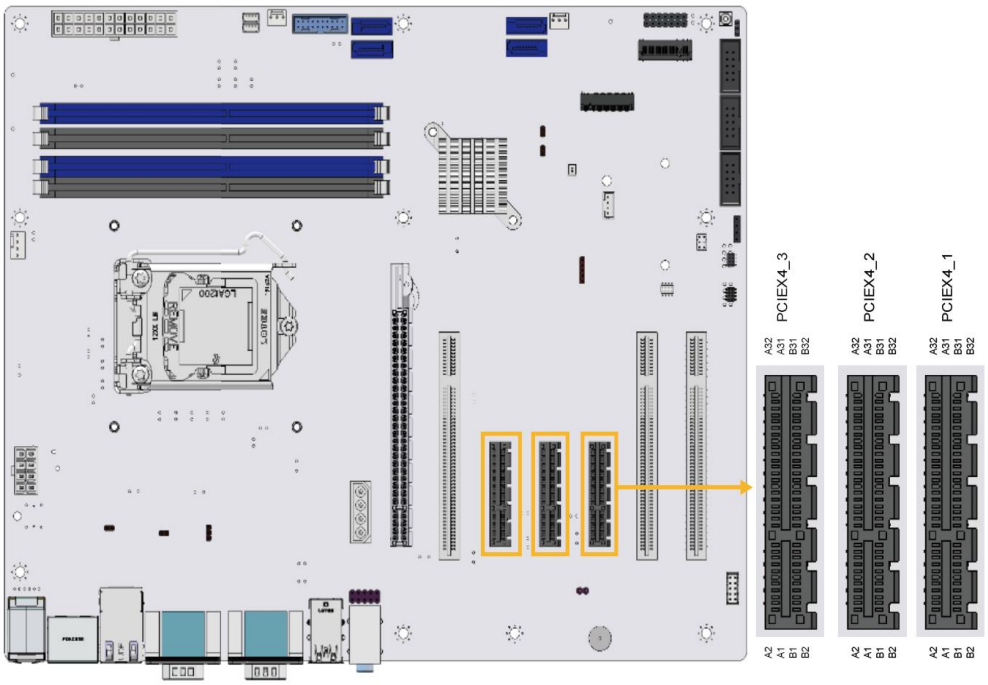


Figure 3-25: PCIe x4 Slot Locations

3.2.25 PCIe x16 slots

CN Label: **PCIEX16_1**

CN Type: PCIe x16 slot

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

The PCIe x8 expansion card slots are for PCIe x8 expansion cards.

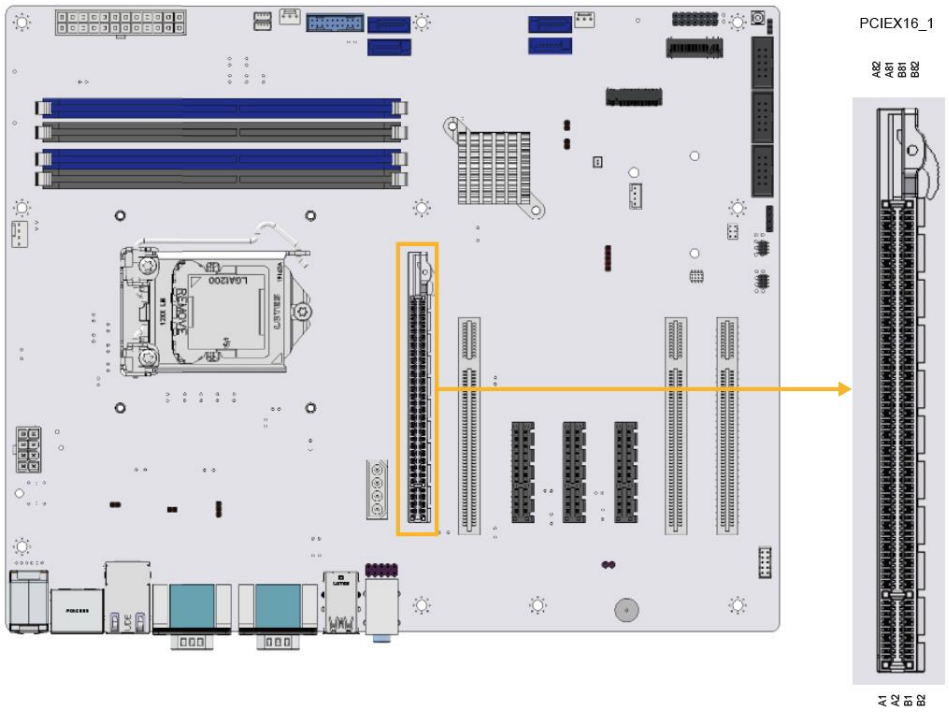


Figure 3-26: PCIe x8 Slot Locations

3.2.26 Onboard Power Button

CN Label: **PWR_SW1**

CN Type: Push button

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

The on-board power button controls system power.

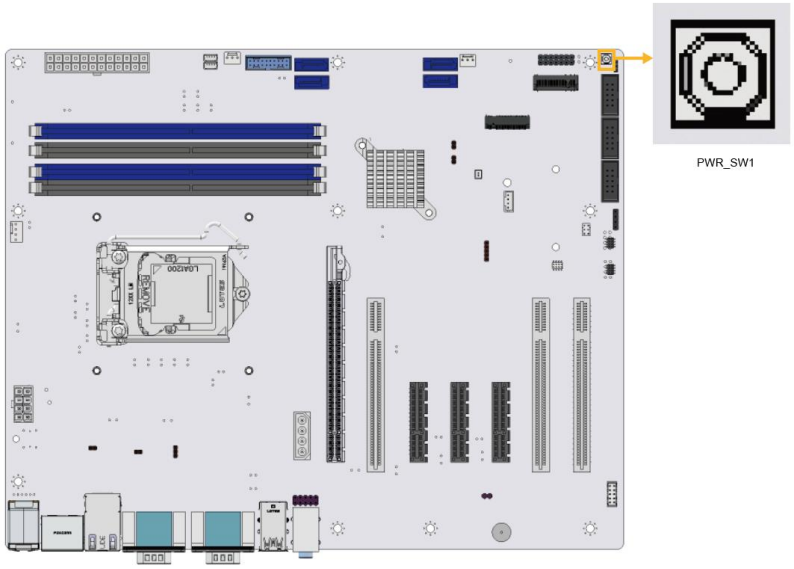


Figure 3-27: Power Button Location

3.2.27 DDR4 DIMM sockets

CN Label: **CHA_DIMM0, CHA_DIMM1, CHB_DIMM0, CHB_DIMM1**

CN Type: 288-pin socket

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

The DIMM slots are for DDR4 DIMM memory modules

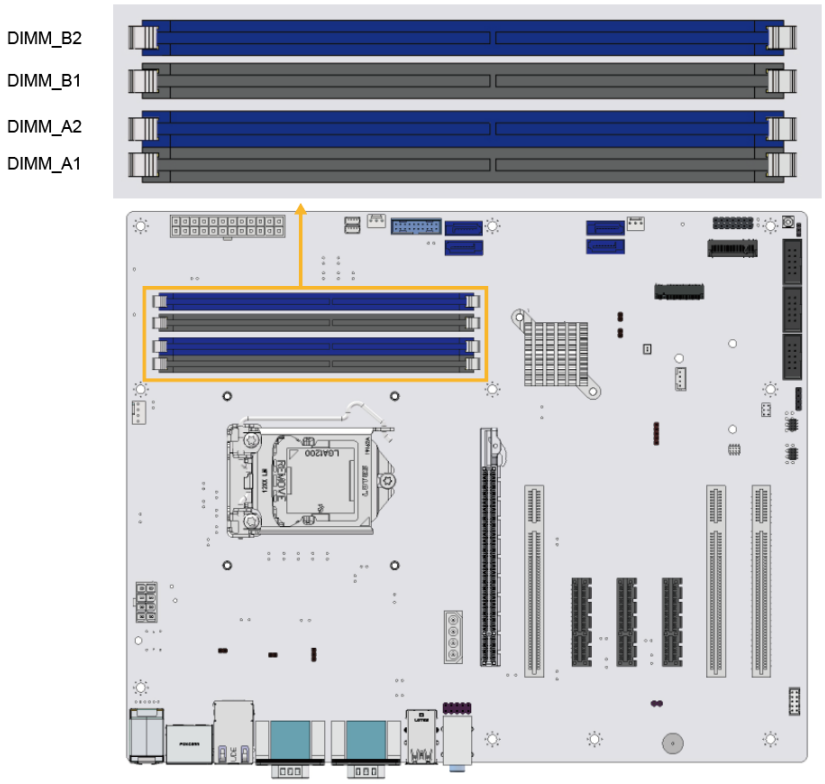


Figure 3-28: DDR4 DIMM Sockets Location

3.2.28 SATA 6Gb/s Connectors

CN Label:	**S_ATA1, S_ATA2, S_ATA3, S_ATA4**
CN Type:	7-pin SATA connector
CN Location:	See **Figure 3-29**
CN Pinouts:	See **Table 3-26**

The SATA drive connectors can be connected to SATA drives and support up to 6Gb/s data transfer rate.

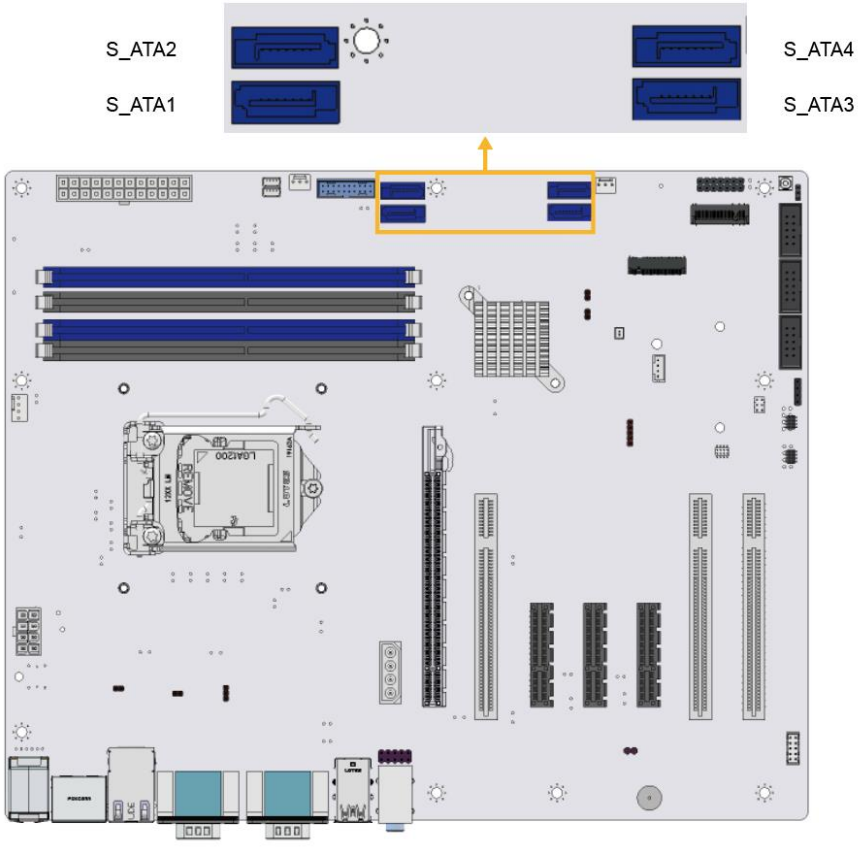


Figure 3-29: SATA 6Gb/s Connector Locations

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

Table 3-26: SATA 6Gb/s Connector Pinouts

3.2.29 Serial Port, RS-232

CN Label: **COM3, COM4**

CN Type: 10-pin box header, p=2.54 mm

CN Location: See **Figure 3-30**

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

Each of these connectors provides RS-232 connections.

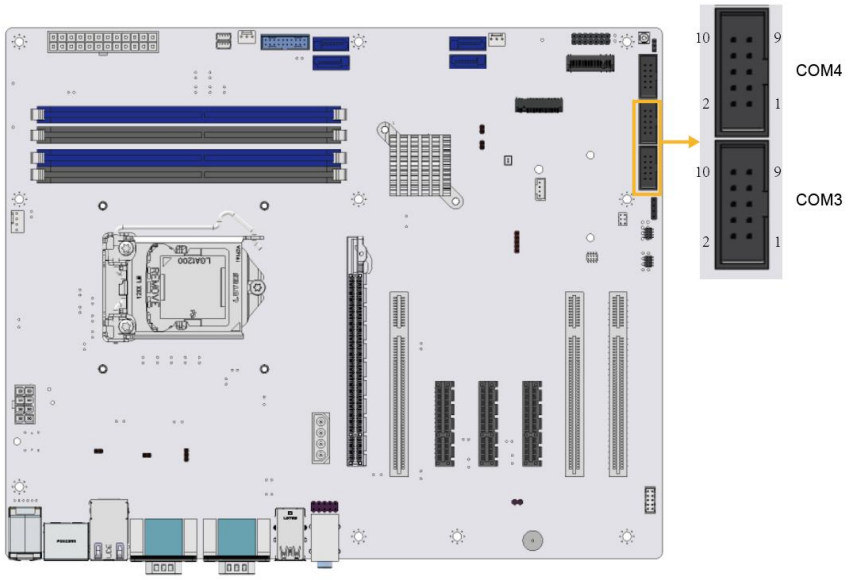


Figure 3-30: RS-232 Serial Port Connector Location

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

Table 3-27: RS-232 Serial Port Connector Pinouts

3.2.30 Serial Port , RS-232/422/485

CN Label: **COM5**

CN Type: 10-pin box header, p=2.54 mm

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

CN Pinouts: See **Table 3-28** and **Table 3-29**

Each of these connectors provides RS-232, RS-422 or RS-485 communications.

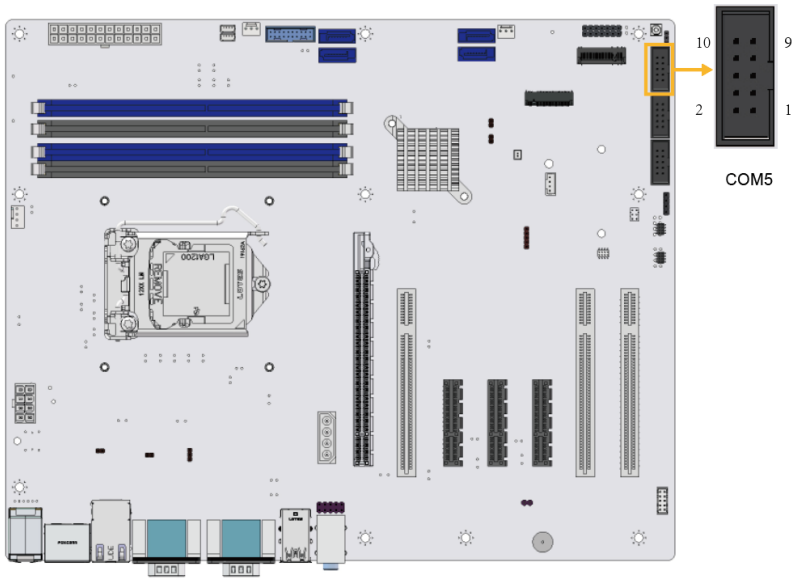


Figure 3-31: RS-232/422/485 Connector Location

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

Table 3-28: RS-232/422/485 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.

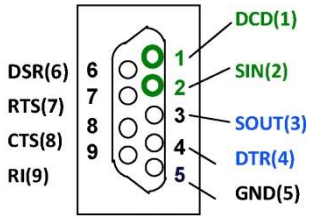
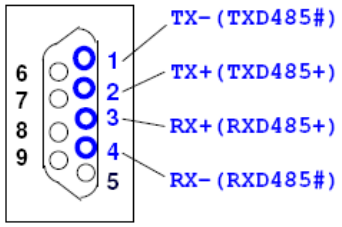
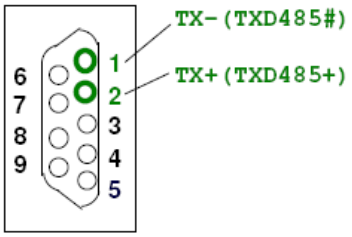
RS-232 Pinouts	RS-422 Pinouts	RS-485 Pinouts
 D-SUB 9PIN MALE MODE 01	 D-SUB 9PIN MALE MODE 00	 D-SUB 9PIN MALE MODE 10/11

Table 3-29: DB-9 RS-232/422/485 Pinouts

3.2.31 Flash SPI ROM Connector

CN Label: **JSPI1**

CN Type: 6pin header, p=1.25 mm

CN Location: See **Figure 3-32**

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

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

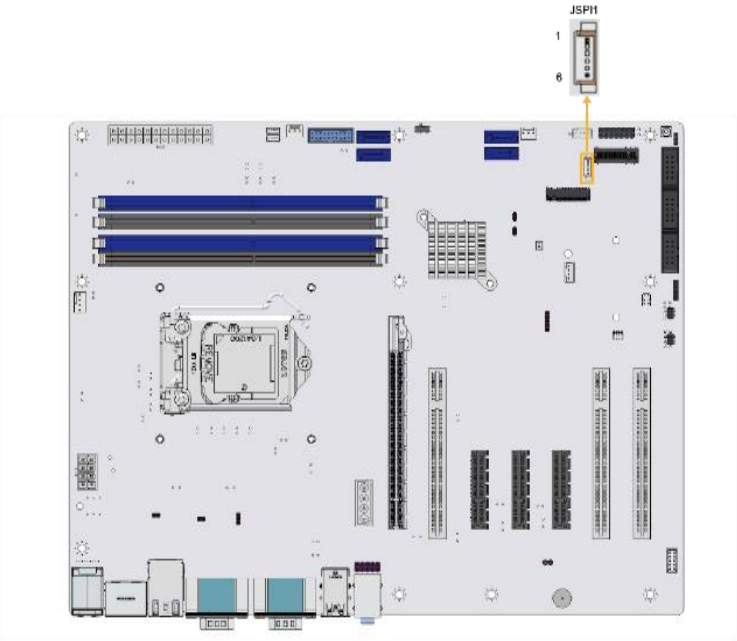


Figure 3-32: Flash SPI ROM Connector Location

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

Table 3-30: Flash SPI ROM Connector Pinouts

3.2.32 Flash EC ROM Connector

CN Label: **JEC1**

CN Type: 8-pin header, p=1.27 mm

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

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

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

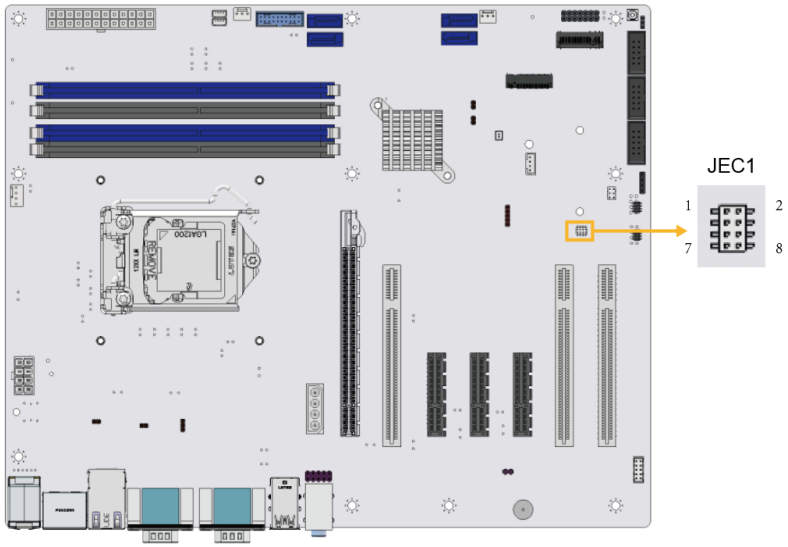


Figure 3-33: Flash EC ROM Connector Location

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

Table 3-31: Flash EC ROM Connector Pinouts

3.2.33 Internal USB 2.0 Connectors

CN Label:	**JUSB4, JUSB5**
CN Type:	8-pin header, p=2.54 mm
CN Location:	See **Figure 3-34**
CN Pinouts:	See **Table 3-32**

The Internal USB 2.0 connectors connect to USB 2.0 devices. Each pin header provides two USB 2.0 ports.

