

**MODEL:
IMB-Q470**

microATX motherboard supports 14nm LGA1200 10th/11th Generation Intel® Core® i9/i7/i5/i3, Celeron® and Pentium® processor, DDR4, triple independent displays, 2.5GbE LAN, M.2, 8 USB 3.2, 6 USB 2.0, 10 COM, SATA 6Gb/s, HD Audio and RoHS

User Manual

Revision

Date	Version	Changes
November 1, 2023	1.00	Initial release

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Manual Conventions



WARNING

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



CAUTION

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



NOTE

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

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Chapter

1

Introduction

1.1 Introduction



Figure 1-1: IMB-Q470

The IMB-Q470 is a microATX motherboard. It is powered by Socket LGA1200 Intel® 10/11th Core® i9/i7/i5/i3, Pentium® or Celeron® processor. It supports two 288-pin 2933 dual-channel unbuffered DDR4 SDRAM DIMM slots supporting up to 64 GB memory.

The IMB-Q470 includes DP, VGA and DVI-D for triple independent display. It provides two 2.5GbE interfaces through the Intel® I226V and Intel® I219-LM controllers. Expansion and I/O include two PCIe x4 slots, one PCIe x16 slot, two M.2 slots, ten COM ports, one LPT, eight USB 3.2 Gen 1, six USB 2.0, one KB/MS and four SATA 6Gb/s connectors.

IMB-Q470

1.2 Features

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

- LGA1200 socket supports 10th/11th generation Intel® Core® i9/i7/i5/i3, Pentium® or Celeron® processor, up to 125W TDP
- Two 288-pin 2933 MHz dual-channel DDR4 SDRAM unbuffered DIMMs slots supporting up to 64GB
- One I219-LM controller and one I226-V controller
- Triple independent display by VGA, DVI-D and Internal DP
- Four SATA 6Gb/s connectors
- Eight USB 3.2 Gen 1 ports, six USB 2.0 and one PS/2
- One M.2 M-key slot with PCIe x4 signal; one M.2 B-key slot with PCIe x2 signal
- One PCIe Gen3 x16 slot
- Two PCIe Gen3 x 4
- Ten serial ports
- One LPT port
- TPM 2.0 security function supported by PTT
- RoHS compliant

1.3 Connectors

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

2 x 288-pin 2933 MHz dual-channel DDR4

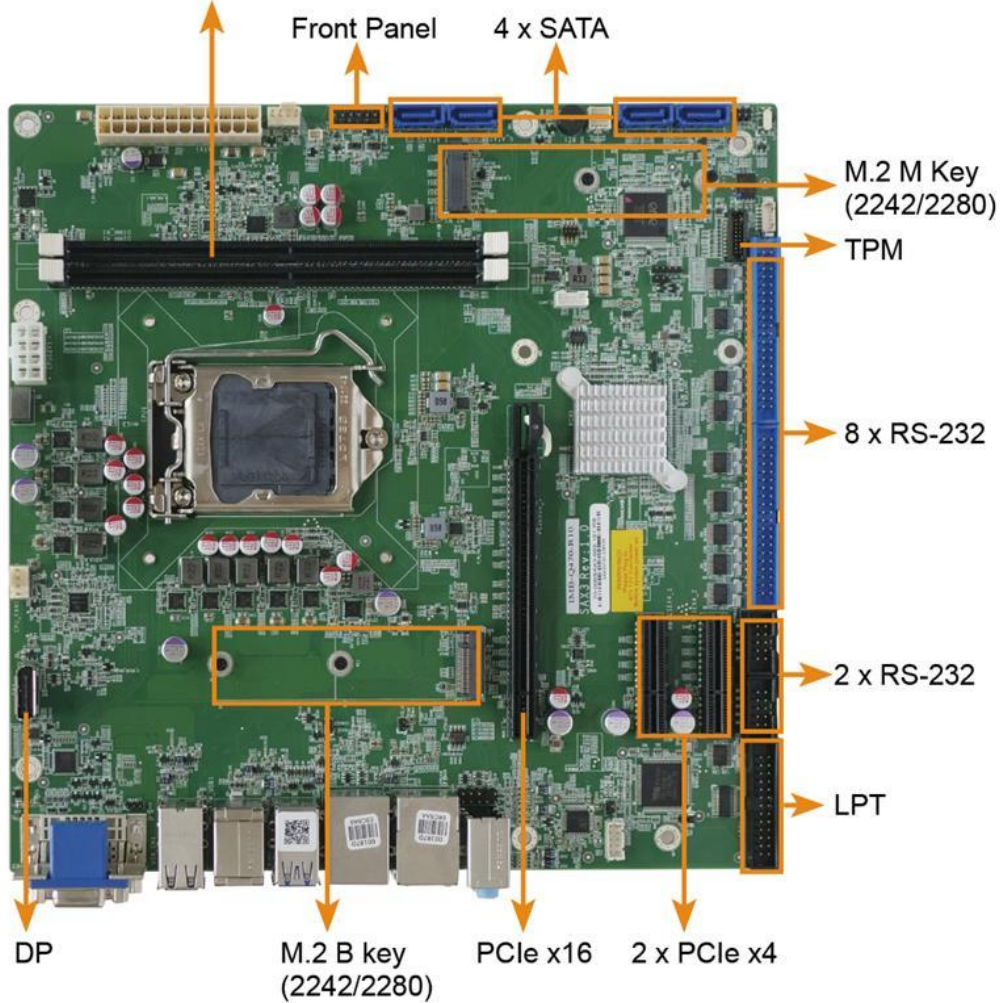


Figure 1-2: Connectors

IMB-Q470

1.4 Dimensions

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

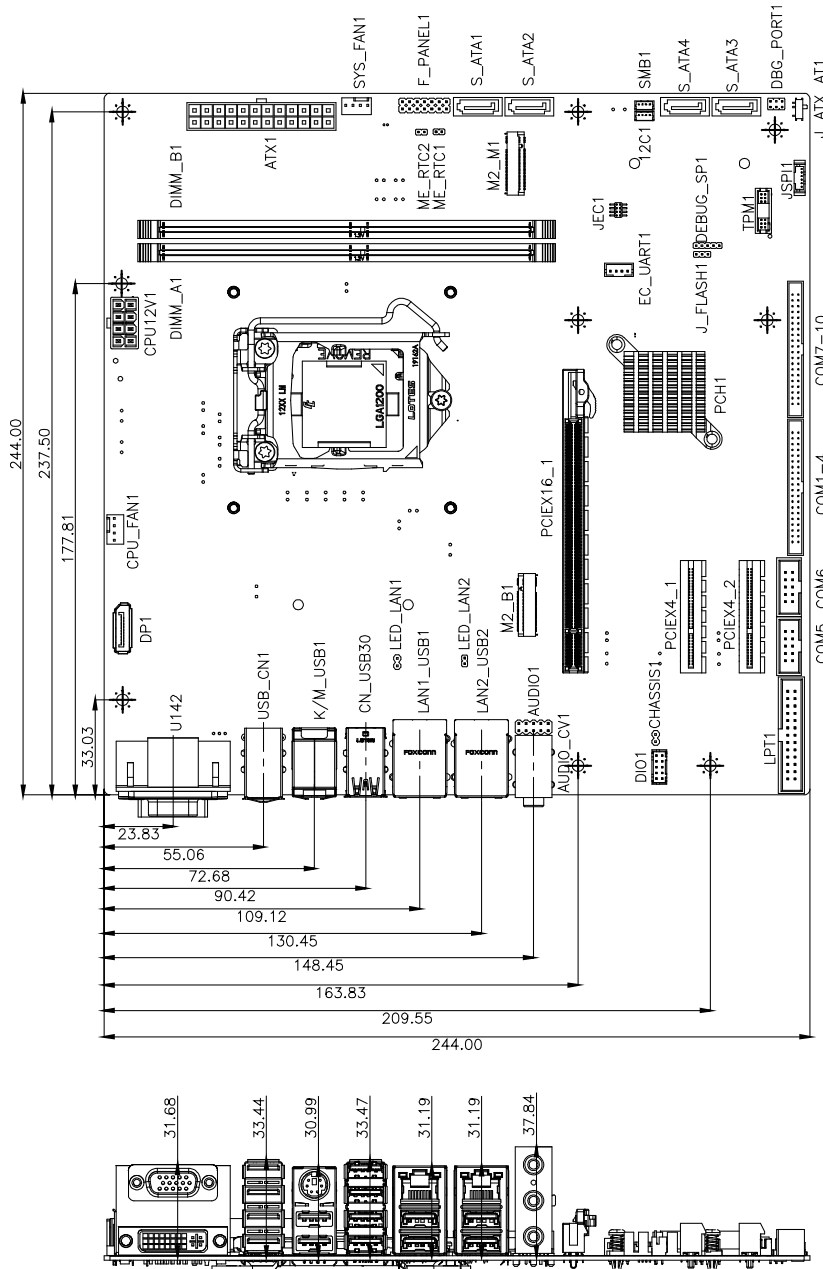


Figure 1-3: IMB-Q470 Dimensions (mm)

1.5 Data Flow

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

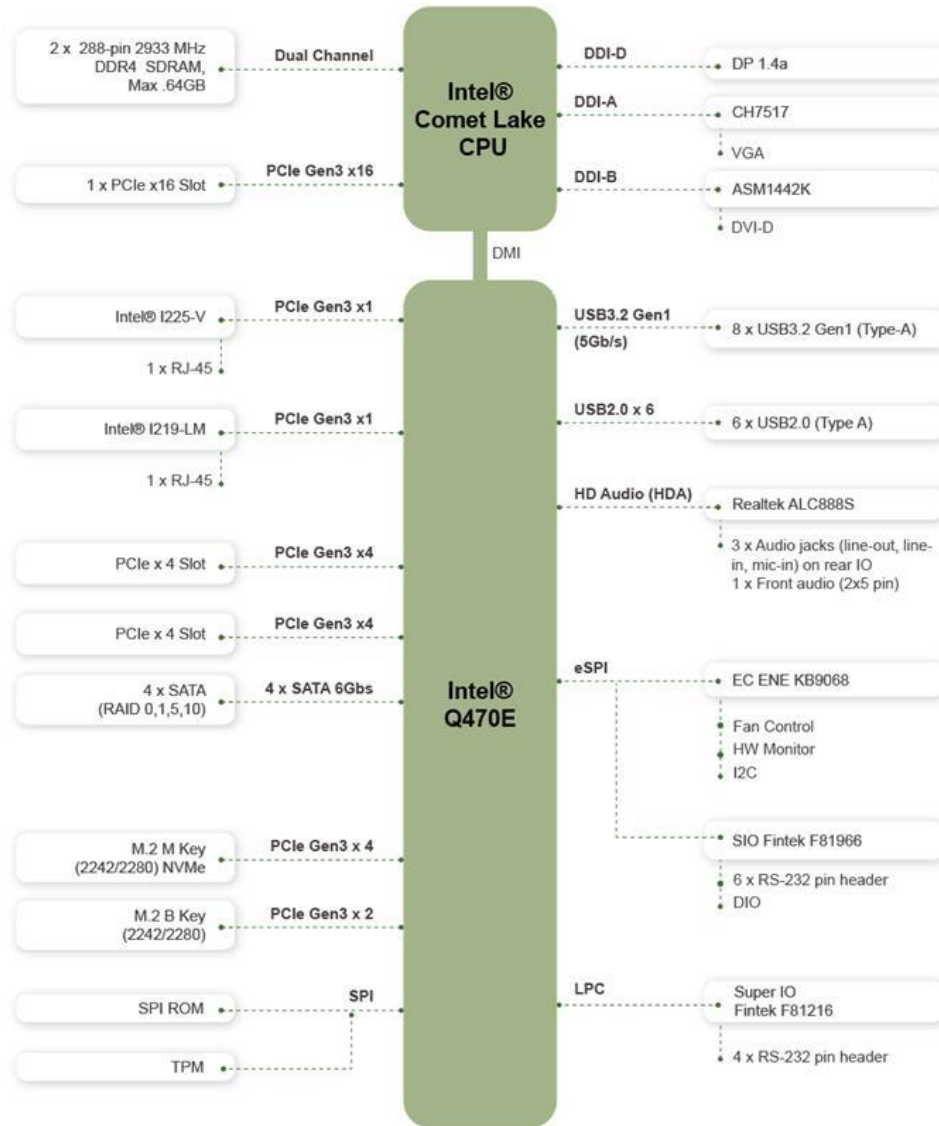


Figure 1-4: Data Flow Diagram

IMB-Q470

1.6 Technical Specifications

The IMB-Q470 technical specifications are listed below.

Specification/Model	IMB-Q470
Form Factor	microATX
CPU Supported	LGA1200 socket supports 10th/11th generation Intel® Core® i9/i7/i5/i3, Pentium® or Celeron® processor, up to 125W TDP
Chipset	Intel® Q470 / Q470E
Memory	Two 288-pin 2933 MHz dual-channel DDR4 SDRAM unbuffered DIMMs slots supporting up to 64GB
Graphics Engine	Intel® UHD Graphics
Display Output	Triple independent display 1 x VGA (up to 1920 x 1080 @60Hz) 1 x DVI-D (800 x 600 @60Hz by default, up to 1920 x 1080 @60Hz) 1 x Internal DP (up to 3840 x 2160 @60Hz)
Ethernet Controllers	LAN1: Intel® I219-LM controller LAN2: Intel® I226-V controller
Audio	Realtek ALC888S HD Audio codec supports 7.1-channel
BIOS	AMI UEFI BIOS
Watchdog Timer	Software programmable supports 1~255 sec. system reset
Expansions	1 x PCIe Gen3 x16 2 x PCIe Gen3 x4 1 x M.2 B key 2242/2280 (PCIe Gen3 x2) 1 x M.2 M key 2242/2280 (PCIe Gen3 x4)
I/O Interface Connectors	
Audio Connectors	One internal audio connector (10-pin header)
Chassis Intrusion	One 2-pin header
Digital I/O	8-bit digital I/O

Specification/Model	IMB-Q470
Ethernet	Two RJ-45 GbE ports
Fan	1 x CPU fan connector (1x4 pin) 1 x System fan connector (1x4 pin)
Front Panel	One 14-pin header (power LED, HDD LED, speaker, power button, reset button)
I²C	One 4-pin wafer connector
LAN LED	Two 2-pin headers for LAN1 LED and LAN2 LED
Serial ATA	Four SATA 6Gb/s connectors
Serial Ports	10 x RS-232 (2x20 pin, p=2.54)
SMBus	One 4-pin wafer connector
USB Ports	8 x USB 3.2 Gen 1 6 x USB 2.0
Environmental and Power Specifications	
Power Supply	AT/ATX power supply
Power Consumption	3.3V@1.13A, 5V@10.14A, 12V@11.86A, 5VSB@0.23A (11th Gen. Intel® Core® i9-11900K 3.50 GHz 125W CPU with 32GB 2933MHz DDR4 memory, EUP enabled) 3.3V@1.16A, 5V@10.45A, 12V@5.93A, 5VSB@0.26A (10th Gen. Intel® Core® i9-10900E 2.80 GHz 65W CPU with 32GB 2933MHz DDR4 memory, EUP enabled)
Operating Temperature	0°C ~ 60°C
Storage Temperature	-30°C ~ 70°C
Operating Humidity	5% ~ 95% (non-condensing)
Physical Specifications	
Dimensions	244 mm x 244 mm
Weight (GW/NW)	1200g / 680g

Table 1-1: IMB-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 IMB-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.

IMB-Q470



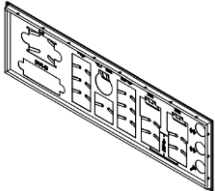
2.3 Packing List



NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the IMB-Q470 was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com.

The IMB-Q470 is shipped with the following components:

Quantity	Item and Part Number	Image
1	IMB-Q470 single board computer	
2	SATA cable	
1	I/O shielding	

Quantity	Item and Part Number	Image
1	Quick installation guide	

Table 2-1: Packing List

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
SATA power cable (P/N: 32102-000100-200-RS)	
RS-232 cable, 230mm · P=2.54 (P/N: 19800-020100-100-RS)	
RS-232 cable, 400mm, 2x20 pin, p=2.54 (P/N: 19800-014700-100-RS)	
Cooler module (P/N: 19100-000318-00-RS)	

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Item and Part Number	Image
Cooler module (P/N: CF-115XA-R10)	
Cooler module (P/N: CF-1156C-R20)	
Cooler module (P/N: CF-1156D-R30)	
Cooler module (P/N: CF-115XE-R10)	

Table 2-2: Optional Items

Chapter

3

Connectors

IMB-Q470

3.1 Peripheral Interface Connectors

This chapter details all the peripheral interface connectors.

3.1.1 IMB-Q470 Layout

The figures below show all the peripheral interface connectors.

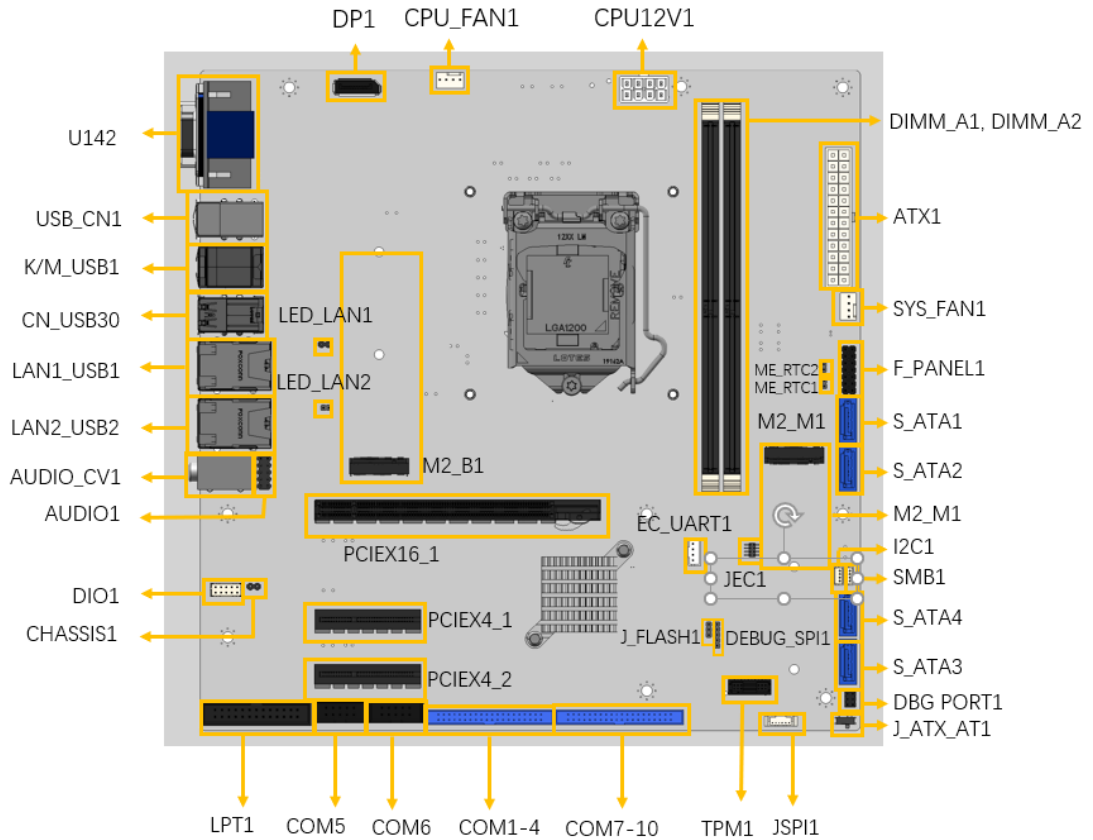


Figure 3-1: Peripheral Interface Connectors

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
Clear CMOS jumper	Button	ME_RTC2

Connector	Type	Label
Clear ME Jumper	2-pin header	ME_RTC1
AT/ATX Power Mode Setting Switch	3-pin switch	J_ATX_AT1
Flash Descriptor Security Override Jumper	3-pin header	J_FLASH1
+12V Power Source Connector	8-pin Molex power connector	CPU12V1
24-pin ATX Power Source Connector	24-pin connector	ATX1
Audio Connector	10-pin header	AUDIO1
Digital I/O Connector	10-pin header	DIO1
Chassis Status Connector	2-pin header	CHASSIS1
CPU Fan Connector	4-pin header	CPU_FAN1
System Fan Connector	4-pin header	SYS_FAN1
Front Panel Connector	14-pin header	F_PANEL1
LAN1 Link LED Connector	2-pin header	LED_LAN1
LAN2 Link LED Connector	2-pin header	LED_LAN2
Parallel Port Connector	26-pin box header	LPT1
RS-232 Serial port Connectors	40-pin box header	COM1-4, COM7-10
RS-232 Serial port Connectors	10-pin box header	COM5, COM6
SATA 6Gb/s Connectors	8-pin SATA connector	S_ATA1, S_ATA2 S_ATA3, S_ATA4
SMBus Connector	4-pin wafer	SMB1
I2C Connector (to EC)	4-pin wafer	I2C1
Trusted Platform Module Connector	20-pin header	TPM1
Flash SPI ROM Connector	6-pin header	JSPI1
Flash EC ROM Connector	8-pin header	JEC1
Debug Port Connector	6-pin header	DBG_PORT1
EC debug Port Connector	6-pin header	DEBUG_SPI1

Connector	Type	Label
EC UART Debug Connector	4-pin header	EC_UART1
Internal DisplayPort Connector	DisplayPort	DP1
M.2 B key 2242/2280 Slot	M.2 B-key slot	M2_B1
M.2 M key 2242/2280 Slot	M.2 M-key slot	M2_M1
PCIe Gen3 x16 Slot	PCIe x16 slot	PCIEX16_1
PCIe Gen3 x4 Slots	PCIe x4 slot	PCIEX4_1, PCIEX4_2

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 connector	Audio jacks	AUDIO_CV1
External VGA female connector and DVI-D connector	VGA, DVI	U142
External RJ-45 LAN and dual USB 3.2 Gen 1 connector	USB 3.2, RJ45	LAN1_USB1, LAN2_USB2
External keyboard/mouse and dual USB 2.0 connector	USB 2.0, PS/2	K/M_USB1
External quad-port USB 2.0 connector	USB 2.0	USB_CN1
External quad-port USB 3.2 Gen 1 connector	USB 3.2	CN_USB30

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

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

3.2.1 +12V Power Source 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.

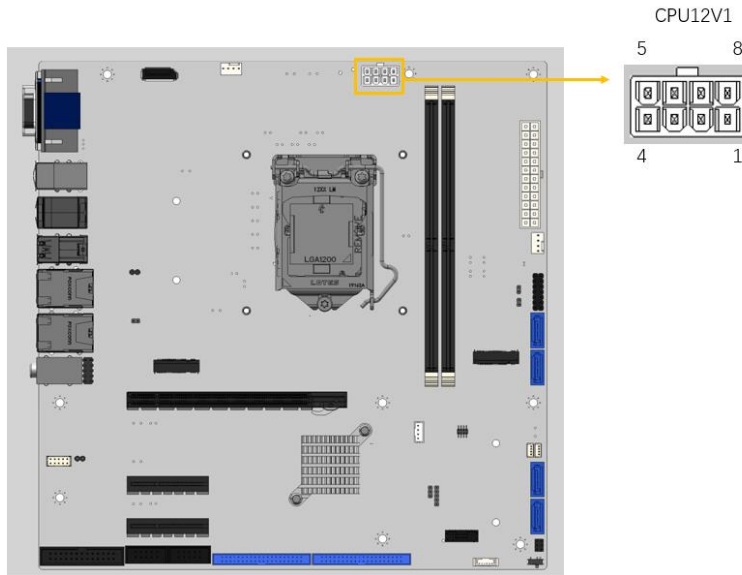


Figure 3-2: CPU 12V Power Connector Location

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: CPU 12V Power Connector Pinouts

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3.2.2 ATX Power Connector

- CN Label:** ATX1
- CN Type:** 24-pin connector, p=4.2 mm
- CN Location:** See Figure 3-3
- CN Pinouts:** See Table 3-4

The ATX power connector connects to an ATX power supply.

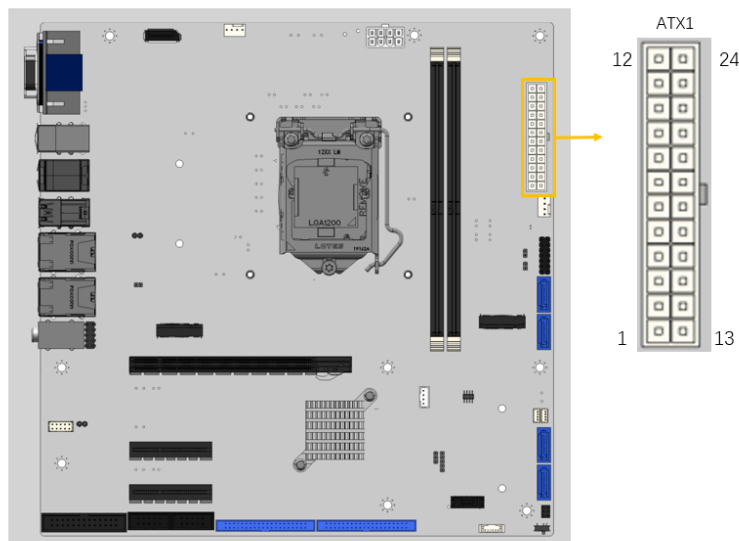


Figure 3-3: ATX Power Connector Location

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

Pin	Description	Pin	Description
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	GND

Table 3-4: ATX Power Connector Pinouts

3.2.3 Chassis Intrusion Connector

- CN Label:** CHASSIS1
- CN Type:** 2-pin header, p=2.54 mm
- CN Location:** See **Figure 3-4**
- CN Pinouts:** See **Table 3-5**

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

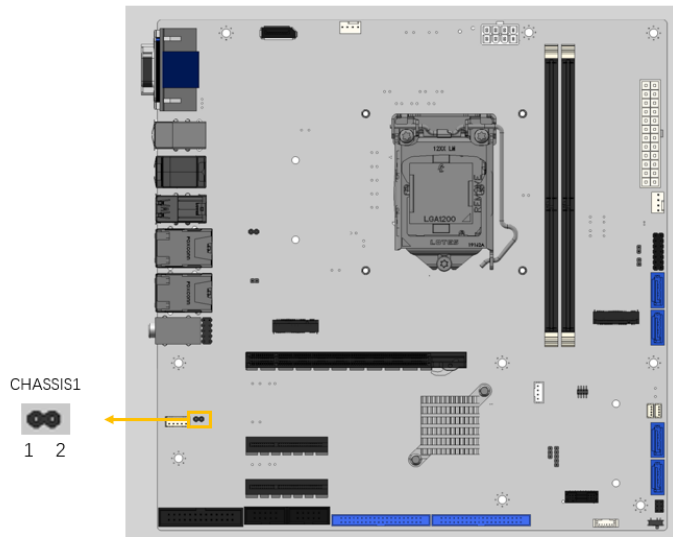


Figure 3-4: Chassis Intrusion Connector Location

Pin	Description	Pin	Description
1	+3.3VSB	2	CHASSIS OPEN

Table 3-5: Chassis Intrusion Connector Pinouts

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3.2.4 AT/ATX Power Mode Setting

- CN Label:** J_ATX_AT1
- CN Type:** 3-pin switch
- CN Location:** See Figure 3-5
- CN Pinouts:** See Table 3-6

The AT/ATX power mode selection is made through the AT/ATX power mode switch.

