IEI Integration Corp.

MODEL:

KINO-EHL2

Mini-ITX SBC supports Intel® Elkhart Lake Celeron® J6412 on-board SoC with Triple Independent Display, HDMI, DP, iDPM, SATA 6Gb/s, Dual 2.5GbE, USB 3.2, M.2, 12~28V DC input and RoHS

User Manual

Rev. 1.00 – April 14, 2024

RoHS Lead Free

Revision

Date	Version	Changes
April 14, 2024	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: KINO-EHL2-J6412

The KINO-EHL2-J6412 is a Mini-ITX form factor single bard computer. It has an on-board 10nm Intel® Celeron® processor, and supports one DDR4 3200 SO-DIMM (up to 16GB).

The KINO-EHL2-J6412 series includes one DP port and one HDMI port for dual independent display. It also has an internal iDPM 3040 slot supporting IEI eDP/LVDS/VGA module. Expansion and I/O include one PCIe x4 slot (with PCIe x1 signal), one M.2 2230 A key (PCIe x1 / USB 2.0 signal) and one M.2 3052/3042/2242/2280 B key with SIM slot (PCIe x2 / USB 2.0 signal), two USB 3.2 Gen 2 (10Gb/s) ports plus two USB 2.0 on the rear panel, four USB 2.0 by pin header, two SATA 6Gb/s with 5V SATA power connector, four RS-232 serial ports, and two RS-232/422/485 serial ports.

1.2 Benefits

The KINO-EHL2-J6412 motherboard benefits include:

- Powerful graphics support multi-display
- Staying connected with wired LAN connections
- Speedy running of multiple programs and applications

1.3 Features

The KINO-EHL2-J6412 motherboard features are listed below:

- Mini-ITX form factor
- RoHS compliant
- On-board 10nm Intel® Celeron® processor
- 1 x 260-pin 3200 MHz DDR4 SO-DIMM (system max. 16GB)
- iDPM, DP and HDMI interfaces for triple independent displays
- Two 2.5 GbE connectors
- Two SATA 6Gb/s connector
- One M.2 2230 A key and one M.2 3052/3042/2242/2280 B key slot
- One PCIe x4 (x1 signal) expansion slot
- Two USB 3.2 Gen 2 (10Gb/s) ports and six USB 2.0 ports
- Four RS-232 serial ports and two RS-232/422/485 serial ports
- Realtek ALC888S HD Audio codec: 3 x Audio Jack (Line-in, Line-out, Mic-in)

1.4 Connectors

The connectors on the KINO-EHL2-J6412 are shown in the figure below.

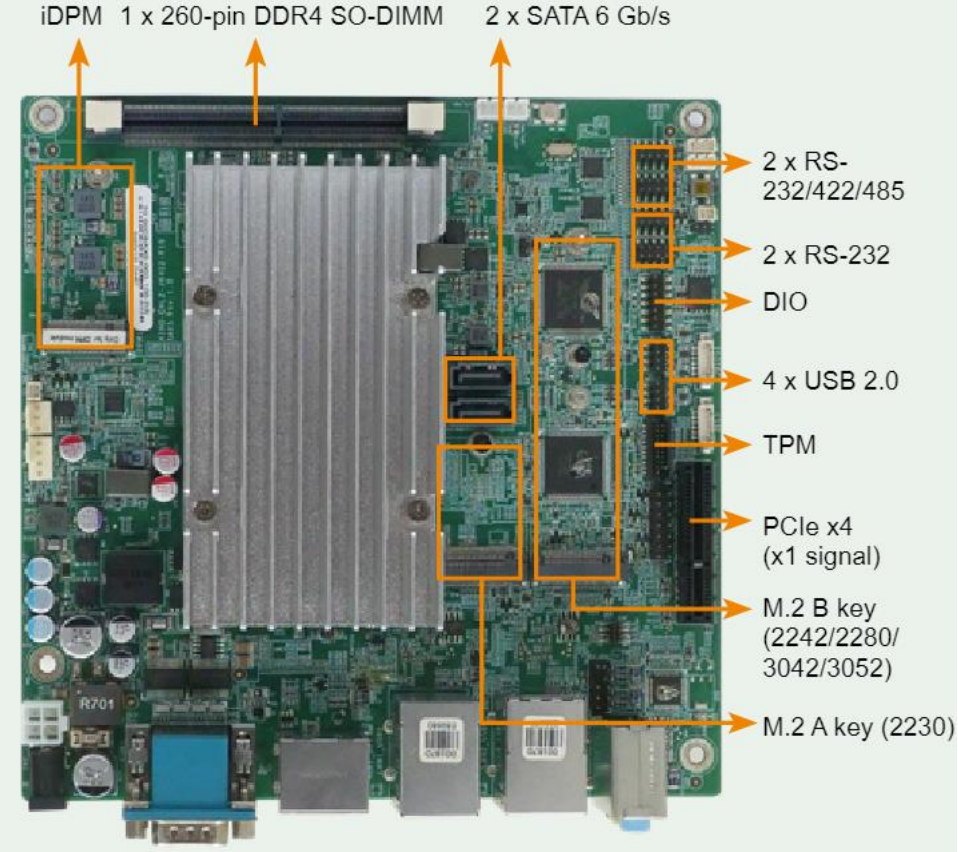


Figure 1-2: Connectors

1.5 Dimensions

The main dimensions of the KINO-EHL2-J6412 are shown in the diagram below.

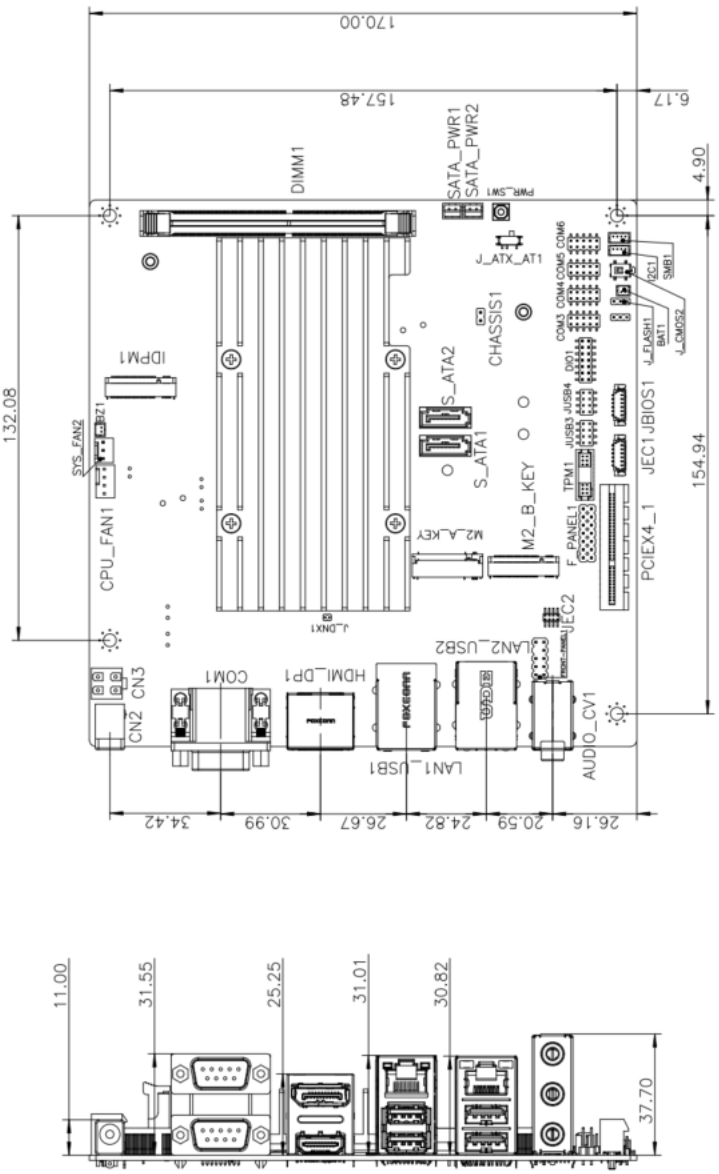


Figure 1-3: KINO-EHL2-J6412 Series Main Dimensions (mm)