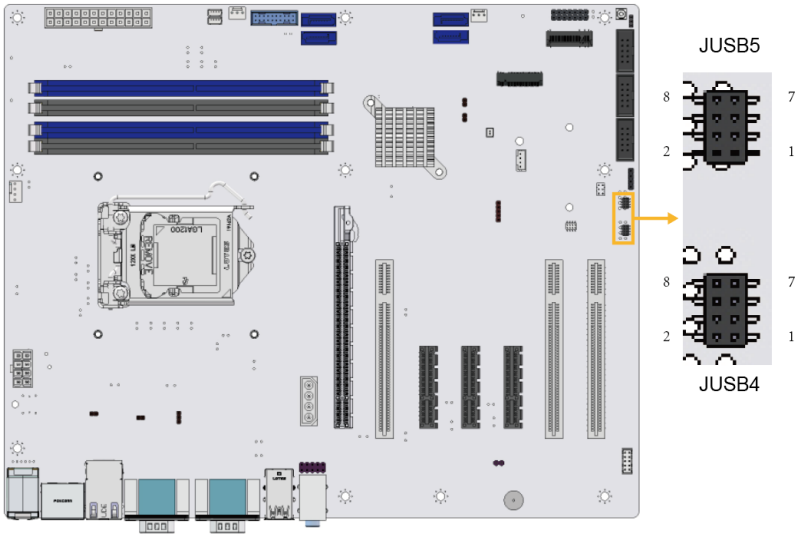


Figure 3-34: Internal USB 2.0 Connector Locations

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

Table 3-32: Internal USB 2.0 Connector Pinouts

3.2.34 Internal USB 2.0 Connector

CN Label: **JUSB6**

CN Type: 4pin header, p=2.54 mm

CN Location: See **Figure 3-35**

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

The Internal USB 2.0 connector connects to USB 2.0 devices.

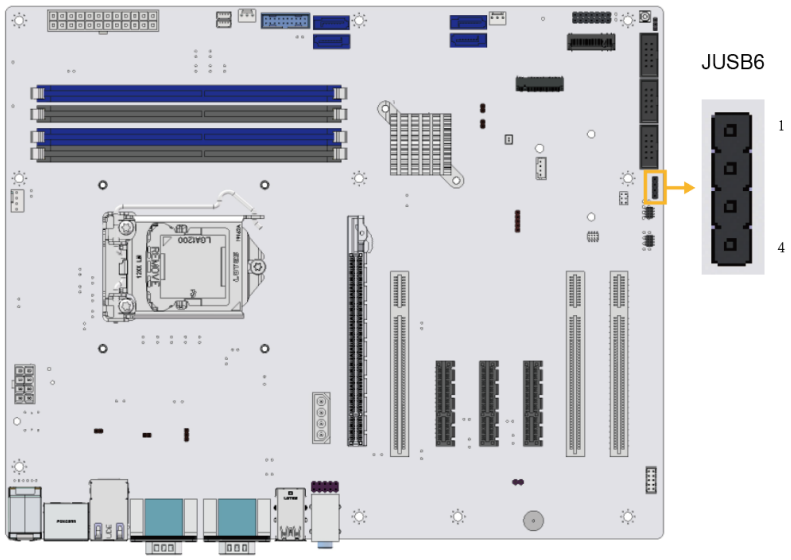


Figure 3-35: Internal USB 2.0 Connector Locations

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

Table 3-33: Internal USB 2.0 Connector Pinouts

3.2.35 Internal USB 3.2 Gen 1 Connector

CN Label: **JUSB3-1**

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

CN Location: See **Figure 3-36**

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

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

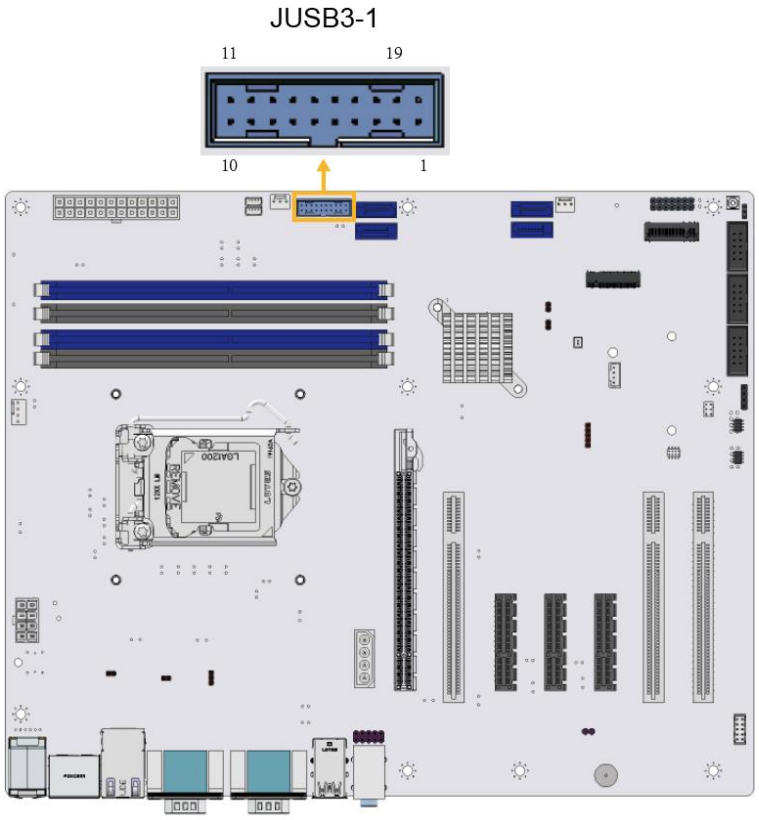


Figure 3-36: Internal USB 3.2 Gen 1 Connector Location

Pin	Description	Pin	Description
1	VCC	11	USB_DATA+
2	USB_RX-	12	USB_ DATA-
3	USB_RX+	13	GND
4	GND	14	USB3_TX+

Pin	Description	Pin	Description
5	USB3_TX-	15	USB3_ TX-
6	USB3_TX+	16	GND
7	GND	17	USB3_RX+
8	USB3_DATA-	18	USB3_RX-
9	USB3_DATA+	19	VCC
10	NC		

Table 3-34: Internal USB 3.2 Gen 1 Connector Pinouts

3.3 External Peripheral Interface Connector Panel

The figure below shows the external peripheral interface connector (EPIC) panel. The EPIC panel consists of the following:

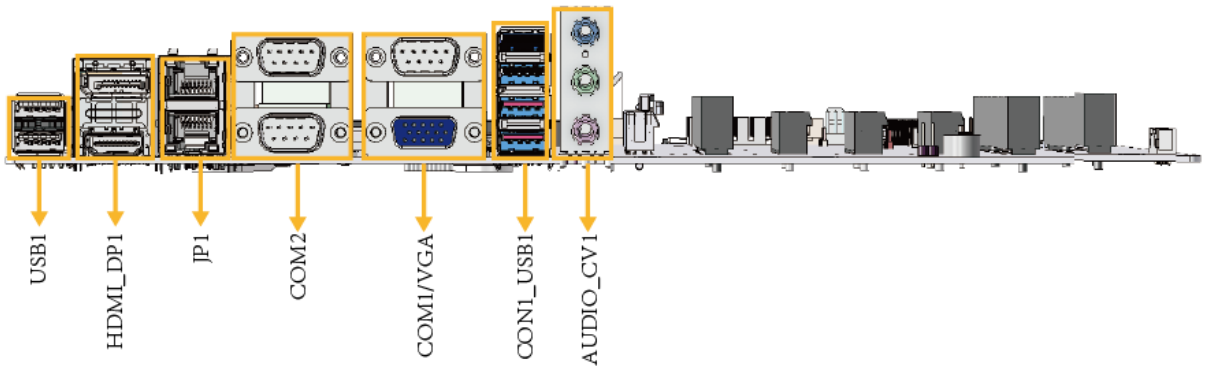


Figure 3-37: External Peripheral Interface Connector

3.3.1 External HD Audio jack

CN Label: **AUDIO_CV1**

CN Type: Audio jacks

CN Location: See **Figure 3-38**

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.

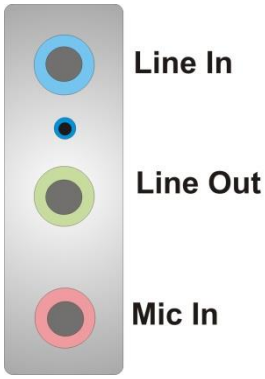


Figure 3-38: Audio Connector

3.3.2 External USB 2.0 Connector

CN Label:	**USB1**
CN Type:	USB 2.0
CN Location:	See **Figure 3-39**
CN Pinouts:	See **Table 3-35**

There are two external USB 2.0 connectors on the IMBA-Q470. The USB 2.0 connector can be connected to a USB 2.0/1.1 device

Figure 3-39: USB 2.0 Connector

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

Table 3-35: USB 2.0 Port Pinouts

3.3.3 External HDMI And DP Combo Connector

CN Label: **HDMI_DP1**

CN Type: HDMI, DisplayPort

CN Location: See **Figure 3-40** and **Figure 3-41**

CN Pinouts: See **Table 3-36**and **Table 3-37**

The HDMI connector can connect to an HDMI device.

Pin	Description	Pin	Description
21	HDMI_DATA2	31	GND
22	GND	32	HDMI_CLK#
23	HDMI_DATA2#	33	N/C
24	HDMI_DATA1	34	N/C
25	GND	35	HDMI_SCL
26	HDMI_DATA1#	36	HDMI_SDA
27	HDMI_DATA0	37	GND
28	GND	38	+5V
29	HDMI_DATA0#	39	HDMI_HPD
30	HDMI_CLK		

Table 3-36: HDMI Connector Pinouts

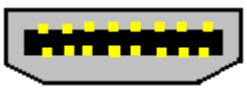


Figure 3-40: HDMI Connector

The DP++ connector connects to a display device with DisplayPort interface.

Pin	Description	Pin	Description
1	LANE0P	11	GND
2	GND	12	LANE3N
3	LANE0N	13	AUX_CTRL_DET_C
4	LANE1P	14	GND
5	LANE1N	15	AUXP
6	GND	16	GND
7	LANE2P	17	AUXN
8	GND	18	HPD
9	LANE2N	19	GND
10	LANE3P	20	+5V

Table 3-37: DP++ Connector Pinouts

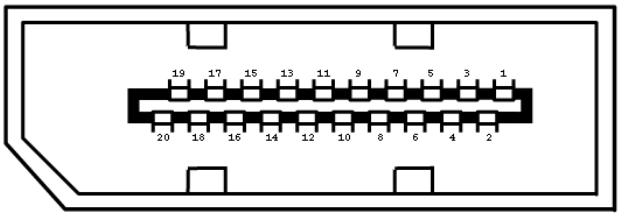


Figure 3-41: DP++ Connector

3.3.4 External Dual 2.5GbE RJ-45 Connector

CN Label: **JP1**

CN Type: Dual RJ45

CN Location: See **Figure 3-42**

CN Pinouts: See **Table 3-38**

The dual 2.5GbE RJ-45 connector support 10/100/1000/2500Mb/s data rate

PIN	DESCRIPTION	PIN	DESCRIPTION
A1	LAN1_MDI0P	B1	LAN1_MDI0P
A2	LAN1_MDI0N	B2	LAN1_MDI0N
A3	LAN1_MDI1P	B3	LAN1_MDI1P
A4	LAN1_MDI1N	B4	LAN1_MDI1N
A5	LAN1_MDI2P	B5	LAN1_MDI2P
A6	LAN1_MDI2N	B6	LAN1_MDI2N
A7	LAN1_MDI3P	B7	LAN1_MDI3P
A8	LAN1_MDI3N	B8	LAN1_MDI3N
A9	Connect 0.1uf	B9	Connect 0.1uf
A10	GND	B10	GND
AL1	2.5G_LED	BL1	2.5G_LED
AL2	1G_LED	BL2	1G_LED
AL3	ACT_LED	BL3	ACT_LED
AL4	+3.3V	BL4	+3.3V

Table 3-38: Dual RJ45 Pinouts

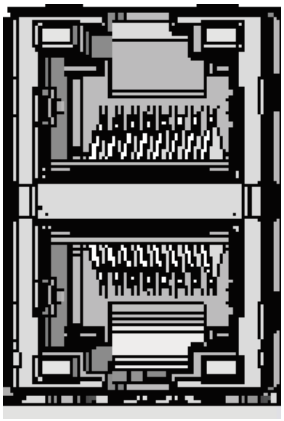


Figure 3-42: Dual RJ45 connector

3.3.5 VGA And RS-232 Connectors

CN Label: **VGACOM1**

CN Type: 15-pin VGA and 9-pin COM

CN Location: See **Figure 3-43** and **Figure 3-444**

CN Pinouts: See **Table 3-39** and **Table 3-40**

The COM connector (COM1) connects to a serial device that supports RS-232 communication.

Pin	Description	Pin	Description
1	DCD1	6	DSR1
2	RXD1	7	RTS1
3	TXD1	8	CTS1
4	DTR1	9	RI1
5	GND1		

Table 3-39: COM1 Connector Pinouts

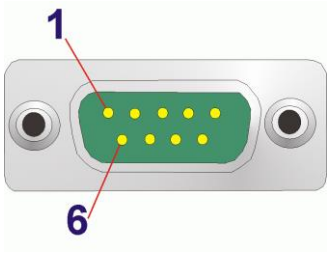


Figure 3-43: COM1 Serial Port Pinout Locations

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
V1	RED	V2	GREEN
V3	BLUE	V4	NC
V5	GND	V6	Hot plug detect
V7	GND	V8	GND
V9	VCC	V10	GND
V11	NC	V12	DDCDA
V13	HSYNC	V14	VSYNC
V15	DDCCLK		

Table 3-40: VGA Connector Pinouts

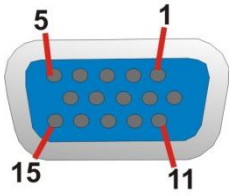


Figure 3-44: VGA Connector

3.3.6 External RS-232 And RS-422/485 Combo Connector

CN Label: **COM2**

CN Type: Dual DB-9

CN Location: See **Figure 3-45**

CN Pinouts: See **Table 3-41** and **Table 3-42**

The COM connector (COM2) connects to a serial device that supports RS-232 communication.

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD1	6	DSR1
2	RXD1	7	RTS1
3	TXD1	8	CTS1
4	DTR1	9	RI1
5	GND1		

Table 3-41: External RS-232 Connector Pinouts

The COM connector (COM6) connects to a serial device that supports RS-422/485 communication.

PIN	DESCRIPTION	PIN	DESCRIPTION
12	RS422TX-/RS485D-	17	NC
13	RS422TX+/RS485D+	18	NC
14	RS422RX+	19	NC
15	RS422RX-	20	NC
16	GND		

Table 3-42: External RS-422/485 Connector Pinouts

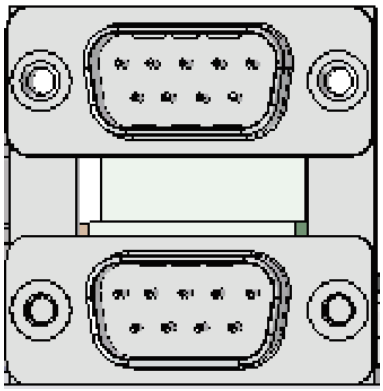


Figure 3-45: Dual DB-9

3.3.7 External Dual USB 3.2 Gen 1 And Dual USB 3.2 Gen 2 Connector

CN Label:	**CON1_USB1**
CN Type:	USB 3.2 Gen1&USB 3.2 Gen 2 Type A
CN Location:	See **Figure 3-46**
CN Pinouts:	See **Table 3-43**

There are four external USB 3.2 connectors on the IMBA-Q470.The CON1_USB1 connector supports dual USB 3.2 Gen 2(10Gb/s) and dual USB 3.2 Gen 1（5Gb/s）. The red connector is USB 3.2 Gen 2, and the blue one is USB 3.2 Gen1.

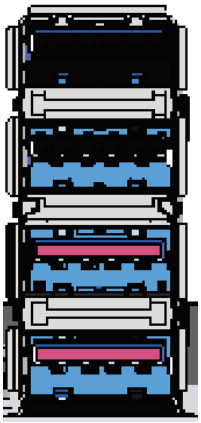


Figure 3-46: USB 3.2 Gen1&USB 3.2 Gen 2 Type A

PIN	DESCRIPTION	PIN	DESCRIPTION
A1	VCC	C1	VCC
A2	USB_DATA-	C2	USB_DATA-
A3	USB_DATA+	C3	USB_ DATA+
A4	GND	C4	GND
A5	USB3_RX-	C5	USB3_RX-
A6	USB3_RX+	C6	USB3_ RX+
A7	GND	C7	GND
A8	USB3_TX-	C8	USB3_TX-
A9	USB3_TX+	C9	USB3_TX+
B1	VCC	D1	VCC
B2	USB_DATA-	D2	USB_DATA-
B3	USB_DATA+	D3	USB_ DATA+
B4	GND	D4	GND
B5	USB3_RX-	D5	USB3_RX-
B6	USB3_RX+	D6	USB3_ RX+
B7	GND	D7	GND
B8	USB3_TX-	D8	USB3_TX-
B9	USB3_TX+	D9	USB3_TX+

Table 3-43: External Dual USB 3.2 Gen 1 And Dual USB 3.2 Gen 2 Connector Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the IMBA-Q470 may result in permanent damage to the IMBA-Q470 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IMBA-Q470. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IMBA-Q470 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 IMBA-Q470, place it on an anti-static pad. This reduces the possibility of ESD damaging the IMBA-Q470.
- ***Only handle the edges of the PCB***:-: When handling the PCB, hold the PCB by the edges.

4.2 Internal Peripheral Device Connections

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

4.2.1 SATA Drive Connection

The IMBA-Q470 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 4-1**.

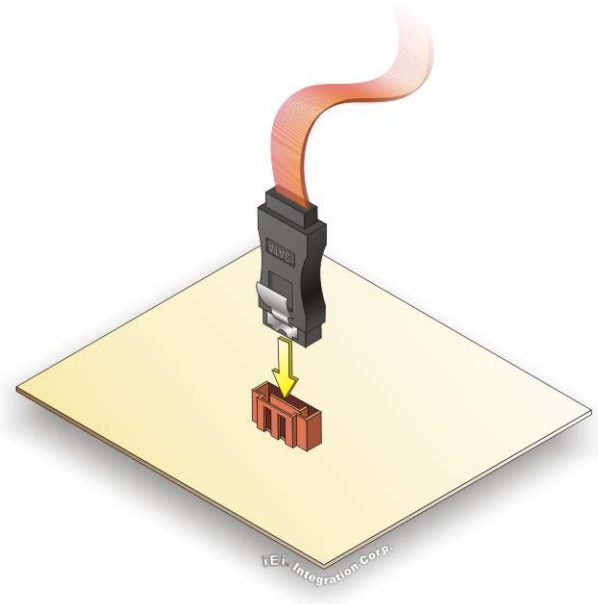


Figure 4-1: SATA Drive Cable Connection

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 4-2**.

Step 4: **Connect the SATA power cable**. Connect the SATA power connector to the back of the SATA drive. See **Figure 4-2**.