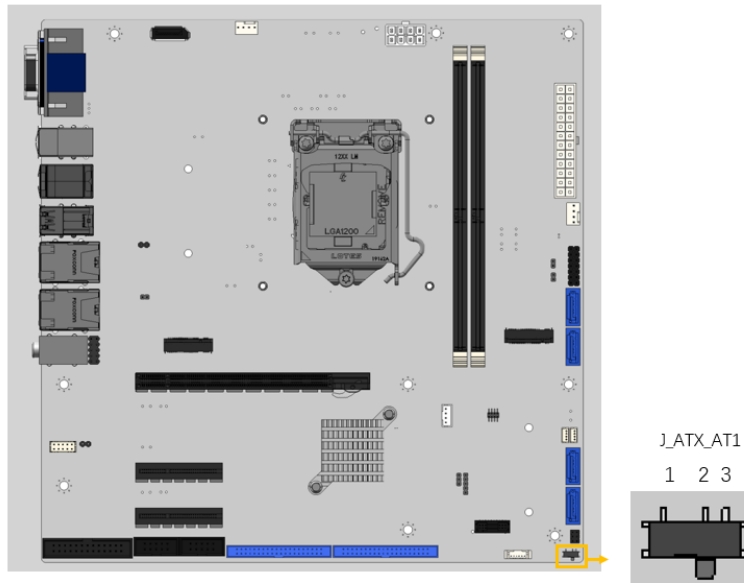


Figure 3-5: AT/ATX Power Mode Switch Location

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

Table 3-6: AT/ATX Power Mode Switch Settings

3.2.5 Flash Descriptor Override Setting Jumper

- CN Label:** J_FLASH1
- CN Type:** 3-pin header, P=2.00mm
- CN Location:** See **Figure 3-6**
- CN Pinouts:** See **Table 3-7**

The J_FLASH1 connector is used for Flash Descriptor Security Override.

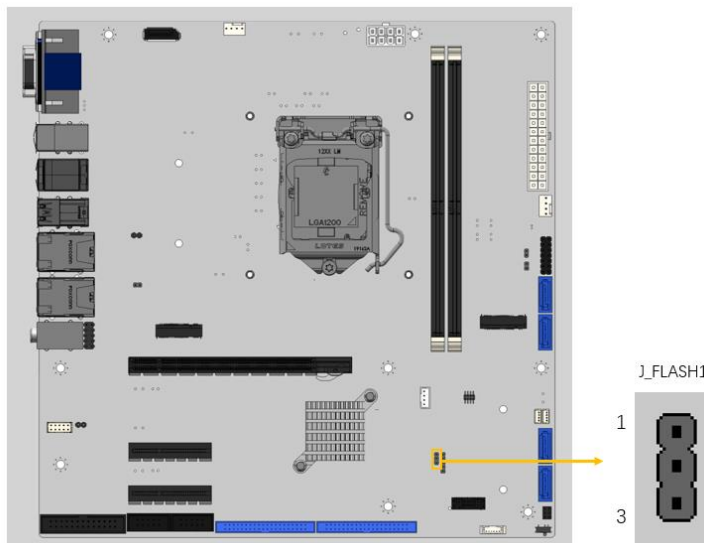


Figure 3-6: Flash Descriptor Override Setting Jumper Location

PIN NO.	DESCRIPTION
Short 1 - 2	Disable (default)
Short 2 - 3	Enable

Table 3-7: Flash Descriptor Override Setting Jumper Pinouts

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

Step 1: Before turning on the system power, short the Flash Descriptor Security Override jumper.

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

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Step 3: Remove the metal clip on the Flash Descriptor Security Override jumper to its default setting.

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

3.2.6 Clear ME Jumper

- CN Label:** ME_RTC1
- CN Type:** 2-pin header, p=2.00 mm
- CN Location:** See **Figure 3-7**
- CN Pinouts:** See **Table 3-8**

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

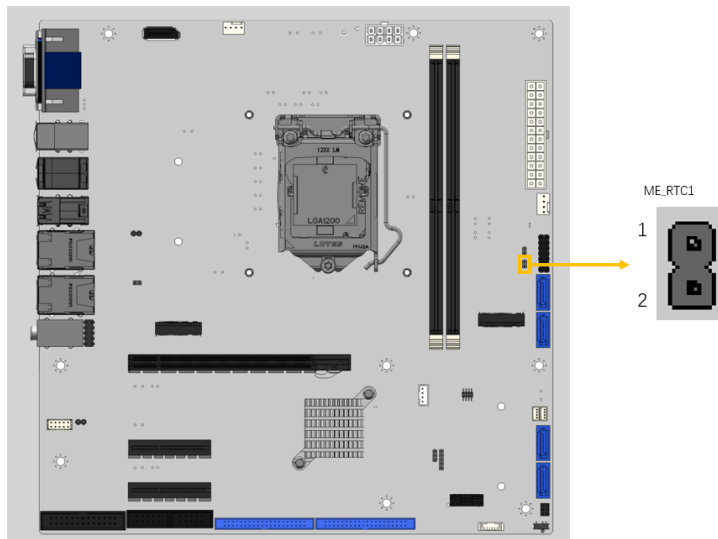


Figure 3-7: Clear ME Jumper Location

Pin	Description
Open	Keep RTC (default)
Short	Clear RTC

Table 3-8: Clear ME Jumper Pinouts

3.2.7 Digital I/O Connector

- CN Label:** DIO1
- CN Type:** 10-pin wafer, p=2.0 mm
- CN Location:** See **Figure 3-8**
- CN Pinouts:** See **Table 3-9**

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

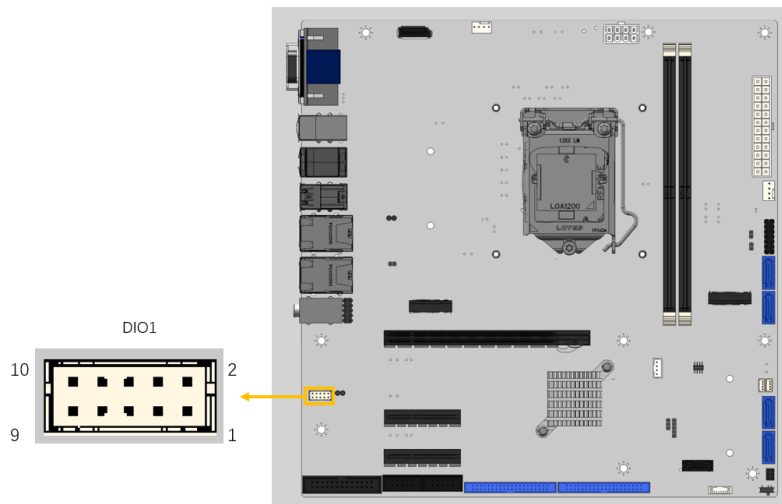


Figure 3-8: Digital I/O Connector Location

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 3-9: Digital I/O Connector Pinouts

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3.2.8 EC Debug Port Connector

- CN Label:** DEBUG_SPI1
- CN Type:** 5-pin header, p=2.0 mm
- CN Location:** See Figure 3-9
- CN Pinouts:** See Table 3-10

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

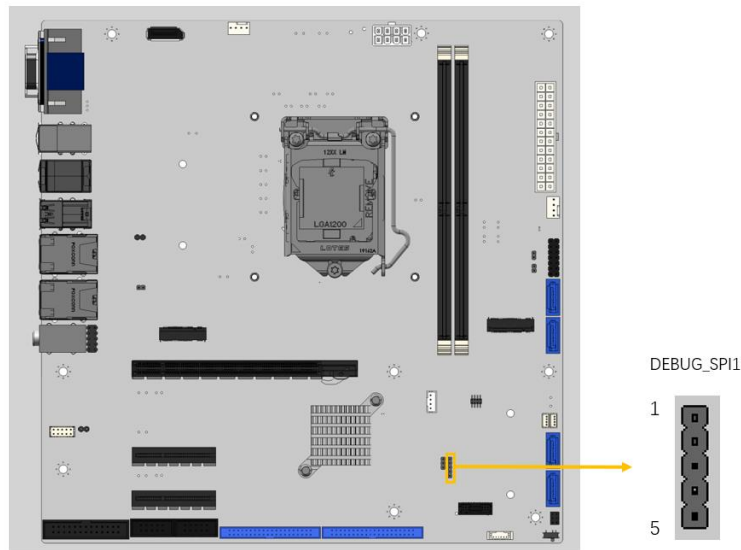


Figure 3-9: EC Debug Connector Location

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

Table 3-10: EC Debug Connector Pinouts

3.2.9 Debug Port Connector

- CN Label:** **DBG_PORT1**
- CN Type:** 6-pin header, p=2.0 mm
- CN Location:** See **Figure 3-10**
- CN Pinouts:** See **Table 3-11**

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

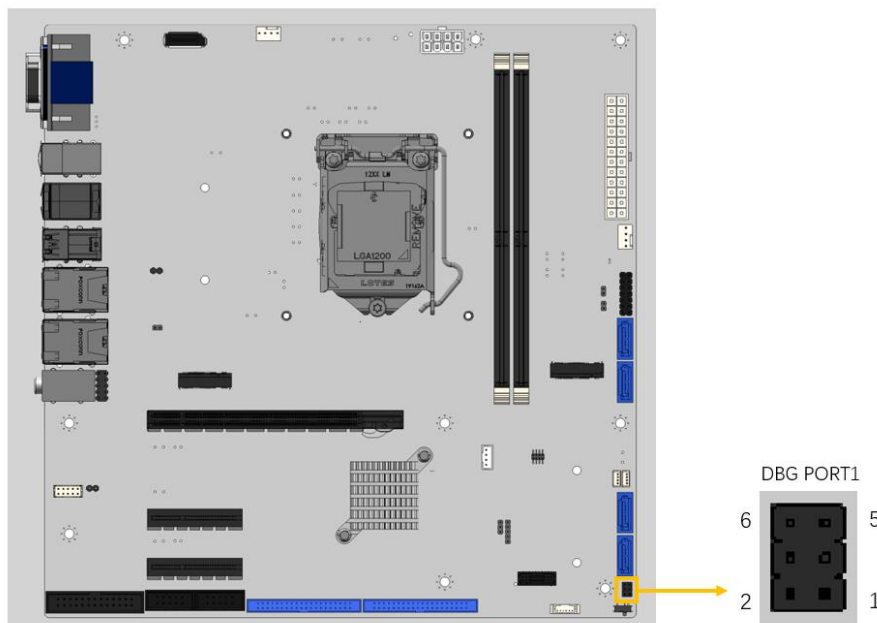


Figure 3-10: Debug Port Connector Location

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

Table 3-11: Debug Port Connector Pinouts

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3.2.10 EC UART Debug Connector

- CN Label:** EC_UART1
- CN Type:** 4-pin wafer, p=2.0 mm
- CN Location:** See Figure 3-11
- CN Pinouts:** See Table 3-12

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

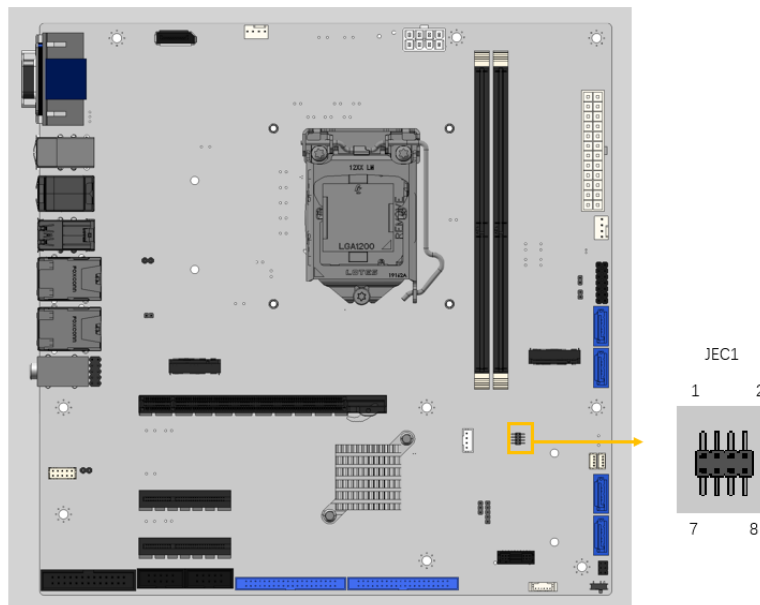


Figure 3-11: EC UART Debug Connector Location

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

Table 3-12: EC UART Debug Connector Pinouts

3.2.11 Clear CMOS Jumper

- CN Label:** ME_RTC2
- CN Type:** 2-pin header, p=2.0 mm
- CN Location:** See **Figure 3-12**
- CN Pinouts:** See **Table 3-13**

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

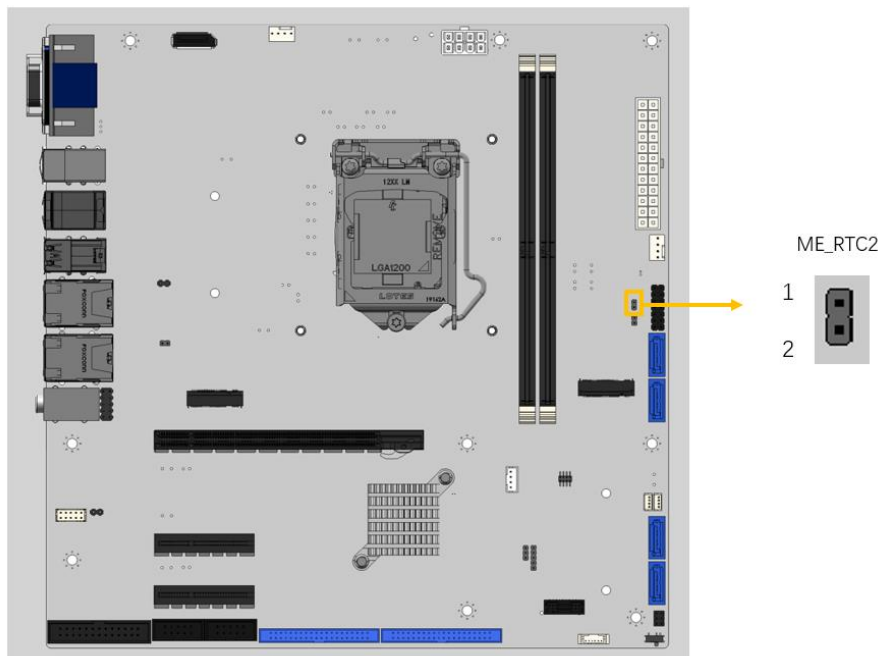


Figure 3-12: Clear CMOS Jumper Location

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

Table 3-13: Clear CMOS Jumper Pinouts

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3.2.12 Fan Connector (CPU)

- CN Label:** CPU_FAN1
- CN Type:** 4-pin wafer, p=2.54 mm
- CN Location:** See Figure 3-13
- CN Pinouts:** See Table 3-14

The fan connector attaches to a CPU cooling fan.

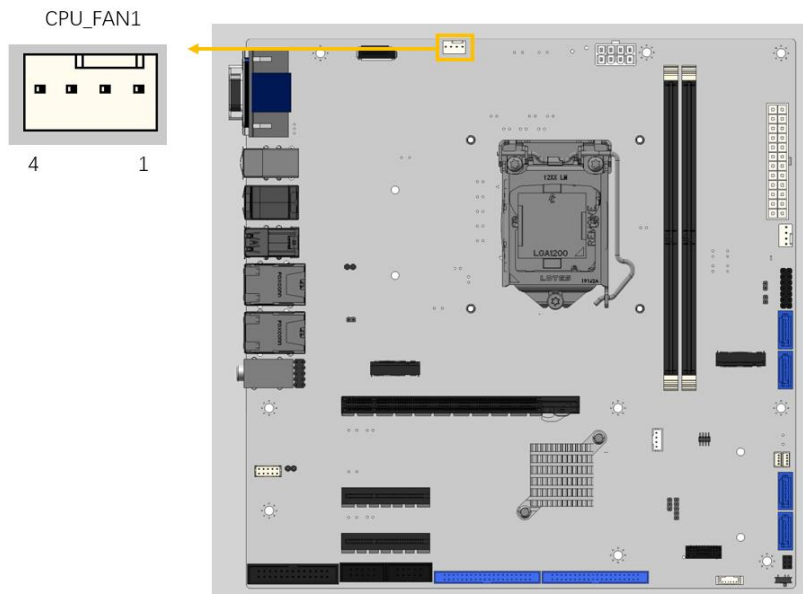


Figure 3-13: CPU Fan Connector Location

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

Table 3-14: CPU Fan Connector Pinouts

3.2.13 Fan Connectors (System)

- CN Label:** **SYS_FAN1**
- CN Type:** 4-pin wafer, p=2.54 mm
- CN Location:** See **Figure 3-14**
- CN Pinouts:** See **Table 3-15**

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

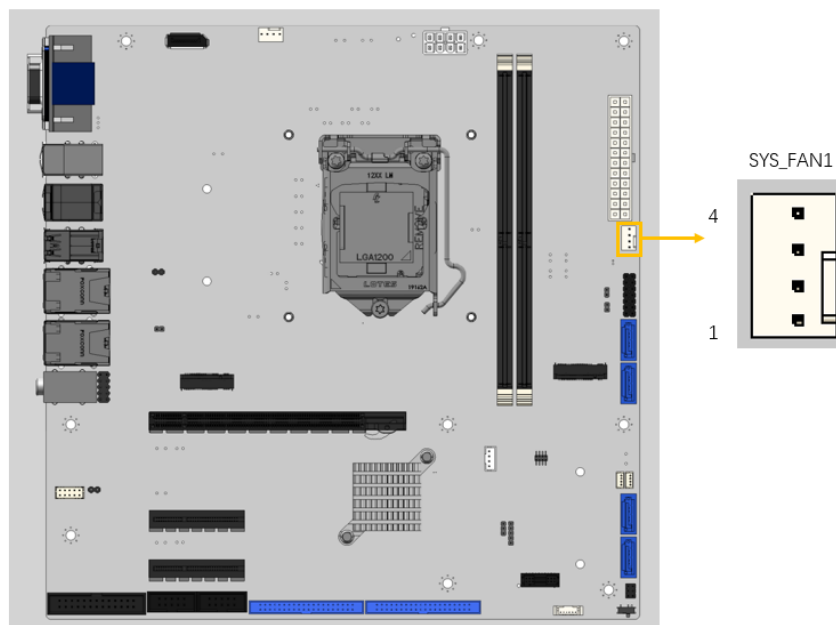


Figure 3-14: System Fan Connector Location

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

Table 3-15: System Fan Connector Pinouts

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3.2.14 Audio Connector

- CN Label:** AUDIO1
- CN Type:** 10-pin header, p=2.54 mm
- CN Location:** See Figure 3-15
- CN Pinouts:** See Table 3-16

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

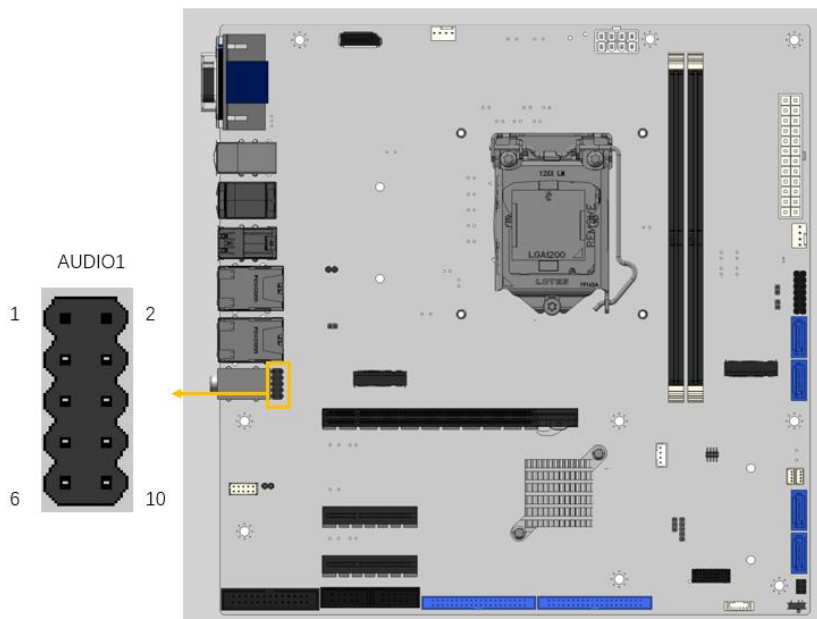


Figure 3-15: Audio Connector Location

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 3-16: Audio Connector Pinouts

3.2.15 Front Panel Connector

- CN Label:** F_PANEL1
- CN Type:** 14-pin header, p=2.54 mm
- CN Location:** See Figure 3-16
- CN Pinouts:** See Table 3-17

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

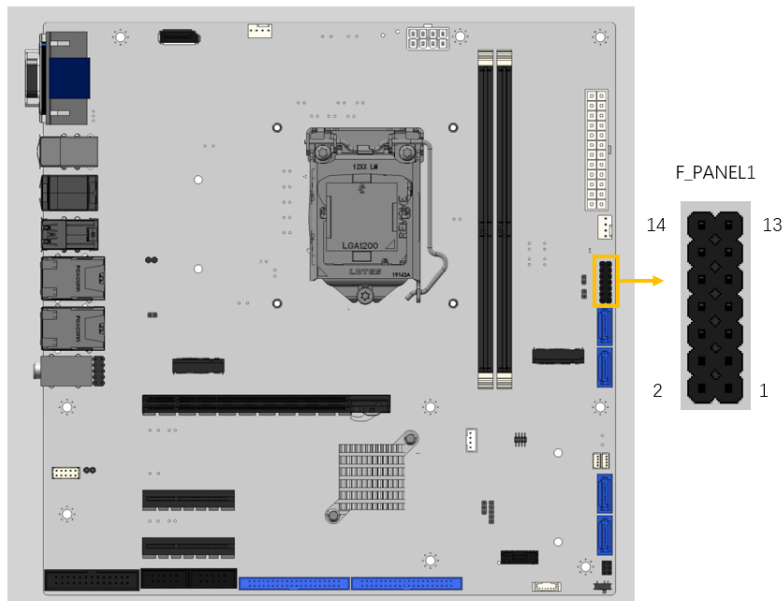


Figure 3-16: Front Panel Connector Location

Function	Pin	Description	Pin	Description	
PWR LED	1	+5V	2	BEEP_PWR	SPKR
	3	NC	4	NC	
	5	GND	6	NC	
PWR BTN	7	PWRBTN_SW#	8	PC_BEEP	
	9	GND	10	NC	
HDD LED	11	+5V	12	EXTRST-	RESET
	13	SATA_LED#	14	GND	

Table 3-17: Front Panel Connector Pinouts

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3.2.16 I²C Connector

- CN Label:** I2C1
- CN Type:** 4-pin wafer, p=1.25 mm
- CN Location:** See Figure 3-17
- CN Pinouts:** See Table 3-18

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

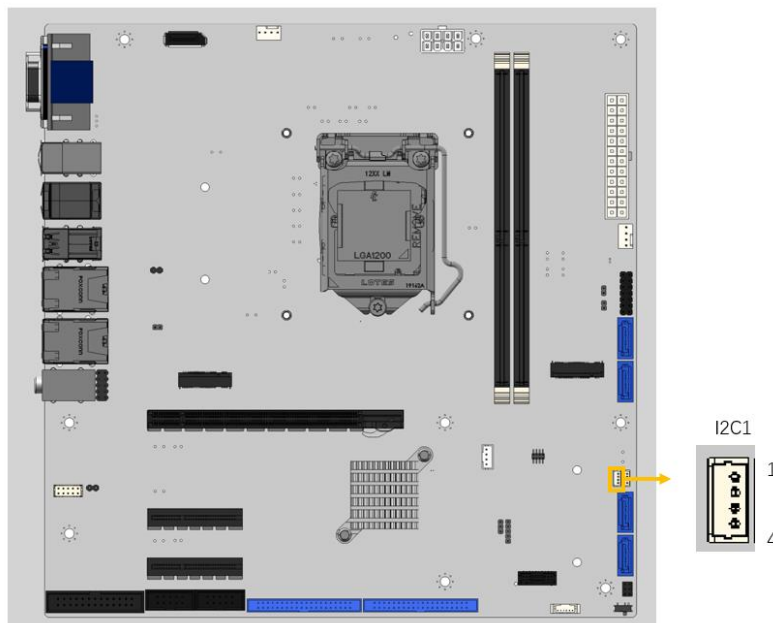


Figure 3-17: I²C Connector Location

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

Table 3-18: I²C Connector Pinouts

3.2.17 SMBus Connector

- CN Label:** J_SMB1
- CN Type:** 4-pin wafer, p=1.25 mm
- CN Location:** See **Figure 3-18**
- CN Pinouts:** See **Table 3-19**

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

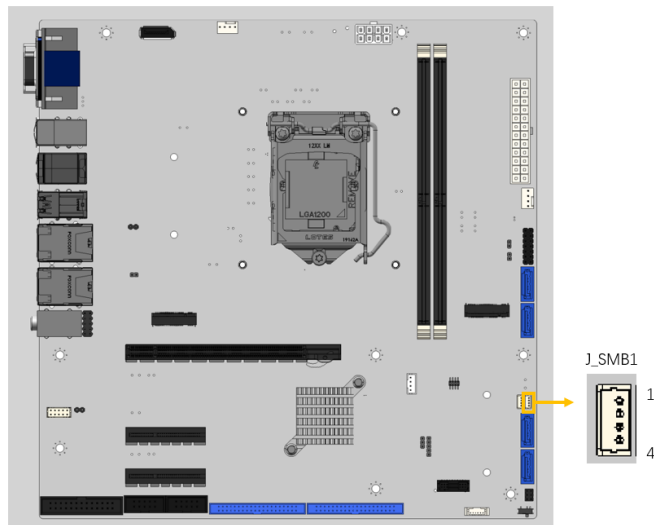


Figure 3-18: SMBus Connector Location

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

Table 3-19: SMBus Connector Pinouts

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3.2.18 Trusted Platform Module Connector

- CN Label:** TPM1
- CN Type:** 20-pin header, p=1.27 mm
- CN Location:** See Figure 3-19
- CN Pinouts:** See Table 3-20

The TPM1 connector is used to the trusted platform module.

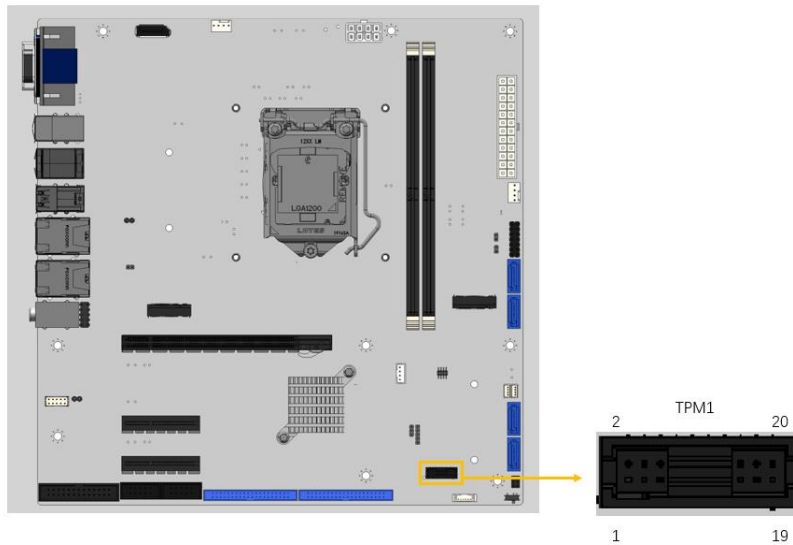


Figure 3-19: Trusted Platform Module Connector Location

Pin	Description	Pin	Description
1	NC	2	SPI_CS#0
3	SPI_TPM_GPIO	4	SPI_CS#1
5	GND	6	+3.3V
7	SPI_CLK	8	SPI_IO2
9	SPI_IO3	10	SPI_SO
11	SPI_HOLD	12	SPI_SI
13	SPI_CS#2	14	GND
15	SPI_WP	16	SERIRQ
17	SPI_PIRQ	18	+3.3V
19	PLTRST#	20	NC

Table 3-20: Trusted Platform Module Connector Pinouts

3.2.19 LAN Link LED Connector

- CN Label:** LED_LAN1, LED_LAN2
- CN Type:** 2-pin header, p=2.00 mm
- CN Location:** See **Figure 3-20**
- CN Pinouts:** See **Table 3-21** and **Table 3-22**

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.