1.6 Data Flow

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

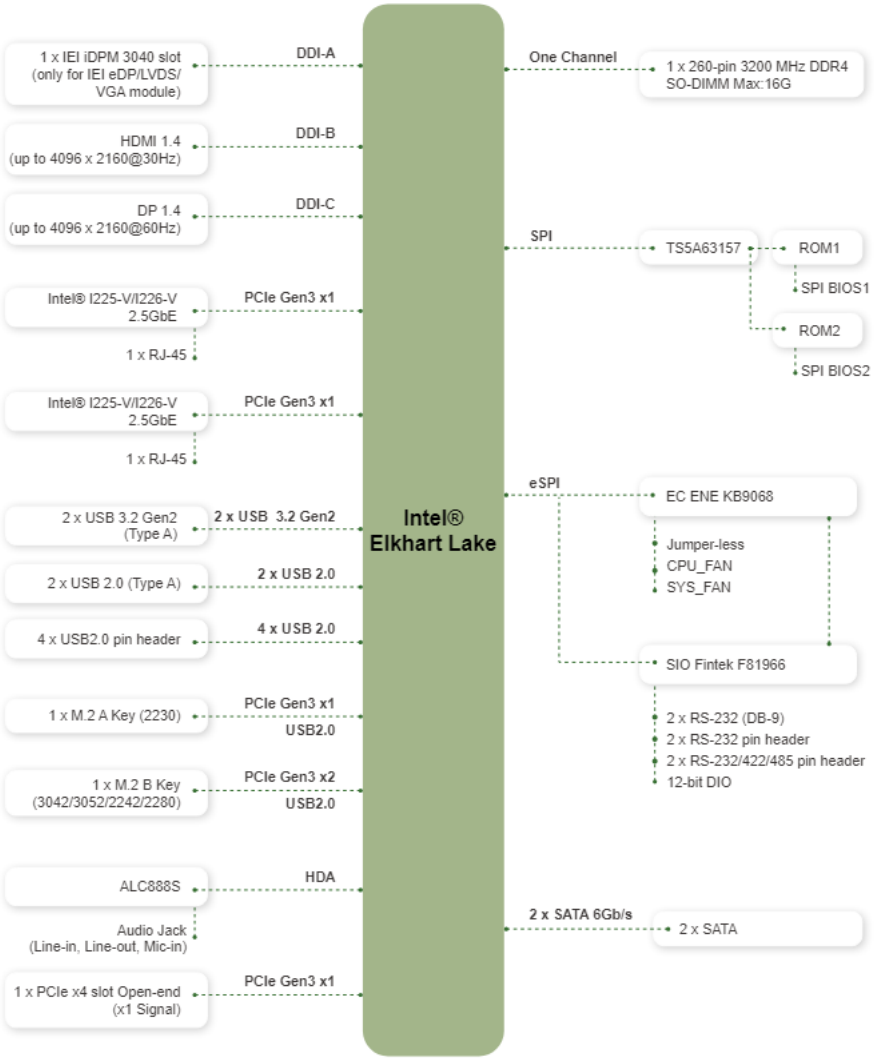


Figure 1-4: Data Flow Diagram

1.7 Technical Specifications

The KINO-EHL2-J6412 technical specifications are listed below.

Specification/Model	KINO-EHL2-J6412 Series
Form Factor	Mini-ITX
On-board SoC	Intel® Celeron® J6412 on-board SoC
Memory	1 x 260-pin 3200 MHz DDR4 SO-DIMM (system max. 16GB)
Integrated Graphics	Intel® UHD Graphics
Audio	Realtek ALC888S HD Audio codec 3 x Audio jack (Line-in, Line-out, Mic-in) 1 x Analog audio (2x5 pin, p=2.54)
BIOS	AMI UEFI BIOS
Ethernet Controllers	2 x PCIe 2.5GbE with Intel® I225-V/I226-V controler
Digital I/O	1 x 12-bit digital I/O (2x7 pin, p=2.0)
Super I/O Controller	Fintek F81966D-I
Watchdog Timer	Software programmable supports 1 sec–255 sec system reset
Expansion	
PCIe	1 x PCIe x4 Slot Open-ended (PCIe Gen3 x1 signal)
M.2 A key	1 x M.2 A key (2230) (PCIex1 & USB 2.0)
M.2 B key	1 x M.2 B key (3052/3042/2242/2280) (PCIe x2 & USB 2.0)
SIM card socket	1 x On-board SIM card socket (hinge type) for M.2 B key
I/O Interface Connectors	
Audio Connector	Realtek ALC888S HD Audio codec 3 x Audio Jack (Line-in, Line-out, Mic-in)

Specification/Model	KINO-EHL2-J6412 Series
Display Ports	Triple independent display 1 x HDMI 1.4 (up to 4096 x 2160@30Hz) 1 x DP 1.4 (up to 4096 x 2160 @60Hz) 1 x IEI iDPM 3040 slot (only for IEI eDP/LVDS/VGA module)
Ethernet	LAN1: Intel® I225-V/I226-V 2.5GbE controller LAN2: Intel® I225-V/I226-V 2.5GbE controller
Serial Ports	2 X RS-232/422/485 via internal pin header connector 2 X RS-232 via internal pin header connector 2 X RS-232 via D-sub 9 connector
USB Ports	2 x USB 3.2 Gen2(10Gb/s) (USB Type A) 2 x USB 2.0 (USB Type A) 4 x USB 2.0 by two 8-pin headers
Serial ATA	2 x SATA 6Gb/s
SMBus	Supported by one 4-pin wafer connector
Environmental and Power Specifications	
Power Supply	12~28V DC input 1 x Internal power connector (2x2 pin) 1 x External DC power jack (Ø2.5mm) ErP/EuP Compliant
Power Consumption	12V@3.23A, 19V@2.15A, 24V@1.74A, 28V@1.53A (Intel® Celeron® J6412 2.0GHz with 32GB 3200MHz DDR4 memory and EUP enabled)
Operating Temperature	-10ºC–65ºC
Storage Temperature	-30ºC–70ºC

Specification/Model	KINO-EHL2-J6412 Series
Humidity	5%–95% (non-condensing)
Physical Specifications	
Dimensions	170 mm x 170 mm
Weight GW/NW	900 g / 400 g

Table 1-1: KINO-EHL2-J6412 Series 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 KINO-EHL2-J6412 series is unpacked, please do the following:

- Follow the antistatic guidelines above.
- Make sure the packing box is facing upwards when opening.
- Make sure all the packing list items are present.

2.3 Packing List

NOTE:

If any of the components listed in the checklist below are missing, do not proceed with the installation. Contact the IEI reseller or vendor the KINO-EHL2-J6412 series was purchased from or contact an IEI sales representative directly by sending an email to sales@ieiworld.com

The KINO-EHL2-J6412 series is shipped with the following components:

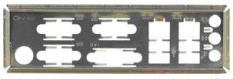
Quantity	Item and Part Number	Image
1	KINO-EHL2-J6412 single board computer	
1	SATA and power cable	
1	I/O shielding	
1	Quick Installation Guide	Mini-ITX SBC Supports Intel® Celeron® J6412 on-board SoC with HDMI, DP, iDPM, Dual 2.5GbE LAN, M.2, PCIe x4 Slot, SATA 6Gb/s, COM, USB 3.2 Gen 2, 12V~28V and RoHS KINO-EHL2-J6412 Quick Installation Guide Version 1.0 July 26, 2023 Package List KINO-EHL2-J6412 package includes the following items: 1 x KINO-EHL2-J6412 single board computer 1 x SATA cable 1 x I/O shielding 1 x QIG ©2023 Copyright by IEI Integration Corp. All rights reserved.