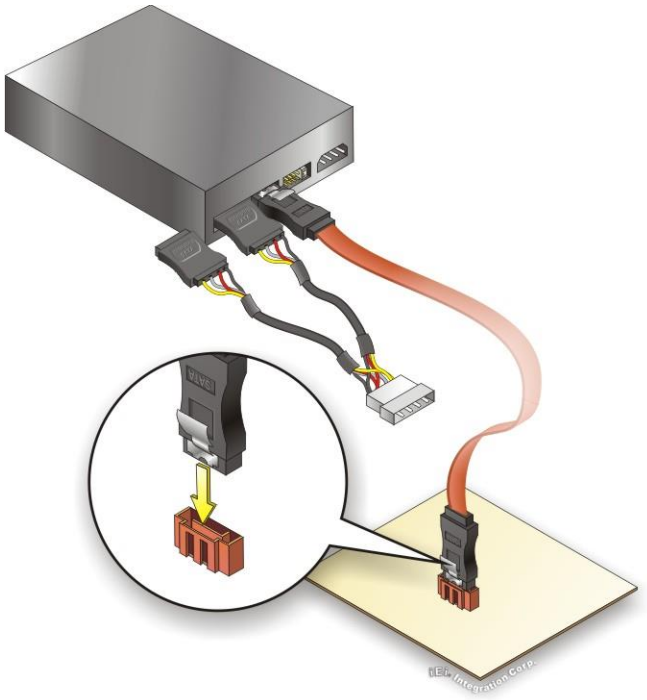


Figure 4-2: SATA Power Drive Connection

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

4.3 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 IMBA-Q470 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 IMBA-Q470 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 IMBA-Q470 off:
  - When working with the IMBA-Q470, 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 IMBA-Q470, **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.

4.4 Socket LGA1200 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 4-3.**

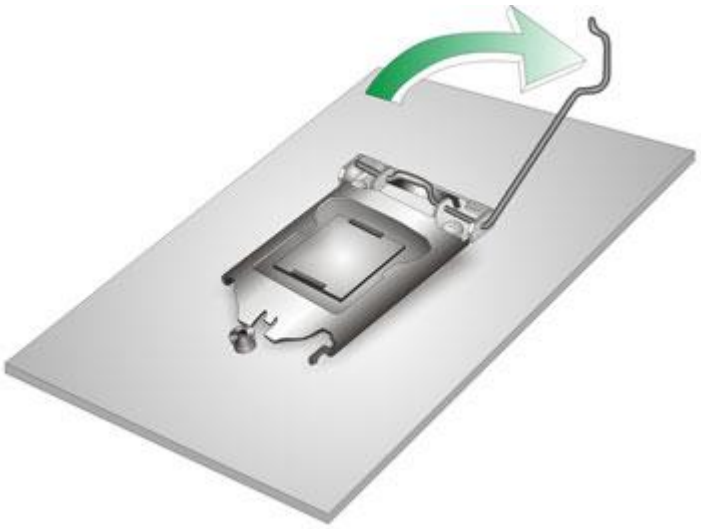


Figure 4-3: Disengage The CPU Socket Load Lever

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 4-4**.

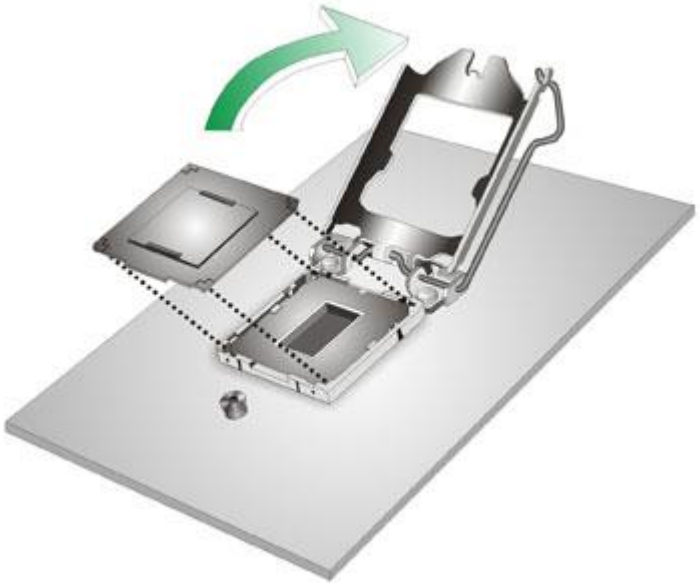


Figure 4-4: Remove Protective Cover

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 4-5.**

Figure 4-5: Insert The Socket LGA1200 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 4-6**). There will be some resistance, but will not require extreme pressure.

Figure 4-6: Close The Socket LGA1200

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

4.5 Socket LGA1200 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 4-7.**

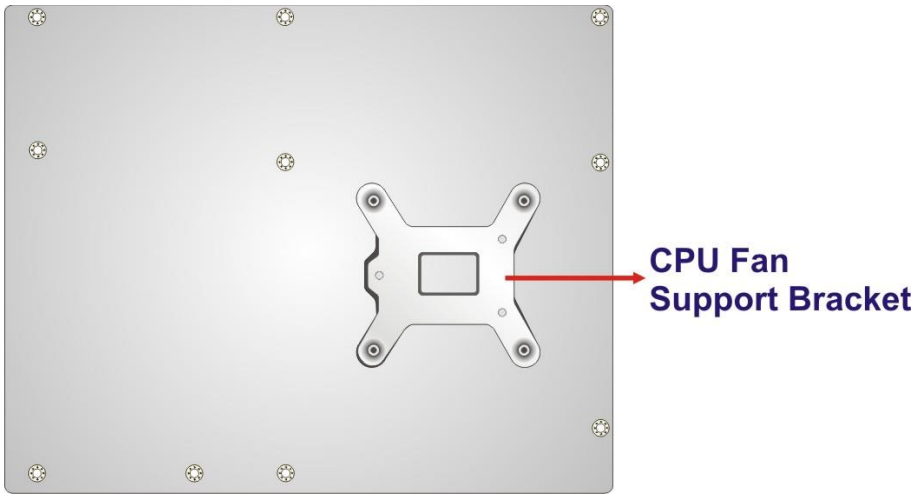


Figure 4-7: Cooling Kit Support Bracket

Step 2: **Place the cooling kit onto the socket LGA1200 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 IMBA-Q470. Carefully route the cable and avoid heat generating chips and fan blades.

4.6 DIMM Installation

To install a DIMM, please follow the steps below and refer to **Figure 4-8**.

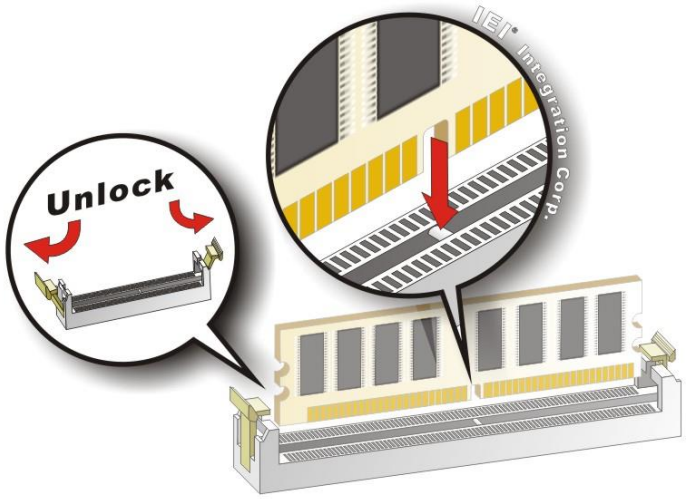


Figure 4-8: DIMM Installation

Step 1: **Open the DIMM socket handles**. Open the two handles outwards as far as they can. See **Figure 4-8**.

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 4-8**.

Step 3: **Insert the DIMM**. Once aligned, press down until the DIMM is properly seated. Clip the two handles into place. See **Figure 4-8**.

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

CAUTION:

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

4.7 M.2 Module Installation

The IMBA-Q470 provide two ways to install the M.2 expansion card. One is using screw, and the other is using the retainer. Please follow the steps below.

Mode One: Using screw

Step 1: Locate the M.2 module slot. See **Chapter 3**.

Step 2: Remove the retention screw secured on the motherboard.

Step 3: Line up the notch on the module with the notch on the slot. Slide the M.2 module into the socket at an angle of about 20º (**Figure 4-9)**.

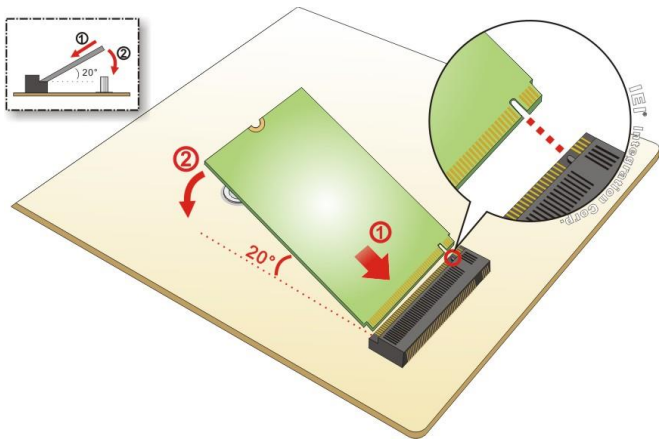


Figure 4-9: Inserting the M.2 Module into the Slot at an Angle

Step 4: Secure the M.2 module with the previously removed retention screw (**Figure 4-10**).

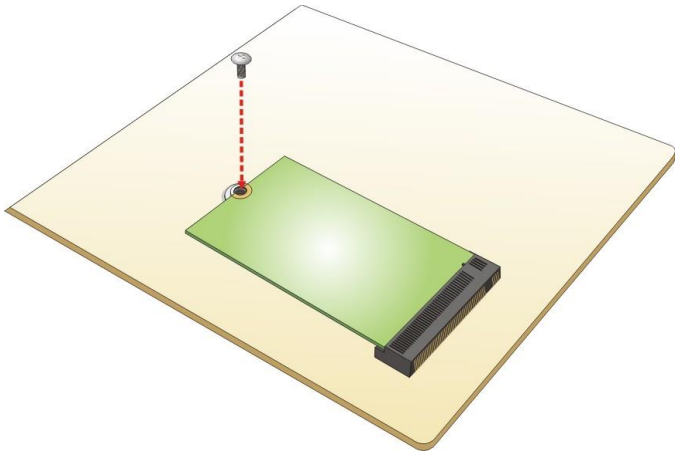


Figure 4-10: Securing the M.2 Module

Mode Two: Using the Retainer

Step 1: Press the retainer down as shown below. (See **Figure 4-11**)

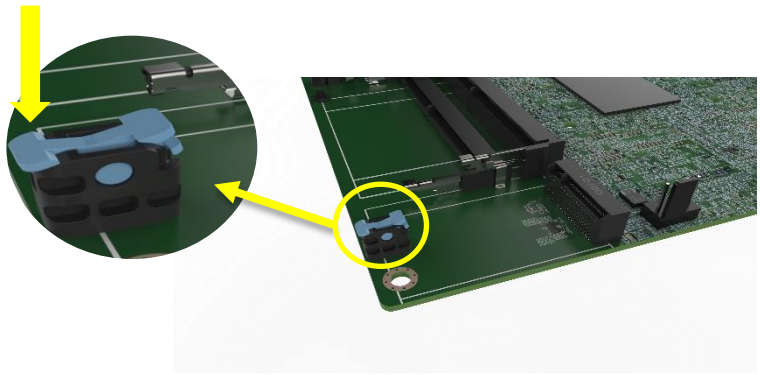


Figure 4-11: Press the Retainer

Step 2: Line up the notch on the M.2 module with the notch on the slot. Slide the M.2 module into the socket at an angle of about 20º. (See **Figure 4-9**)

Step 3: Align the notch on the end of the M.2 module with the clip of the retainer. (See **Figure 4-12**)

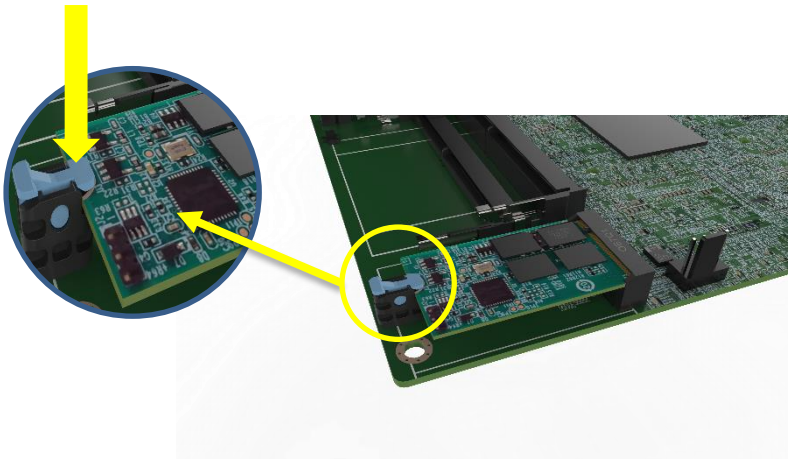


Figure 4-12: Aligning the M.2 Module with the Retainer

Step 4: Press the M.2 module down until it is secured into place by the retainer. (See **Figure 4-13**)

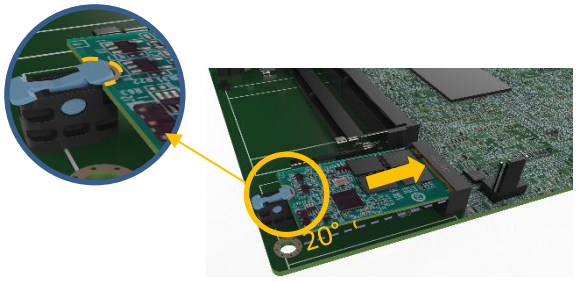


Figure 4-13: Securing the M.2 Module

Step 5: If you want to remove the M.2 module, you should press the retainer down as described in Step 1 to release the M.2 module.. (See **Figure 4-11**)

4.8 Software Installation

All the drivers for the IMBA-Q470 are available on IEI Resource Download Center (https://download.ieiworld.com). Type IMBA-Q470 and press Enter to find all the relevant software, utilities, and documentation.

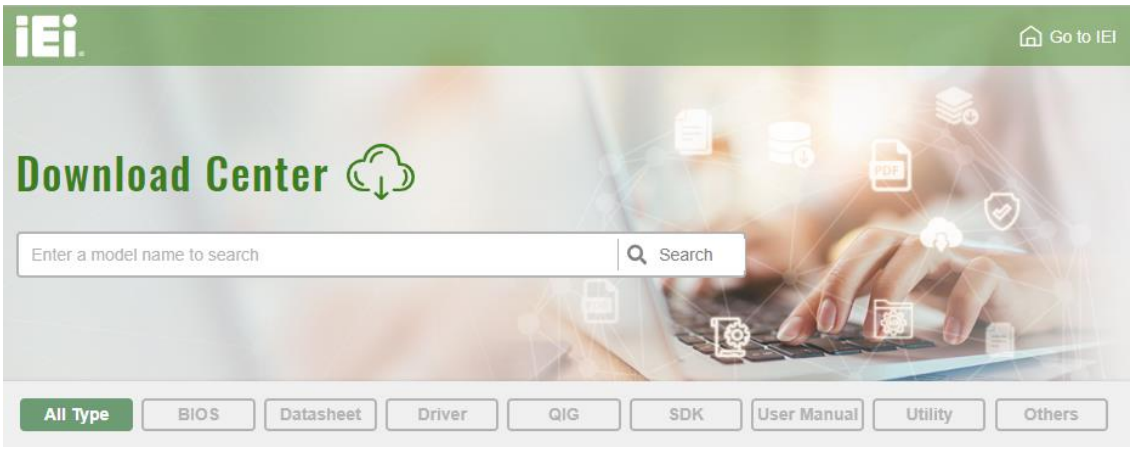
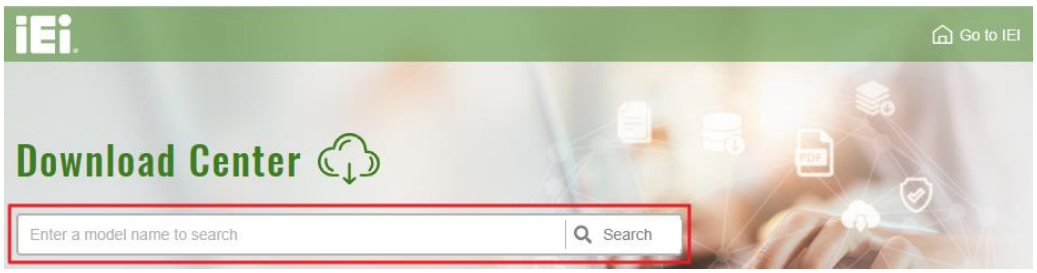


Figure 4-14: IEI Resource Download Center

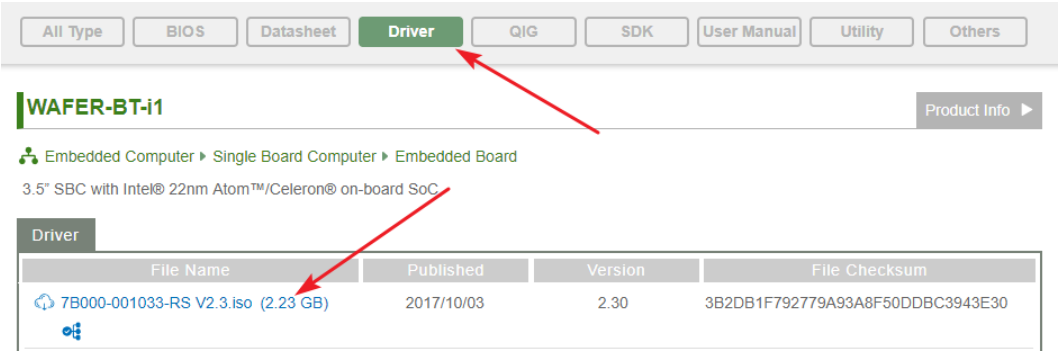
4.9 Driver Download

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

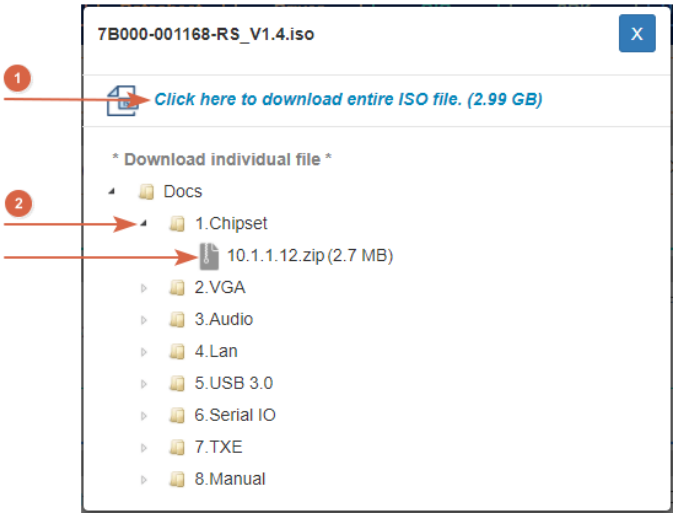
Step 1: Go to https://download.ieiworld.com. Type IMBA-Q470 and press Enter.



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



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



NOTE:

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

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. **Using keyboard**: Press the **DEL** or **F2** as soon as the system is turned on.
2. **Using touchscreen**: Press the **Setup** button on the upper right corner of the BIOS Starting Menu.

If the message disappears before the **DEL or F2** key is pressed, restart the computer and try again, then the BIOS Starting Menu will appear. Select "Setup" and press Enter to get into the BIOS Setup.