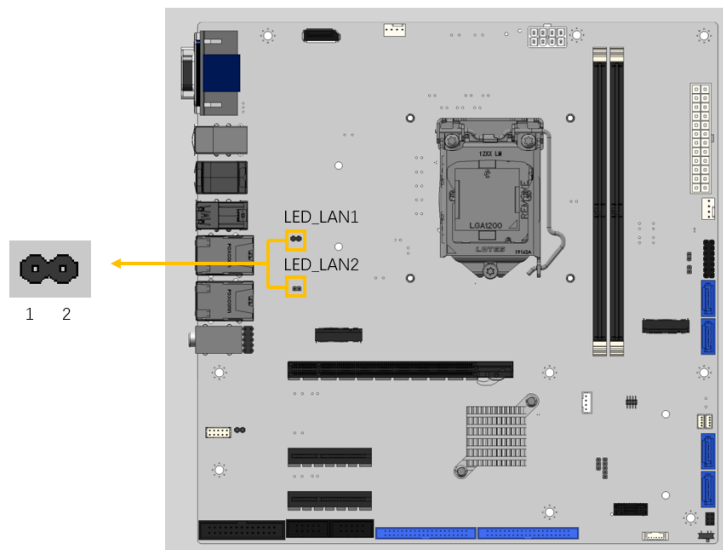


Figure 3-20: LAN LED Connector Locations

Pin	Description
1	+3.3V
2	LAN1_LED_LNK#_ACT

Table 3-21: LAN1 LED Connector (JLAN_LED1) Pinouts

Pin	Description
1	+3.3V
2	LAN2_LED_LNK#_ACT

Table 3-22: LAN2 LED Connector (JLAN_LED 2) Pinouts

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3.2.20 Parallel Port Connector

- CN Label:** LPT1
- CN Type:** 26-pin box header, p=2.54 mm
- CN Location:** See Figure 3-21
- CN Pinouts:** See Figure 3-23

The parallel port connector connects to a parallel port connector interface or some other parallel port device such as a printer.

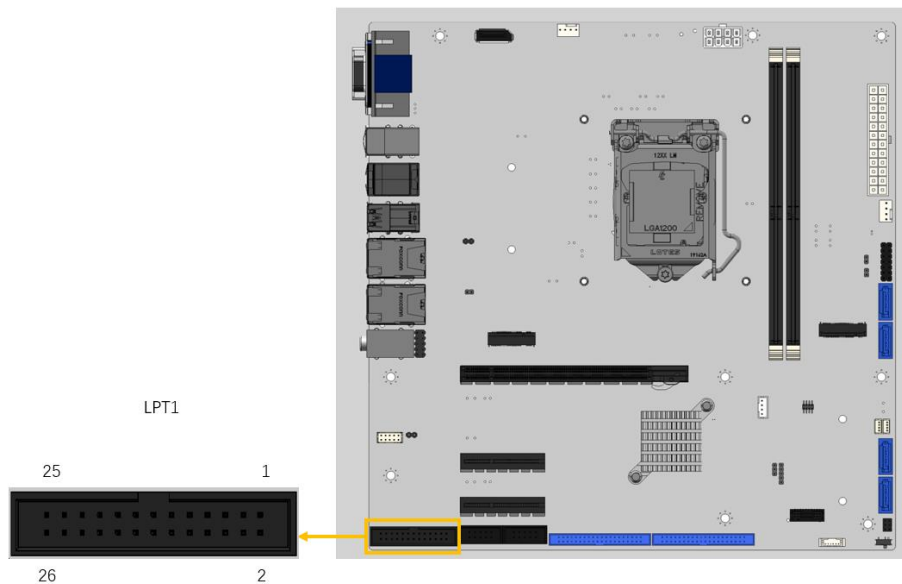


Figure 3-21: Parallel port connector Location

Pin	Description	Pin	Description
1	STB	2	SIO_AFD#
3	RPD0	4	SIO_ERR#
5	RPD1	6	SIO_INIT#
7	RPD2	8	SIO_SLIN#
9	RPD3	10	GND
11	RPD4	12	GND
13	RPD5	14	GND
15	RPD6	16	GND

Pin	Description	Pin	Description
17	RPD7	18	GND
19	SIO_ACK#	20	GND
21	SIO_BUSY	22	GND
23	SIO_PE	24	GND
25	SIO_SLCT	26	NC

Table 3-23: Parallel port connector Pinouts

3.2.21 Internal DisplayPort Connector

- CN Label:** DP1
- CN Type:** DisplayPort
- CN Location:** See **Figure 3-22**

The DP1 connects to a display device with DisplayPort interface.

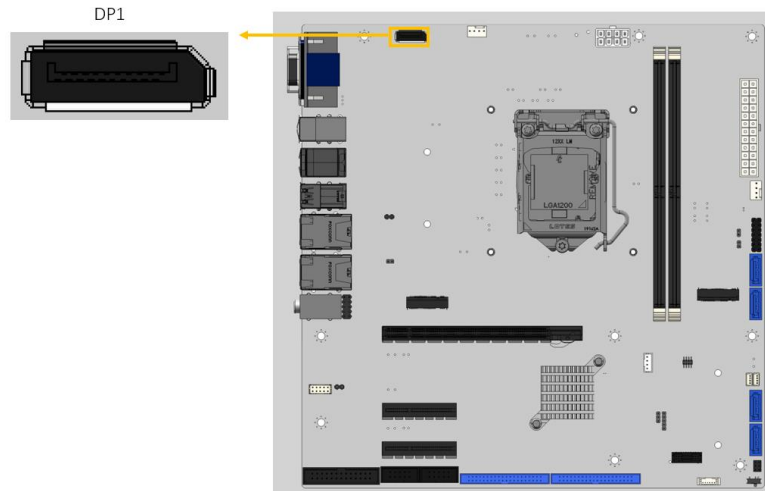


Figure 3-22: Internal DisplayPort Connector Location

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3.2.22 M.2 M-key Slot

- CN Label:** M2_M1
- CN Type:** M.2 M-key slot
- CN Location:** See Figure 3-23
- CN Pinouts:** See Table 3-24

The M.2 2242/2280 slot with PCIe x 4 signal is keyed in the M position.

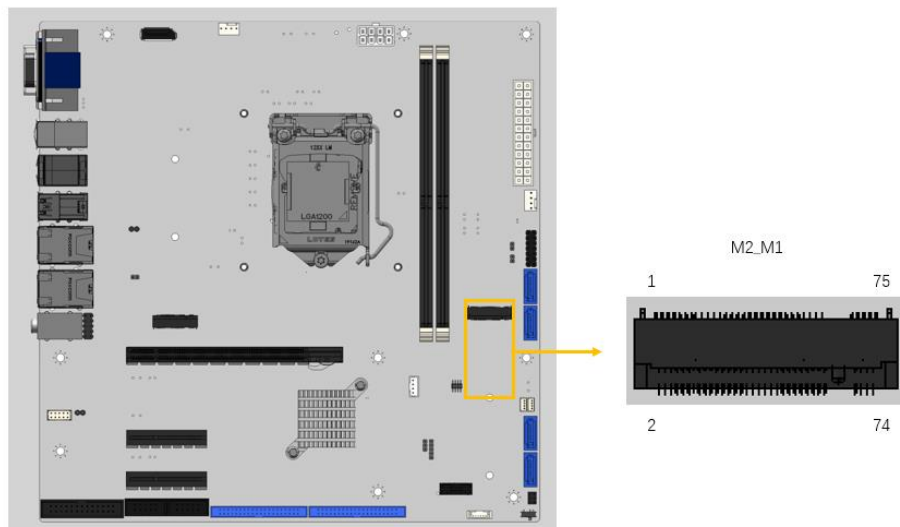


Figure 3-23: M.2 M-key Slot Location

Pin	Description	Pin	Description
1	GND	2	+V3.3
3	GND	4	+V3.3
5	PCIE_3_RX_DN	6	NC
7	PCIE_3_RX_DP	8	NC
9	GND	10	NGFF_ACT_N
11	PCIE_3_TX_DN	12	+V3.3
13	PCIE_3_TX_DP	14	+V3.3
15	GND	16	+V3.3
17	PCIE_2_RX_DN	18	+V3.3
19	PCIE_2_RX_DP	20	NC

Pin	Description	Pin	Description
21	GND	22	NC
23	PCIE_2_TX_DN	24	NC
25	PCIE_2_TX_DP	26	NC
27	GND	28	NC
29	PCIE_1_RX_DN	30	NC
31	PCIE_1_RX_DP	32	NC
33	GND	34	NC
35	PCIE_1_TX_DN	36	NC
37	PCIE_1_TX_DP	38	SATA_SSD_SLP
39	GND	40	NC
41	PCIE_0_RX_DN	42	NC
43	PCIE_0_RX_DP	44	NC
45	GND	46	NC
47	PCIE_0_TX_DN	48	NC
49	PCIE_0_TX_DP	50	SLOT_RST
51	GND	52	NC
53	PCIE_CLK_DN	54	NC
55	PCIE_CLK_DP	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	NC	70	+V3.3
71	GND	72	+V3.3
73	GND	74	+V3.3
75	GND		

Table 3-24: M.2 M-key Connector Pinouts

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3.2.23 M.2 B-key Slot

- CN Label:** M2_B1
- CN Type:** M.2 B-key slot
- CN Location:** See Figure 3-24
- CN Pinouts:** See Table 3-25

The M.2 2242/2280 slot with PCIe Gen3 x 2 signal is keyed in the B position.

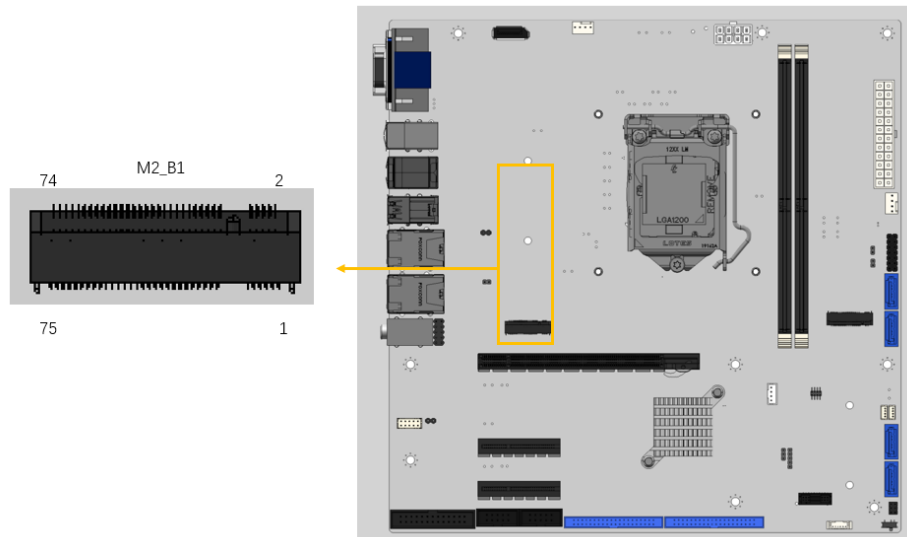


Figure 3-24: M.2 B-key Slot Location

Pin	Description	Pin	Description
1	GND	2	+V3.3
3	GND	4	+V3.3
5	GND	6	NC
7	NC	8	NC
9	NC	10	NGFF2_ACT_N
11	GND	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	Module Key
17	Module Key	18	Module Key
19	Module Key	20	NC

Pin	Description	Pin	Description
21	GND	22	NC
23	NC	24	NC
25	NC	26	NC
27	GND	28	NC
29	PCIE_1_RX_DN	30	NC
31	PCIE_1_RX_DP	32	NC
33	GND	34	NC
35	PCIE_1_TX_DN	36	NC
37	PCIE_1_TX_DP	38	NC
39	GND	40	NC
41	PCIE_0_RX_DN	42	NC
43	PCIE_0_RX_DP	44	NC
45	GND	46	NC
47	PCIE_0_TX_DN	48	NC
49	PCIE_0_TX_DP	50	NC
51	GND	52	NC
53	PCIE_CLK_DN	54	NC
55	PCIE_CLK_DP	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	NC
67	NC	68	NC
69	NC	70	+V3.3
71	GND	72	+V3.3
73	GND	74	+V3.3
75	GND		

Table 3-25: M.2 B-key Connector Pinouts

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3.2.24 PCIe x16 Slot

- CN Label:** PCIEX16_1
CN Type: PCIe x16 slot
CN Location: See Figure 3-25

The PCIe x16 expansion card slot is for PCIe x16 expansion card.

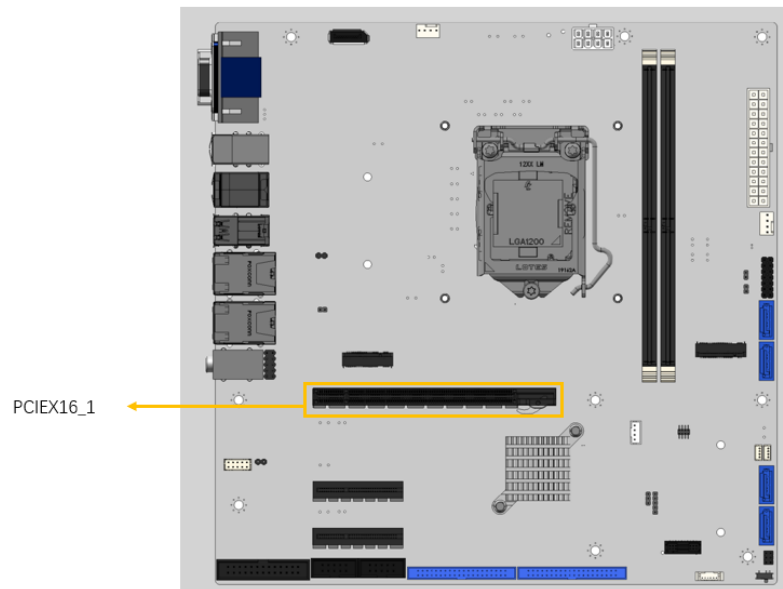


Figure 3-25: PCIe x16 Slot Location

3.2.25 PCIe x4 Slots

CN Label: PCIEX4_1, PCIEX4_2

CN Type: PCIe x4 slot

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

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

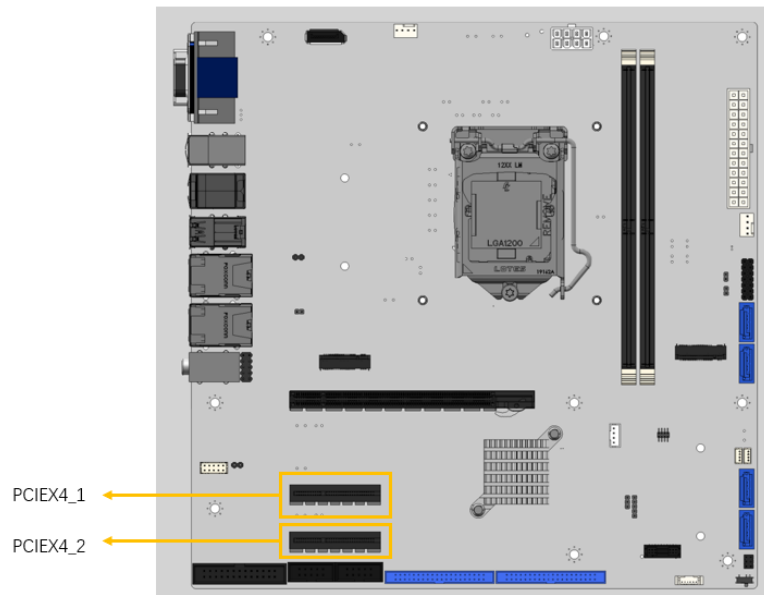


Figure 3-26: PCIe x4 Slot Locations

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3.2.26 DDR4 DIMM Sockets

CN Label: DIMM_A1, DIMM_B1

CN Type: 288-pin socket

CN Location: See Figure 3-27

The DIMM slots are for DDR4 DIMM memory modules

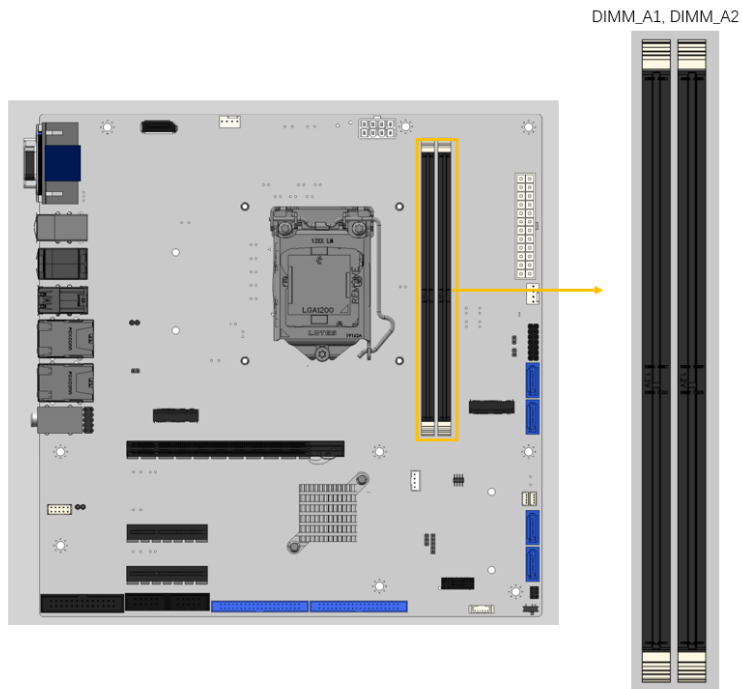


Figure 3-27: DDR4 DIMM Sockets Location

3.2.27 SATA 6Gb/s Connectors

- CN Label:** SATA1, SATA2, SATA3, SATA4
- CN Type:** 8-pin SATA connector
- CN Location:** See Figure 3-28
- 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.

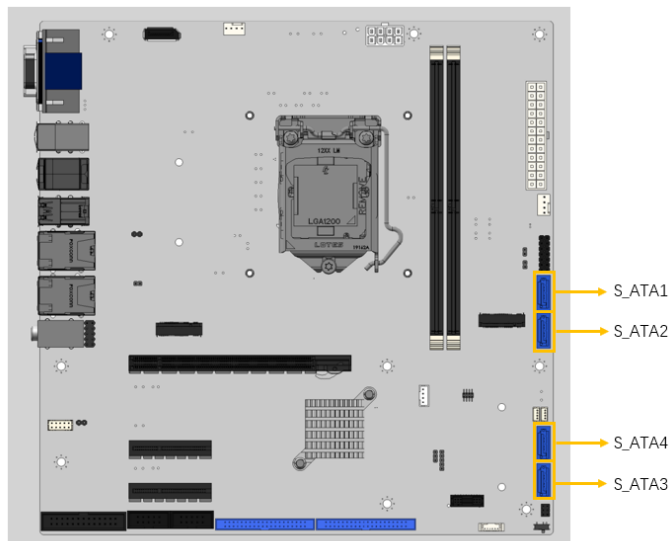


Figure 3-28: SATA 6Gb/s Connector Locations

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

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3.2.28 RS-232 Serial Port Connectors

- CN Label:** COM1-4
- CN Type:** 40-pin box header, p=2.54 mm
- CN Location:** See Figure 3-29
- CN Pinouts:** See Table 3-27

The connectors provide RS-232 communications.

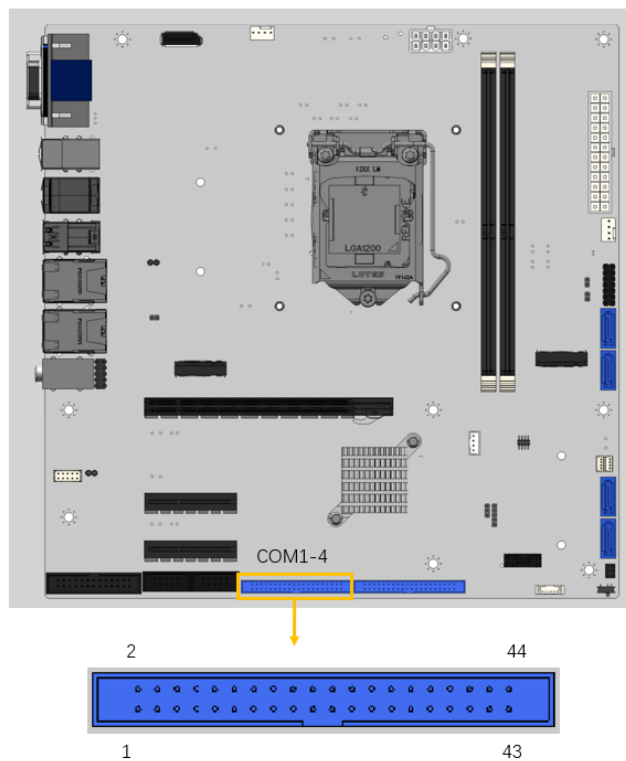


Figure 3-29: RS-232 Connector Locations

Pin	Description	Pin	Description
1	DCD1	2	DSR1
3	RXD1	4	RTS1
5	TXD1	6	CTS1
7	DTR1	8	RI1
9	GND1	10	GND1
11	DCD2	12	DSR2

Pin	Description	Pin	Description
13	RXD2	14	RTS2
15	TXD2	16	CTS2
17	DTR2	18	RI2
19	GND2	20	GND2
21	DCD3	22	DSR3
23	RXD3	24	RTS3
25	TXD3	26	CTS3
27	DTR3	28	RI3
29	GND3	30	GND3
31	DCD4	32	DSR4
33	RXD4	34	RTS4
35	TXD4	36	CTS4
37	DTR4	38	RI4
39	GND4	40	GND4

Table 3-27: RS-232 Connector Pinouts

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3.2.29 RS-232 Serial Port Connectors

- CN Label:** COM7-10
- CN Type:** 40-pin box header, p=2.54 mm
- CN Location:** See Figure 3-30
- CN Pinouts:** See Table 3-28

The connectors provide RS-232 communications.

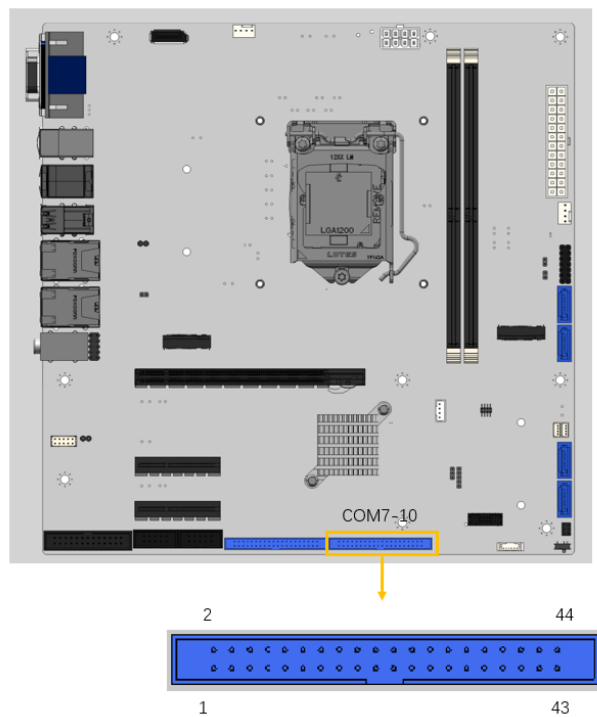


Figure 3-30: RS-232 Connector Locations

Pin	Description	Pin	Description
1	DCD7	2	DSR7
3	RXD7	4	RTS7
5	TXD7	6	CTS7
7	DTR7	8	RI7
9	GND7	10	GND7
11	DCD8	12	DSR8
13	RXD8	14	RTS8

Pin	Description	Pin	Description
15	TXD8	16	CTS8
17	DTR8	18	RI8
19	GND8	20	GND8
21	DCD9	22	DSR9
23	RXD9	24	RTS9
25	TXD9	26	CTS9
27	DTR9	28	RI9
29	GND9	30	GND9
31	DCD10	32	DSR10
33	RXD10	34	RTS10
35	TXD10	36	CTS10
37	DTR10	38	RI10
39	GND10	40	GND10

Table 3-28: RS-232 Connector Pinouts

IMB-Q470

3.2.30 RS-232 Serial Port Connectors

- CN Label:** COM5, COM6
- CN Type:** 10-pin header, p=2.54 mm
- CN Location:** See Figure 3-31
- CN Pinouts:** See Table 3-29

Each of these connectors provides RS-232 communications.

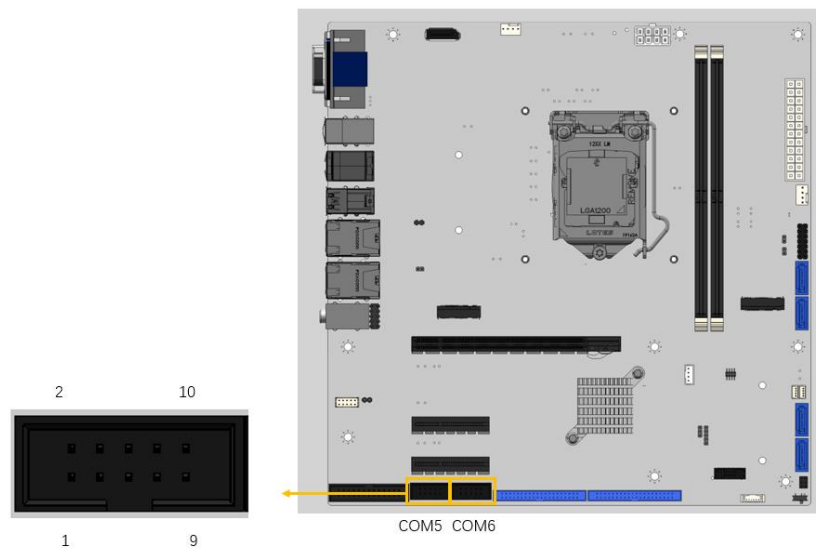


Figure 3-31: RS-232 Connector Locations

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 3-29: RS-232 Connector Pinouts

3.2.31 Flash SPI ROM Connector

- CN Label:** JSPI1
- CN Type:** 6-pin 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.