Table 2-1: Packing List

2.4 Optional Items

The following are optional components which may be separately purchased:

Item and Part Number	Image
USB cable, 300mm， P=2.00 (**P/N** : CB-USB02A-RS)	
SATA power cable, MOLEX 5264-4P to SATA15P (**P/N**: 32102-000100-200-RS)	
RS-232/422/485, 200mm,2*5 pin, P=2.0 (**P/N**: 19800-000300-100-RS)	

Chapter

3

Connectors

3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

3.1.1 KINO-EHL2-J6412 Layout

The figures below show all the connectors and jumpers.

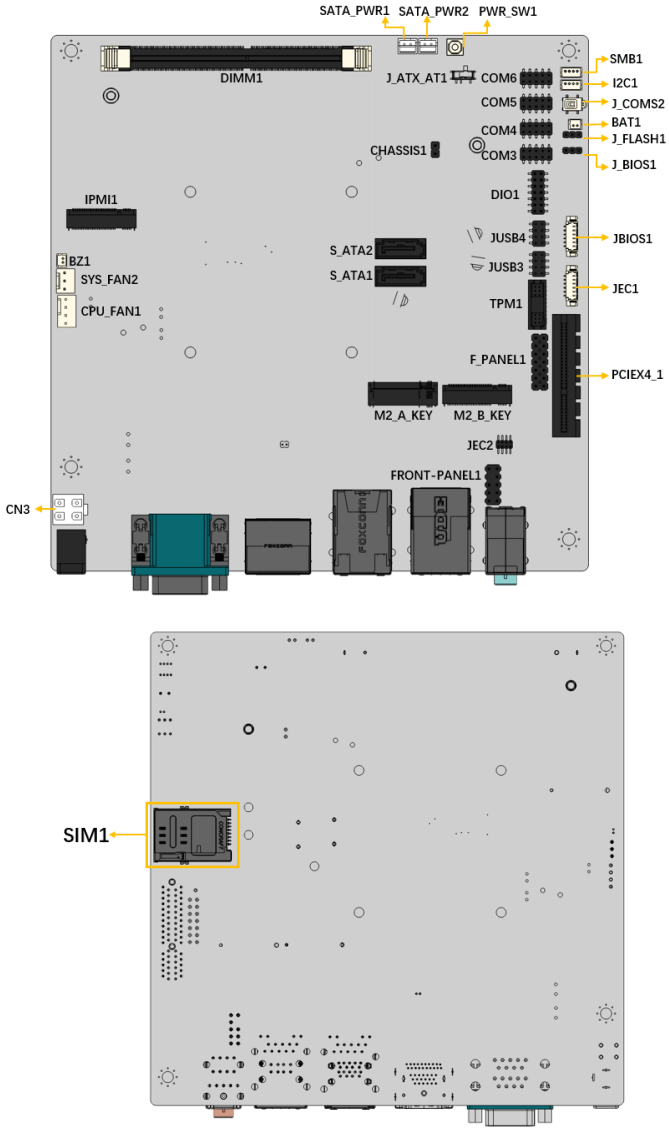


Figure 3-1: Connectors and Jumpers

3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
Battery connector	2-pin wafer	BAT1
Buzzer connector	2-pin wafer	BZ1
Digital I/O connector	14-pin header	DIO1
Fan connector (CPU)	4-pin wafer	CPU_FAN1
Fan connector (system)	3-pin wafer	SYS_FAN2
Front panel connector	14-pin header	F_PANEL1
Memory SDRAM	DDR4 SO-DIMM socket	DIMM1
PCIe x4 slot (x1 signal)	PCIe x4 slot	PCIEX4_1
M.2 2230 A-key slot	M.2 A-key slot	M2_A_KEY
M.2 052/3042/2242/2280 B-key slot	M.2 B-key slot	M2_B_KEY
IDPM Slot	IDPM Slot	IDPM1
Power button	Push button	PWR_SW1
Power input connector	4-pin connector	CN3
SATA 6Gb/s drive connector	7-pin SATA connector	S_ATA1,S_ATA2
SATA power connector (5 V)	2-pin wafer	SATA_PWR1,SATA_PWR2
Serial port, RS-232	10-pin header	COM3,COM4
Serial port, RS-232/422/485	10-pin header	COM5,COM6
SMBus connector	4-pin wafer	SMB1
I2C connector	4-pin wafer	I2C1

Connector	Type	Label
Flash SPI ROM Connector	6-pin wafer	JBIOS1
Flash EC ROM Connector	8-pin header	JEC2
DNX mode setting jumper	2-pin header	J_DNX1
EC Debug Connector	6-pin wafer	JEC1
Flash Setting Jumper	3-pin header	J_FLASH1
USB 2.0 connectors	8-pin header	JUSB3, JUSB4
Clear CMOS Button	Press button	J_CMOS2
AT/ATX power mode setting switch	Toggle switch	J_ATX_AT1
Chassis intrusion connector	2-pin header	CHASSIS1
SIM Slot	SIM Slot	SIM1

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
Ethernet and USB 2.0 connector	RJ-45 and USB Type-A	LAN2_USB2
Ethernet and USB 3.2 Gen 2 connector	RJ-45 and USB Type-A	LAN1_USB1
Power connector	4-pin DIN	CN2
Serial port connectors	D-sub 9, male	COM1
HDMI and DP connector	HDMI and DP	HDMI_DP1
External audio jack	audio jacks	AUDIO_CV1

Table 3-2: Rear Panel Connectors

3.2 Internal Peripheral Connectors

The section describes all of the connectors on the KINO-EHL2-J6412.

3.2.1 Battery Connector

CAUTION:

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

CN Label:	**BAT1**
CN Type:	2-pin wafer, p=1.25 mm
CN Location:	See **Figure 3-2**
CN Pinouts:	See **Table 3-3**

A system battery is placed in the battery holder. The battery provides power to the system clock to retain the time when power is turned off. **NOTE**: It is recommended to attach the RTC battery onto the system chassis in which the KINO-EHL2-J6412 is installed.

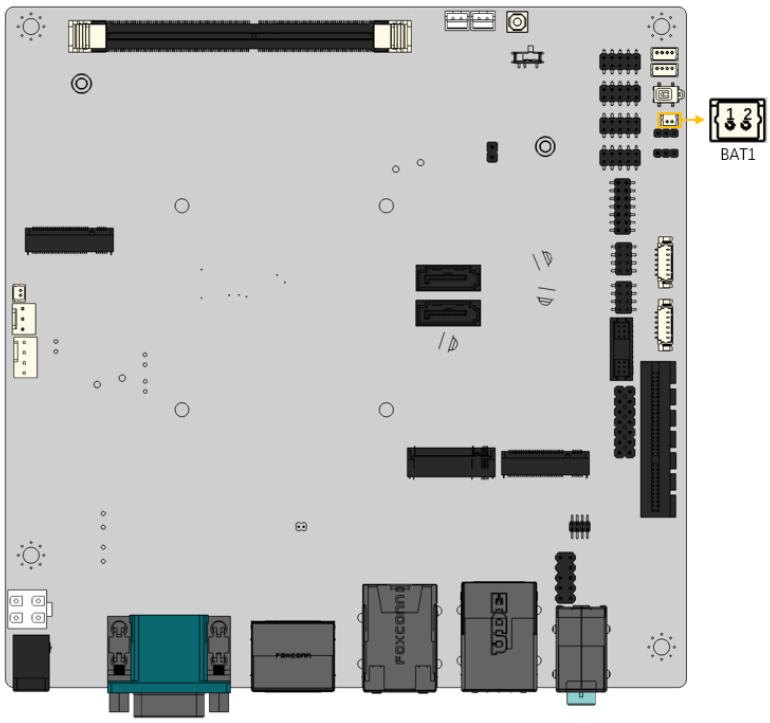


Figure 3-2: Battery Connector Location

Pin	Description
1	VBATT
2	GND

Table 3-3: Battery Connector Pinouts

3.2.2 Buzzer Intrusion Connector

CN Label: **BZ1**

CN Type: 2-pin header, p=1.25 mm

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

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

The buzzer connector is connected to a buzzer.