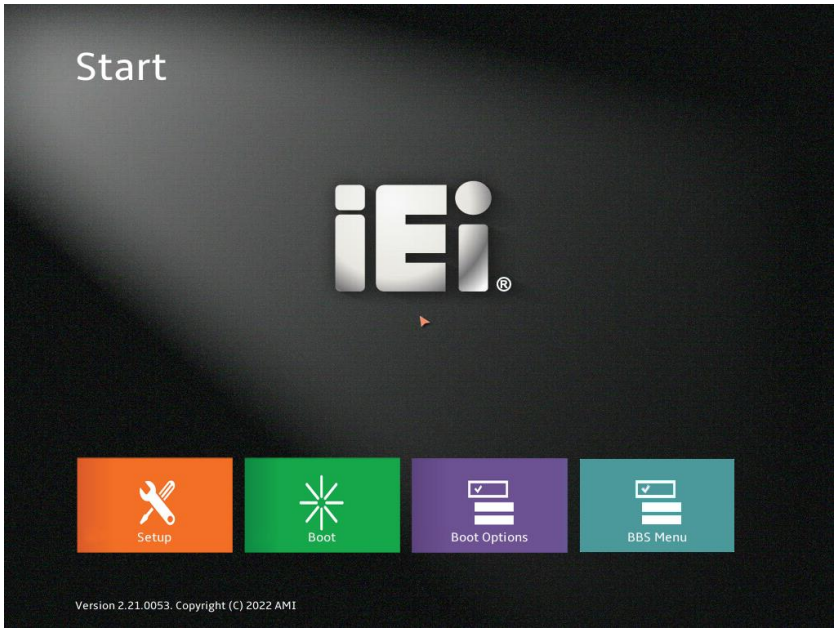


Figure 5-1: BIOS Starting Menu

5.1.2 Using Setup

The BIOS Setup menu can be navigated by using a keyboard or a touchscreen.

5.1.2.1 Keyboard Navigation

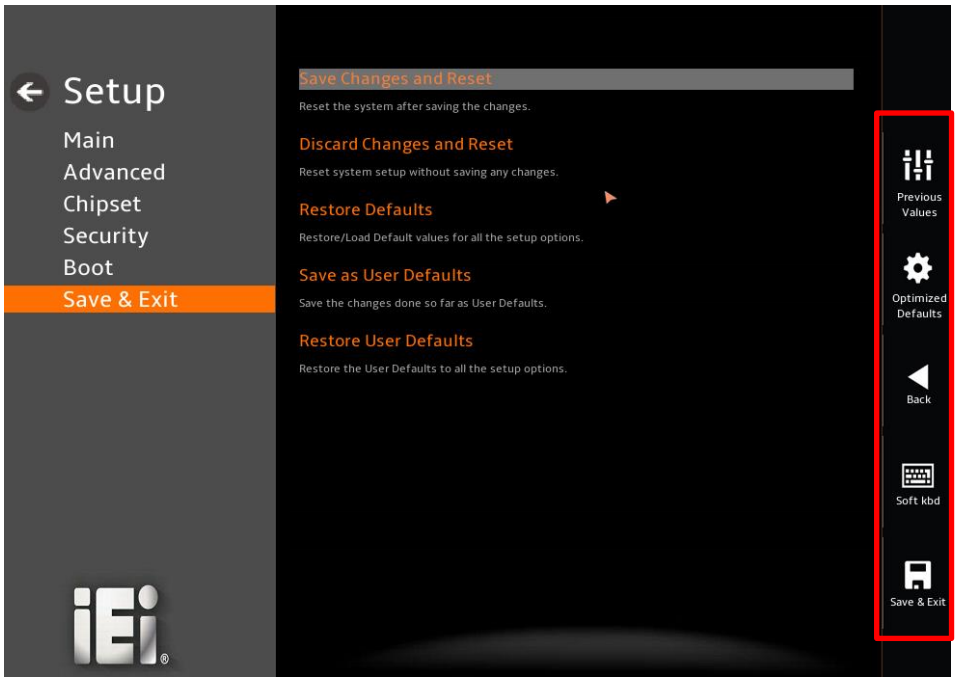
For keyboard navigation, use the navigation keys shown in **Table 5-1**.

Key	Function
Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+	Increase the numeric value or make changes
-	Decrease the numeric value or make changes
Page Up	Move to the previous page
Page Dn	Move to the next page
Esc	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2	Load previous values
F3	Load optimized defaults
F4	Save changes and Exit BIOS
<K>	Scroll help area upwards
<M>	Scroll help area downwards

Table 5-1: BIOS Navigation Keys

5.1.2.2 Touch Navigation

For touchscreen navigation, use the on-screen navigation keys shown below.



On-screen Button	Function
Previous Values	Load the last value you set.
Optimized Defaults	Load the factory default values in order to achieve the best performance.
Back	Return to the previous menu.
Soft kbd	Display the on-screen keyboard.
Save & Exit	Save the changes made to the BIOS options and reset the system.

Table 5-2: BIOS On-screen 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 the **Esc** key.

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:

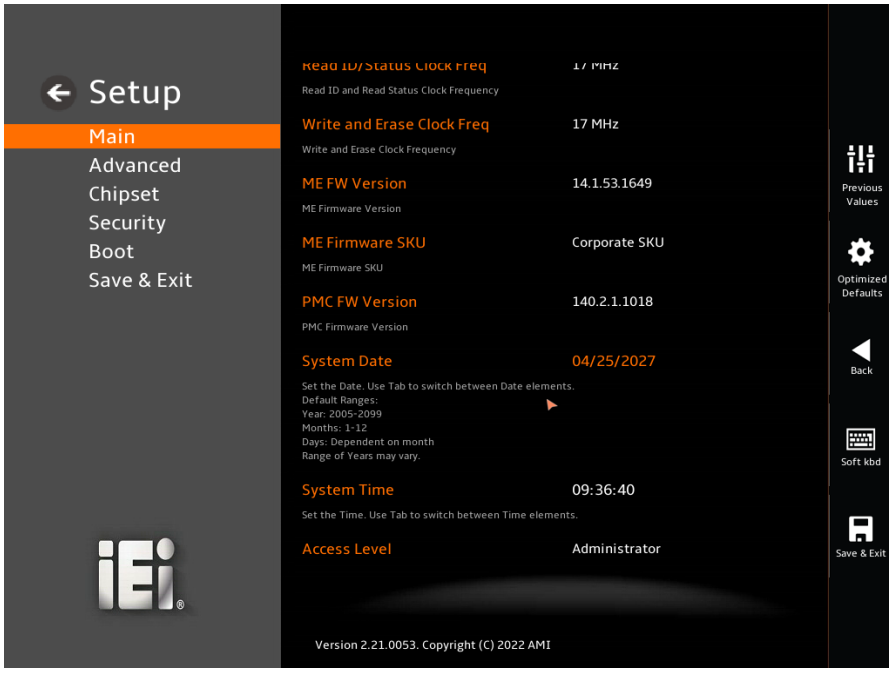
- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Security – Sets User and Supervisor Passwords.
- Boot – Changes the system boot configuration.
- Save & Exit – Selects exit options and loads default settings

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 & BIOS Menu 2**) appears when the **BIOS Setup** program is entered. The **Main** menu gives an overview of the basic system information.

BIOS Menu 1: Main (1/2)



BIOS Menu 2: Main (2/2)

➔ **BIOS Information**

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

- **BIOS Vendor:** Installed BIOS vendor
- **Core Version:** Current BIOS version
- **Compliancy:** Current UEFI & PI version
- **Project Version:** the board version
- **Build Date:** Date the current BIOS version was made
- **EC Version:** Current EC version
- BIOS Information

➔ **Processor Information**

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

- **Name:** Displays the Processor Details
- **Type:** Displays the Processor Type
- **Speed:** Displays the Processor Speed
- **ID:** Displays the Processor ID
- **Stepping:** Displays the Processor Stepping
- **Package:** Displays the Processor Package
- **Number of Processors:** Displays number of CPU cores
- **Microcode Revision:** CPU Microcode Revision
- **GT Info:** Processor GT Info. Only valid if SNB stepping is D0 or above
- **IGFX GOP Version:** Displays the IGFX GOP Version
- **PCIe GEN4 Dekel FW Version:** Dekel Firmware Version used by PCIe Gen4 PHY
- **SAM Firmware Version:** System Agent Manage ability Engine FW Version
- **Memory RC Version:** Displays the Memory RC Version
- **Total Memory:** Total Memory in the System
- **Memory Frequency:** Displays the Frequency of Memory

➔ **PCH Information**

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

- **Name:** Displays the PCH Name
- **PCH SKU:** Displays the PCH SKU
- **Stepping:** Displays the PCH Stepping
- **Dual Output Fast Read support:** Displays the Processor Details
- **Read ID/Status Clock Freq:** Displays the Read ID and Read Status Clock Frequency
- **Write and Erase Clock Freq:** Displays the Write and Erase Clock Frequency
- **ME FW Version:** Displays the ME Firmware Version
- **ME Firmware SKU:** Displays the ME Firmware SKU
- **PMC FW Version:** Displays the PMC Firmware Version

The System Overview field also 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 3**) to configure the CPU and peripheral devices through the following sub-menus:

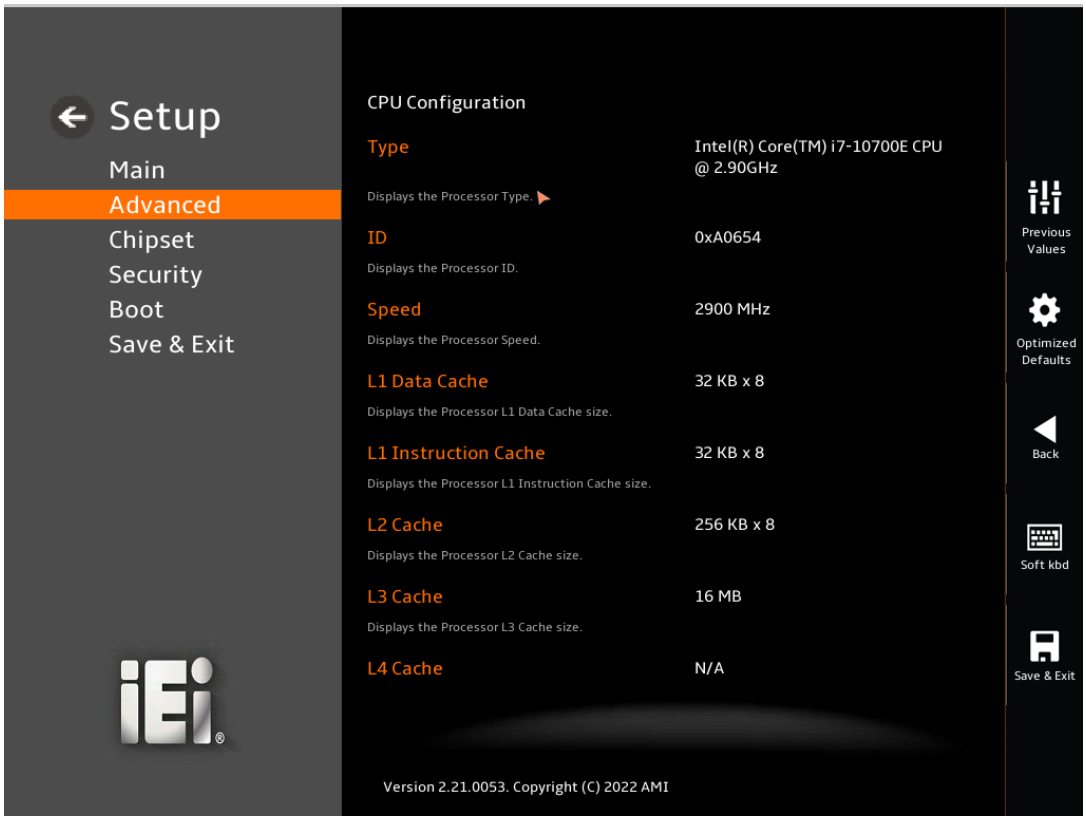
WARNING!

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

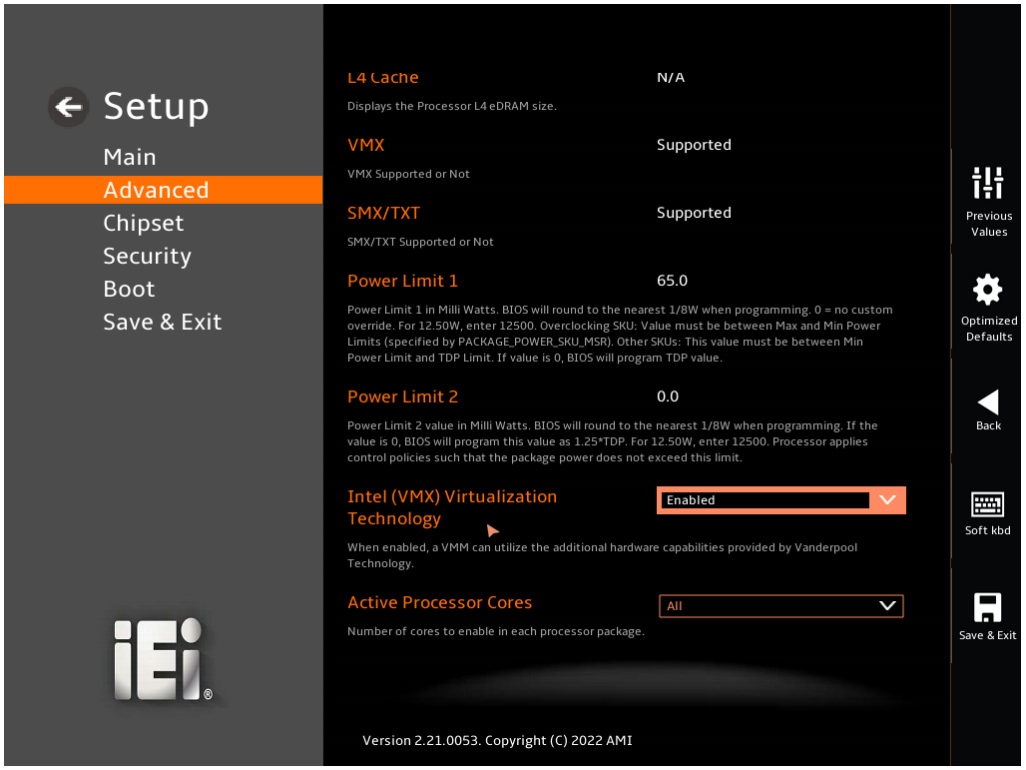
BIOS Menu 3: Advanced

5.3.1 CPU Configuration

Use the **CPU Configuration** menu (**BIOS Menu 4 & BIOS Menu 5 & BIOS Menu 6**) to view detailed CPU specifications or enable the Intel Virtualization Technology.



BIOS Menu 4: CPU Configuration (1/3)



BIOS Menu 5: CPU Configuration (2/3)

BIOS Menu 6: CPU Configuration (3/3)

➔ **Intel (VMX) Virtualization Technology [Disabled]**

Use the **Intel (VMX) 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**		Disables Intel Virtualization Technology.
➔ **Enabled**	**DEFAULT**	Enables Intel Virtualization Technology.

➔ **Active Processor Cores [All]**

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

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

➔ **Hyper-Threading [Enabled]**

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

➔ **Disabled**		Disables Hyper-Threading Technology
➔ **Enabled**	**DEFAULT**	Enables Hyper-Threading 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

➔ **C states [Disabled]**

Use the **C states** option to enable or disable CPU power management which allows CPU to go to C states when it is not 100% utilized.

➔ **Disabled**	**DEFAULT**	Disables CPU power management
➔ **Enabled**		Enables CPU power management

➔ **Tcc Activation Offset [Enabled]**

Use the **Turbo Mode** option to enable or disable Turbo Mode which requires Intel Speed Step or Intel Speed Shift to be available and enabled.

➔ **Disabled**	**DEFAULT**	Disables Turbo Mode Technology
➔ **Enabled**		Enables Turbo Mode Technology

➔ **Power Limit 1 Override [Disabled]**

Enable/Disable Power Limit 1 override. If this option is disabled. BIOS will program the default values for Limit 1 and Power Limit 1 Time Window.

➔ **Power Limit 2 Override [Disabled]**

Power Limit 1 in Milli Watts. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500.

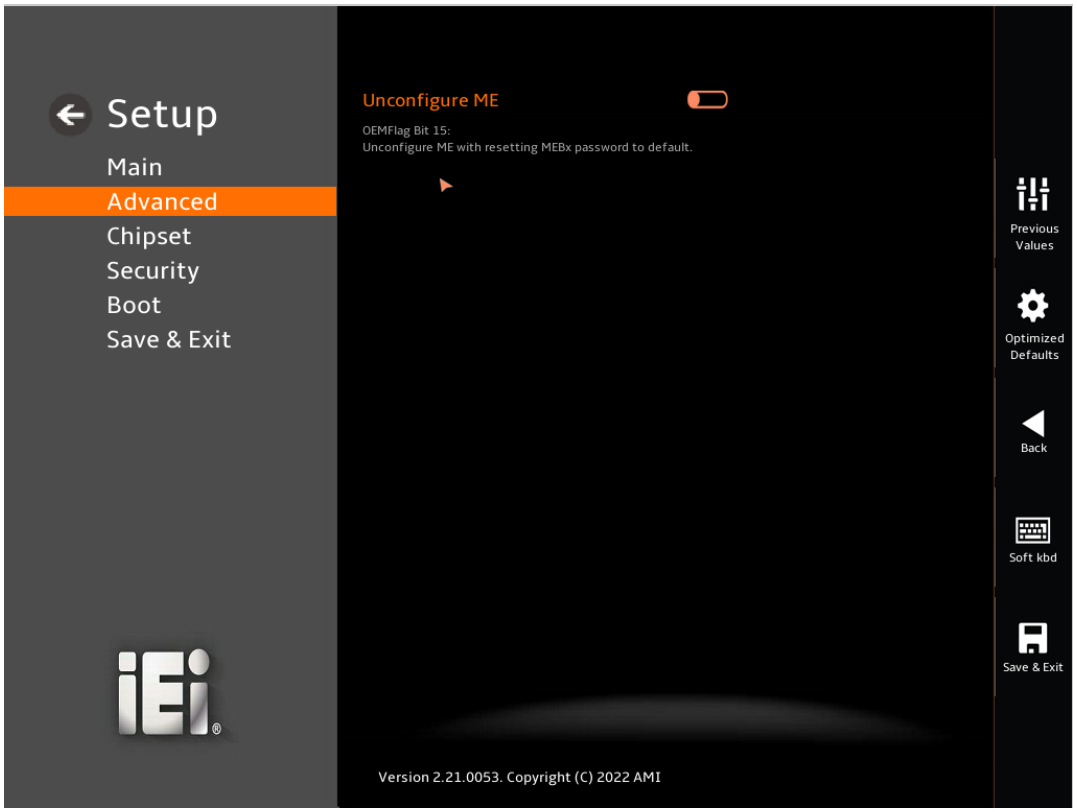
➔ **Turbo Mode [Enabled]**

Use the **Turbo Mode** option to enable or disable Turbo Mode which requires Intel Speed Step or Intel Speed Shift to be available and enabled.

➔ **Disabled**		Disables Turbo Mode Technology
➔ **Enabled**	**DEFAULT**	Enables Turbo Mode Technology

5.3.2 PCH-FW Configuration

The **PCH-FW Configuration** menu (**BIOS Menu 7**) allows Intel® Active Management Technology (AMT) options to be configured.



BIOS Menu 7: PCH-FW Configuration

➔ **Unconfigure ME [Disabled]**

Use the **Unconfigure ME** option to unconfigure ME with resetting MEBx password to default.