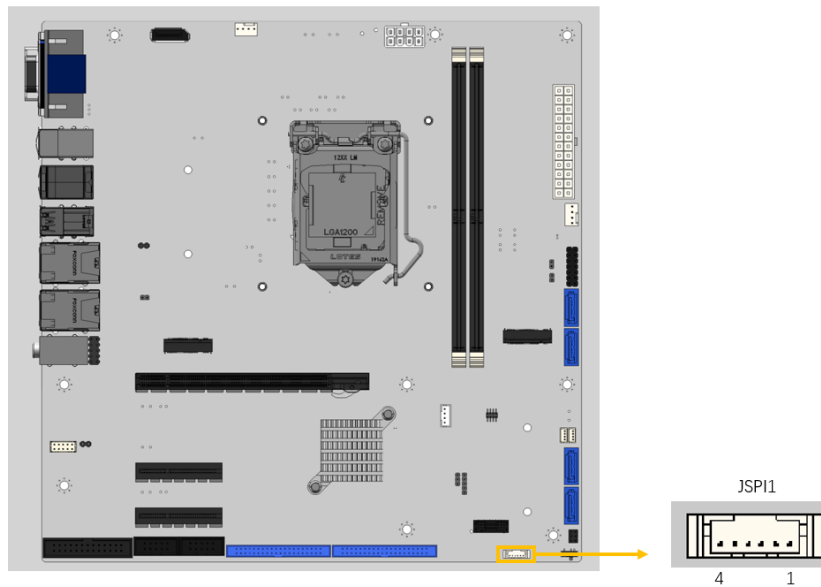


Figure 3-32: Flash SPI ROM Connector Location

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

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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 8-pin Flash EC ROM connector is used to flash the EC internal ROM.

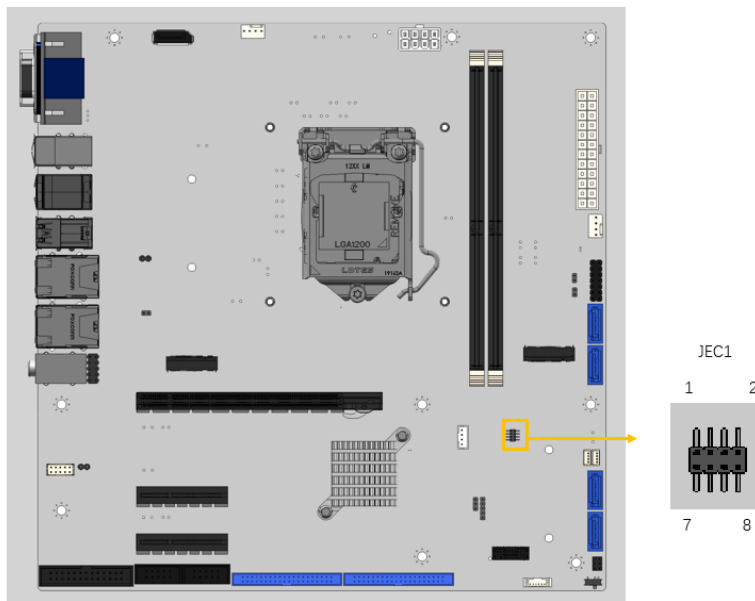


Figure 3-33: Flash EC ROM Connector Location

Pin	Description	Pin	Description
1	VCC3.3	2	SPI_CS#
3	SPI_SO	4	NC
5	EC_DET_FLASH	6	SPI_CLK
7	GND	8	SPI_SI

Table 3-31: Flash EC ROM Connector Pinouts

3.3 External Peripheral Interface Connector Panel

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

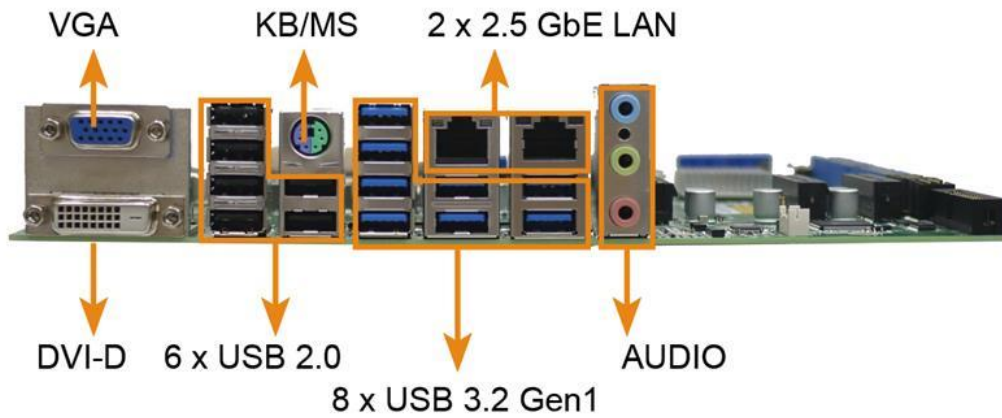


Figure 3-34: External Peripheral Interface Connector

3.3.1 External HD Audio connector

- CN Label:** AUDIO_CV1
- CN Type:** Audio jacks
- CN Location:** See **Figure 3-35**
- CN Pinouts:** See **Table 3-32**

The audio jacks connect to external audio devices.

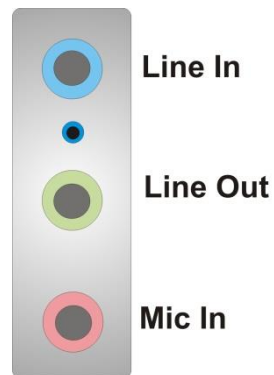


Figure 3-35: External HD Audio connector

IMB-Q470

Pin	Description
Line-in (Blue)	CD/DVD or other audio source input port
Line-out (Green)	Connect this port to headphone or speaker
Microphone (Pink)	Connect this port to microphone

Table 3-32: External HD Audio connector Pinouts

3.3.2 External RJ-45 LAN and dual USB 3.2 Gen 1 connector

CN Label: LAN1_USB1, LAN2_USB2

CN Type: USB 3.2, RJ45

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

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

The LAN1_USB1 and LAN2_USB2 include dual USB 3.2 Gen 2 (10Gb/s) and one 2.5GbE RJ-45.



Figure 3-36: USB 3.2 and RJ45 Connector

The USB 3.2 connector.

Pin	Description	Pin	Description
1	VCC	10	VCC
2	USB_DATA-	11	USB_DATA-
3	USB_DATA+	12	USB_DATA+

Pin	Description	Pin	Description
4	GND	13	GND
5	USB3_RX-	14	USB3_RX-
6	USB3_RX+	15	USB3_RX+
7	GND	16	GND
8	USB3_TX-	17	USB3_TX-
9	USB3_TX+	18	USB3_TX+

Table 3-33: USB 3.2 Port Pinouts

The 2.5GbE RJ-45 connector.

PIN	DESCRIPTION	PIN	DESCRIPTION
20	LAN1_MDI0P	24	LAN1_MDI2P
21	LAN1_MDI0N	25	LAN1_MDI2N
22	LAN1_MDI1P	26	LAN1_MDI3P
23	LAN1_MDI1N	27	LAN1_MDI3N

Table 3-34: Dual RJ45 Pinouts

3.3.3 External quad-port USB 3.2 Gen 1 connector

- CN Label:** CN_USB30
- CN Type:** USB 3.2
- CN Location:** See Figure 3-37
- CN Pinouts:** See Table 3-35

The external USB 3.2 Gen 1 connectors.



Figure 3-37: USB 3.2 Gen 1 Connectors

IMB-Q470

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

Table 3-35: USB 3.2 Gen 1 Port Pinouts

3.3.4 External quad-port USB 2.0 connector

- CN Label:** USB_CN1
- CN Type:** USB 2.0
- CN Location:** See Figure 3-37
- CN Pinouts:** See Table 3-36

The external USB2.0 connectors.



Figure 3-38: USB 2.0 Connectors

Pin	Description	Pin	Description
1	VCC	10	VCC
2	USB_DATA-	11	USB_DATA-
3	USB_DATA+	12	USB_DATA+

Pin	Description	Pin	Description
4	GND	13	GND
5	USB3_RX-	14	USB3_RX-
6	USB3_RX+	15	USB3_RX+
7	GND	16	GND
8	USB3_TX-	17	USB3_TX-
9	USB3_TX+	18	USB3_TX+

Table 3-36: USB 2.0 Port Pinouts

3.3.5 External keyboard/mouse and dual USB 2.0 connector

- CN Label:** K/M_USB1
- CN Type:** USB 2.0, PS/2
- CN Location:** See **Figure 3-39**
- CN Pinouts:** See **Table 3-37**

The K/M_USB1 include dual USB 2.0 and one PS/2.



Figure 3-39: External keyboard/mouse and dual USB 2.0 connector

The USB 2.0 connector.

Pin	Description	Pin	Description
1	GND	8	VBUS10_5
2	USB_DATA4+	9	GND
3	USB_DATA4-	10	KDAT_C
4	VBUS10_4	11	MDAT_C

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Pin	Description	Pin	Description
5	GND	12	+5V_KBMS
6	USB_DATA5+	13	KCLK_C
7	USB_DATA5-	14	MCLK_C
1	GND	8	VBUS10_5
2	USB_DATA4+	9	GND

Table 3-37: USB 2.0 Port Pinouts

3.3.6 External VGA female connector and DVI-D connector

- CN Label:** U142
- CN Type:** VGA, DVI
- CN Location:** See **Figure 3-40**
- CN Pinouts:** See **Table 3-38** and **Table 3-39**

The DVI1 connector include VGA and DVI device.



Figure 3-40: VGA and DVI-I connector

The VGA connector connects to VGA device.

Pin	Description	Pin	Description
1	BR	9	CRT_VCC
2	BG	10	CRT_PLUG#
3	BB	11	NC
4	NC	12	VGA_SDA
5	GND	13	5HSYNC
6	GND	14	5VSYNC
7	GND	15	VGA_SCL

Pin	Description	Pin	Description
8	GND		

Table 3-38: External VGA Connector Pinouts

The DVI connector connects to DVI device.

Pin	Description	Pin	Description
1	HDMI_DATA2#1_L	15	SHIELD_GND
2	HDMI_DATA2-1_L	16	HDMIC_OB_HPD
3	SHIELD_GND	17	HDMI_DATA0#1_L
4	NC	18	HDMI_DATA0-1_L
5	NC	19	SHIELD_GND
6	HDMIC_OB_SCL	20	NC
7	HDMIC_OB_SDA	21	NC
8	NC	22	SHIELD_GND
9	HDMI_DATA1#1_L	23	HDMI_CLK-1_L
10	HDMI_DATA1-1_L	24	HDMI_CLK#-1_L
11	SHIELD_GND	25	SHIELD_GND
12	NC	26	SHIELD_GND
13	NC	27	SHIELD_GND
14	+5V	28	SHIELD_GND

Table 3-39: External DVI-I Connector Pinouts

Chapter

4

Installation

4.1 Anti-static Precautions



WARNING:

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

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the IMB-Q470. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the IMB-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 IMB-Q470, place it on an anti-static pad. This reduces the possibility of ESD damaging the IMB-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 IMB-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**.

IMB-Q470

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**.

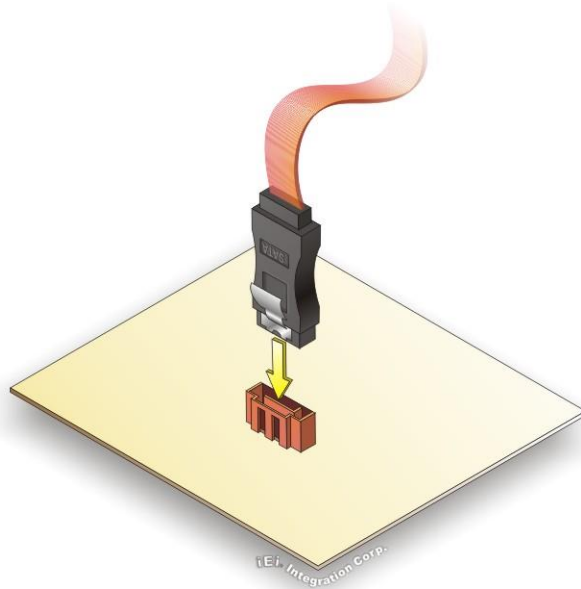


Figure 4-1: SATA Drive Cable Connection

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**.

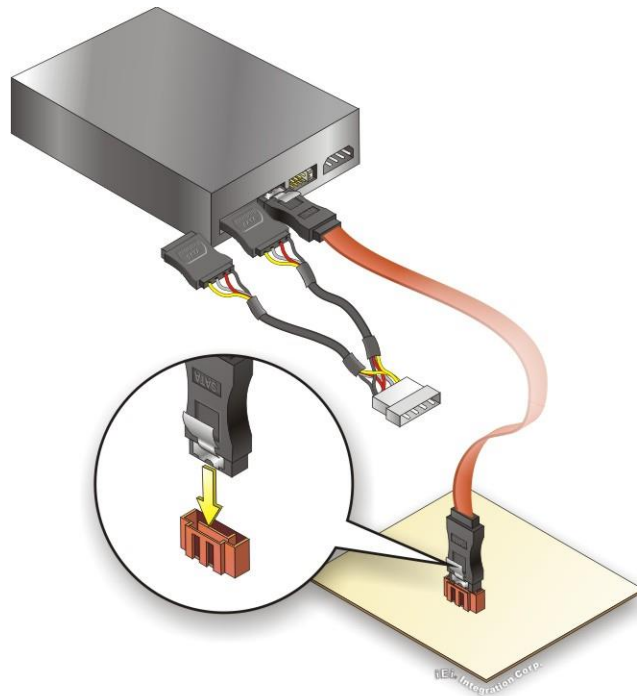


Figure 4-2: SATA Power Drive Connection

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 IMB-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 IMB-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 IMB-Q470 off:
 - When working with the IMB-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 IMB-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**.

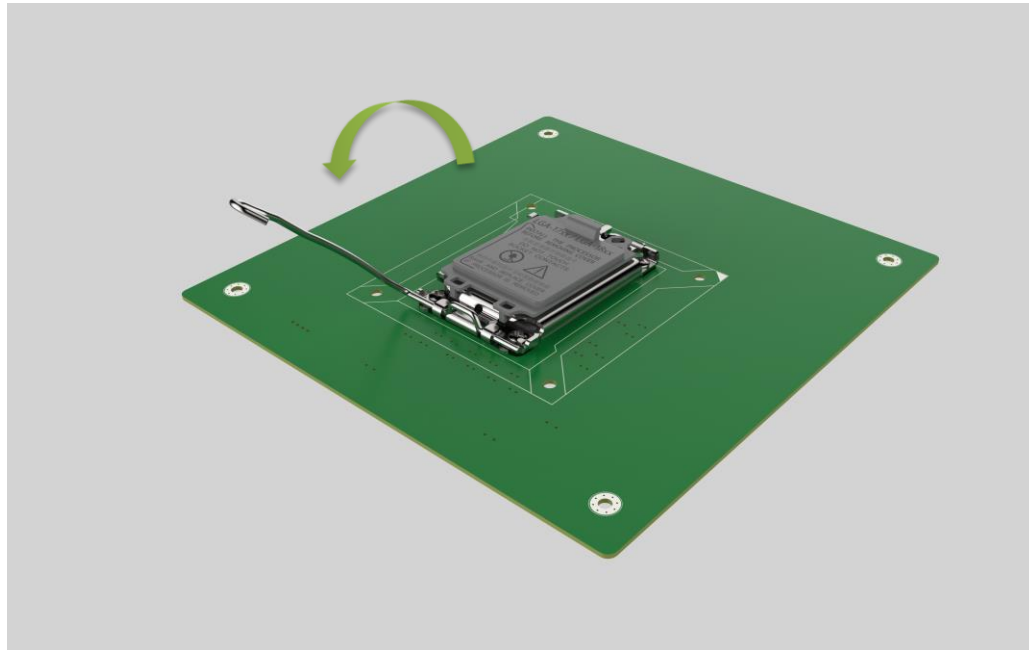


Figure 4-3: Disengage the CPU Socket Load Lever

- 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**.

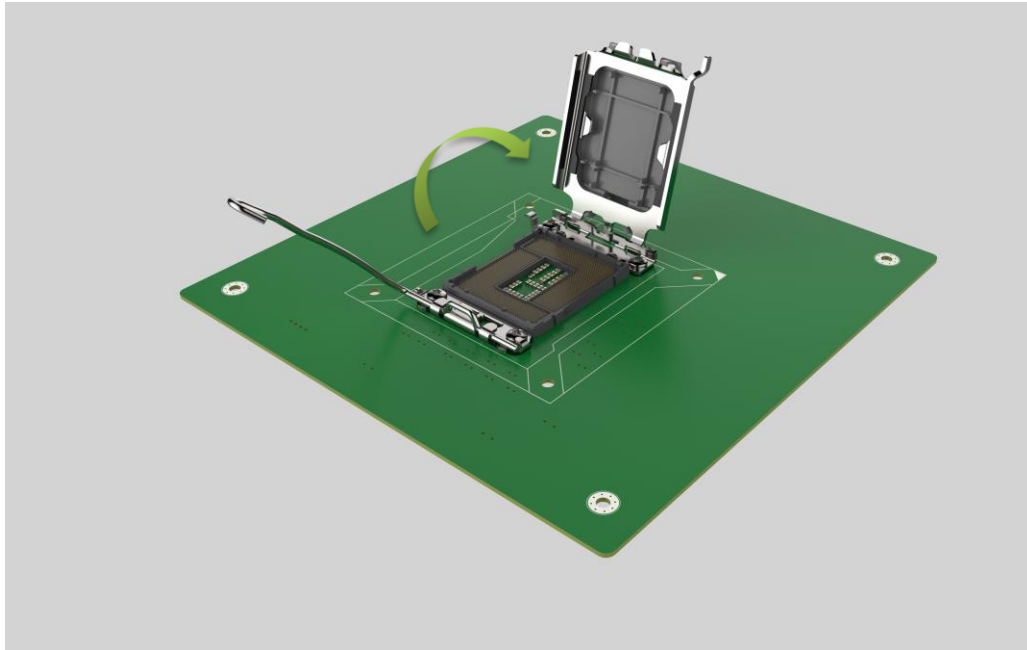


Figure 4-4: Remove Protective Cover

- 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.

IMB-Q470

- 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**.

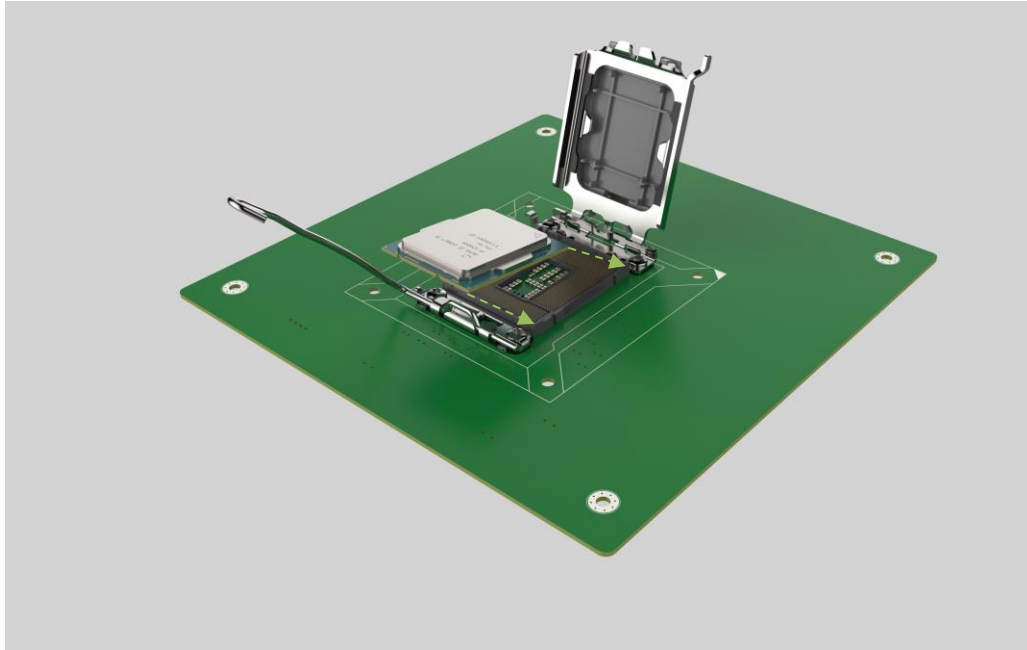


Figure 4-5: Insert the Socket LGA1700 CPU

- 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.

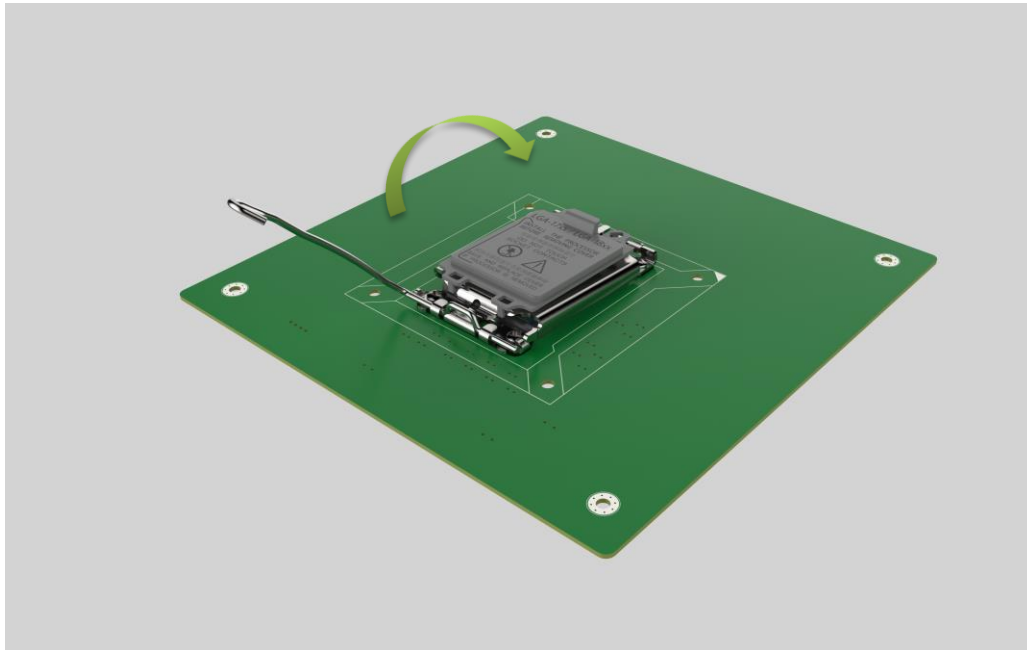


Figure 4-6: Close the Socket LGA1200

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**.

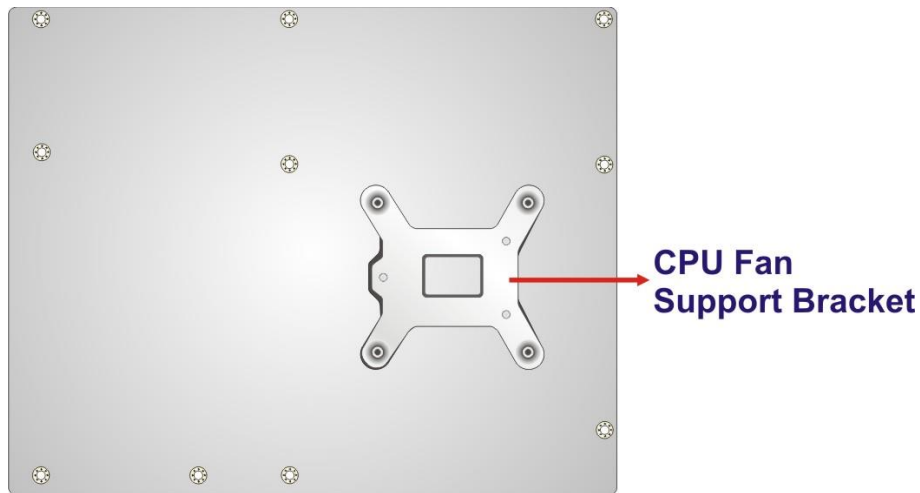


Figure 4-7: Cooling Kit Support Bracket

- 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 IMB-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**.

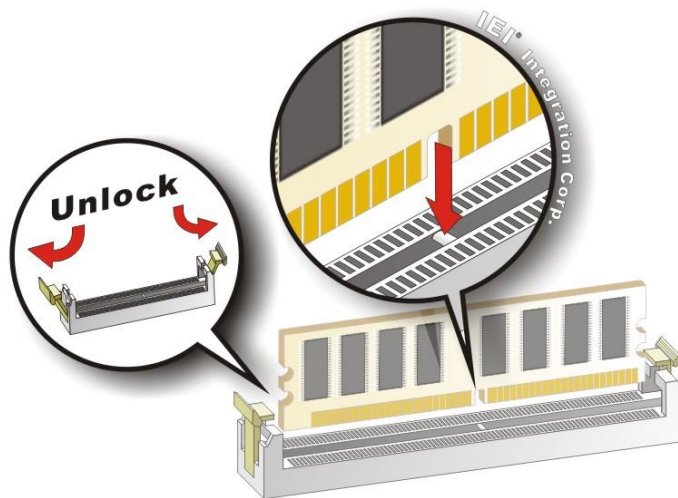


Figure 4-8: DIMM Installation

- 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 IMB-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 20° (**Figure 4-9**).