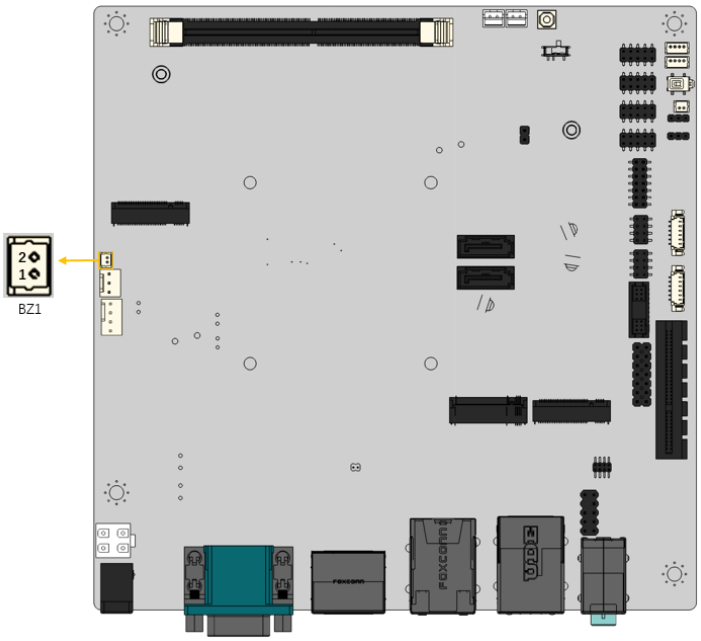


Figure 3-3: Buzzer Connector Location

Pin	Description
1	+5V
2	PC_BEEP

Table 3-4: Buzzer Connector Pinouts

3.2.3 Digital I/O Connector

CN Label: **DIO1**

CN Type: 14-pin header, p=2.00 mm

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

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

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

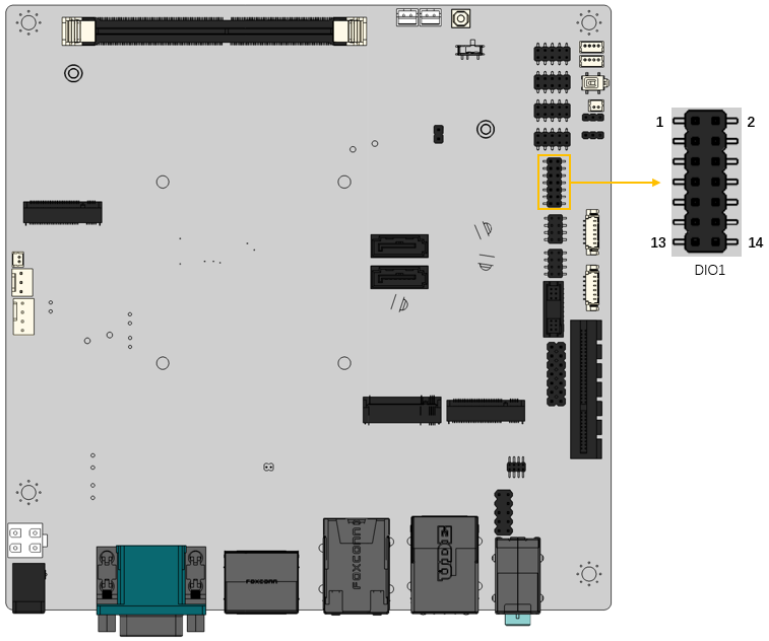


Figure 3-4: Digital I/O Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	VCC
3	DOUT5	4	DOUT4
5	DOUT3	6	DOUT2
7	DOUT1	8	DOUT0
9	DIN5	10	DIN4
11	DIN3	12	DIN2
13	DIN1	14	DIN0

Table 3-5: Digital I/O Connector Pinouts

3.2.4 Fan Connector (CPU)

CN Label:	**CPU_FAN1**
CN Type:	4-pin wafer, p=2.54 mm
CN Location:	See **Figure 3-5**
CN Pinouts:	See **Table 3-6**

The fan connector attaches to a CPU cooling fan.

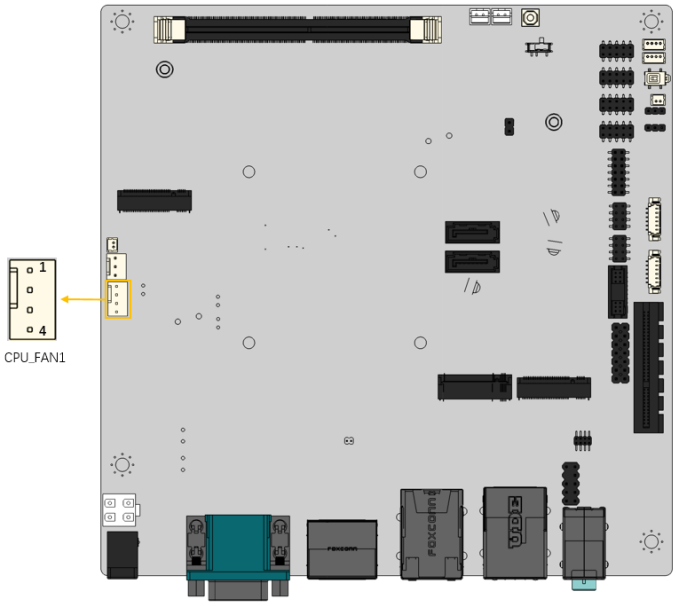


Figure 3-5: CPU Fan Connector Location

PIN NO.	DESCRIPTION
1	GND
2	+12 V
3	FAN_IO
4	PWM

Table 3-6: CPU Fan Connector Pinouts

3.2.5 Fan Connector (System)

CN Label:	**SYS_FAN2**
CN Type:	3-pin wafer, p=2.54 mm
CN Location:	See **Figure 3-6**
CN Pinouts:	See **Table 3-7**

Each fan connector attaches to a system cooling fan.

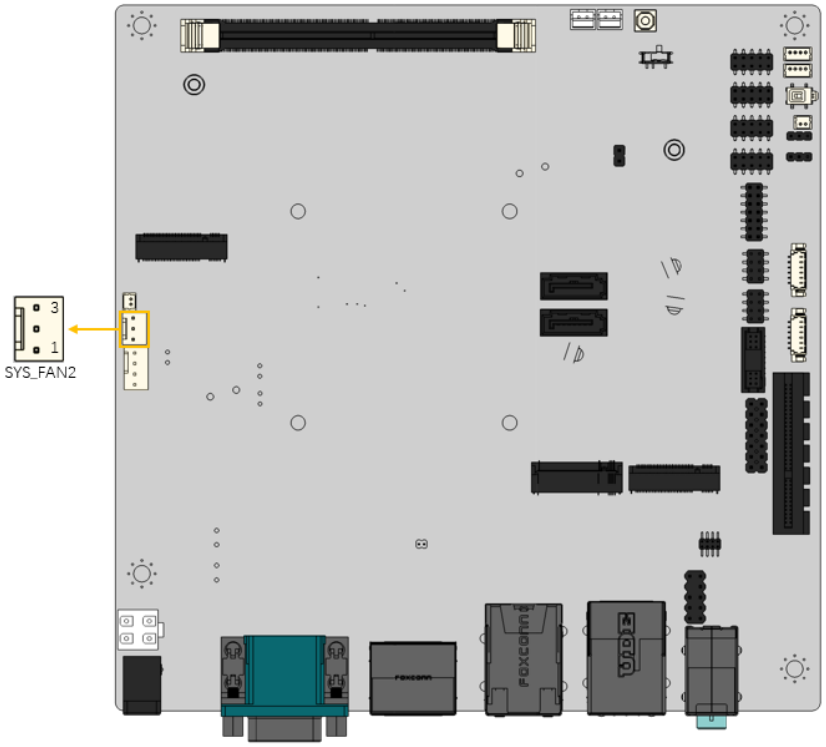


Figure 3-6: System Fan Connector Location

PIN NO.	DESCRIPTION
1	FANIO
2	PWM
3	GND

Table 3-7: System Fan Connector Pinouts

3.2.6 Front Panel Connector

CN Label:	**F_PANEL1**
CN Type:	14-pin header, p=2.54 mm
CN Location:	See **Figure 3-7**
CN Pinouts:	See **Table 3-8**