➔ **Disabled**	**DEFAULT**	Not unconfigure ME with resetting MEBx password to default
➔ **Enabled**		Unconfigure ME with resetting MEBx password to default

5.3.3 Trusted Computing

Use the **Trusted Computing** menu (**BIOS Menu 8**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).

BIOS Menu 8: PCH-FW Configuration

➔ **Security Device Support [Disable]**

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

➔ **Disable** TPM support is disabled.

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

➔ **Pending Operation [None]**

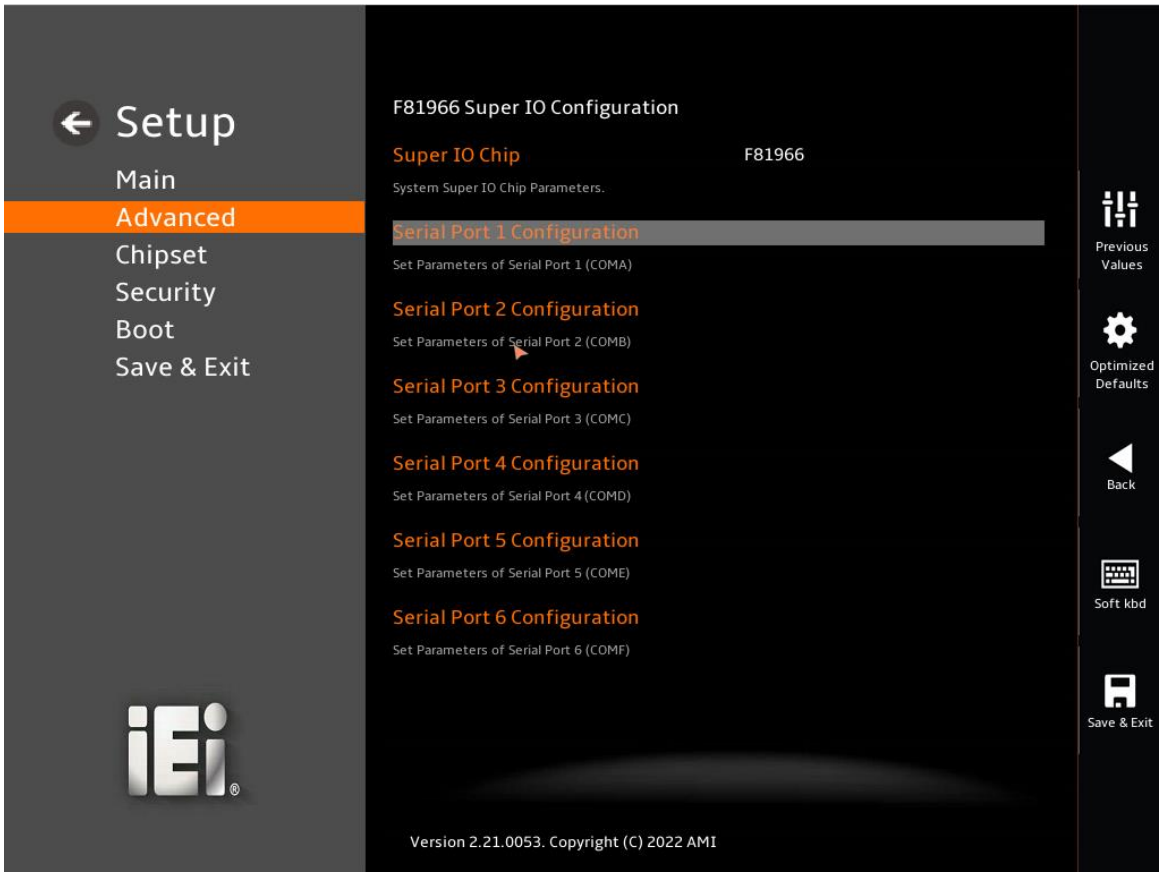
Use the **Pending Operation** option to schedule an operation for the security device.

➔ **None** **DEFAULT** TPM information is previous.S

➔ **TPM Clear** TPM information is cleared

5.3.4 F81866 Super IO Configuration

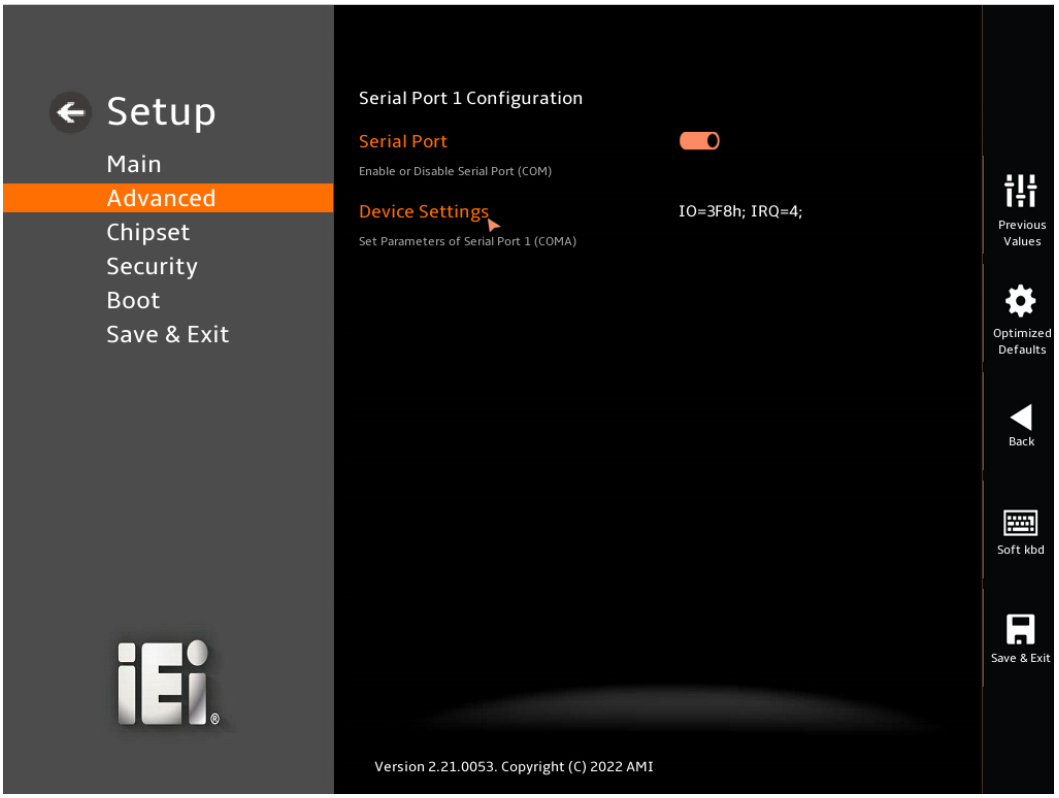
Use the **F81866 Super IO Configuration** menu (**BIOS Menu 9**) to set or change the configurations for the parallel ports and serial ports.



BIOS Menu 9: F81866 Super IO Configuration

5.3.4.1 Serial Port 1 Configuration

Use the **Serial Port 1 Configuration** menu (**BIOS Menu 10**) to configure the serial port n.



BIOS Menu 10: Serial Port 1 Configuration Menu

➔ **Serial Port [Enabled]**

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

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

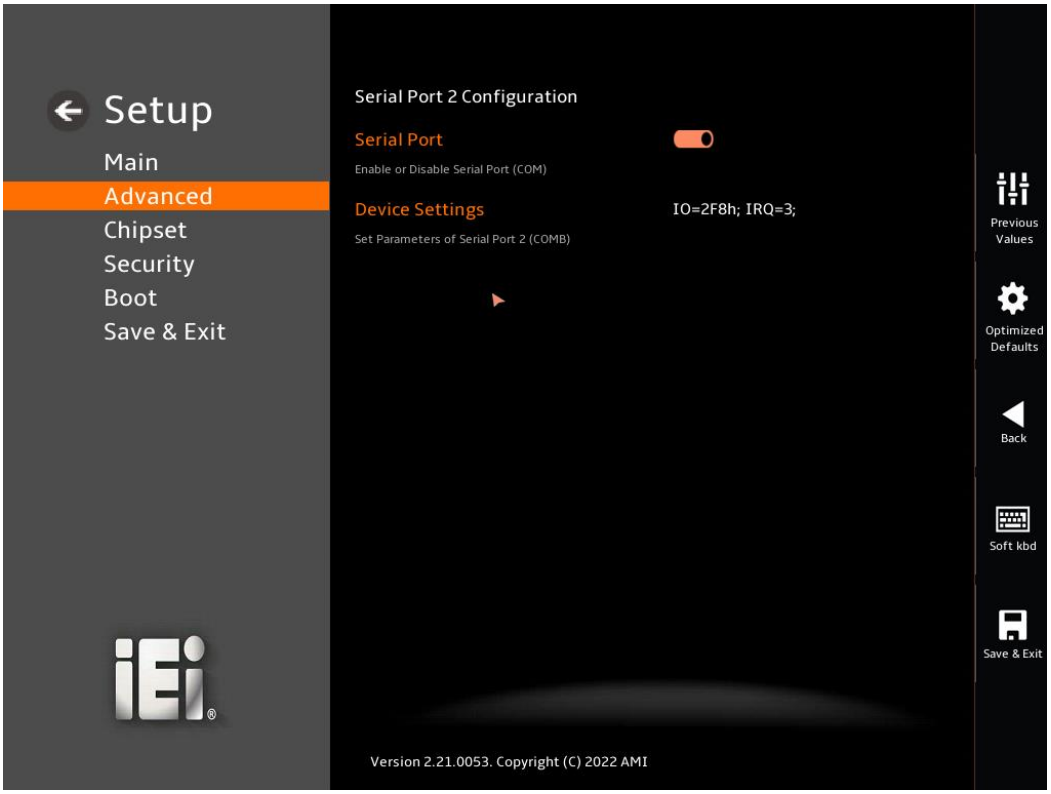
➔ **Device Settings**

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

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

5.3.4.2 Serial Port 2 Configuration

Use the **Serial Port 2 Configuration** menu (**BIOS Menu 11**) to configure the serial port n.



BIOS Menu 11: Serial Port 2 Configuration Menu

➔ **Serial Port [Enabled]**

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

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

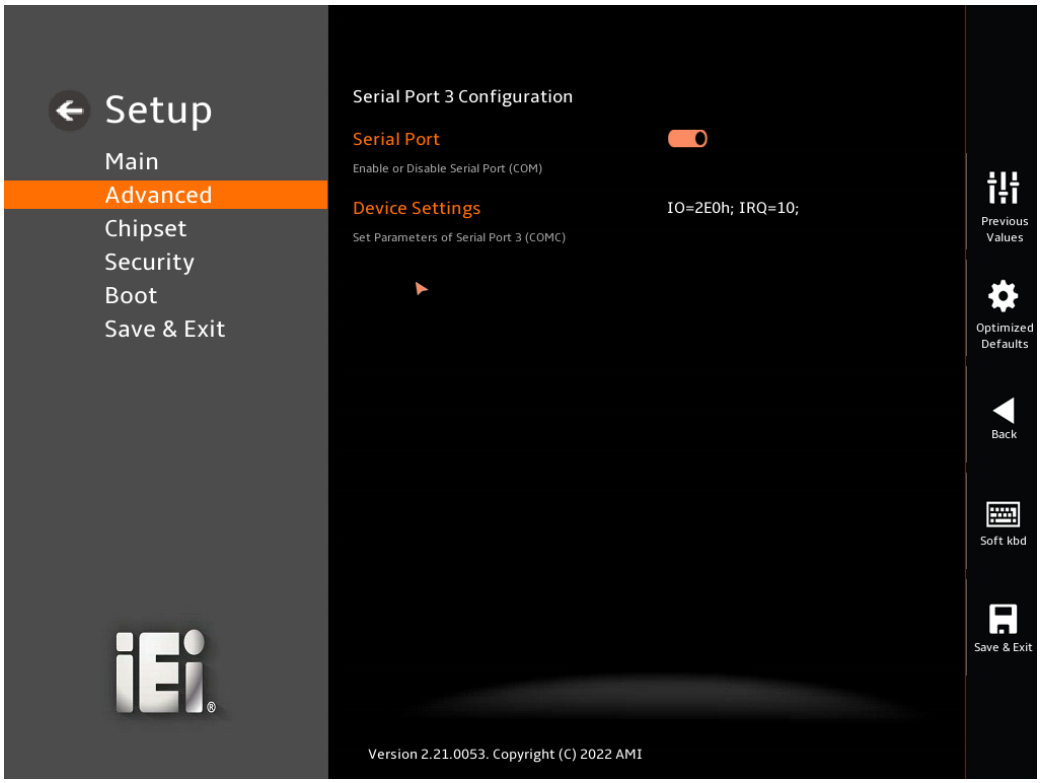
➔ **Device Settings**

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

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

5.3.4.3 Serial Port 3 Configuration

Use the **Serial Port 3 Configuration** menu (**BIOS Menu 12**) to configure the serial port 3.



BIOS Menu 12: Serial Port 3 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

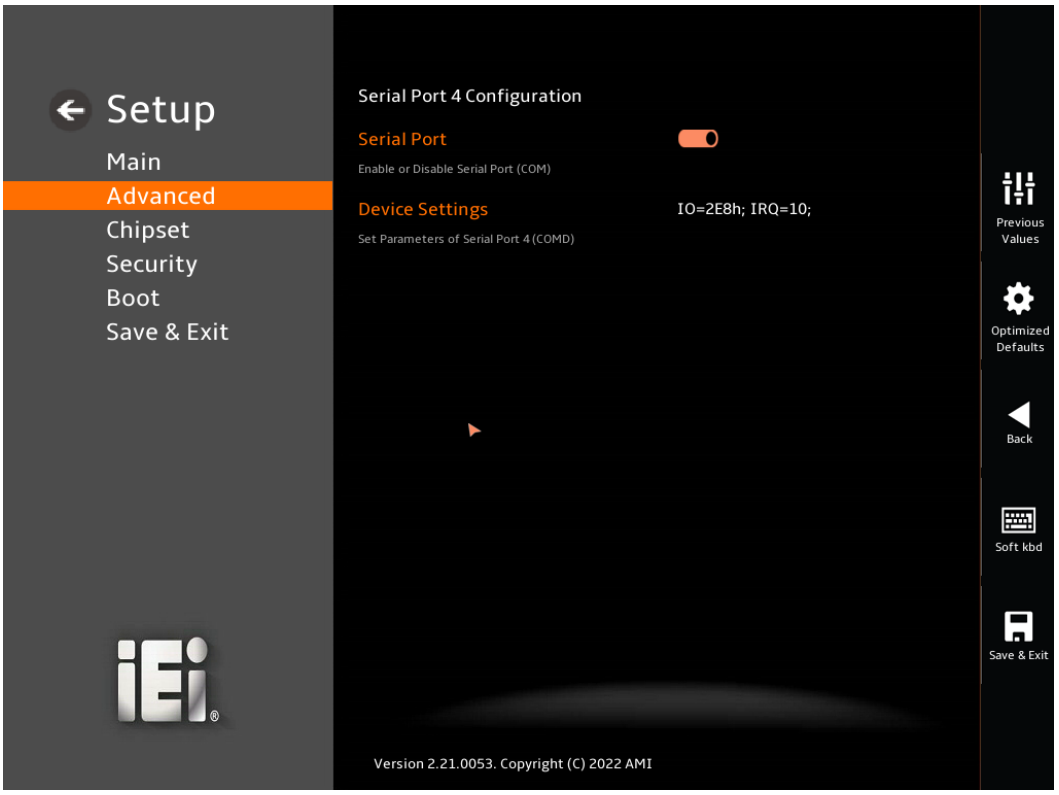
➔ **Device Settings**

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

➔ **IO=2E0h; IRQ=10**	Serial Port I/O port address is 2E0h and the interrupt address is IRQ10

5.3.4.4 Serial Port 4 Configuration

Use the **Serial Port 4 Configuration** menu (**BIOS Menu 13**) to configure the serial port 4.



BIOS Menu 13: Serial Port 4 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

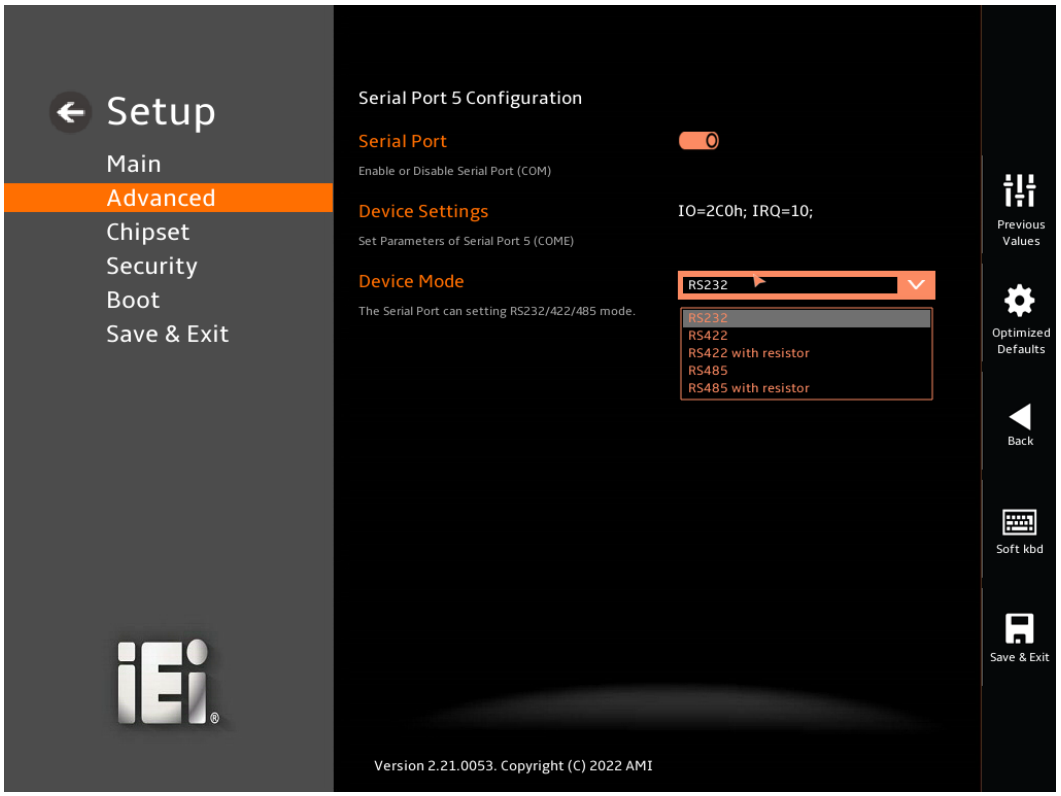
➔ **Device Settings**

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

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

5.3.4.5 Serial Port 5 Configuration

Use the **Serial Port 5 Configuration** menu (**BIOS Menu 14**) to configure the serial port 5.