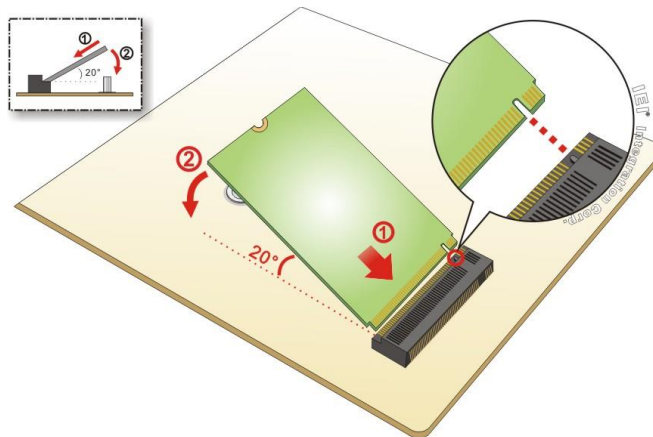


Figure 4-9: Inserting the M.2 Module into the Slot at an Angle

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

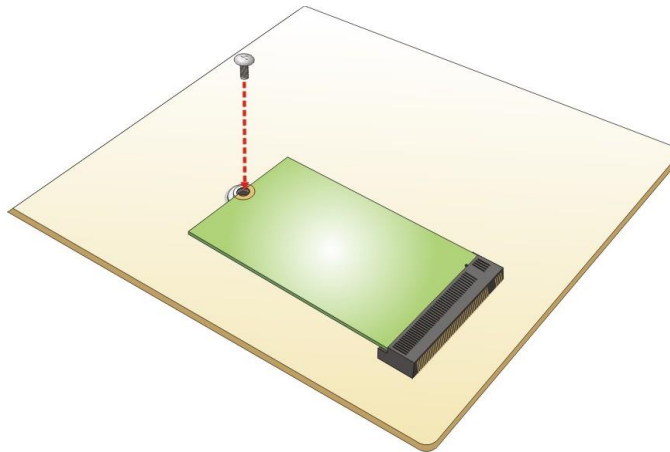


Figure 4-10: Securing the M.2 Module

Mode Two: Using the Retainer

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

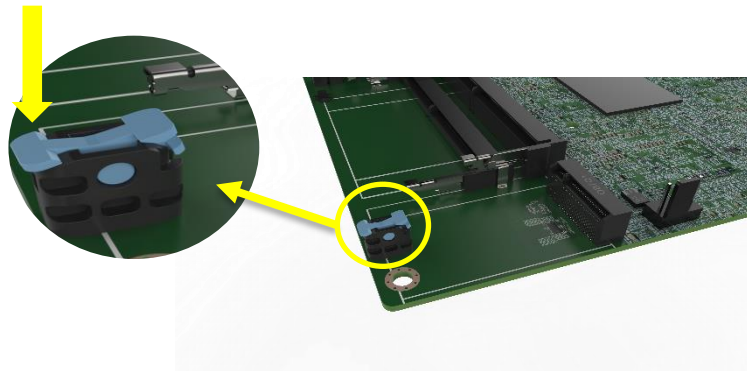


Figure 4-11: Press the Retainer

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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 20°. (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)

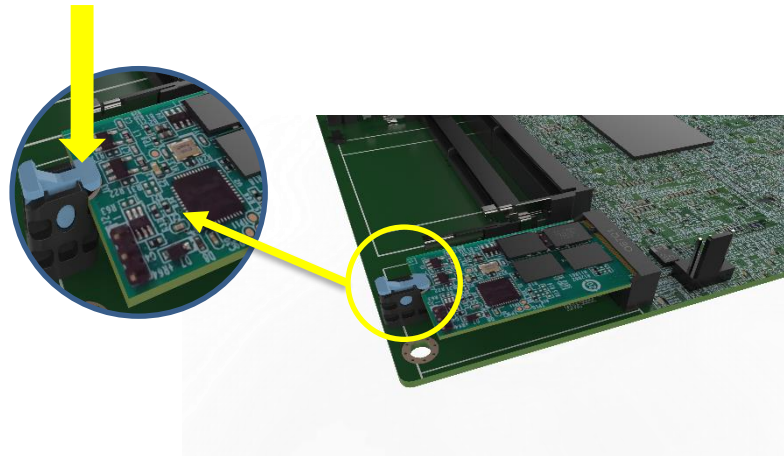


Figure 4-12: Aligning the M.2 Module with the Retainer

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

Figure 4-13)

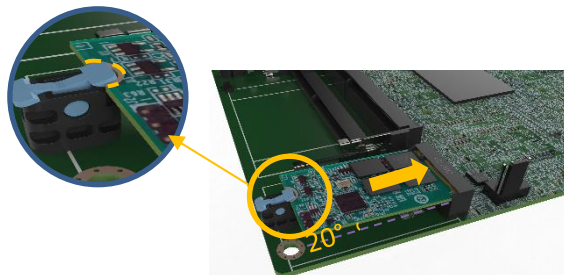


Figure 4-13: Securing the M.2 Module

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

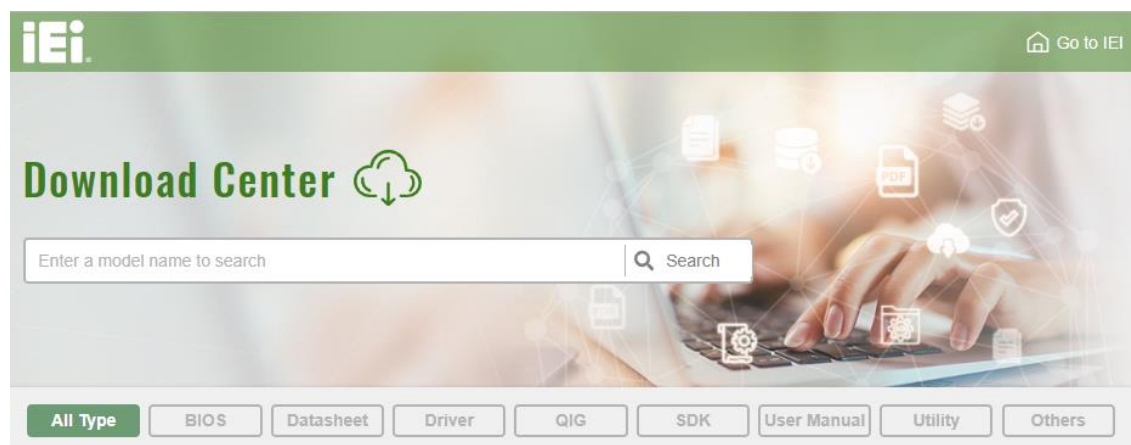
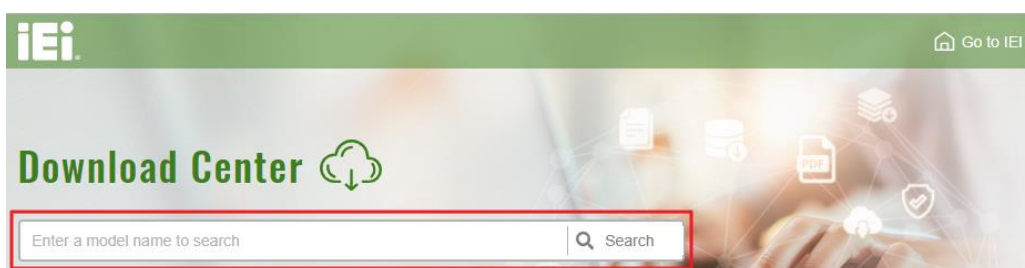


Figure 4-14: IEI Resource Download Center

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 IMB-Q470 and press Enter.



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

IMB-Q470

All Type BIOS Datasheet **Driver** QIG SDK User Manual Utility Others

WAFER-BT-i1 Product Info ▶

Embedded Computer ▶ Single Board Computer ▶ Embedded Board
 3.5" SBC with Intel® 22nm Atom™/Celeron® on-board SoC

Driver

File Name	Published	Version	File Checksum
7B000-001033-RS V2.3.iso (2.23 GB)	2017/10/03	2.30	3B2DB1F792779A93A8F50DDBC3943E30

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).

7B000-001168-RS_V1.4.iso

❶ [Click here to download entire ISO file. \(2.99 GB\)](#)

* Download individual file *

❷

- Docs
 - 1.Chipset
 - 10.1.1.12.zip (2.7 MB)
 - 2.VGA
 - 3.Audio
 - 4.Lan
 - 5.USB 3.0
 - 6.Serial IO
 - 7.TXE
 - 8.Manual



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.

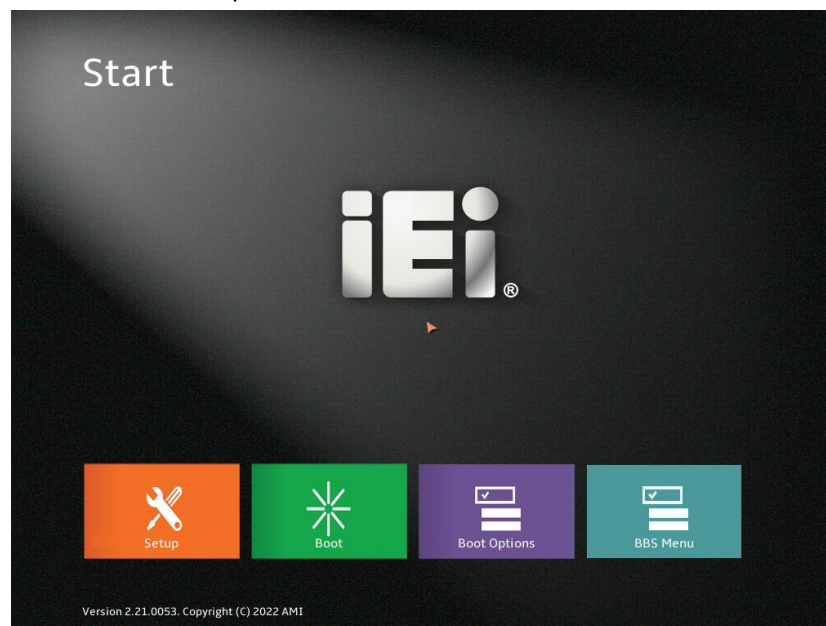


Figure 5-1: BIOS Starting Menu

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

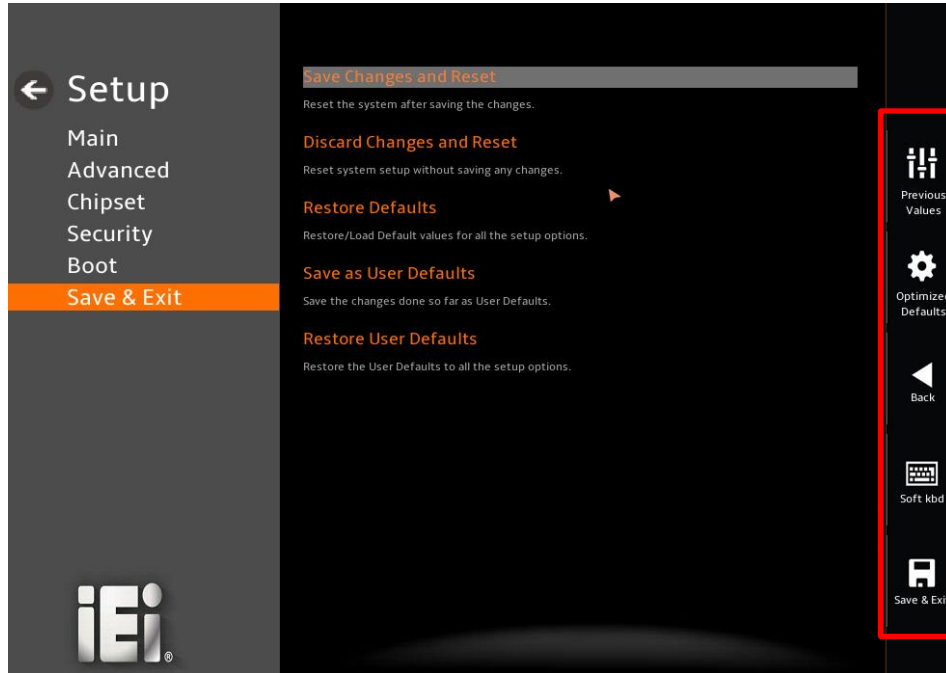
For keyboard navigation, use the navigation keys shown in **Table 5-1**.

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:

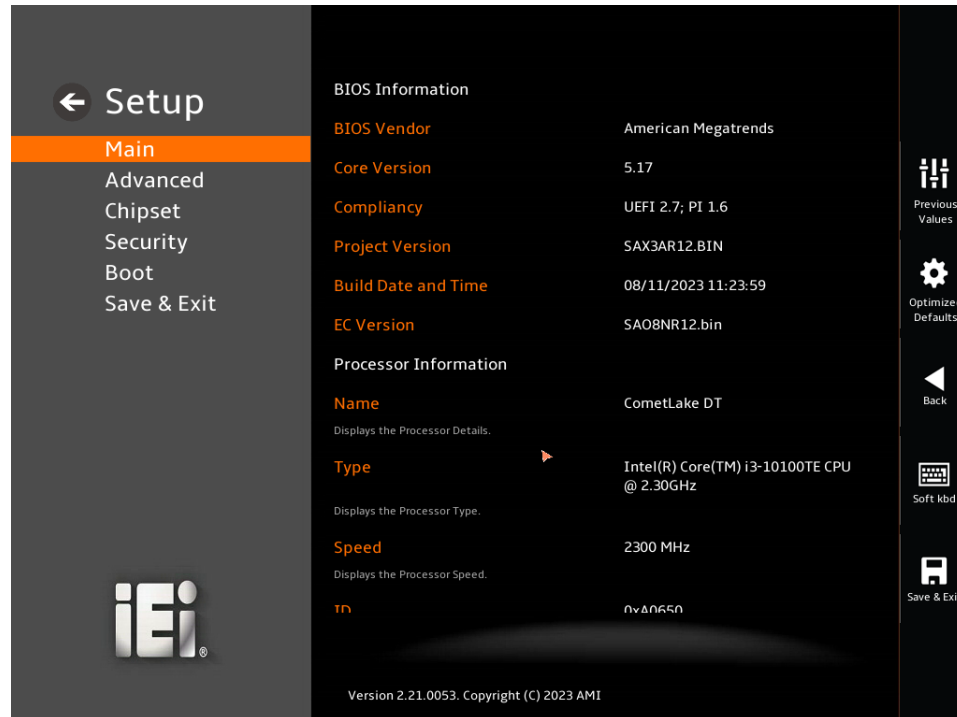
- Main – Changes the basic system configuration.
- Advanced – Changes the advanced system settings.
- Chipset – Changes the chipset settings.
- Security – Sets User and Supervisor Passwords.
- Boot – Changes the system boot configuration.
- Save & Exit – Selects exit options and loads default settings

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 2**) appears when the **BIOS Setup** program is entered.

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



BIOS Menu 1: Main (1/4)

← Setup

- Main
- Advanced
- Chipset
- Security
- Boot
- Save & Exit

iEi

Displays the Processor Speed.

ID 0xA0650

Displays the Processor ID.

Stepping G0

Displays the Processor Stepping.

Package LGA1200

Displays the Processor Package.

Number of Processors 4Core(s) / 8Thread(s)

Displays number of CPU cores.

Microcode Revision BE

CPU Microcode Revision

GT Info GT2 (0x9BC8)

Processor GT Info. Only valid if SNB stepping is D0 or above.

IGFX GOP Version 9.0.1112

IGFX GOP Version

Memory RC Version 0.0.0.67

Memory RC Version

Previous Values

Optimized Defaults

Back

Soft kbd

Save & Exit

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BIOS Menu 2: Main (2/4)

← Setup

- Main
- Advanced
- Chipset
- Security
- Boot
- Save & Exit

iEi

IGFX GOP Version

Memory RC Version 0.0.0.67

Memory RC Version

Total Memory 8192 MB

Total Memory in the System.

Memory Frequency 2400 MHz

Displays the Frequency of Memory

PCH Information

Name CML PCH-H

PCH Name

PCH SKU Q470

PCH SKU

Stepping A0

PCH Stepping

Dual Output Fast Read support Not supported

Dual Output Fast Read support

Read TD/Static Clock Freq 17 MHz

Previous Values

Optimized Defaults

Back

Soft kbd

Save & Exit

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BIOS Menu 3: Main (3/4)



BIOS Menu 4: Main (4/4)

→ 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
- **Compliance:** Current UEFI & PI version
- **Project Version:** the board version
- **Build Date and Time:** Date the current BIOS version was made
- **EC Version:** Current EC version

→ 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

→ **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
- **TXT Capability of Platform/PCH:** Displays the TXT Capability
- **Production Type:** Displays the Production Type
- **ME FW Version:** Displays the ME Firmware Version
- **ME Firmware SKU:** Displays the ME Firmware SKU
- **PMC FW Version:** Displays the PMC Firmware Version

→ **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.

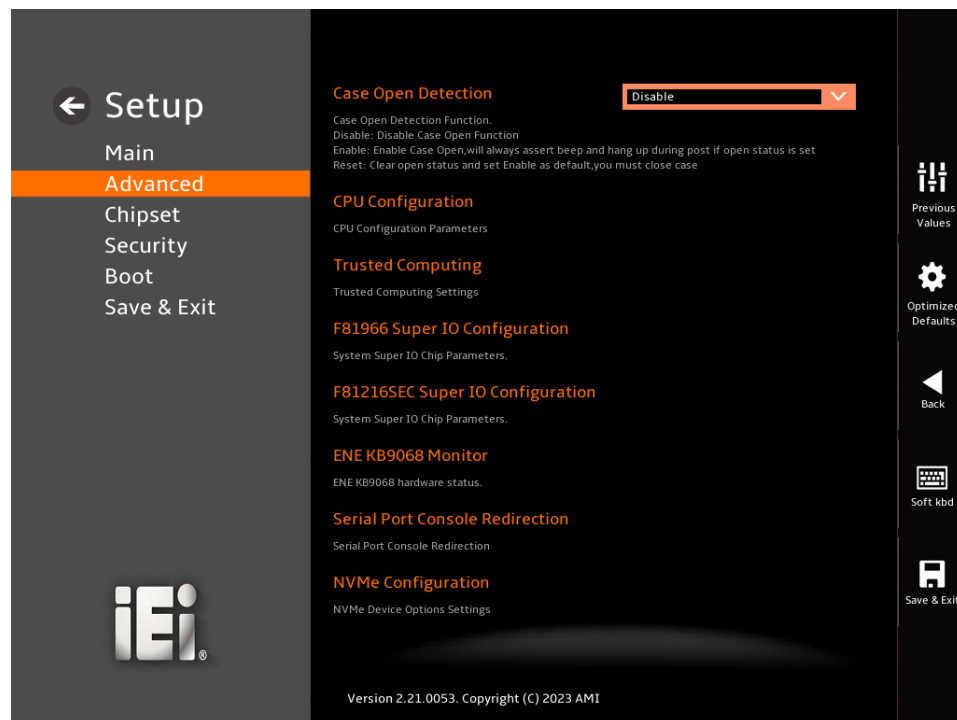
5.3 Advanced

Use the **Advanced** menu (**BIOS Menu 5**) 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 5: Advanced

5.3.1 CPU Configuration

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



BIOS Menu 6: CPU Configuration (1/4)

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← Setup

- Main
- Advanced
- Chipset
- Security
- Boot
- Save & Exit

L3 Cache	6 MB	
<small>Displays the Processor L3 Cache size.</small>		
VMX	Supported	
<small>VMX Supported or Not</small>		
SMX/TXT	Not Supported	
<small>SMX/TXT Supported or Not</small>		
Power Limit 1	35.0	
<small>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. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). Other SKUs: This value must be between Min Power Limit and TDP Limit. If value is 0, BIOS will program TDP value.</small>		
Power Limit 2	55.0	
<small>Power Limit 2 value in Milli Watts. BIOS will round to the nearest 1/8W when programming. If the value is 0, BIOS will program this value as 1.25*TDP. For 12.50W, enter 12500. Processor applies control policies such that the package power does not exceed this limit.</small>		
Intel (VMX) Virtualization Technology	Enabled	▼
<small>When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.</small>		
Active Processor Cores	All	▼
<small>Number of cores to enable in each processor package.</small>		

Previous Values

Optimized Defaults

Back

Soft kbd

Save & Exit

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BIOS Menu 7: CPU Configuration (2/4)

← Setup

- Main
- Advanced
- Chipset
- Security
- Boot
- Save & Exit

Active Processor Cores	All	▼
<small>Number of cores to enable in each processor package.</small>		
Hyper-Threading	Enabled	▼
<small>Enable or Disable Hyper-Threading Technology.</small>		
Intel(R) SpeedStep(tm)	Enabled	▼
<small>Allows more than two frequency ranges to be supported.</small>		
C states	Disabled	▼
<small>Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.</small>		
Tcc Activation Offset	0	
<small>Offset from factory set Tcc activation temperature at which the Thermal Control Circuit must be activated. Tcc will be activated at: Tcc Activation Temp - Tcc Activation Offset. Tcc Activation Offset range is 0 to 63.</small>		
Power Limit 1	0	
<small>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. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE_POWER_SKU_MSR). Other SKUs: This value must be between Min Power Limit and TDP Limit. If value is 0, BIOS will program TDP value.</small>		
Power Limit 1 Time Window	0	▼
<small>Power Limit 1 Time Window value in seconds. The value may vary from 0 to 128. 0 = use default value (28 sec). Defines time window which TDP value should be maintained.</small>		

Previous Values

Optimized Defaults

Back

Soft kbd

Save & Exit

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BIOS Menu 8: CPU Configuration (3/4)



BIOS Menu 9: CPU Configuration (4/4)

→ Intel (VMX) Virtualization Technology [Enabled]

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 P-cores in the processor package.

- **All** **DEFAULT** Enable all cores in the processor package.
- **1** Enable one core in the processor package.

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→ **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 [0]**

Use the **Tcc Activation Offset** option to set Tcc activation temperature at which the Thermal Control Circuit must be activated. Tcc will be activated at: Tcc Activation Temp-Tcc Activation Offset. Tcc Activation Offset range is 0 to 63.

→ **Power Limit 1 [0]**

Use the + or – key to change the **Power Limit 1** value. BIOS will program the default values for Limit 1 and Power Limit 1 Time Window. For 12.50W, enter 12500.

→ **Power Limit 1 Time Window [0]**

Use the **Power Limit 1 Time Window** option to select the PL1 time duration. The value may vary from 0 to 128. For 0 is the default value

➔ **Power Limit 2 [0]**

Use the + or – key to change the Power Limit 2 value. BIOS will round to the nearest 1/8W when programming. 0 = no custom override. For 12.50W, enter 12500.

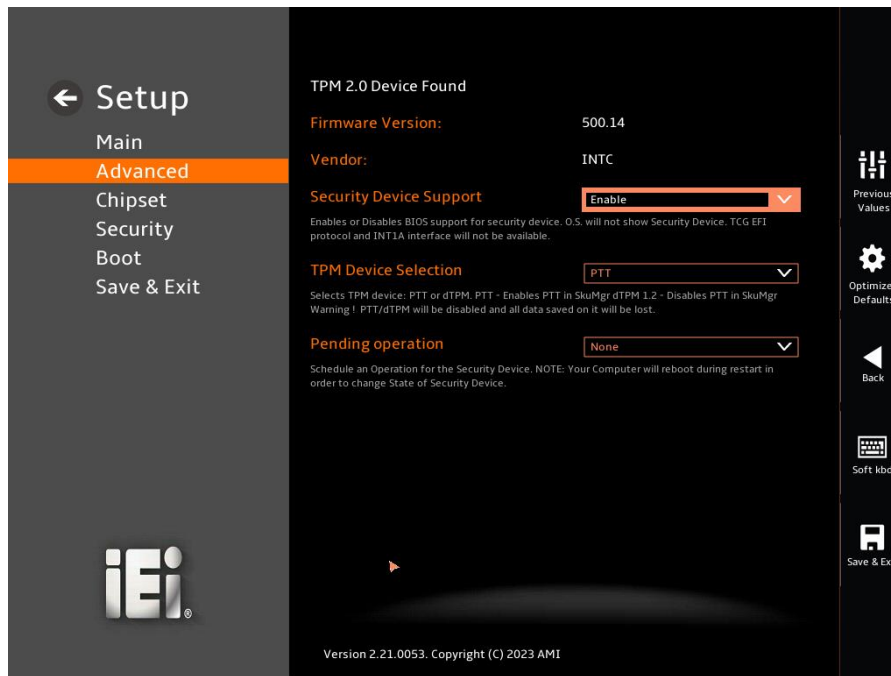
➔ **Turbo Mode [Enabled]**

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 Trusted Computing

Use the **Trusted Computing** menu (**BIOS Menu 10**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).



BIOS Menu 10: PCH-FW Configuration

➔ **TPM Support [Enable]**

Use the **TPM Support** option to enable or disable BIOS support for security device.

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

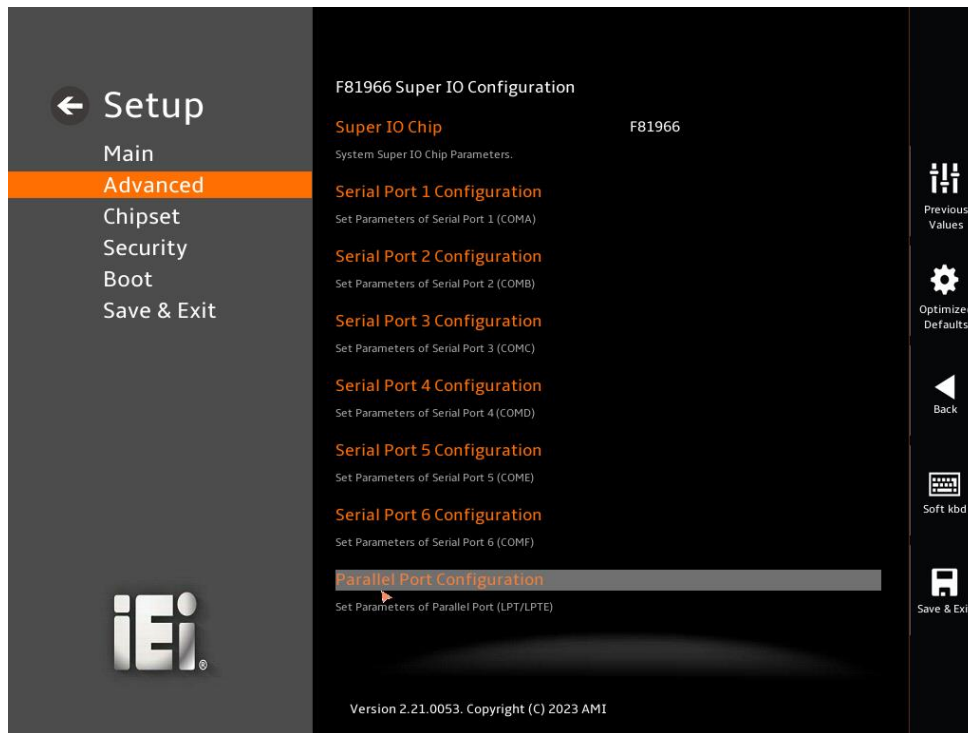
➔ Pending Operation [None]

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

5.3.3 F81966 Super IO Configuration

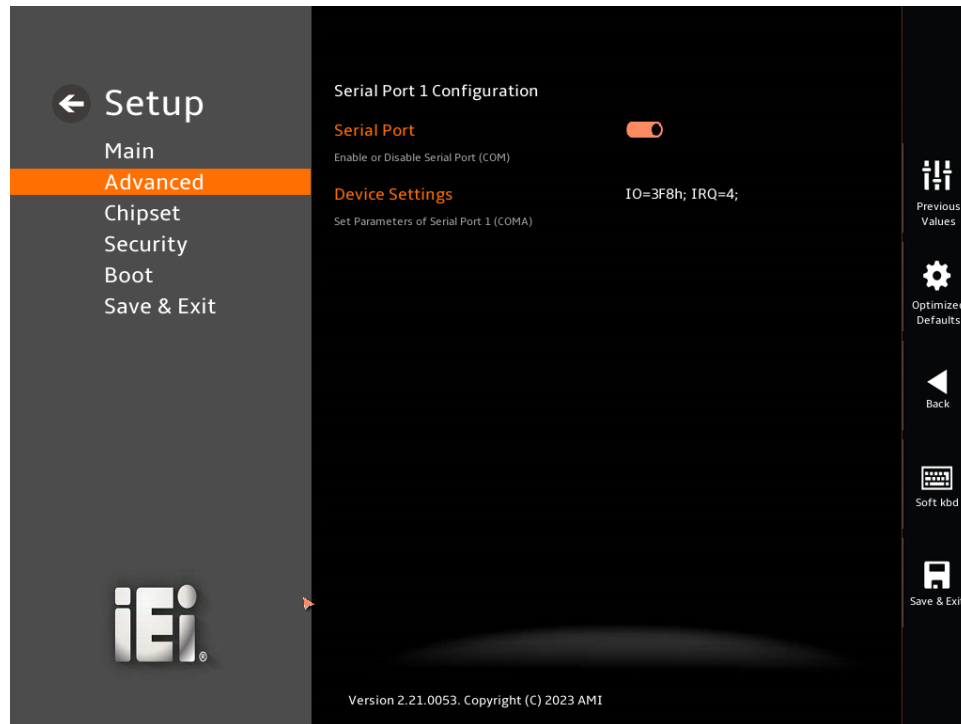
Use the **F81966 Super IO Configuration** menu (**BIOS Menu 11**) to set or change the configurations for the parallel ports and serial ports.



BIOS Menu 11: F81966 Super IO Configuration

5.3.3.1 Serial Port 1 Configuration

Use the **Serial Port 1 Configuration** menu (**BIOS Menu 12**) to configure the serial port.