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

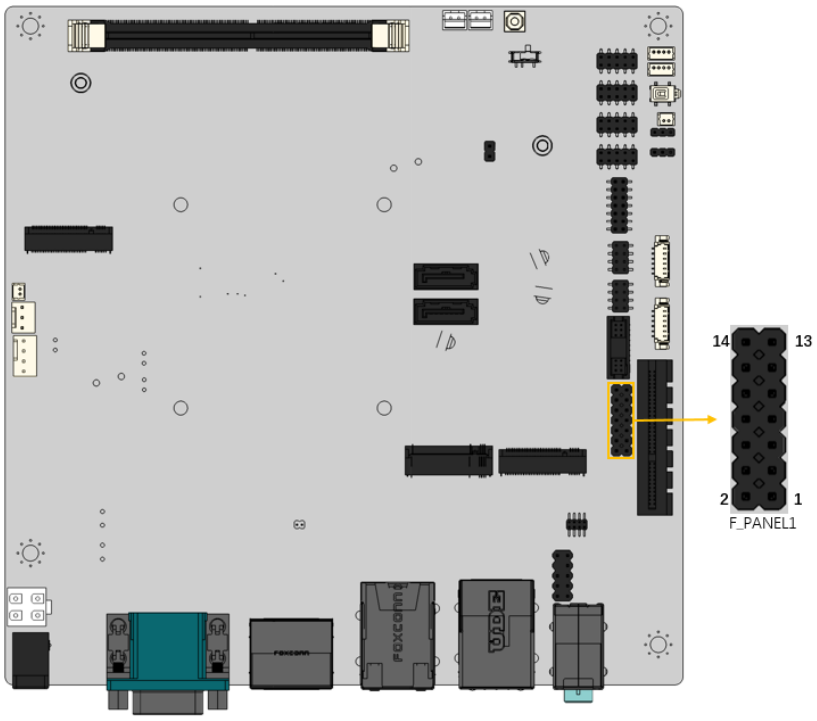


Figure 3-7: Front Panel Connector Location

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power LED	1	PWR_LED+	Speaker	2	SPKR+
	3	NC	IPMI LED	4	NC
	5	PWR_LED-		6	NC

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power Button	7	PWR_BTN+	Speaker	8	SPKR-
	9	PWR_BTN-		10	NC
HDD LED	11	HDD_LED+	Reset Button	12	Reset+
	13	HDD_LED-		14	Reset-

Table 3-8: Front Panel Connector Pinouts

3.2.7 DDR4 SO-DIMM Scoket

CN Label: **DIMM1**

CN Type: DDR4 slot

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

The DIMM slots is for DDR4 DIMM memory modules.

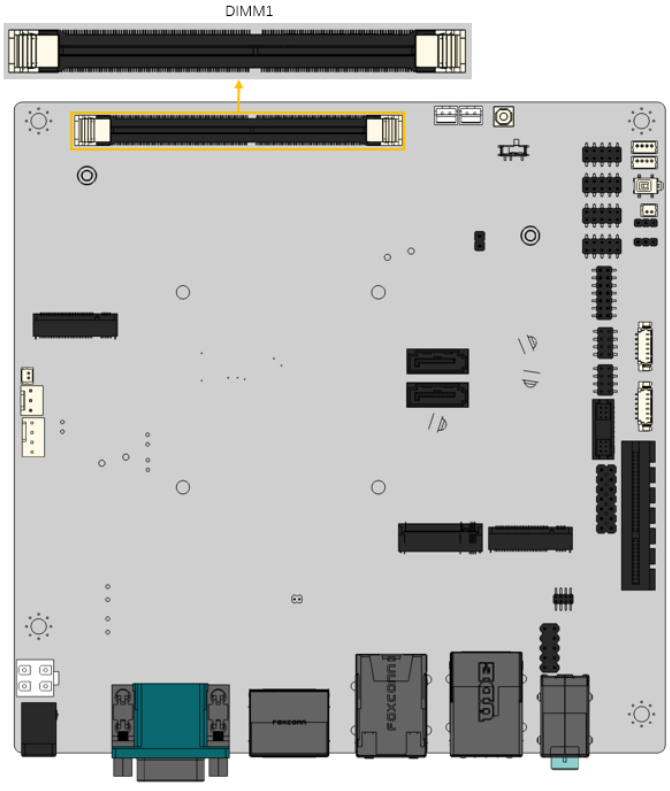


Figure 3-8 DDR4 DIMM Scoket Location

3.2.8 PCIe x4 Slot

CN Label:	**PCIEX4_1**
CN Type:	PCIe x4 slot
CN Location:	See **Figure 3-9**

The PCIe x4 interface provides x1 signal for PCIe expansion cards.

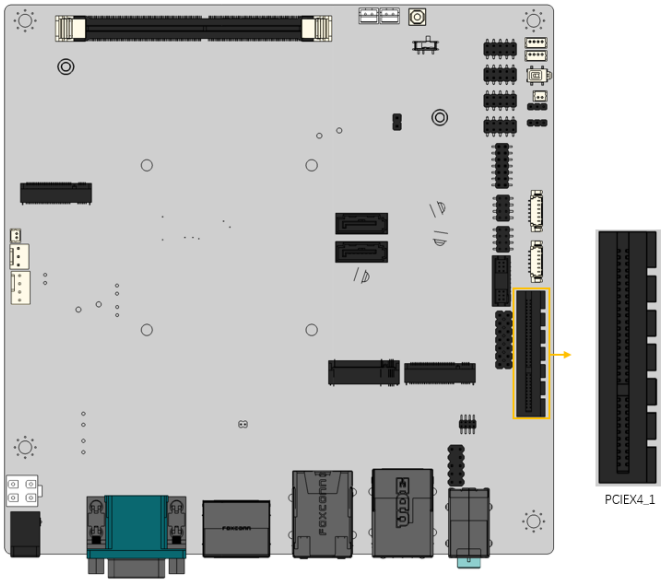


Figure 3-9: PCIe x4 Slot Location

3.2.9 M.2 Slot, A-key

CN Label:	**M2_A_KEY**
CN Type:	M.2 A-key slot
CN Location:	See **Figure 3-10**
CN Pinouts:	See **Table 3-9**

The M.2 slot is keyed in the A position and accepts 2230 size of M.2 modules. The M.2 slot supports PCIe x1 and USB 2.0 signals.