BIOS Menu 14: Serial Port 5 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

➔ **Device Settings**

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

➔ **IO=2C0h; IRQ=10**	Serial Port I/O port address is 2C0h and the interrupt address is IRQ10

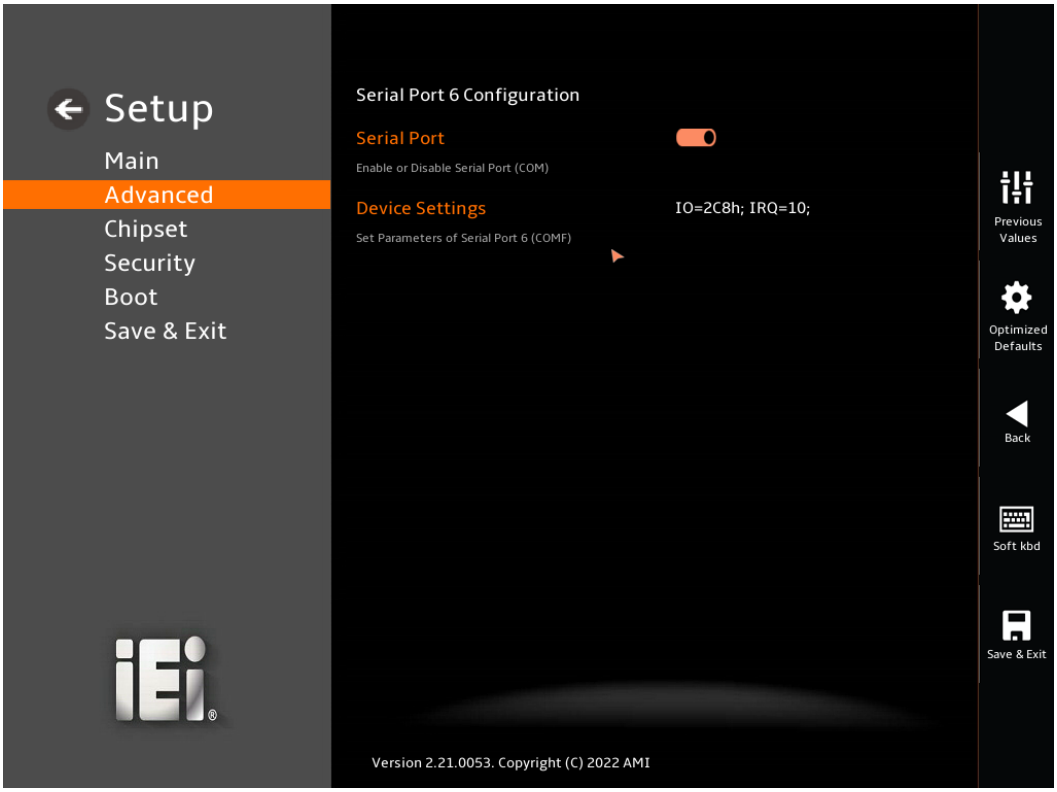
➔ **Device Mode [Printer Mode]**

Use the **Device Mode** option to select the Serial Port 5 signaling mode. Configuration options are listed below.

➔ **RS232**	**DEFAULT**	Serial Port 5 signaling mode is RS-232
➔ **RS422**		Serial Port 5 signaling mode is RS-422
➔ **RS422 with resistor**		Serial Port 5 signaling mode is RS-422 with resistor
➔ **RS485**		Serial Port 5 signaling mode is RS-485
➔ **RS485 with resistor**		Serial Port 5 signaling mode is RS-485 with resistor

5.3.4.6 Serial Port 6 Configuration

Use the **Serial Port 6 Configuration** menu (**BIOS Menu 15**) to configure the serial port 6.



BIOS Menu 15: Serial Port 6 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

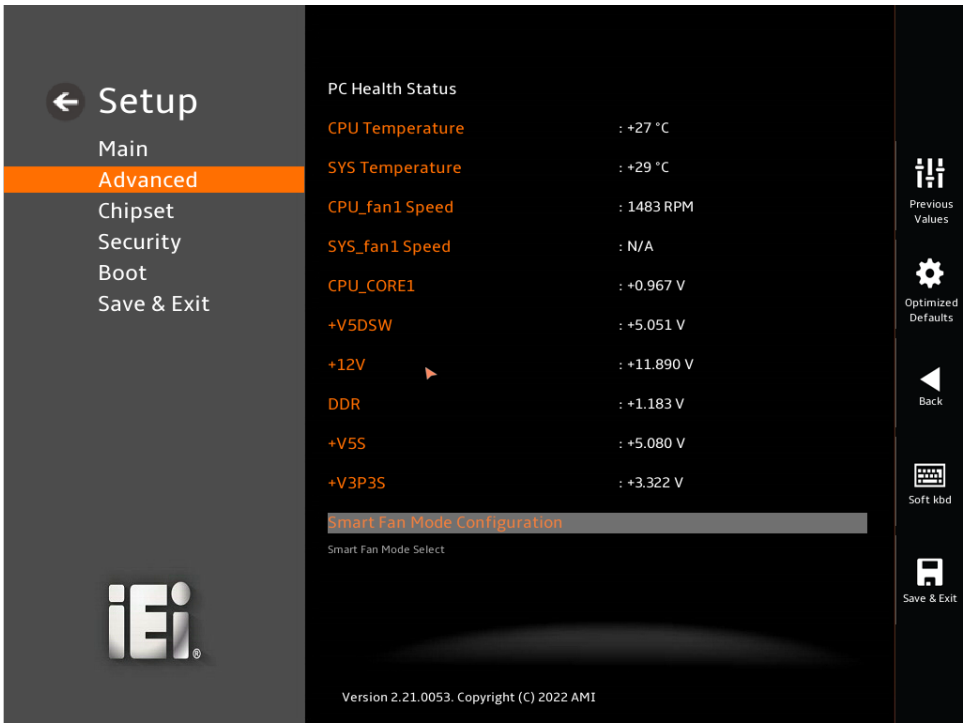
➔ **Device Settings**

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

➔ **IO=2C8h; IRQ=10**	Serial Port I/O port address is 2C8h and the interrupt address is IRQ10

5.3.5 ENE KB9068 Monitor

The ENE KB9068 Monitor menu (**BIOS Menu 16**) contains the smart fan mode configuration submenu and shows the state of H/W real-time operating temperature, fan speeds and system voltages.



BIOS Menu 16: ENE KB9068 Monitor

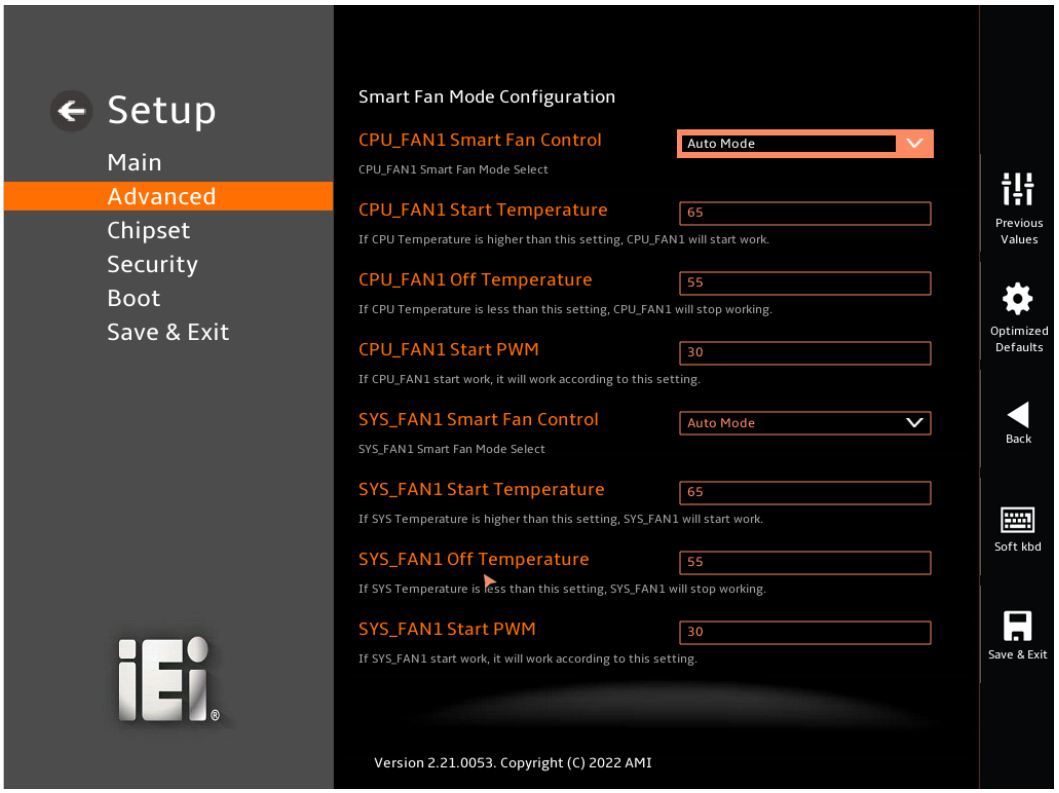
➔ **PC Health Status**

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

- System Temperatures:
  - CPU Temperature
  - System Temperature
- Fan Speeds:
  - CPU Fan Speed
  - System Fan Speed
- Voltages:
  - 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 17**) to configure the CPU/system fan start/off temperature and control mode.



BIOS Menu 17: Smart Fan Mode Configuration

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

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

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

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

➔ **CPU_FAN1 Start Temperature**

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

➔ **CPU_FAN1 Off Temperature**

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

➔ **CPU_FAN1 Start PWM**

Use the **CPU_FAN1 Start PWM** option to set the PWM start value. Use the + or – key to change the value or enter a decimal number between 1 and 100.

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

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

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

➔ **SYS_FAN1 Start Temperature**

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

➔ **SYS_FAN1 Off Temperature**

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

➔ **SYS_FAN1 Start PWM**

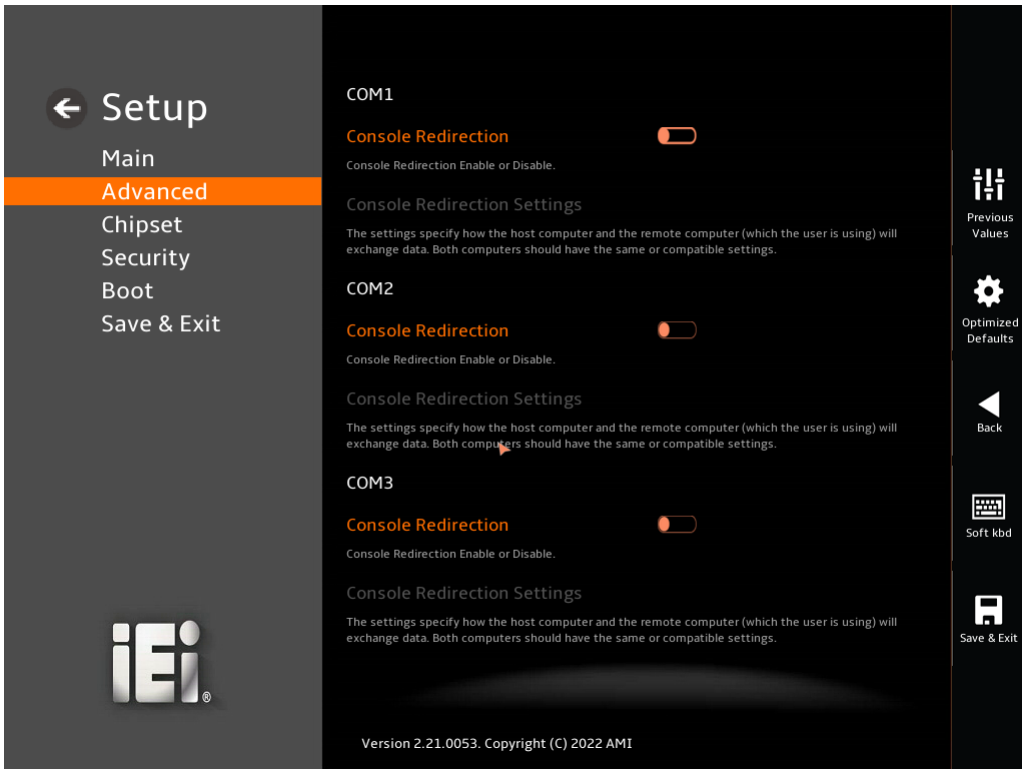
Use the **SYS_Fan1 Start PWM** option to set the PWM start value. Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **Auto Mode Fan Slope PWM**

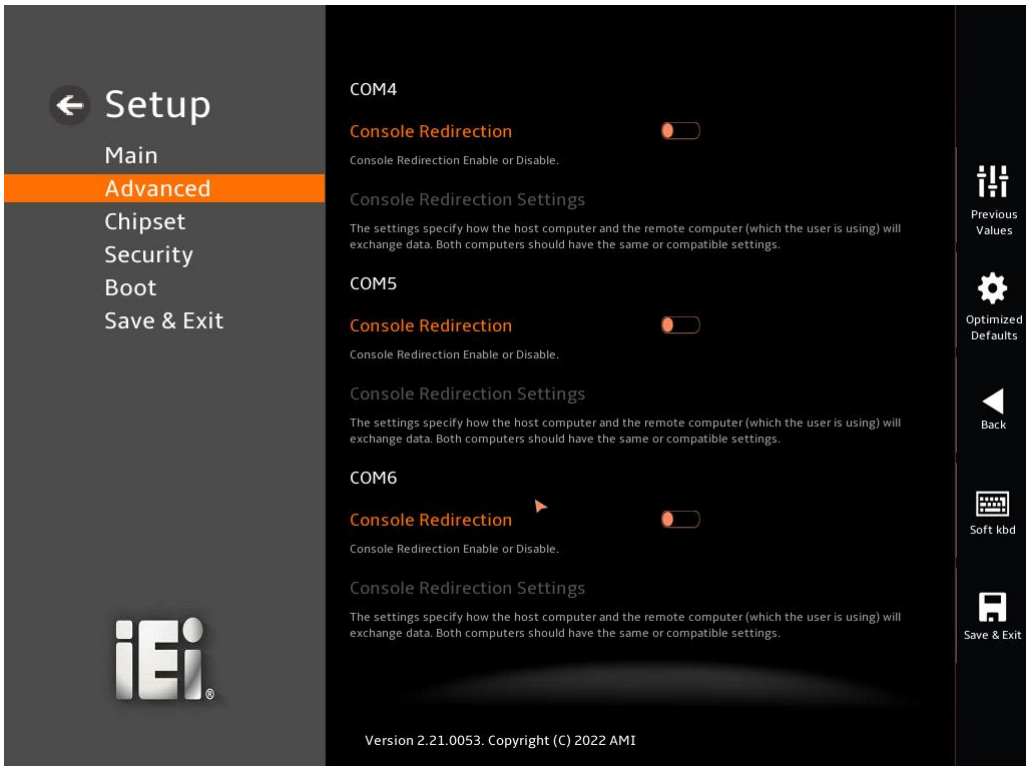
Use the **Auto Mode Fan Slope PWM** option to select the linear rate at which the PWM mode increases with respect to an increase in temperature. Use the + or – key to change the value or enter a decimal number between 1 and 8

5.3.6 Serial Port Console Redirection

The **Serial Port Console Redirection** menu (**BIOS Menu 18 & BIOS Menu 19**) allows the console redirection options to be configured. Console Redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.



BIOS Menu 18: Serial Port Console Redirection (1/2)



BIOS Menu 19: Serial Port Console Redirection (2/2)

➔ **Console Redirection [Disabled]**

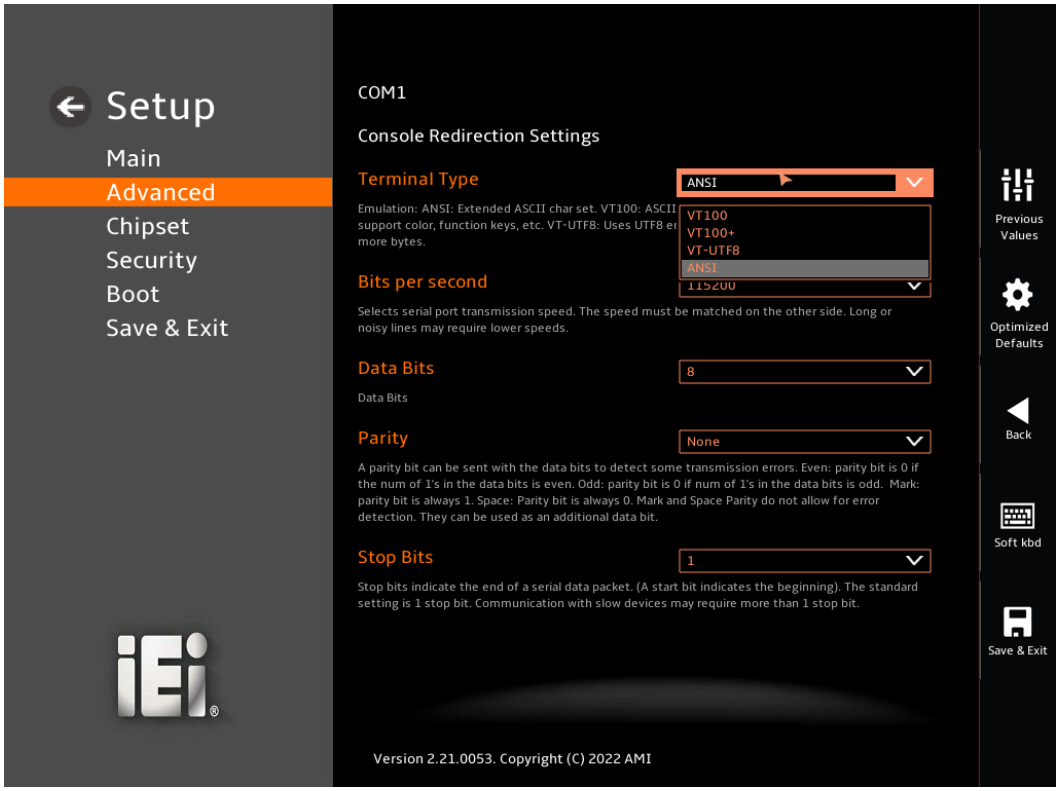
Use **Console Redirection** option to enable or disable the console redirection function.

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

The **Console Redirection Settings** submenu will be available when the **Console Redirection** option is enabled.

5.3.6.1 Console Redirection Settings

The following options are available in the **Console Redirection Settings** submenu (**BIOS Menu 20**) when the **COM Console Redirection** (for COM1 to COM6) option is enabled.



BIOS Menu 20: COM Console Redirection Settings

➔ **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 on 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.
- ➔ **38400** Sets the serial port transmission speed at 38400.
- ➔ **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 allow for error detection.
- ➔ **Space** The parity bit is always 0. T This option does not allow for error detection.