BIOS Menu 12: 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

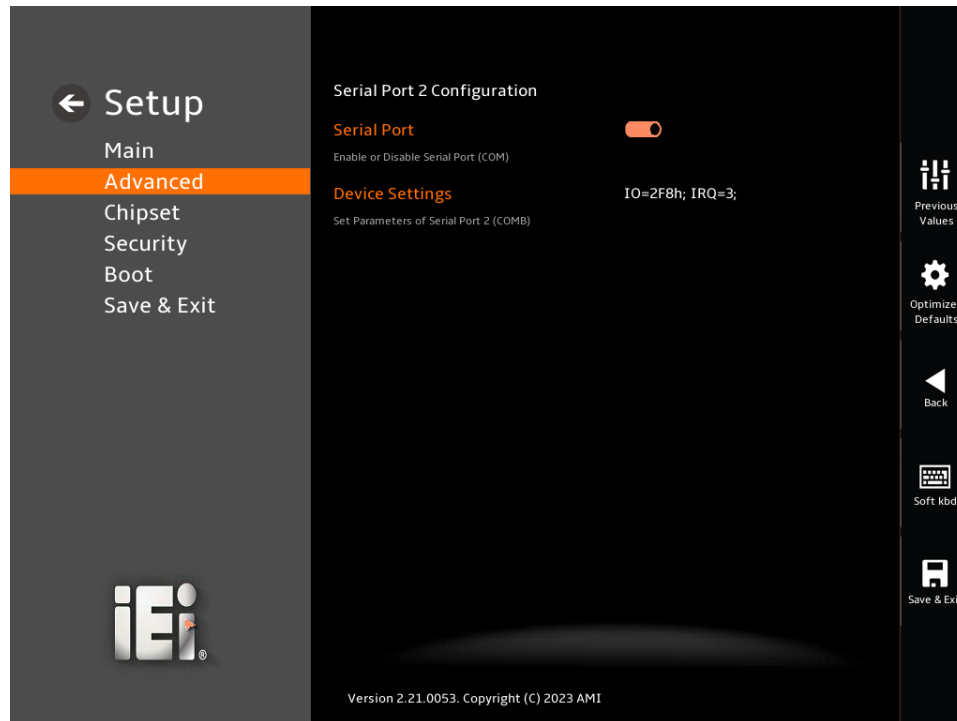
The **Device Settings** option shows the serial port IO port address and interrupt address.

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

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5.3.3.2 Serial Port 2 Configuration

Use the **Serial Port 2 Configuration** menu (**BIOS Menu 13**) to configure the serial port.



BIOS Menu 13: 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

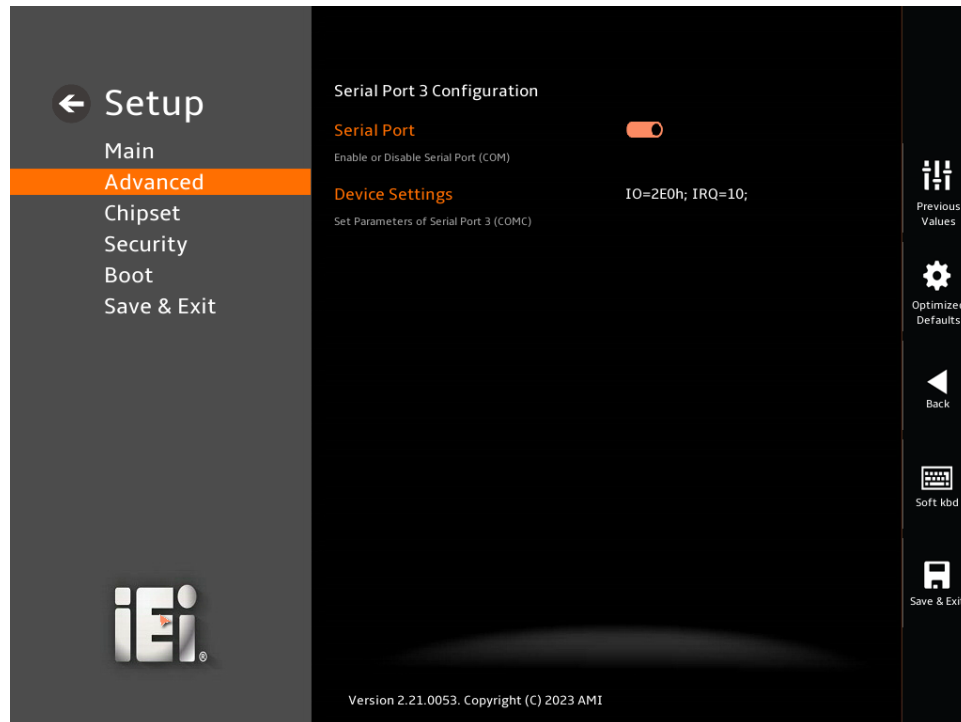
→ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

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

5.3.3.3 Serial Port 3 Configuration

Use the **Serial Port 3 Configuration** menu (**BIOS Menu 14**) to configure the serial port.



BIOS Menu 14: 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

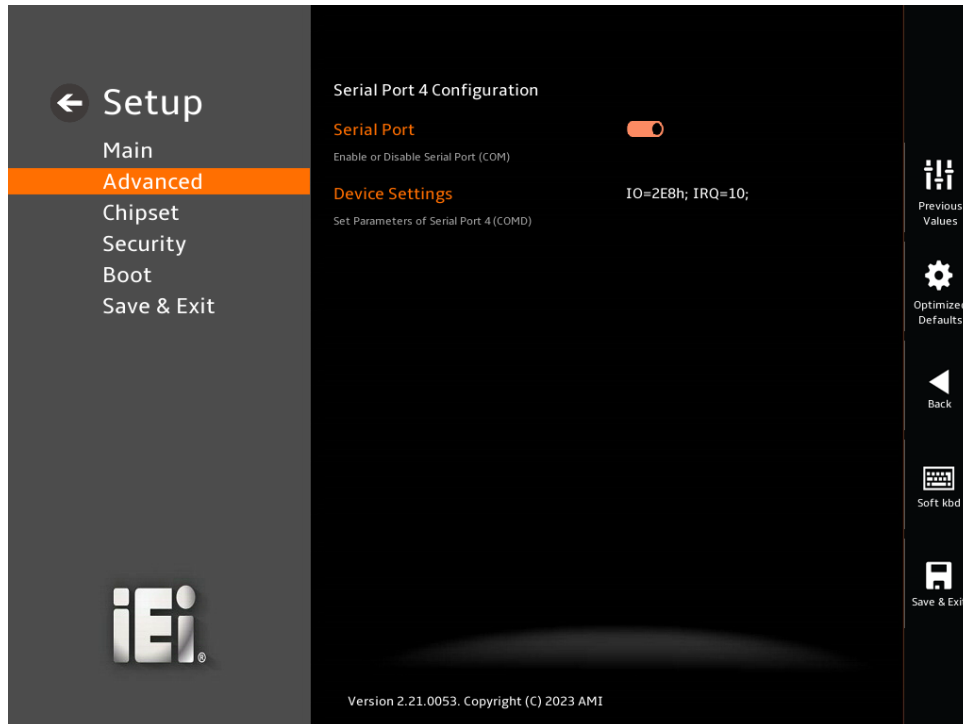
→ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

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

5.3.3.4 Serial Port 4 Configuration

Use the **Serial Port 4 Configuration** menu (**BIOS Menu 15**) to configure the serial port.



BIOS Menu 15: 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

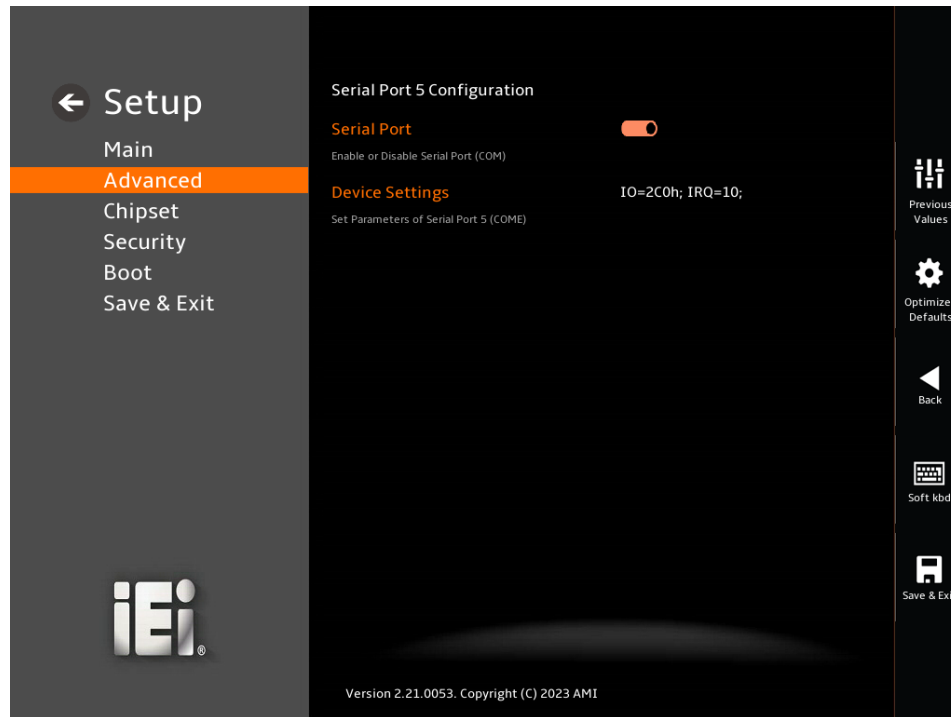
→ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

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

5.3.3.5 Serial Port 5 Configuration

Use the **Serial Port 5 Configuration** menu (**BIOS Menu 16**) to configure the serial port.



BIOS Menu 16: 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

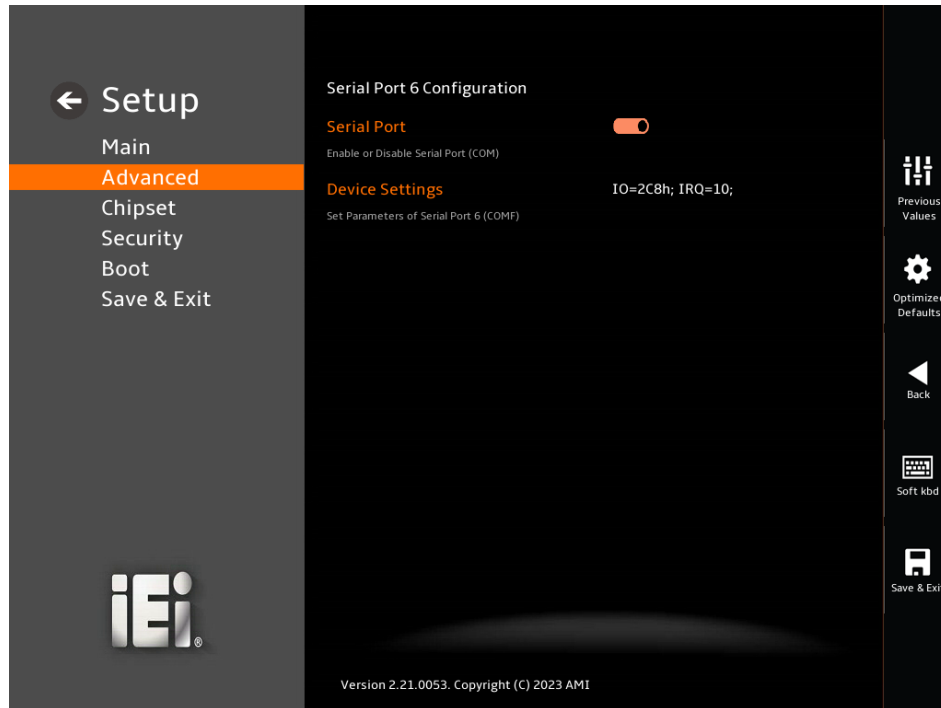
→ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

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

5.3.3.6 Serial Port 6 Configuration

Use the **Serial Port 6 Configuration** menu (**BIOS Menu 17**) to configure the serial port.



BIOS Menu 17: 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

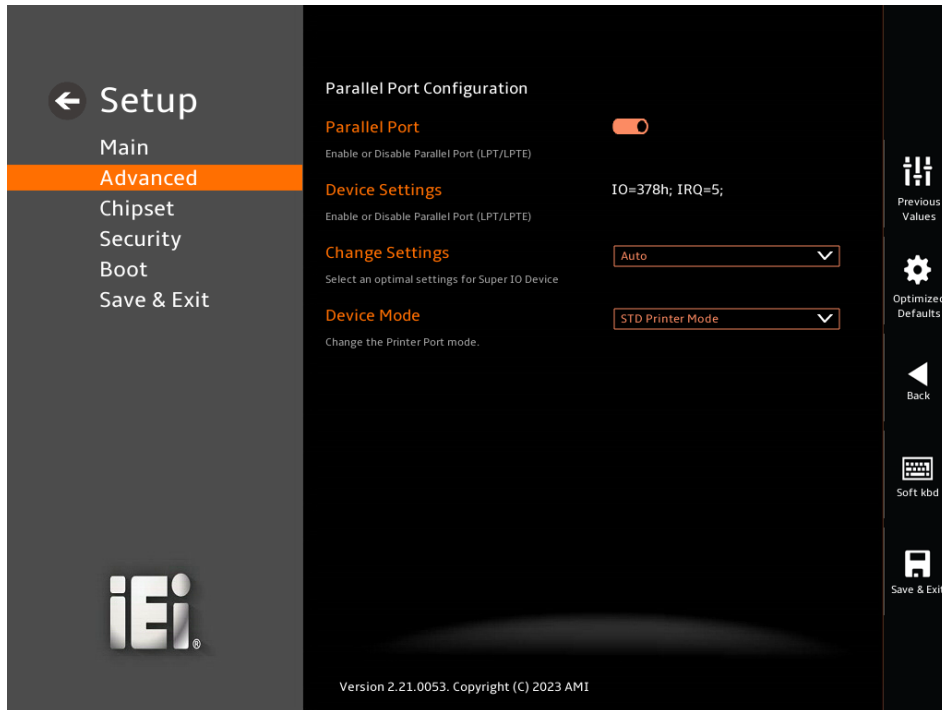
→ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

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

5.3.3.7 Parallel Port Configuration

Use the **Parallel Port Configuration** menu (**BIOS Menu 17**) to configure the parallel port.



BIOS Menu 18: Parallel Port 6 Configuration Menu

➔ Parallel Port [Enabled]

Use the **Parallel Port** option to enable or disable the parallel port.

- ➔ **Disabled** Disable the parallel port
- ➔ **Enabled** **DEFAULT** Enable the parallel port

➔ Change Settings

The **Change Settings** option selects an optimal setting for Parallel port IO port.

- ➔ **IO=378h;** Parallel Port I/O port address is 378h and the interrupt
IRQ=5 address is IRQ5

➔ Device Settings [Auto]

The **Device Settings** option shows the parallel port address and interrupt address.

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- **Auto** **DEFAULT** Parallel Port I/O port adjusts its address using auto mode settings.
- **IO=378h;**
IRQ=5 Parallel Port I/O port address is 378h and the interrupt address is IRQ5
- **IO=378h;**
IRQ=5,6,7,8,
10,11,12 Parallel Port I/O port address is 378h and the interrupt address is IRQ5,6,7,8,10,11,12
- **IO=278h;**
IRQ=5,6,7,8,
10,11,12 Parallel Port I/O port address is 278h and the interrupt address is IRQ5,6,7,8,10,11,12
- **IO=3BCh;**
IRQ=5,6,7,8,
10,11,12 Parallel Port I/O port address is 3BCh and the interrupt address is IRQ5,6,7,8,10,11,12

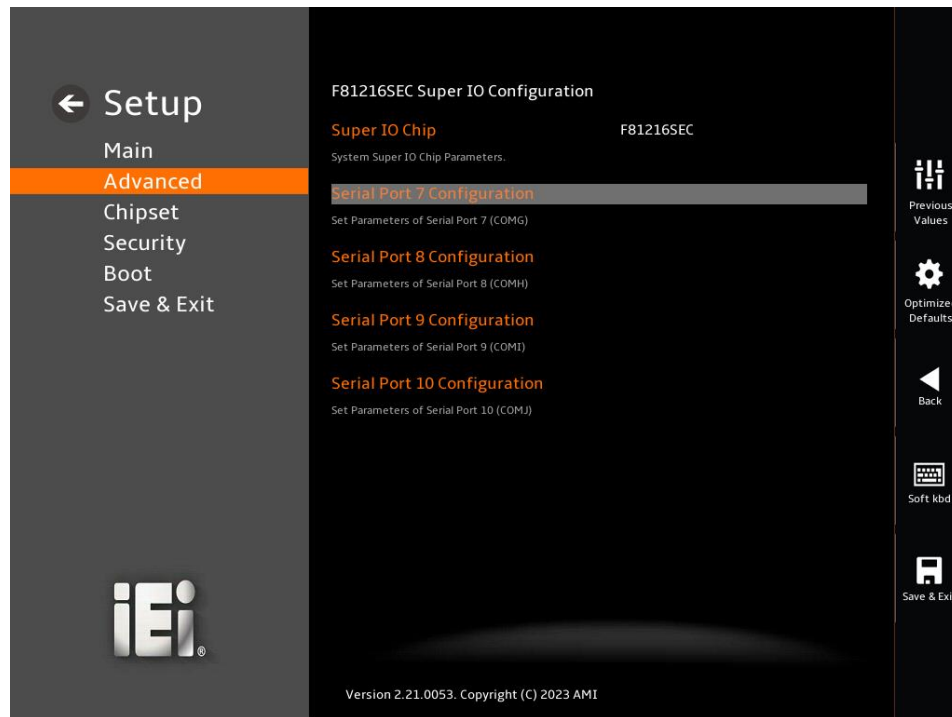
→ **Device Settings [STD Printer Mode]**

Use the **Device Settings** option to change the Printer Port mode.

- **STD Printer Mode** The Printer Port mode is STD Printer Mode
- **SPP Mode** The Printer Port mode is SPP Mode
- **EPP -1.9 and SPP Mode** The Printer Port mode is EPP -1.9 and SPP Mode
- **EPP -1.7 and SPP Mode** The Printer Port mode is EPP -1.9 and SPP Mode
- **ECP Mode** The Printer Port mode is EPP -1.9 and SPP Mode
- **ECP Mode** The Printer Port mode is EPP -1.9 and SPP Mode
- **ECP Mode** The Printer Port mode is EPP -1.9 and SPP Mode

5.3.4 F81216SEC Super IO Configuration

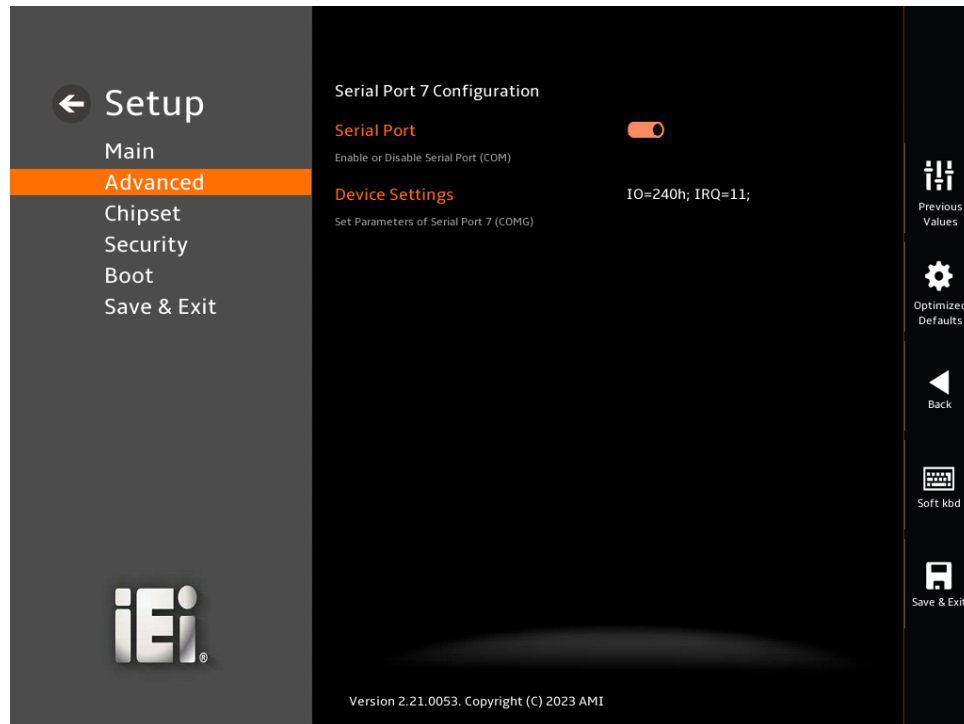
Use the **F81216SEC Super IO Configuration** menu (BIOS Menu 19) to set or change the configurations for serial ports.



BIOS Menu 19: F81216SEC Super IO Configuration

5.3.4.1 Serial Port 7 Configuration

Use the **Serial Port 7 Configuration** menu (**BIOS Menu 20**) to configure the serial port.



BIOS Menu 20: Serial Port 7 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

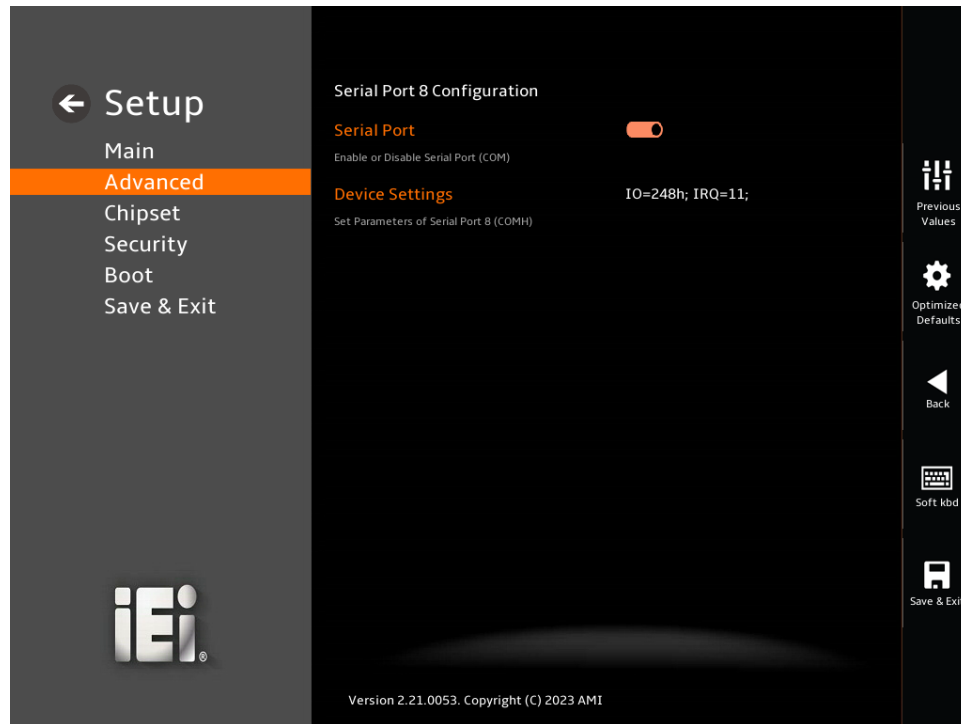
→ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

- **IO=240h;** Serial Port I/O port address is 240h and the interrupt
IRQ=11 address is IRQ11

5.3.4.2 Serial Port 8 Configuration

Use the **Serial Port 8 Configuration** menu (**BIOS Menu 21**) to configure the serial port.



BIOS Menu 21: Serial Port 8 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

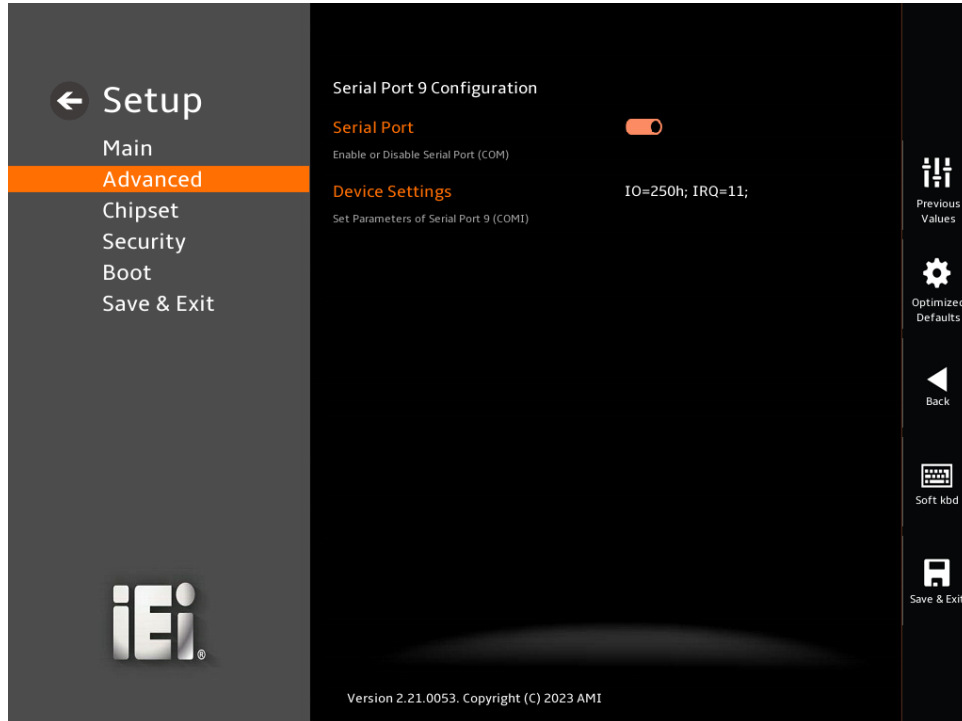
➔ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

- ➔ **IO=248h;** Serial Port I/O port address is 248h and the interrupt
IRQ=11 address is IRQ11

5.3.4.3 Serial Port 9 Configuration

Use the **Serial Port 9 Configuration** menu (**BIOS Menu 22**) to configure the serial port.



BIOS Menu 22: Serial Port 9 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

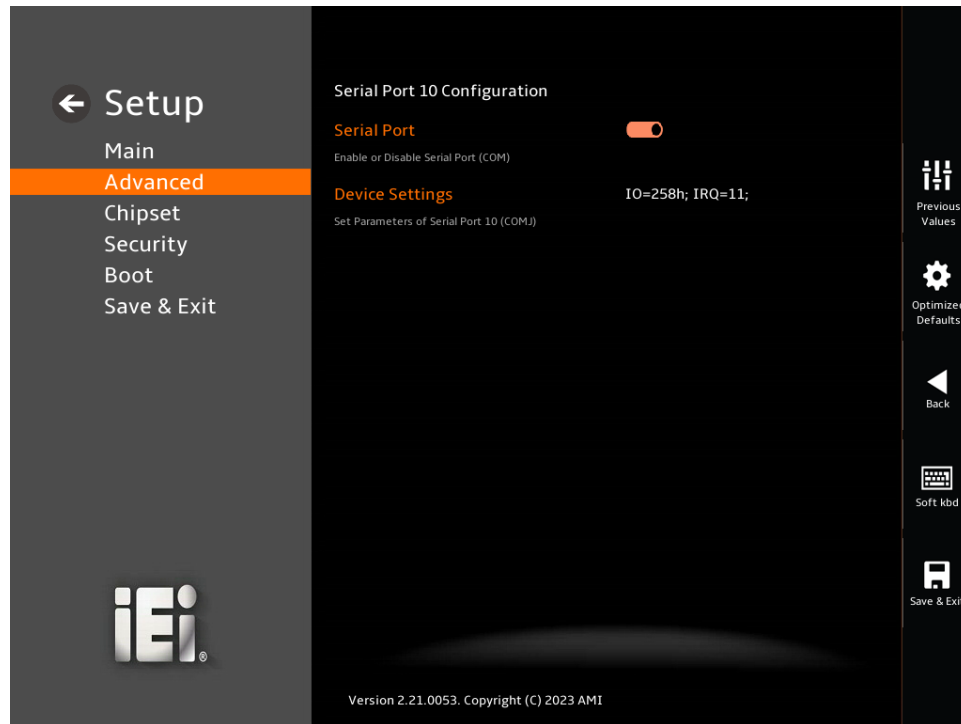
→ Device Settings

The **Device Settings** option shows the serial port IO port address and interrupt address.