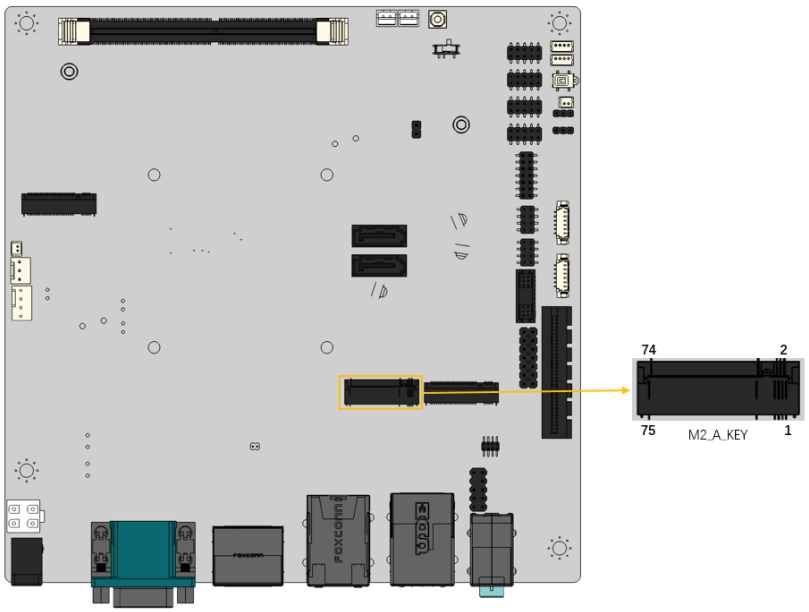


Figure 3-10: M.2 A-key Slot Location

Pin	Description	Pin	Description
1	GND	2	+V3.3A
3	USB+	4	+V3.3A
5	USB-	6	NC
7	GND	8	Module Key
9	Module Key	10	Module Key
11	Module Key	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	NC
17	NC	18	GND
19	NC	20	NC
21	NC	22	NC
23	NC	24	GND
25	NC	26	NC
27	NC	28	NC
29	NC	30	GND
31	NC	32	NC
33	GND	34	NC

Pin	Description	Pin	Description
35	PCIE_TX4+	36	GND
37	PCIE_TX4-	38	NC
39	GND	40	NC
41	PCIE_RX4+	42	NC
43	PCIE_RX4-	44	NC
45	GND	46	NC
47	CLK_M2_A+	48	NC
49	CLK_M2_A-	50	BTWIFI_SUS_CLK
51	GND	52	WLAN_PERST#
53	NC	54	+V3.3A_WLAN
55	+V3.3A_WLAN	56	+V3.3A_WLAN
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	GND	64	NC
65	NC	66	NC
67	NC	68	NC
69	GND	70	PEWAKE#
71	NC	72	+V3.3A
73	NC	74	+V3.3A
75	GND		

Table 3-9: M.2 A-key Slot Pinouts

3.2.10 M.2 Slot, B-key

CN Label: **M2_B_KEY**

CN Type: M.2 B-key slot

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

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

The M.2 slot is keyed in the B position and accepts 3052/2242 size of M.2 modules. The M.2 slot supports PCIe x2 and USB 2.0 signals.

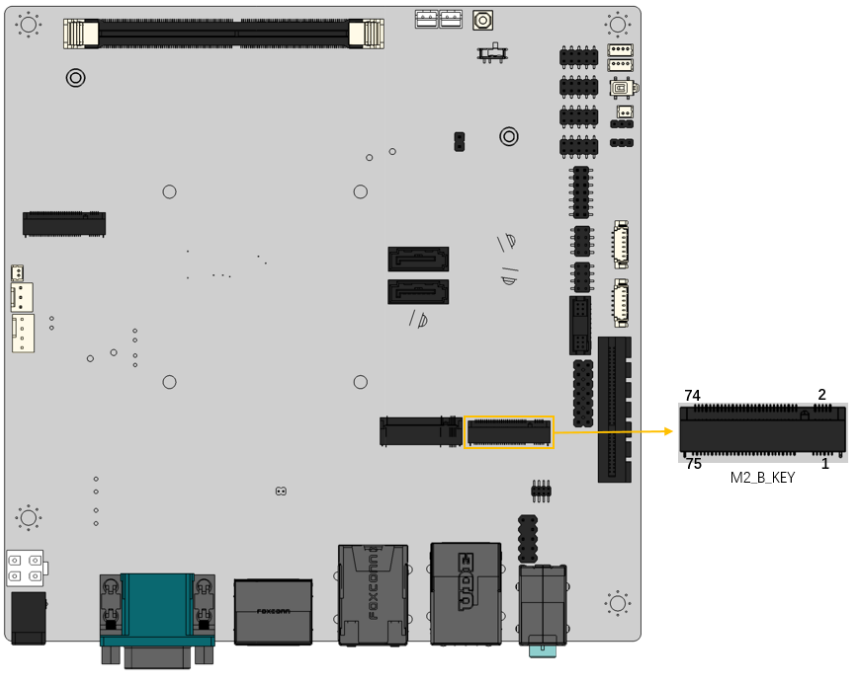


Figure 3-11: M.2 B-key Slot Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	WWAN_CONFIG3	2	+3.3V_WWAN
3	GND	4	+3.3V_WWAN
5	GND	6	WWAN_FCP_OFF
7	USB_D+	8	WWAN_DISABLE
9	USB_D-	10	NC
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	PSE_I2S1_SCLK
21	WWAN_CONFIG0	22	PSE_I2S1_TXD
23	PCIE_WAKE#	24	PSE_I2S1_RXD
25	SAR_DPR_WWAN	26	GNSS_DISABLE_N
27	GND	28	NC

29	PCIE_RXN7	30	WWAN_UIM_RST
31	PCIE_RXP7	32	WWAN_UIM_CLK
33	GND	34	WWAN_UIM_DAT A
35	PCIE_TXN7	36	UIM_PWR
37	PCIE_TXP7	38	SSD_DEVSLP
39	GND	40	NC
41	PCIE_RXN6	42	NC
43	PCIE_RXP6	44	NC
45	GND	46	NC
47	PCIE_TXN6	48	NC
49	PCIE_TXP6	50	WWAN_PERST#
51	GND	52	N/C
53	CLK_M2_B_N	54	WWAN_WAKE#
55	CLK_M2_B_P	56	NC
57	GND	58	NC
59	NC	60	NC
61	NC	62	NC
63	NC	64	NC
65	NC	66	WWAN_SIM1_DET
67	WWAN_RST	68	WWAN_SUSCLK
69	DET_OS-PCIE/ GND-SATA	70	+3.3V
71	GND	72	+3.3V
73	GND	74	+3.3V
75	WWAN_CONFIG2		

Table 3-10: M.2 B-key Slot Pinouts

3.2.11 IDPM Slot

CN Label:	**IDPM1**
CN Type:	M.2 B-key slot
CN Location:	See **Figure 3-12**
CN Pinouts:	See **Table 3-11**