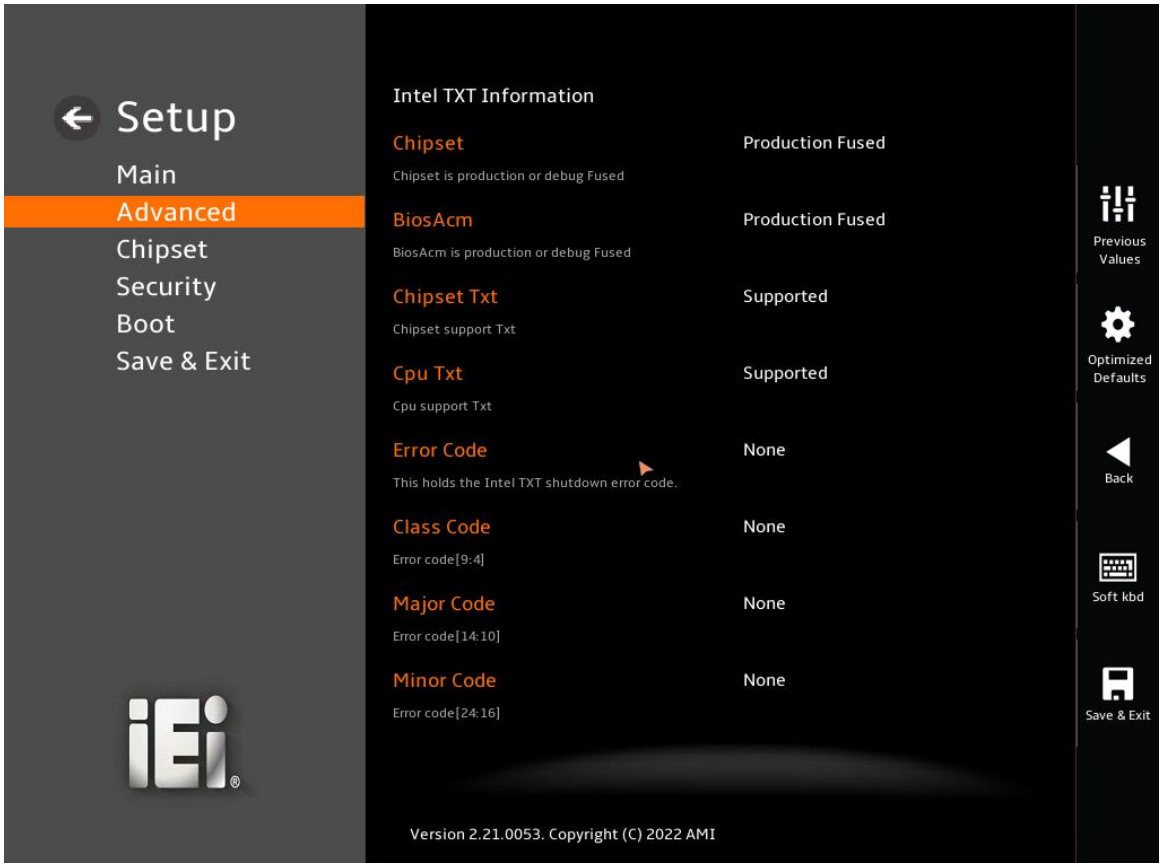
➔ **Stop Bits [1]**

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 Intel TXT Information

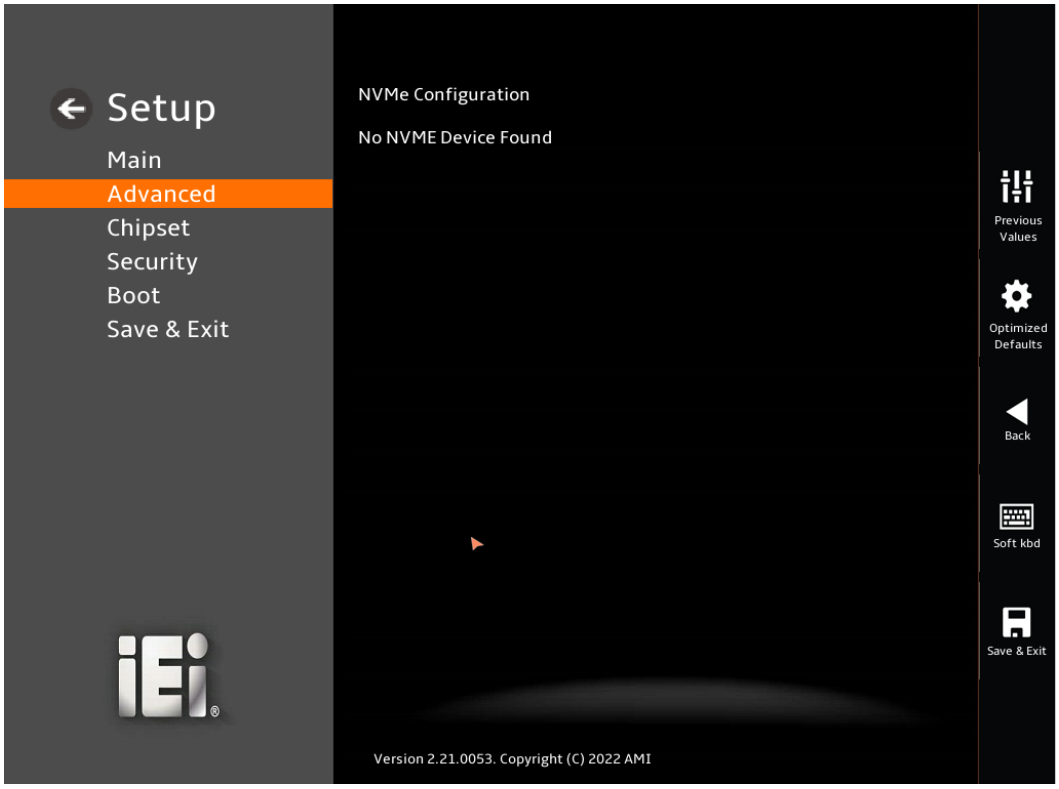
The **Intel TXT Information** menu (**BIOS Menu 21**) displays the Intel Trusted Execution Technology information and shows the Chipset .



BIOS Menu 21: Intel TXT Information

5.3.8 NVMe Configuration

Use the **NVMe Configuration** (**BIOS Menu 22**) menu to display the NVMe controller and device information.



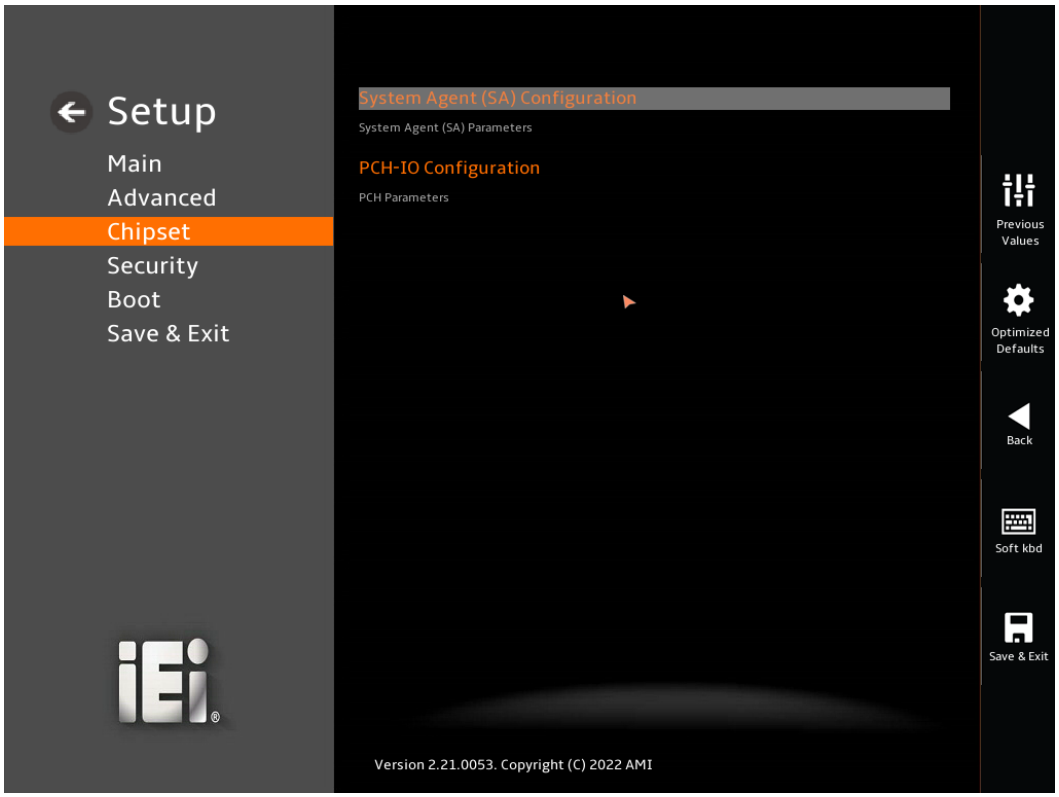
BIOS Menu 22: NVMe Configuration

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 23**) to access the PCH IO and System Agent (SA) configuration menus.

WARNING!

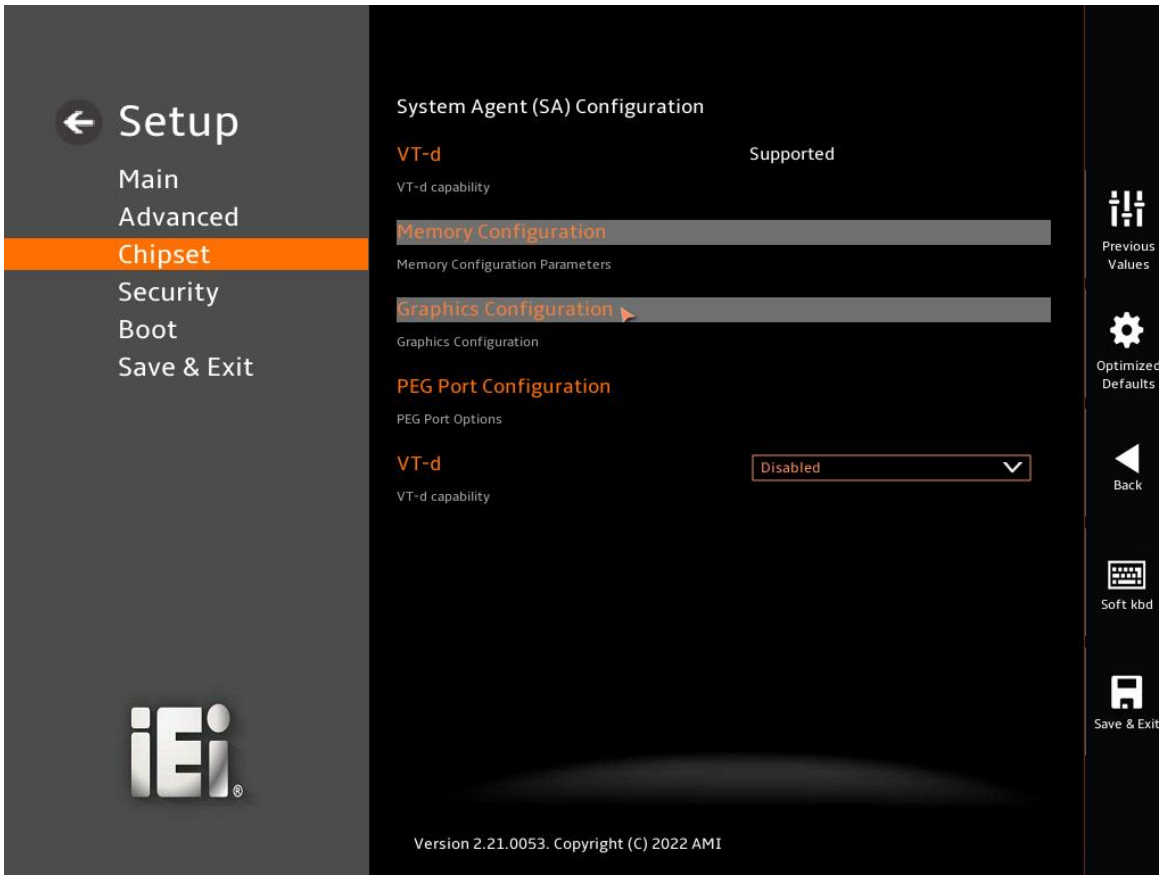
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 23: Chipset

5.4.1 System Agent (SA) Configuration

Use the **System Agent (SA) Configuration** menu (**BIOS Menu 24**) to configure the System Agent (SA) parameters.



BIOS Menu 24: System Agent (SA) Configuration

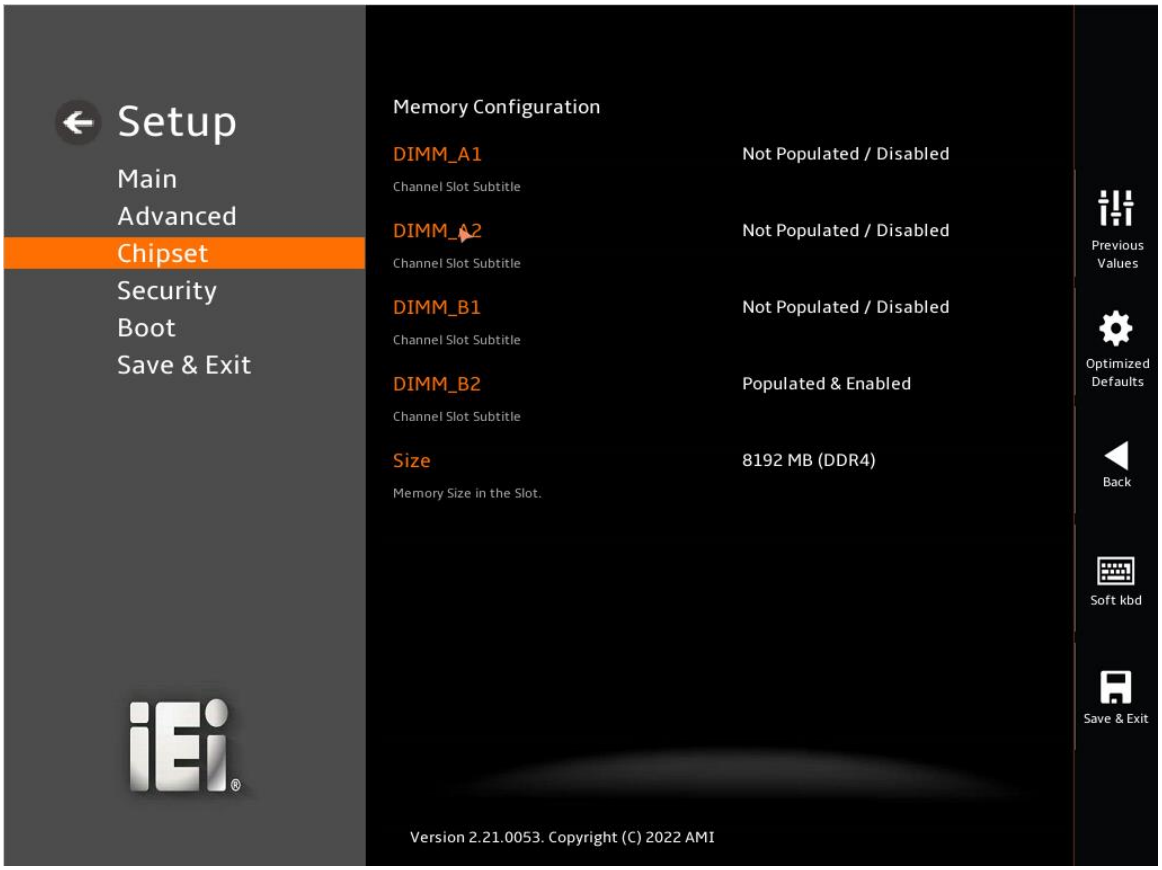
➔ **VT-d [Enabled]**

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

➔	**Disabled**		Disable the VT-d capability
➔	**Enabled**	**DEFAULT**	Enable the VT-d capability

5.4.1.1 Memory Configuration

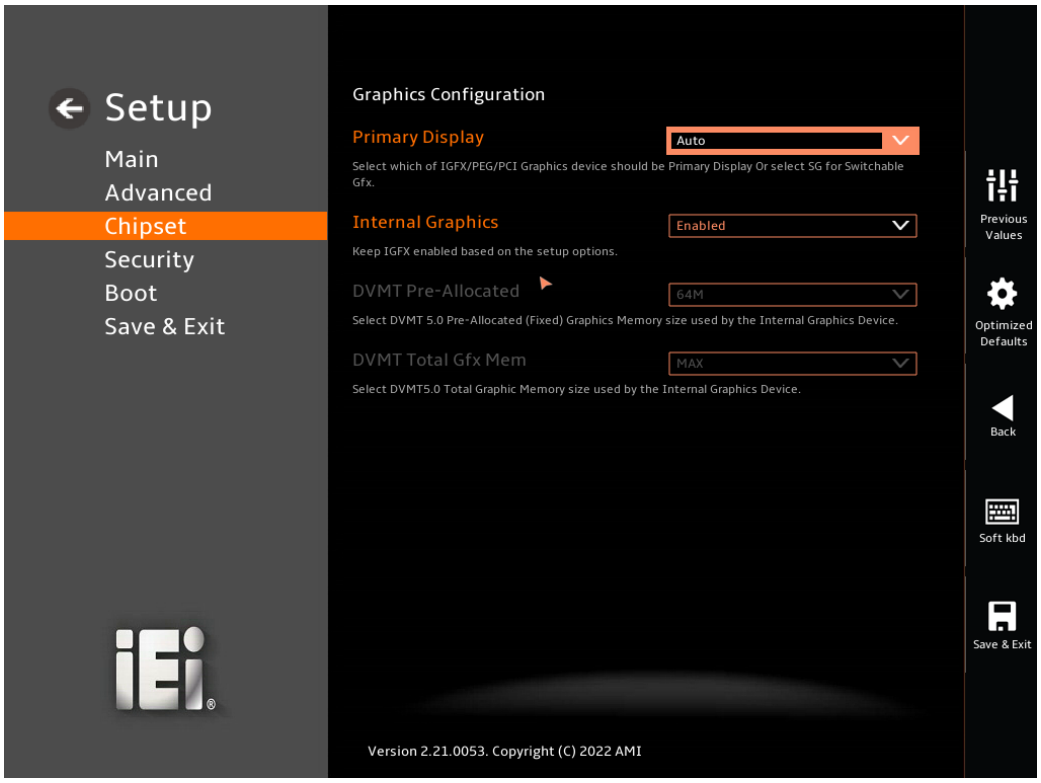
Use the **Memory Configuration** submenu (**BIOS Menu 25**) to view memory information.



BIOS Menu 25: Memory Configuration

5.4.1.2 Graphics Configuration

Use the **Graphics Configuration** (**BIOS Menu 26**) menu to configure the video device connected to the system.



BIOS Menu 26: Graphics Configuration

➔ **Primary Display [Auto]**

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

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

➔ **Internal Graphics [Enabled]**

Use the **Internal Graphics** option to configure whether to keep IGFX enabled. If user wants to support dual display by internal graphics and external graphics, this Internal Graphics

option should be set to Enabled and the above Primary Display option should be set to IGFX.

➔	**Auto**		Auto mode
➔	**Disabled**		Disables IGFX.
➔	**Enabled**	**Default**	Enables IGFX.

➔ **DVMT Pre-Allocated [32M]**

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:

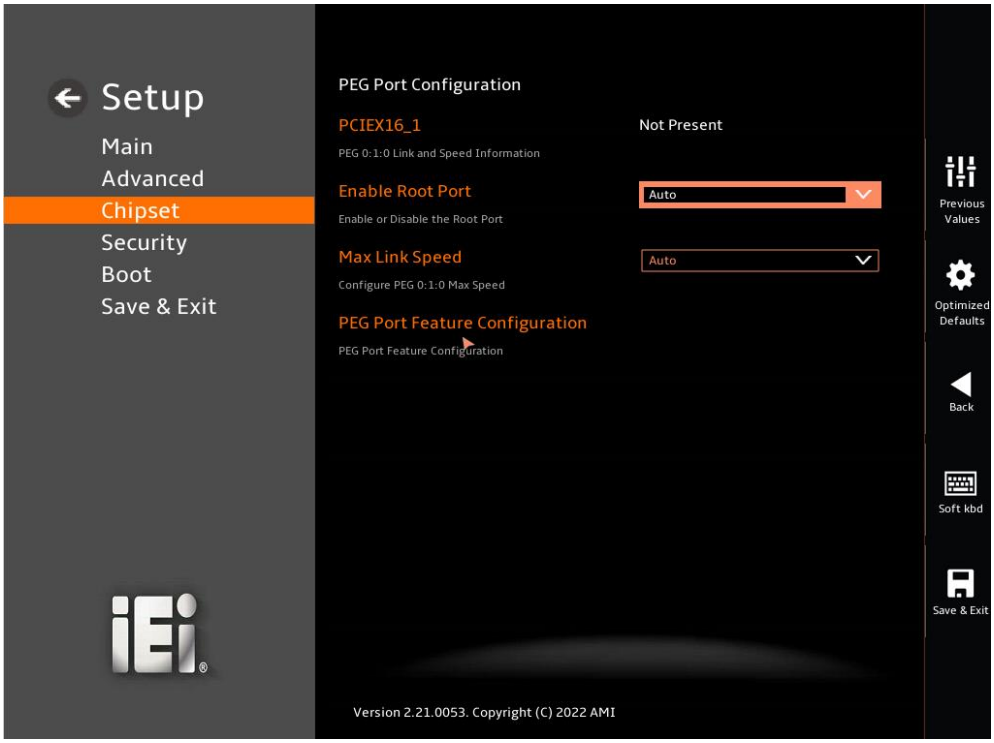
- 32M
- 64M **Default**

➔ **DVMT Total Gfx Mem [256M]**

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

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

5.4.1.3 PEG Port Configuration



BIOS Menu 27: 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.