- **IO=250h;** Serial Port I/O port address is 250h and the interrupt
IRQ=11 address is IRQ11

5.3.4.4 Serial Port 10 Configuration

Use the **Serial Port 10 Configuration** menu () to configure the serial port.



BIOS Menu 23: Serial Port 10 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**

The **Device Settings** option shows the serial port IO port address and interrupt address.

- ➔ **IO=258h;** Serial Port I/O port address is 258h and the interrupt
IRQ=11 address is IRQ11

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5.3.5 ENE KB9068 Monitor

The **ENE KB9068 Monitor** menu (**BIOS Menu 24**) 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 24: ENE KB9068 Monitor

→ PC Health Status

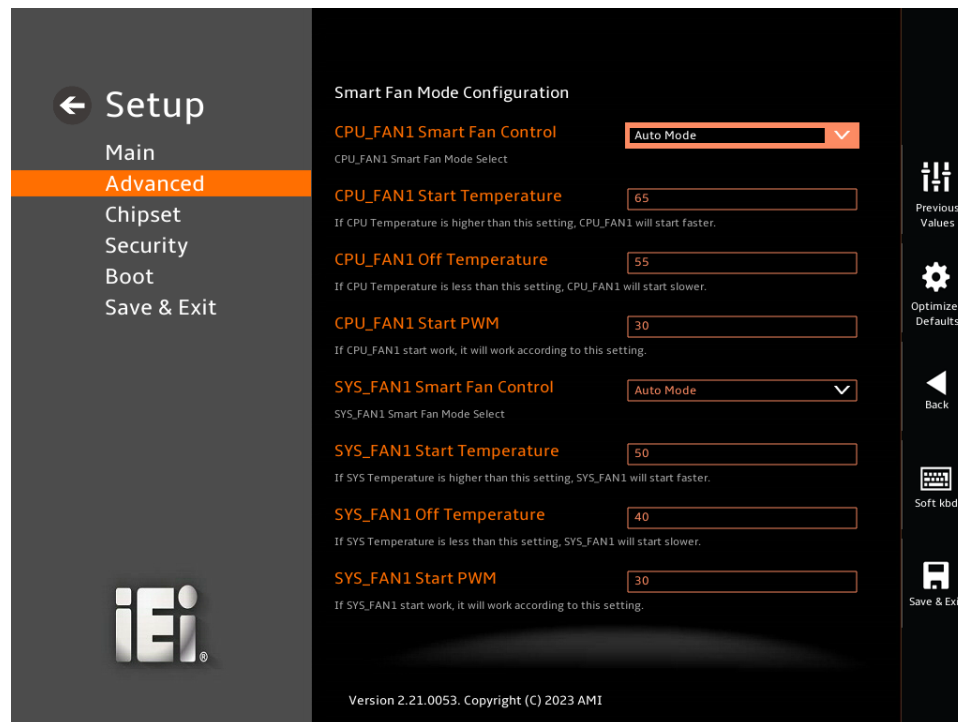
The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
 - CPU Temperature
 - System Temperature1
- Fan Speeds:
 - CPU_Fan1 Speed
 - SYS_Fan1 Speed
- Voltages:

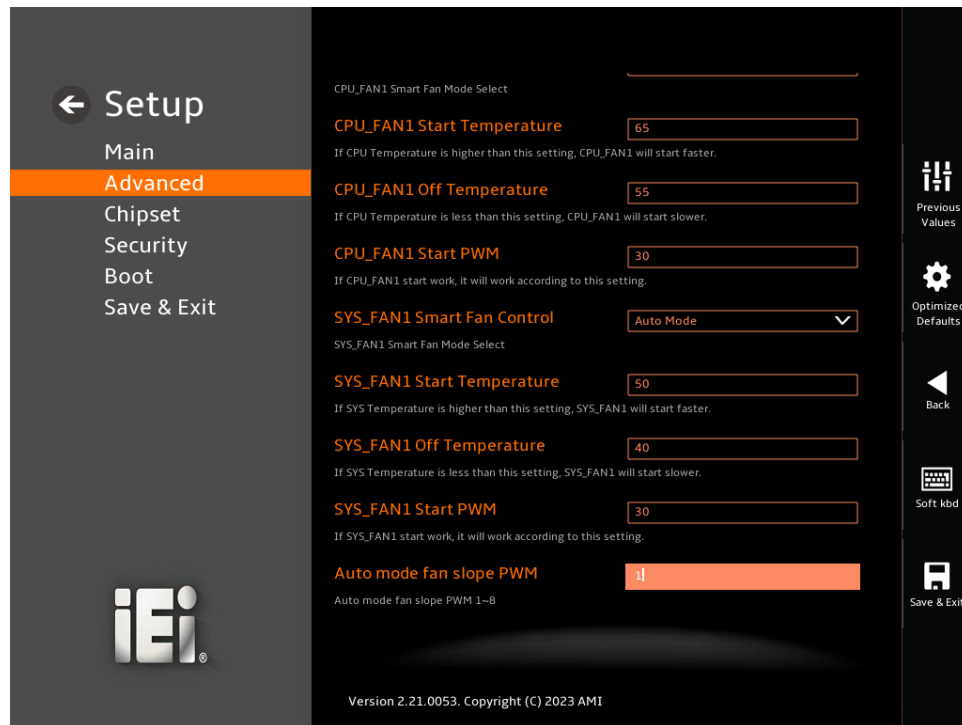
- CPU_CORE1
- +12V
- DDR
- +5VSB
- +3.3VSB
- +VCCIN_AUX_CPU

5.3.5.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 25**) to configure the CPU/system fan start/off temperature and control mode.



BIOS Menu 25: Smart Fan Mode Configuration (1/2)



BIOS Menu 26: Smart Fan Mode Configuration (2/2)

→ 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**

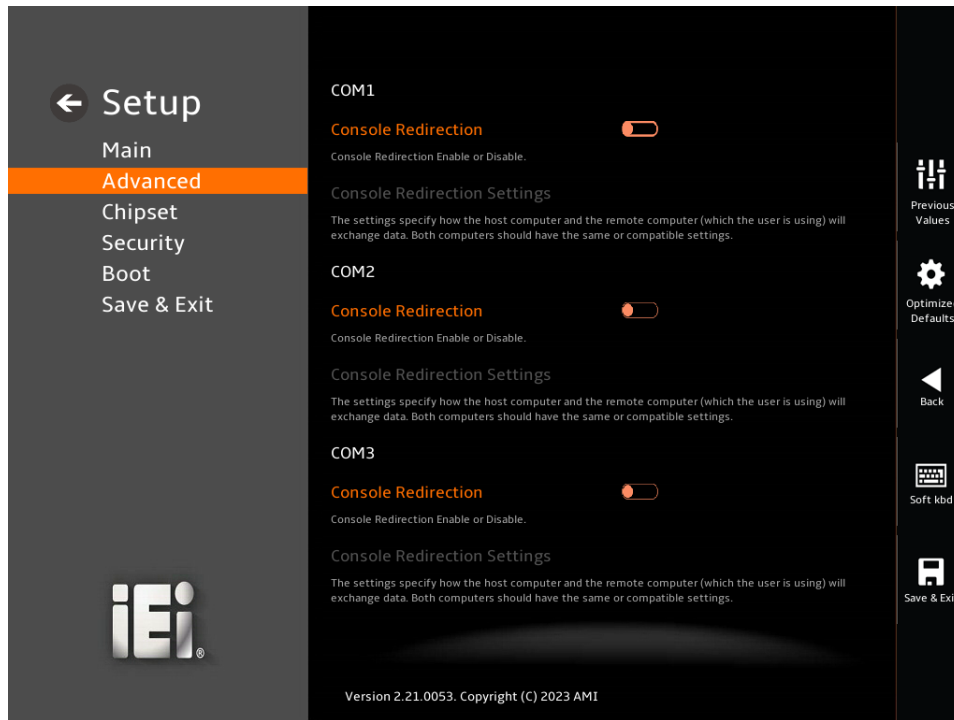
If the System temperature is lower than the value set this option, the fan speed change to be lowest. To set a value, Use the + or – key to change the value or enter a decimal number between 1 and 100.

→ **SYS_FAN1 Start PWM**

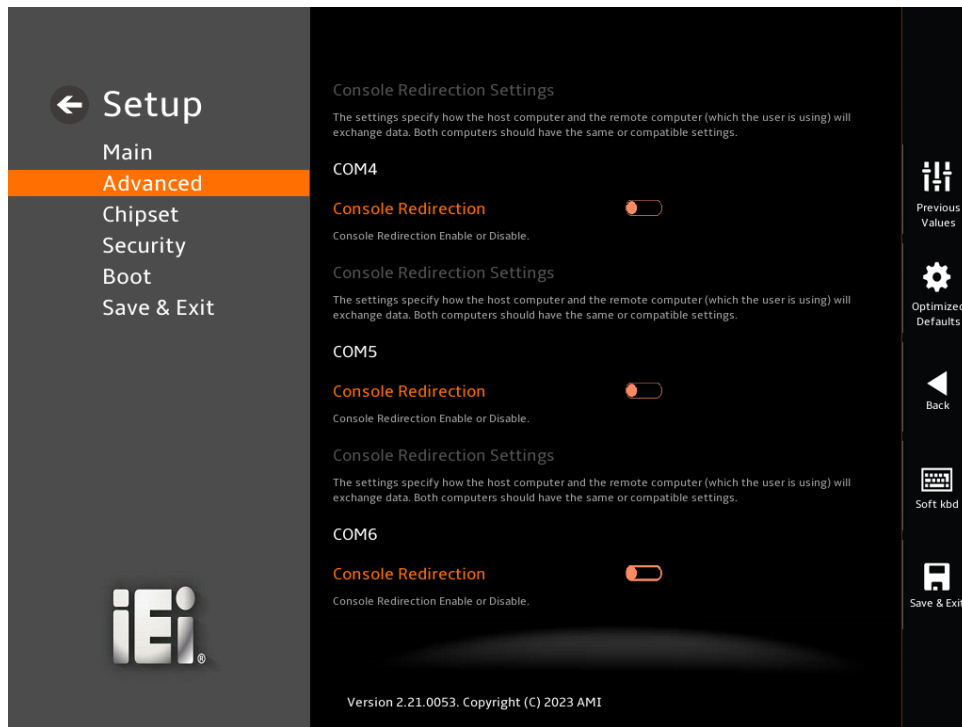
Use the **SYS_Fan1 Start PWM** option to set the PWM start value. Use the + or – key to change the value or enter a decimal number between 1 and 100.

5.3.6 Serial Port Console Redirection

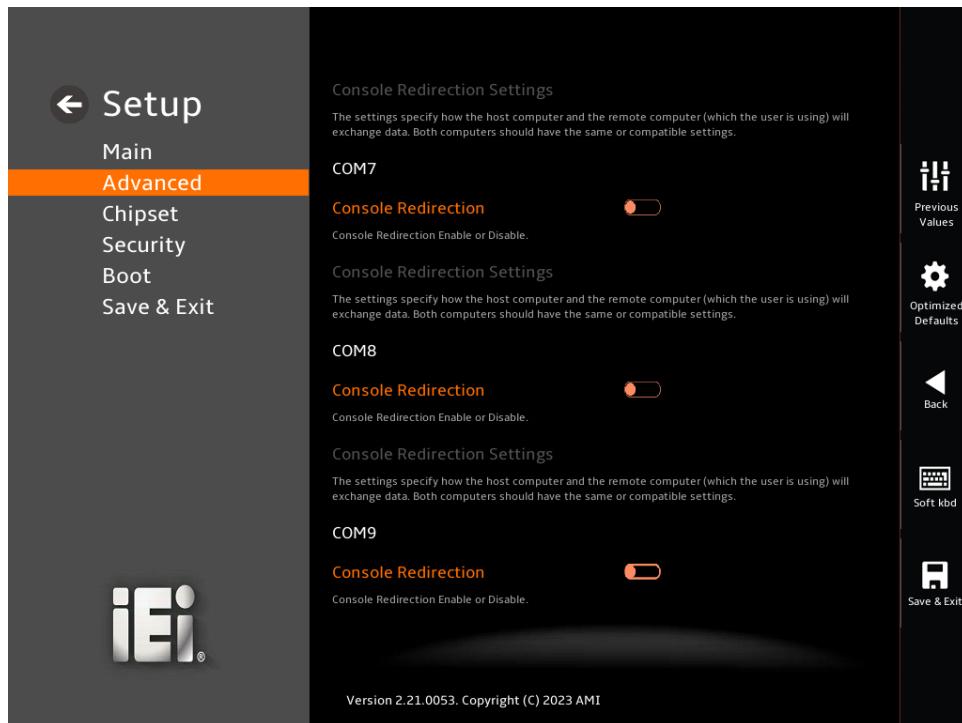
The **Serial Port Console Redirection** menu (**BIOS Menu 27**) allows the console redirection options to be configured. Console Redirection allows users to maintain a system remotely by re-directing keyboard input and text output through the serial port.



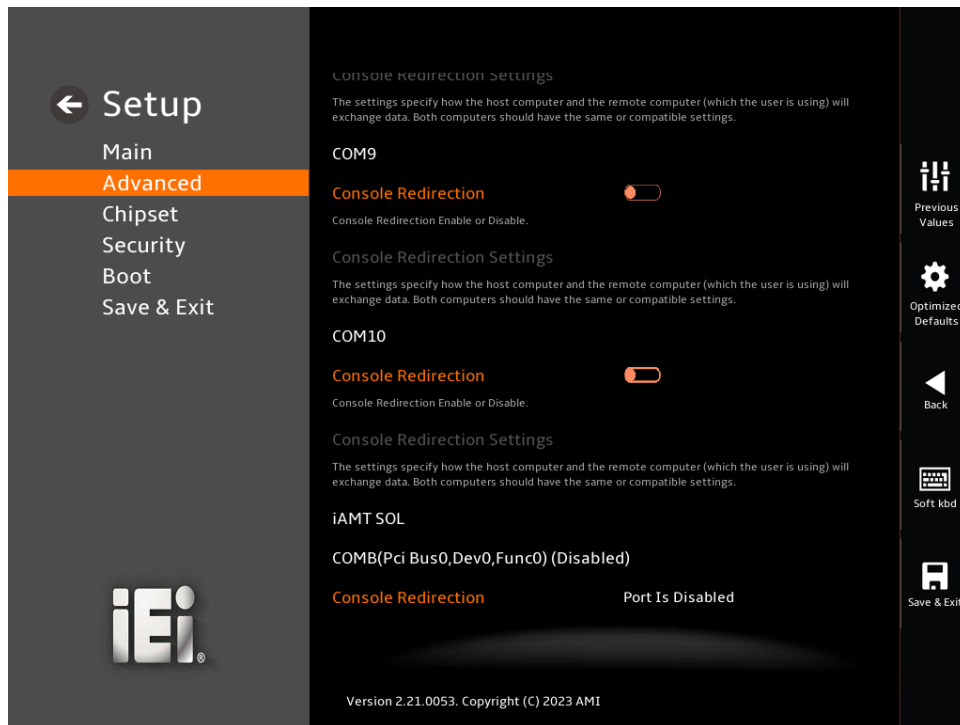
BIOS Menu 27: Serial Port Console Redirection (1/4)



BIOS Menu 28: Serial Port Console Redirection (2/4)



BIOS Menu 29: Serial Port Console Redirection (3/4)



BIOS Menu 30: Serial Port Console Redirection (4/4)

→ Console Redirection [Disabled]

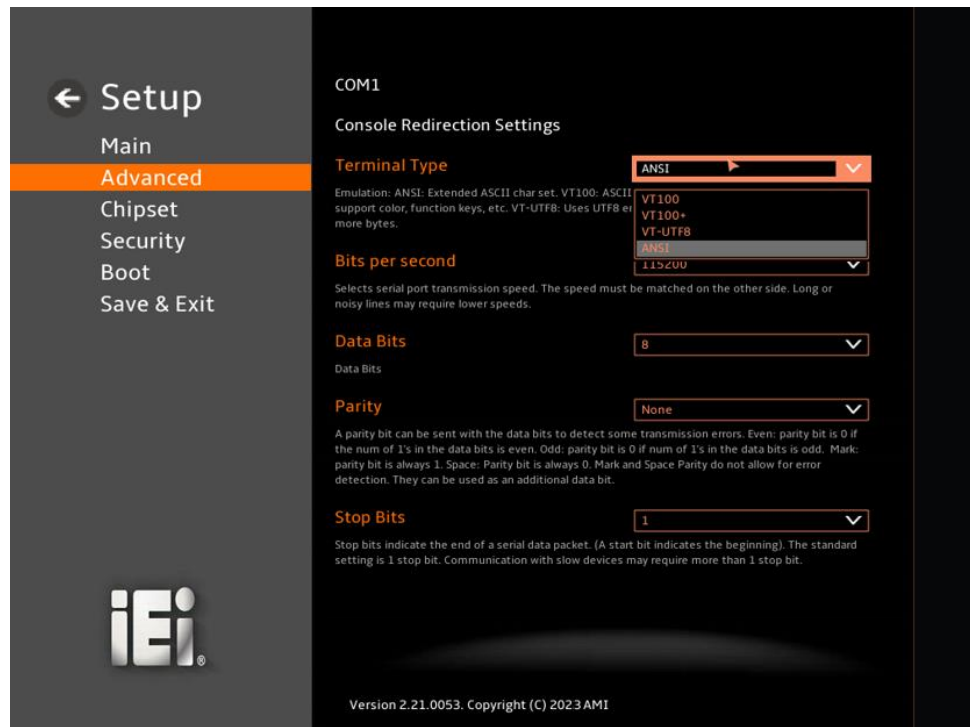
Use **Console Redirection** option to enable or disable the console redirection function.

- **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 31**) when the **COM Console Redirection** (for COM1 to COM10) option is enabled.



BIOS Menu 31: 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 |

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→ **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. 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 NVMe Configuration

Use the **NVMe Configuration (BIOS Menu 32)** menu to display the NVMe controller and device information.



BIOS Menu 32: NVMe Configuration

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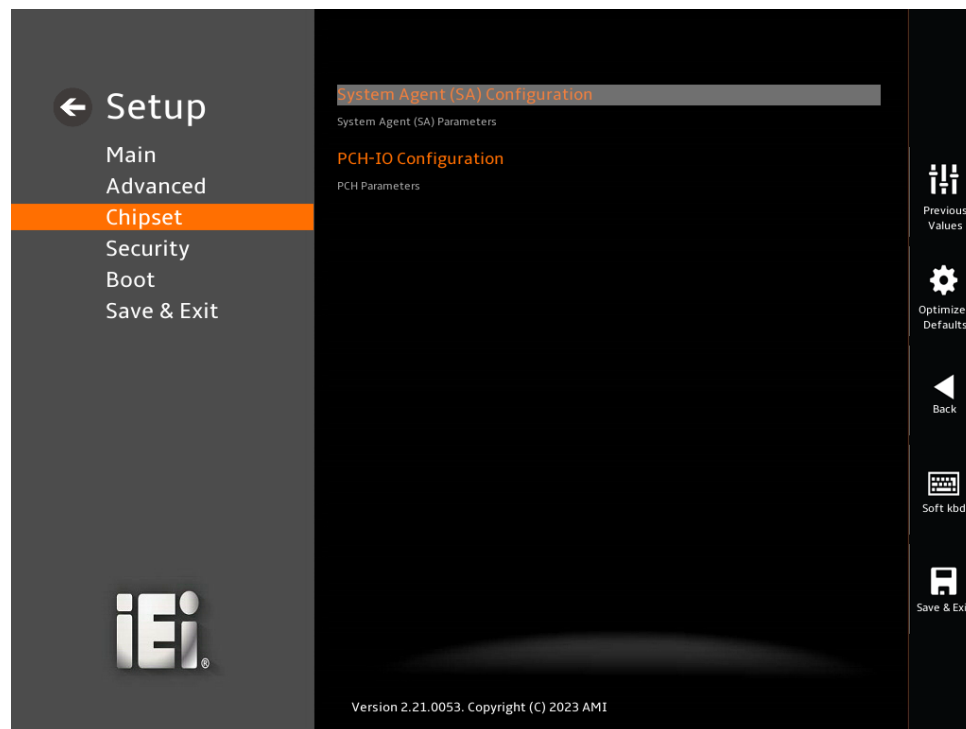
5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 33**) to access the PCH IO and System Agent (SA) configuration menus.



WARNING!

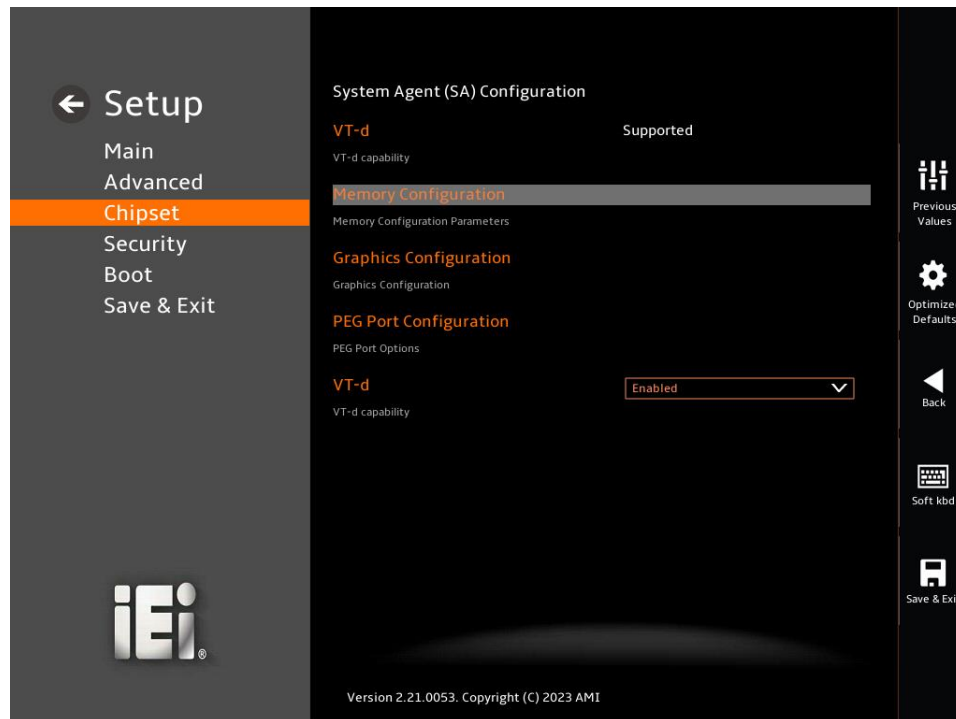
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 33: Chipset

5.4.1 System Agent (SA) Configuration

Use the **System Agent (SA) Configuration** menu (**BIOS Menu 34**) to configure the System Agent (SA) parameters.



BIOS Menu 34: 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

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5.4.1.1 Memory Configuration

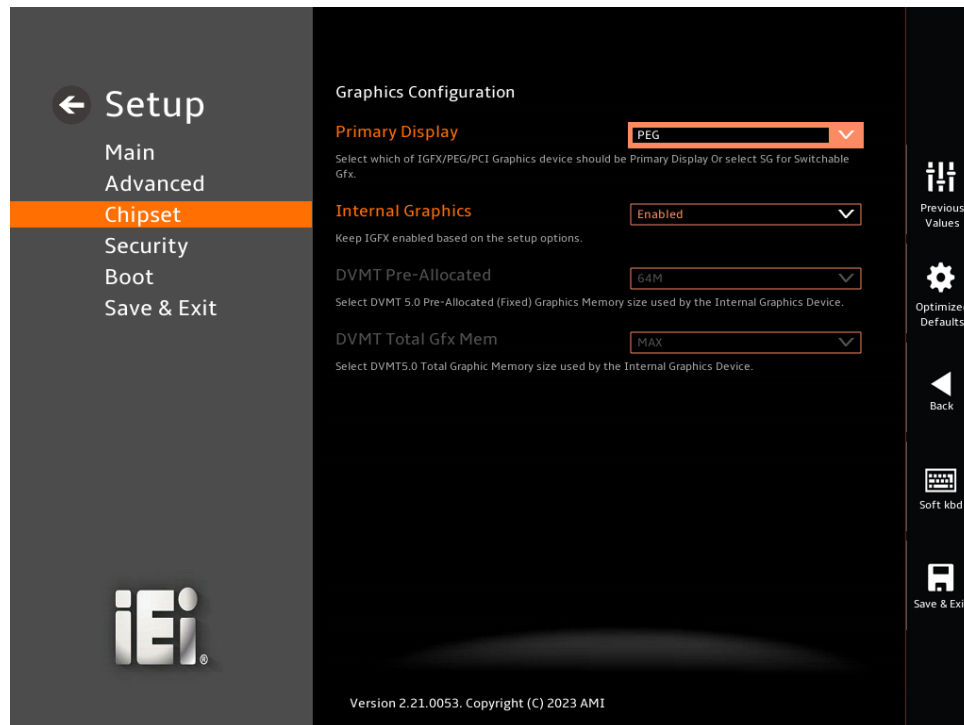
Use the **Memory Configuration** submenu (**BIOS Menu 35**) to view memory information.



BIOS Menu 35: Memory Configuration

5.4.1.2 Graphics Configuration

Use the **Graphics Configuration (BIOS Menu 36)** menu to configure the video device connected to the system.



BIOS Menu 36: Graphics Configuration

→ Primary Display [PEG]

Use the **Primary Display** option to select the primary graphics controller the system uses.

The following options are available:

- Auto
- IGFX
- PEG **Default**
- 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

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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 [160M]

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:

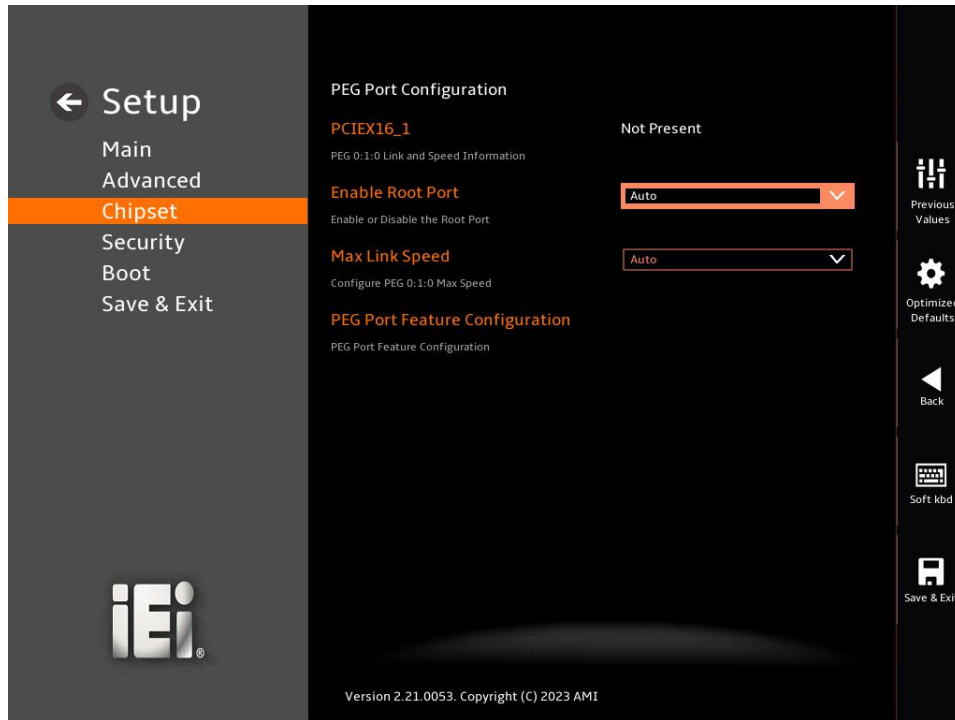
- 80M
- 160M **Default**

➔ DVMT Total Gfx Mem [MAX]

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

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

5.4.1.3 PEG Port Configuration



BIOS Menu 37: PEG Port Configuration

➔ **Enable Root Port [Auto]**

Use the **Enable Root Port Device** option to enable or disable Root Port.