The iDPM slot only use for IEI eDP/LVDS/VGA module

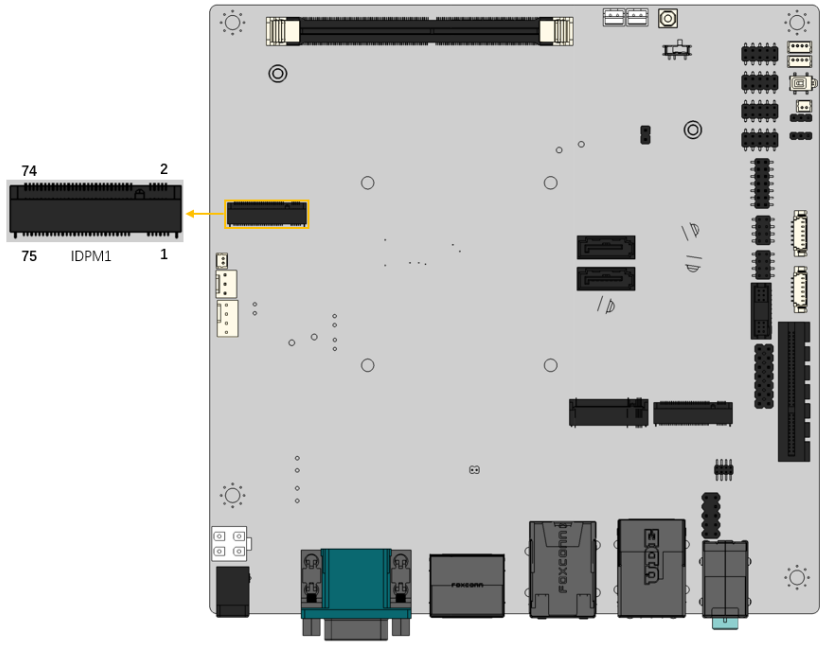


Figure 3-12: IDPM Slot Location

IDPM: IEI IDPM Slot (for IEI eDP/LVDS/VGA Module)			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	GND	2	+3.3V
3	GND	4	+3.3V
5	GND	6	+3.3V
7	GND	8	+3.3V
9	GND	10	+3.3V
11	+5V	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	+3.3VS
21	DISPLAY_DETECT_PIN21	22	+3.3VS
23	DISPLAY_DETECT_PIN23	24	+3.3VS
25	GND	26	+3.3VS
27	GND	28	GND
29	EDP_TX3_DN	30	+12VS
31	EDP_TX3_DP	32	+12VS
33	GND	34	+12VS
35	EDP_TX2_DN	36	+12VS
37	EDP_TX2_DP	38	GND
39	GND	40	SMB_CLK
41	EDP_TX1_DN	42	SMB_DATA
43	EDP_TX1_DP	44	GND
45	GND	46	EC_BKLT_CTRL
47	EDP_TX0_DN	48	EDP1_BKLT_CTRL
49	EDP_TX0_DP	50	EDP1_BKLT_EN
51	GND	52	EDP1_VDD_EN #
53	EDP_AUX_DN	54	EDP_HPD_R
55	EDP_AUX_DP	56	BUF_PLT_RST#
57	GND	58	LVDS_EN
59	GND	60	+V5S
61	GND	62	+V5S
63	GND	64	+V5S
65	GND	66	+V5S
67	GND	68	+12VA
69	GND	70	+12VA
71	GND	72	+12VA
73	GND	74	+12VA
75	GND		

Table 3-11: IDPM Connector Pinouts

3.2.12 Power Button

CN Label:	**PWR_SW1**
CN Type:	Push button
CN Location:	See **Figure 3-13**

The on-board power button controls system power.

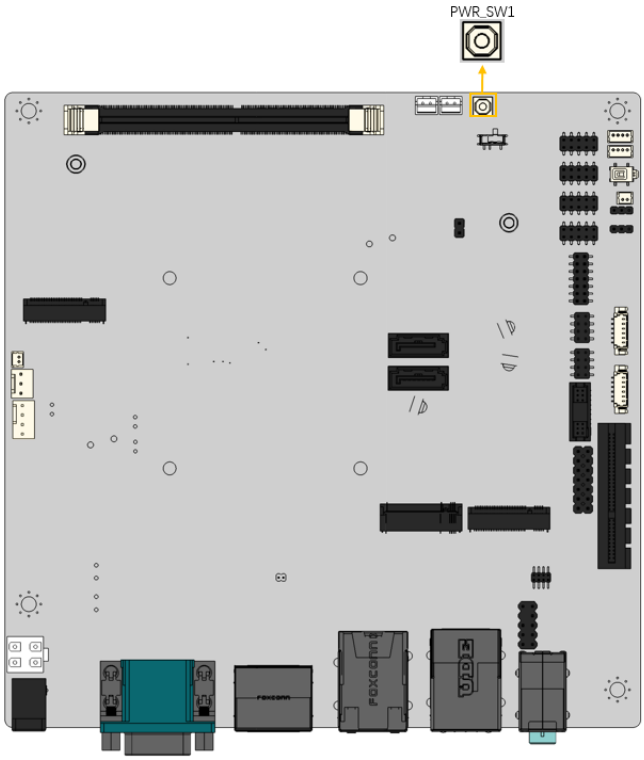


Figure 3-13: Power Button Location

3.2.13 Power Connector

CN Label: **CN3**

CN Type: 4-pin connector, p=4.2 mm

CN Location: See **Figure 3-14**

CN Pinouts: See **Table 3-12**

The power input connector provides power to the system.

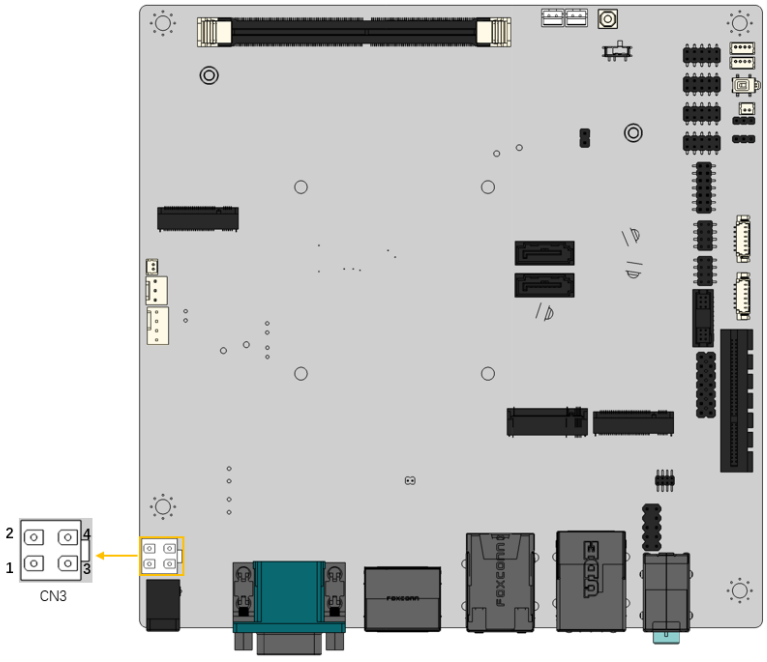


Figure 3-14: Power Connector Location

Pin	Description	Pin	Description
1	GND	3	12 V~28 V
2	GND	4	12 V~28 V

Table 3-12: Power Connector Pinouts

3.2.14 SATA 6Gb/s Drive Connector

CN Label:	**S_ATA1,S_ATA2**
CN Type:	7-pin SATA drive connectors
CN Location:	See **Figure 3-15**
CN Pinouts:	See **Table 3-13**

The SATA drive connector can be connected to SATA drives.

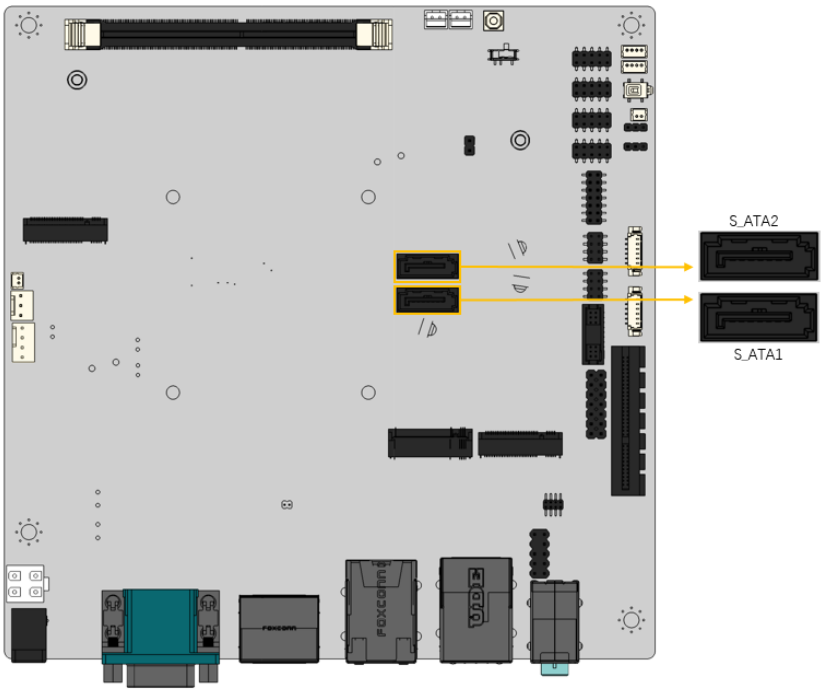


Figure 3-15: SATA 6Gb/s Drive Connector Location

Pin	Description
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND

Pin	Description

Table 3-13: SATA 3Gb/s Drive Connector Pinouts

3.2.15 SATA Power Connector

CN Label: **SATA_PWR1,SATA_PWR2**

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

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

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

Use the SATA Power Connector to connect to SATA device power connections.