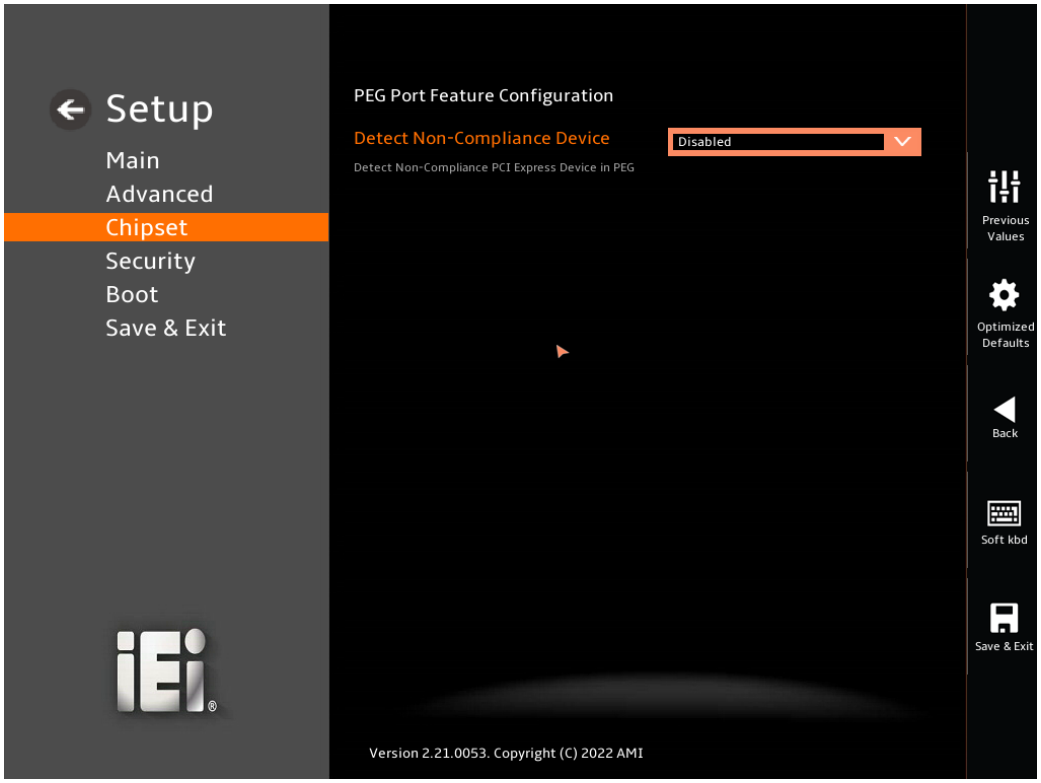
➔ **Max Link Speed [Auto]**

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

5.4.1.3.1 PEG Port Feature Configuration

Use the **PEG Port Feature Configuration** submenu (**BIOS Menu 28**) to configure the SA PCIe settings.



BIOS Menu 28: PEG Port Feature Configuration

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

Use the **Detect Non-Compliance Device** option to detect non-compliance PCIe device in PEG.

➔	**Disabled**	**DEFAULT**	Do not detect non-compliance PCIe device in PEG
➔	**Enabled**		Detect non-compliance PCIe device in PEG

5.4.2 PCH-IO Configuration

Use the **PCH-IO Configuration** menu (**BIOS Menu 29**) to configure the PCH parameters.

BIOS Menu 29: PCH-IO Configuration

➔ **Auto Power Button Function [Enabled(AT)]**

Use the **Auto Power Button Function** BIOS option to show the power mode state. Use the **J_ATX_AT1** to switch the AT/ATX power mode.

- ➔ **Enabled (AT)** The system power mode is AT.
- ➔ **Disabled (ATX)** The system power mode is ATX.

➔ **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 when the power mode is ATX.

- ➔ **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(EUP) [Disabled]**

Use the **Power Saving Function(EUP)** 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.

➔ **VGA Enable/Disable [Enabled]**

Use the **VGA Enable/Disable** BIOS option to select VGA port Disable or enable

- ➔ **Disabled** VGA function is disabled.
- ➔ **Enabled** **DEFAULT** VGA function is enabled.

➔ **USB Power SW1 [+5V DUAL]**

Use the **USB Power SW1** BIOS option to configure the USB power source for the corresponding USB connectors (Table 5-3).

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

➔ **USB Power SW2 [+5V DUAL]**

Use the **USB Power SW2** BIOS option to configure the USB power source for the corresponding USB connectors (Table 5-3).

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

BIOS Options	Configured USB Ports
USB Power SW1	K/M_USB1 (external USB 2.0 ports) LAN1_USB1 (external USB 3.2 Gen 2 ports) LAN2_USB2 (external USB 3.2 Gen 1 ports)
USB Power SW2	USB1 (internal USB 2.0 ports) USB2 (internal USB 2.0 ports) USB3-1 (internal USB 3.2 Gen 1 ports)

Table 5-3: BIOS Options and Configured USB Ports

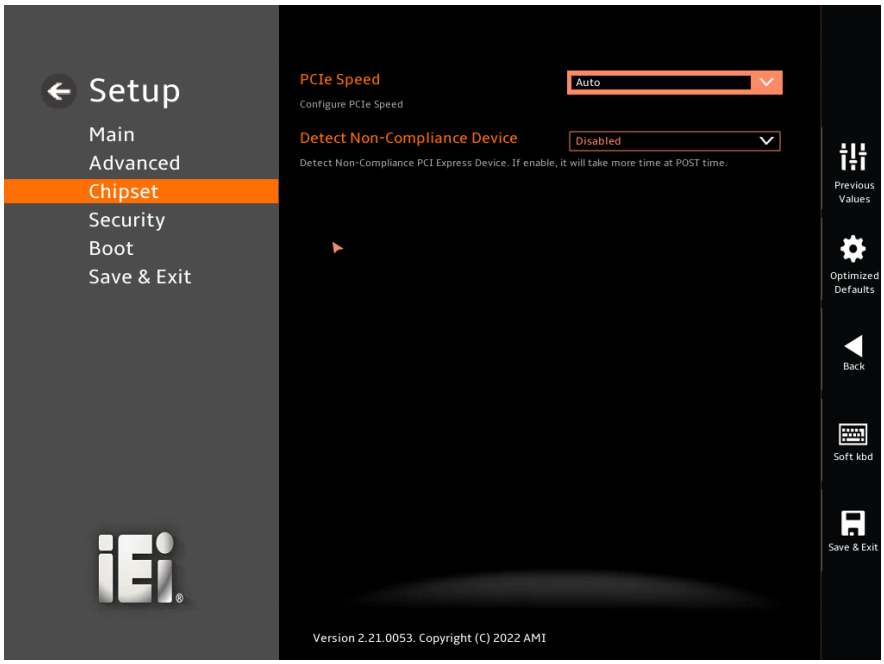
5.4.2.1 PCI Express Configuration

Use the **PCI Express Configuration** submenu (**BIOS Menu 30**) to configure the PCI Express slots.

BIOS Menu 30: PCI Express Configuration

5.4.2.1.1 PCIe Root Port Setting

Use the **PCIEX4_1, PCIEX4_2, PCIEX16_1, M2_A1, M2_M1, PCIEX4_3** submenu (**BIOS Menu 31**) to configure the PCI Root Port Setting.



BIOS Menu 31: PCIe Slot Configuration Submenu

➔ **PCIe Speed [Auto]**

Use the **PCIe Speed** option to specify the PCI Express port speed. Configuration options are listed below.

➔ **Auto**	**DEFAULT**	Auto mode.
➔ **Gen1**		Configure PCIe Speed to Gen1.
➔ **Gen2**		Configure PCIe Speed to Gen2.
➔ **Gen3**		Configure PCIe Speed to Gen3.

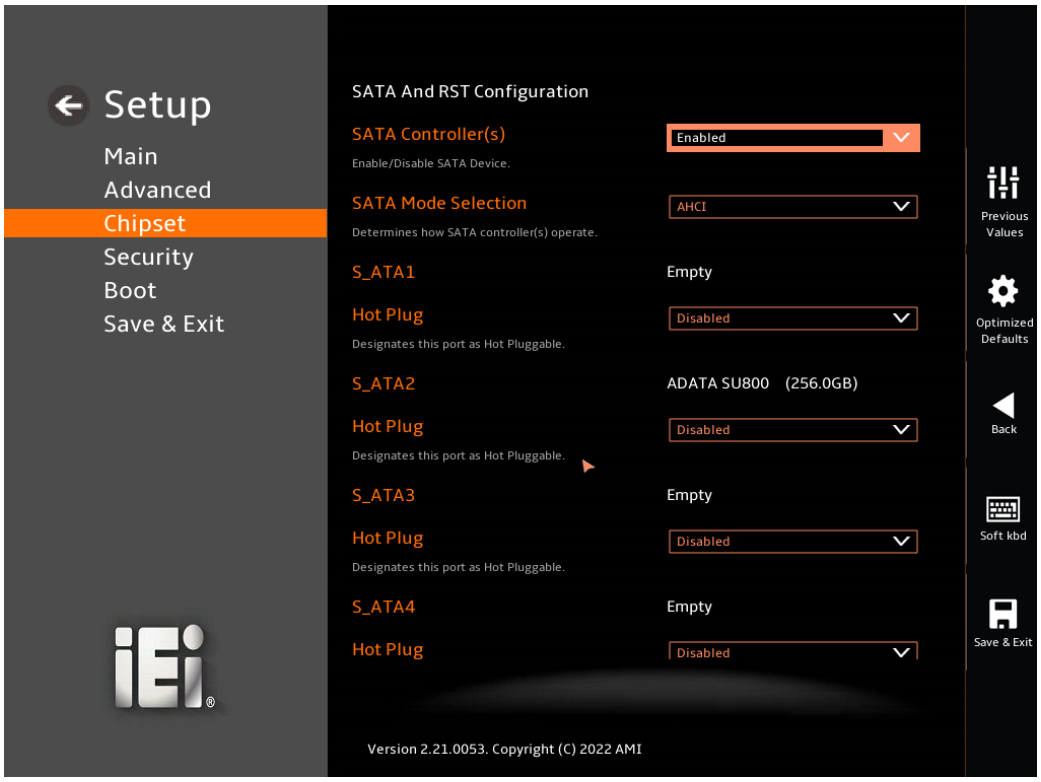
➔ **Detect Non-Compliance Device [Disabled]**

Use the **Detect Non-Compliance Device** option to configure whether to detect if a non-compliance PCI Express device is connected to the PCI Express port.

➔ **Disabled**	**DEFAULT**	Do not detect if a non-compliance PCI Express device is connected to the PCI Express port.
➔ **Enabled**		Detect if a non-compliance PCI Express device is connected to the PCI Express port.

5.4.2.2 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 32**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 32: 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.

➔ **Intel RST Premium With Intel Optane System Acceleration**		Configures SATA devices to the Intel RST Premium With Intel Optane System Acceleration mode.

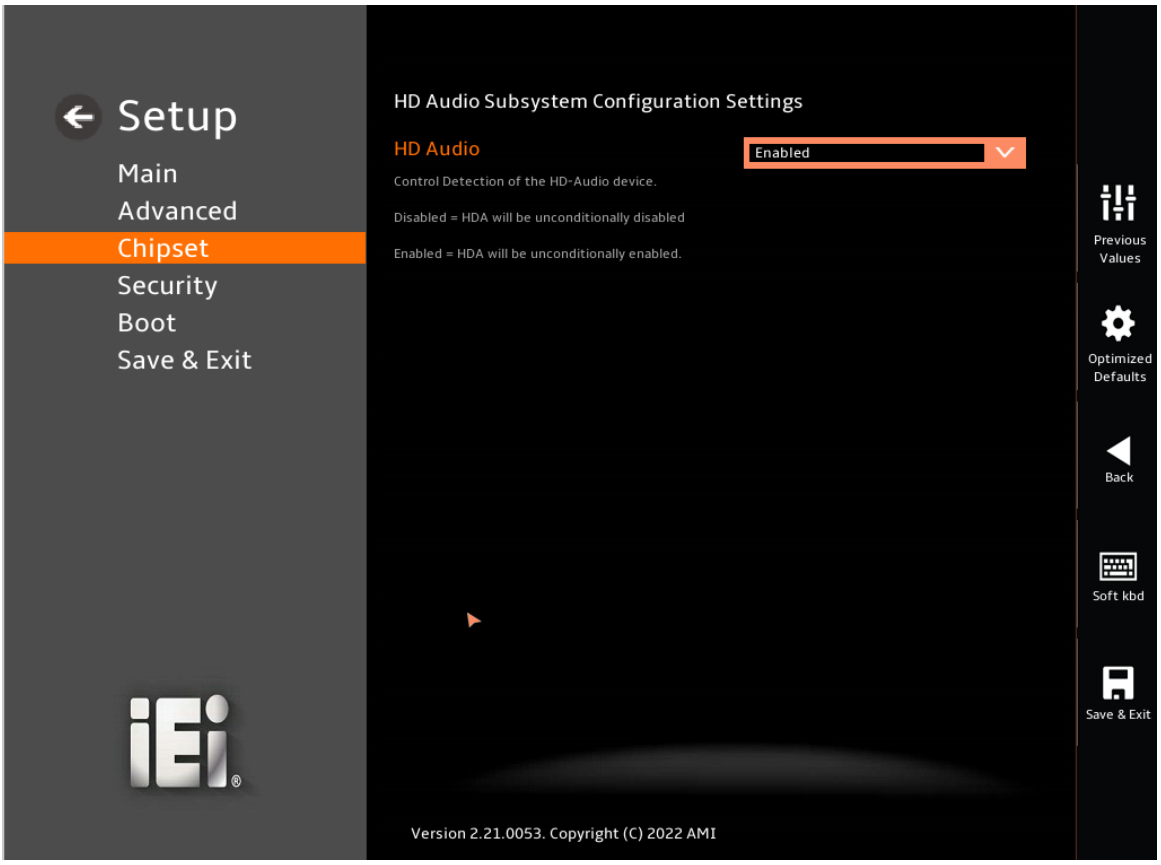
➔ **Hot Plug [Disabled]**

Use the **Hot Plug** option (for S_ATA1 to S_ATA4 and M2_M1) to designate the correspondent port as hot-pluggable.

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

5.4.2.3 HD Audio Configuration

Use the **HD Audio Configuration** menu (**BIOS Menu 33**) to configure the PCH Azalia settings.



BIOS Menu 33: 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** **DEFAULT** The onboard High Definition Audio controller is enabled.

5.5 Security

Use the **Security** menu (**BIOS Menu 34**) to set system and user passwords.

BIOS Menu 34: Security

➔ **Administrator Password**

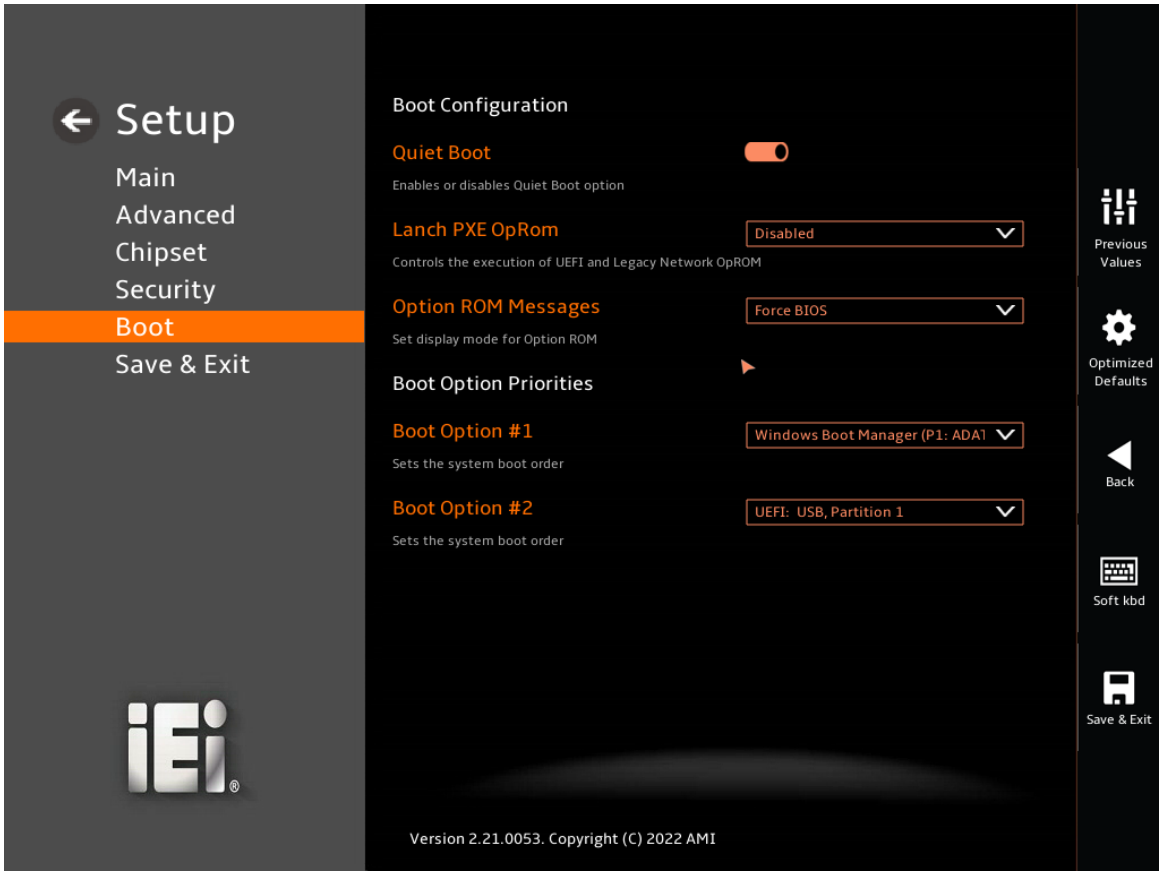
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 35**) to configure system boot options.



BIOS Menu 35: Boot

5.6.1 Boot Configuration

➔ **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.

5.6.2 Boot Option Priorities

Use the Boot Option # N to choose the system boots from the peripherals you selected The following Boot Options are listed as an example.

➔ **Boot Option #1**

Sets the system boot order **ADATA SP580** as the first priority.

➔ **Windows Boot Manager (P1: ADATA SSD SP580 240GB)**

➔ **Disabled**

➔ **Boot Option #2**

Sets the system boot order **USB Partition 1** as the second priority.

➔ **UEFI: USB, Partition 1**

➔ **Disabled**

5.7 Save & Exit

Use the **Safe & Exit** menu (**BIOS Menu 36**) to load default BIOS values, optimal failsafe values and to save configuration changes.

BIOS Menu 36: 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

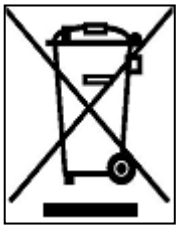
Product Disposal

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

Watchdog Timer

NOTE:

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

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

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

INT 15H:

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

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

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

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

NOTE:

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

EXAMPLE PROGRAM:

```
; INITIAL TIMER PERIOD COUNTER

;
W_LOOP:
;

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

;
; ADD THE APPLICATION PROGRAM HERE
;

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

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

;
; EXIT ;
```

Appendix

E

Error Beep Code

E.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

E.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

F

Hazardous Materials Disclosure

F.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
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.

F.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
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。