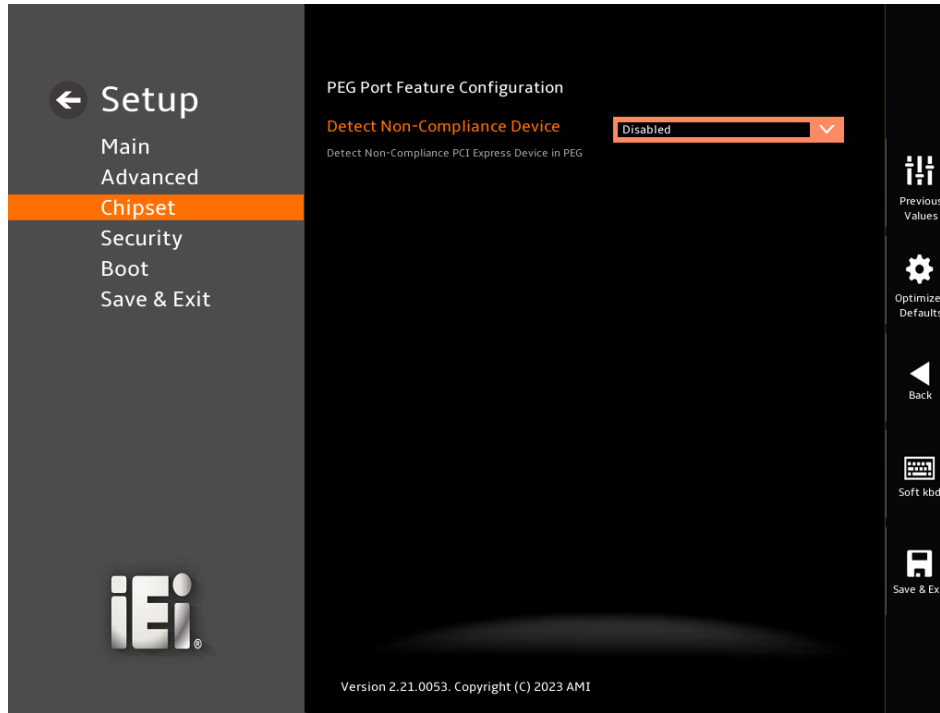
- ➔ **Disabled** Disable Root Port
- ➔ **Enabled** Enable Root Port
- ➔ **Auto** **DEFAULT** Auto mode

➔ **Max Link Speed [Auto]**

Use the **Max Link Speed** option to configure PEG 0:1:0 Max Speed.

- ➔ **Auto** **DEFAULT** Auto mode
- ➔ **Gen1** Configure PEG Max Speed to Gen1
- ➔ **Gen2** Configure PEG Max Speed to Gen2
- ➔ **Gen3** Configure PEG Max Speed to Gen3

5.4.1.3.1 PEG Port Feature Configuration



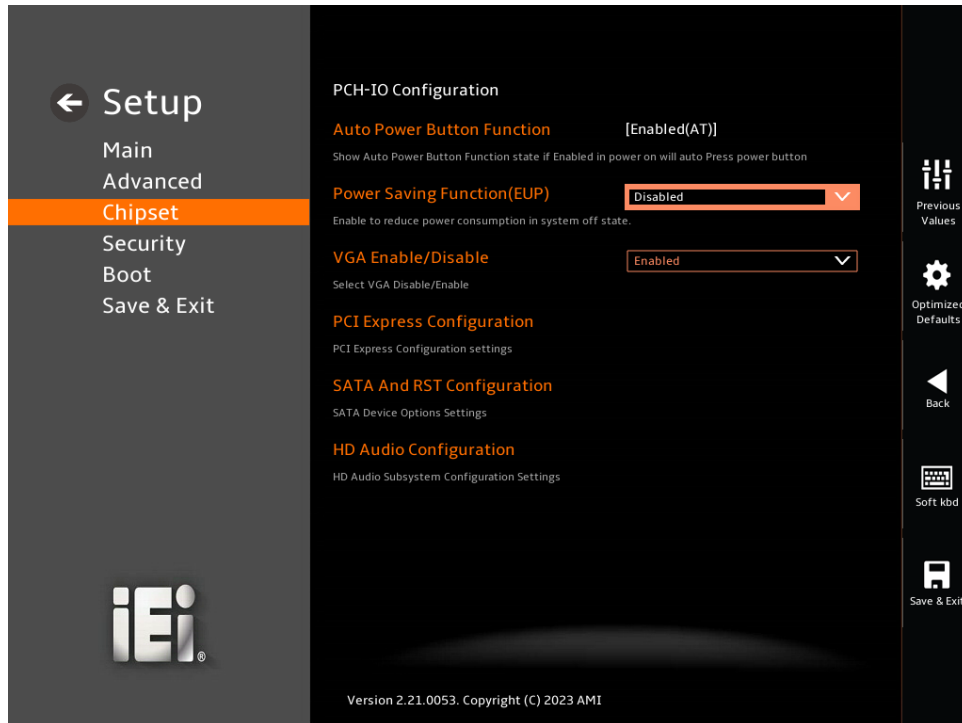
➔ **Detect Non-Compliance Device [Disabled]**

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 38**) to configure the PCH parameters.



BIOS Menu 38: PCH-IO Configuration

➔ Auto Power Button Function [Enable (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)** **DEFAULT** The system power mode is AT.
- ➔ **Disabled (ATX)** The system power mode is ATX.

➔ 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.

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➔ **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** to enable or disable the VGA.

➔ **Enabled**

DEFAULT

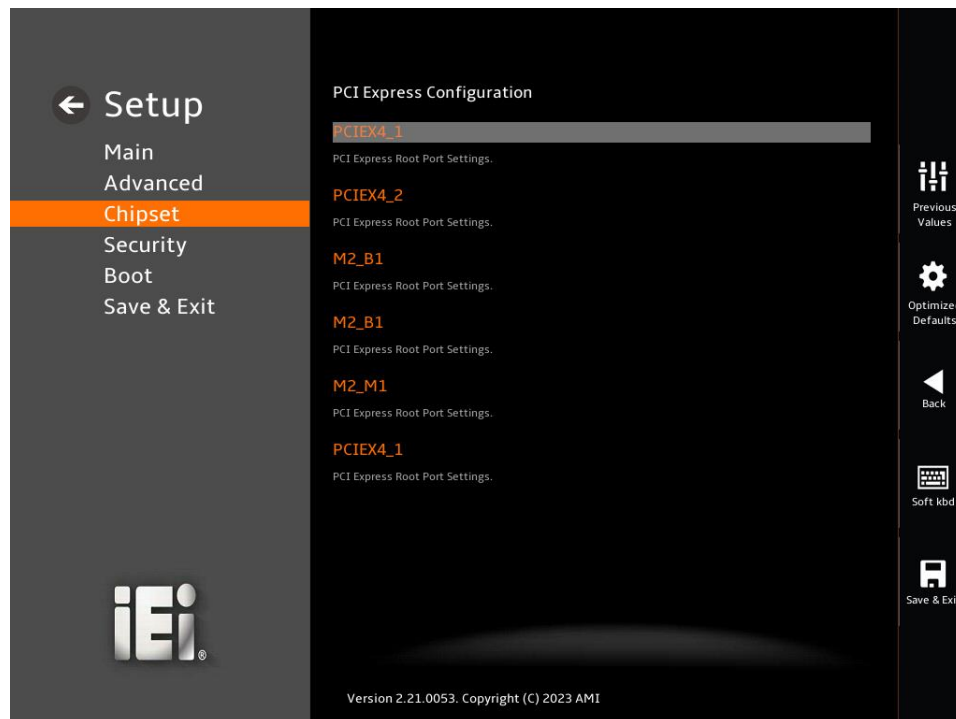
VGA is enabled.

➔ **Disabled**

VGA is disabled.

5.4.2.1 PCI Express Configuration

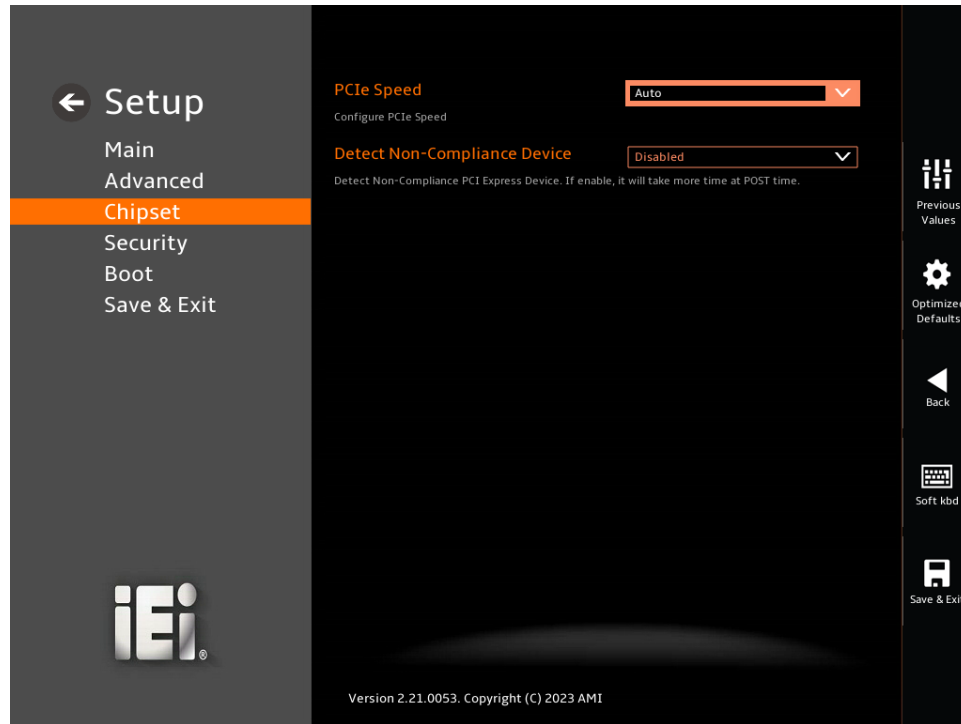
Use the **PCI Express Configuration** submenu (**BIOS Menu 39**) to configure the PCI Express slots.



BIOS Menu 39: PCI Express Configuration

5.4.2.1.1 PCIe Root Port Setting

Use the **PCIEx4_1**, **PCIEx4_2**, **M2_B1**, **M2_M1** submenu (**BIOS Menu 40**) to configure the PCIe Root Port Setting.



BIOS Menu 40: 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. |

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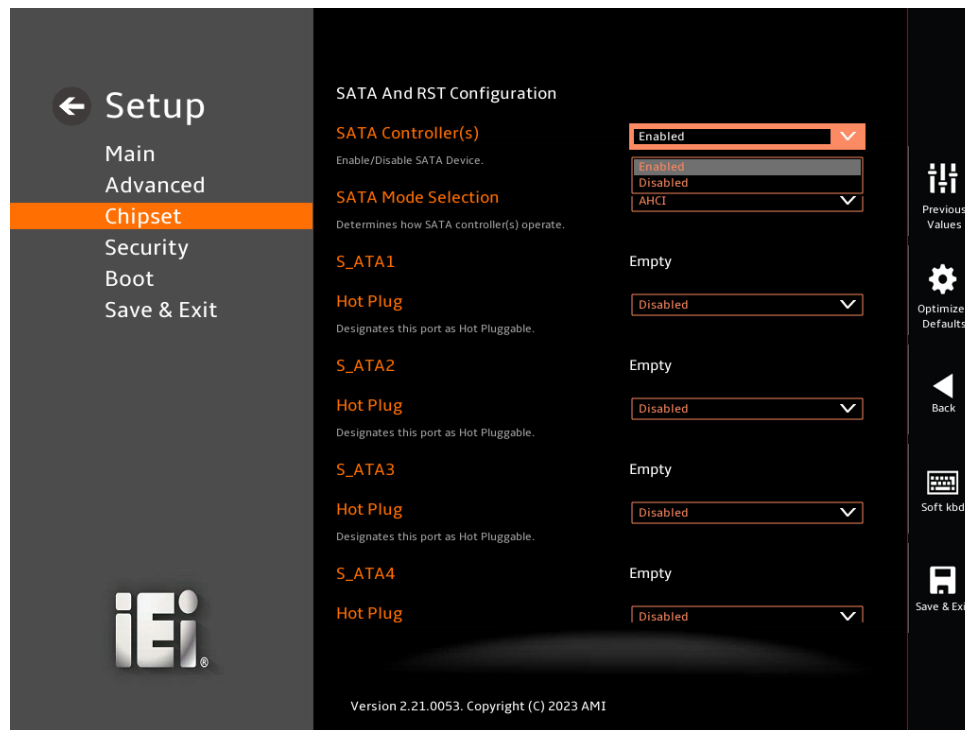
→ Detect Non-Compliance Device [Disabled]

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.

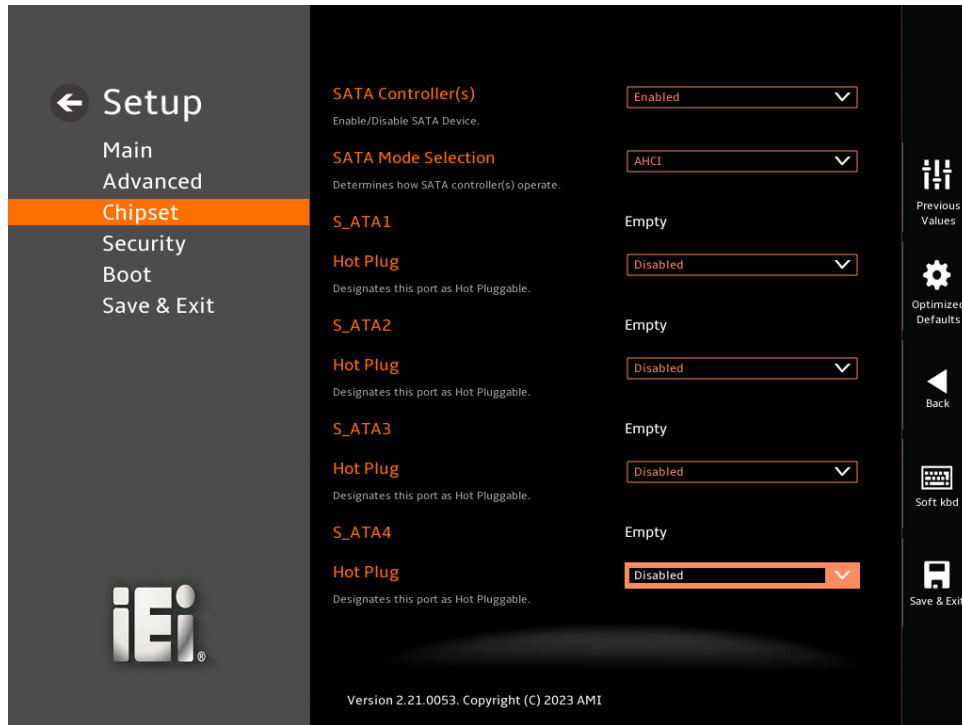
- **Disabled** **DEFAULT** Do not detect if a non-compliance PCI Express device is connected to the PCI Express port.
- **Enabled** Detect if a non-compliance PCI Express device is connected to the PCI Express port.

5.4.2.2 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 41**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 41: PCIe Slot Configuration Submenu (1/2)



BIOS Menu 42: SATA Configuration (2/2)

➔ **SATA Controller(s) [Enabled]**

Use the **SATA Controller(s)** option to designate the correspondent port as hot-pluggable.

- ➔ **Disabled** Disable the SATA device.
- ➔ **Enabled** **DEFAULT** Enable the SATA device.

➔ **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.

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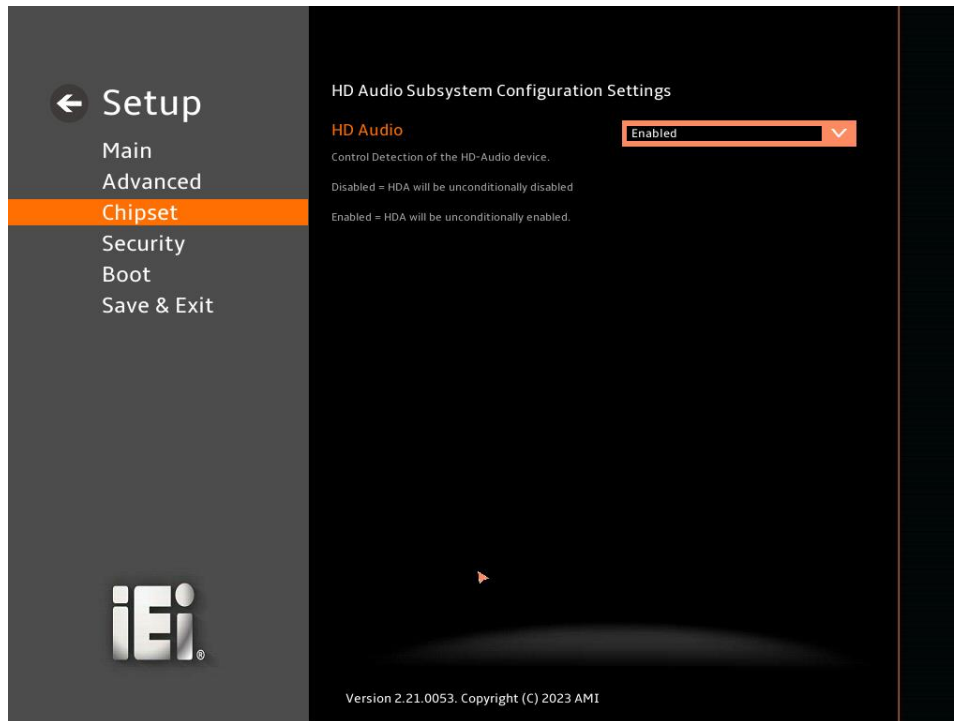
→ Hot Plug [Disabled]

Use the **Hot Plug** option 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 43**) to configure the PCH Azalia settings.



BIOS Menu 43: HD Audio Configuration

→ HD Audio [Enabled]

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

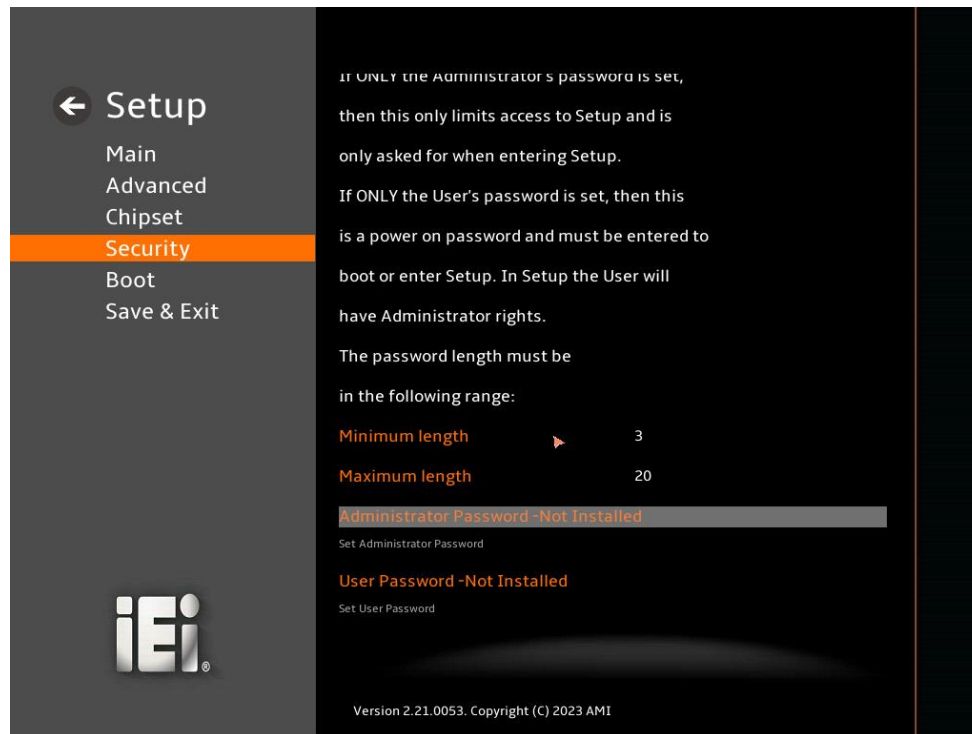
- **Disabled** The onboard High Definition Audio controller is disabled.
- **Enabled** **DEFAULT** The onboard High Definition Audio controller is enabled.

5.5 Security

Use the **Security** menu (**BIOS Menu 45**) to set system and user passwords.



BIOS Menu 44: Security (1/2)



BIOS Menu 45: Security (2/2)

→ Administrator Password

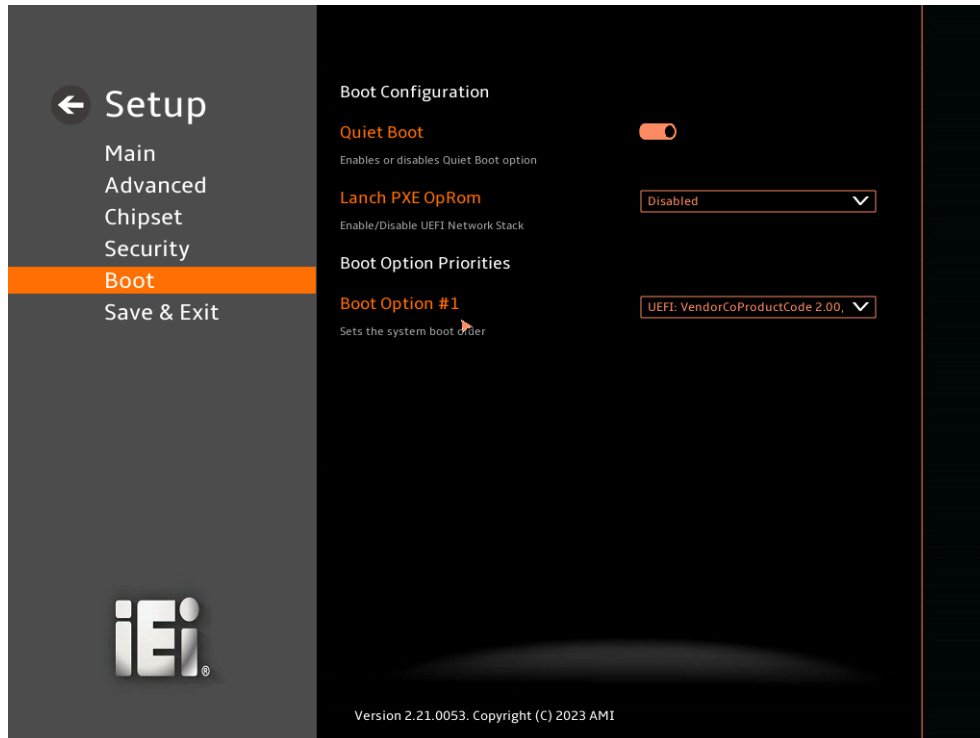
Use the **Administrator Password** to set or change an administrator password.

→ User Password

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 46**) to configure system boot options.



BIOS Menu 46: 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.

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- **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**

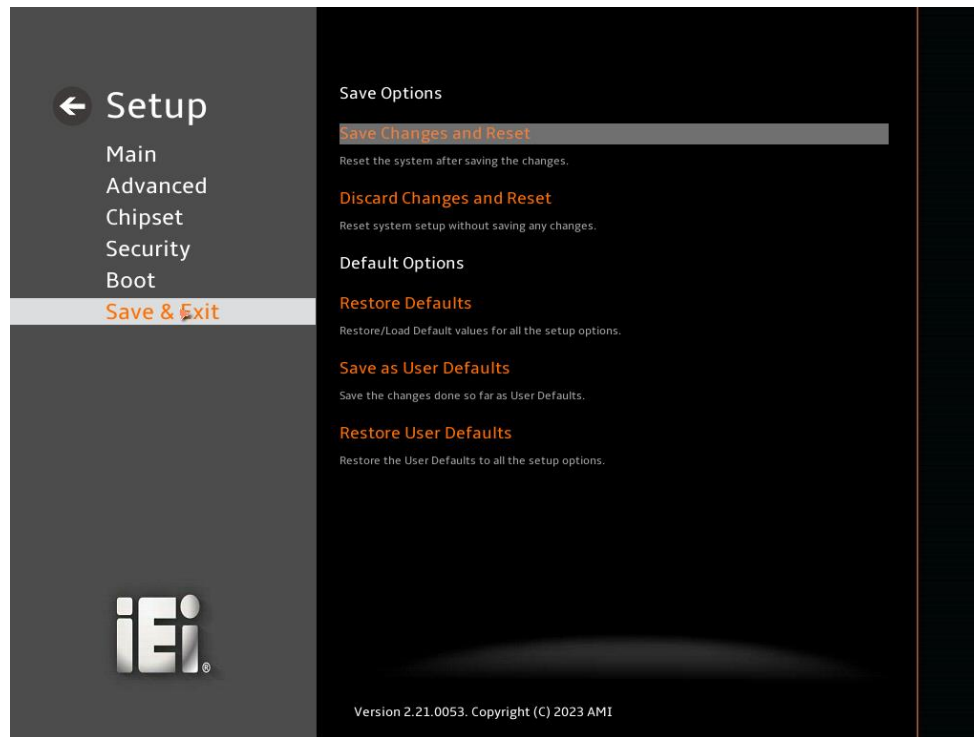
→ **Boot Option #2**

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

- **UEFI: USB, Partition 1**
- **Disabled**

5.7 Save & Exit

Use the **Save & Exit** menu (**BIOS Menu 47**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 47: 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.**

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→ **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

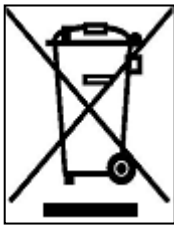
Product Disposal

**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

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

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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
4	Memory not Installed
1	Memory was installed twice (InstallPeiMemory routine in PEI Core called twice)
2	Recovery started
3	DXE IPL 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
<p>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.</p> <p>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.</p>										

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	○	○	○	○	○	○
印刷电路板	○	○	○	○	○	○
金属螺帽	○	○	○	○	○	○
电缆组装	○	○	○	○	○	○
风扇组装	○	○	○	○	○	○
电力供应组装	○	○	○	○	○	○
电池	○	○	○	○	○	○
<p>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。</p> <p>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。</p>						