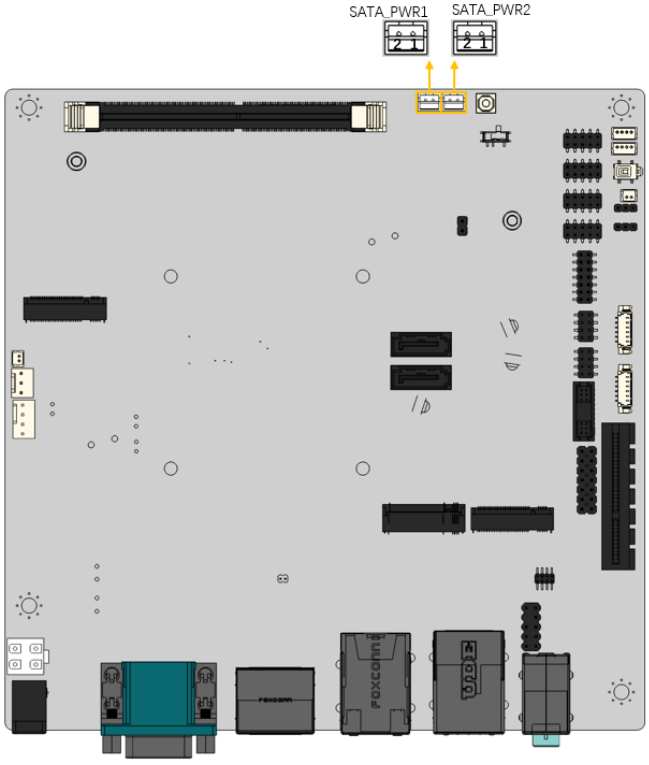


Figure 3-16: SATA Power Connector Location

Pin	Description
1	+5 V
2	GND

Pin	Description

Table 3-14: SATA Power Connector Pinouts

3.2.16 Serial Port Connector, RS-232

CN Label: **COM3, COM4**

CN Type: 10-pin header p=2.00 mm

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

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

Used for RS-23 communications.

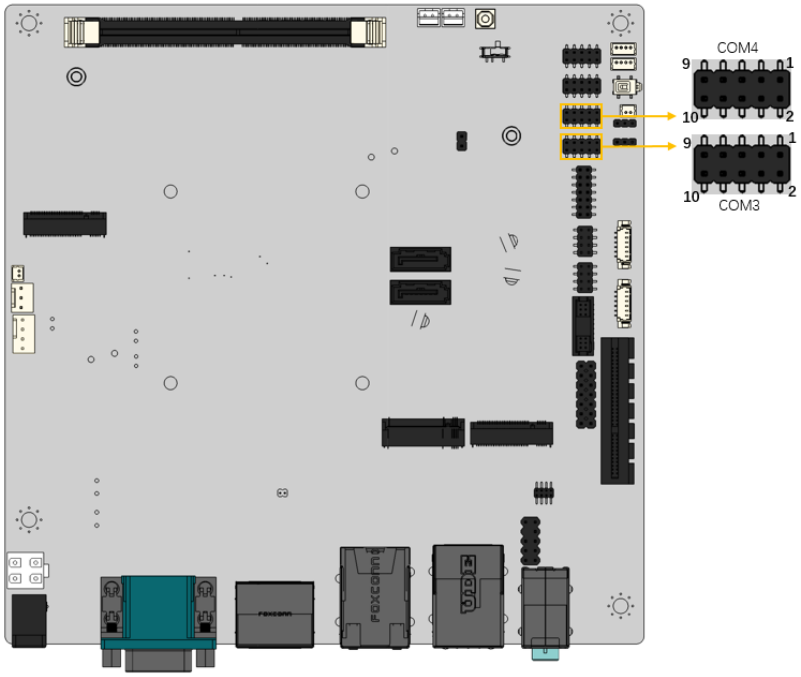


Figure 3-17: RS-232 Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
9	GND	10	GND

Table 3-15:RS-232 Connector Pin

3.2.17 Serial port, RS-232/422/485

CN Label: **COM5, COM6**

CN Type: 10-pin header p=2.00 mm

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

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

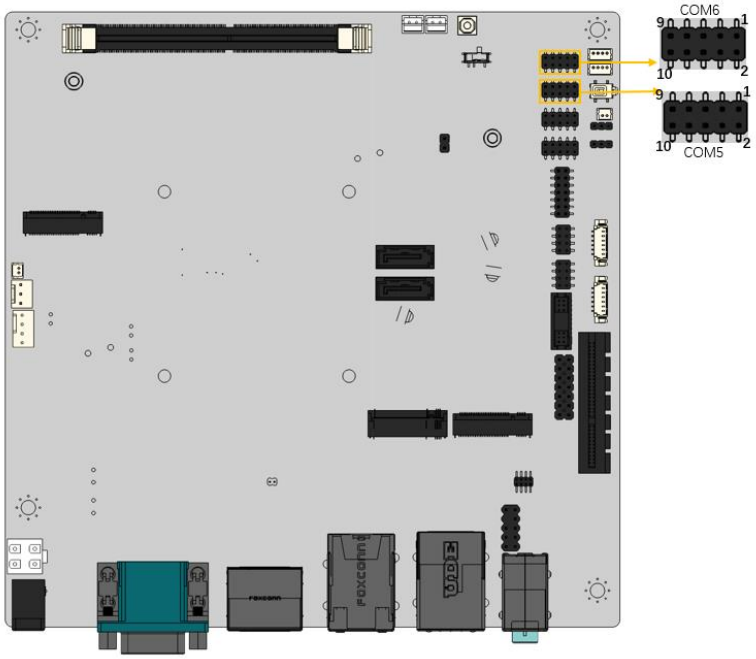


Figure 3-18 RS-232/422/485 Connector Location

Used for RS-232/422/485 communications.

	RS-232	RS-422	RS-485
1	DCD	TXD422-	TXD485-
2	RXD	TXD422+	TXD485+

	RS-232	RS-422	RS-485
3	TXD	RXD422+	--
4	DTR	RXD422-	--
5	GND	--	--
6	DSR	--	--
7	RTS	--	--
8	CTS	--	--
9	RI	--	--

Table 3-16 RS-232/422/485 Connector Pinouts

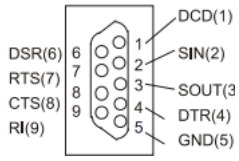
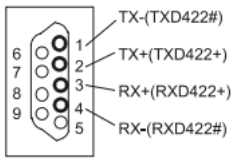
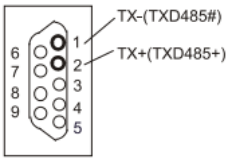
RS-232 Pinouts	RS-422 Pinouts	RS-485 Pinouts
		

Table 3-17 RS-232/422/485 Pinouts of D-sub 9 Connector

3.2.18 SMBus Connector

CN Label: **SMB1**

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

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

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

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

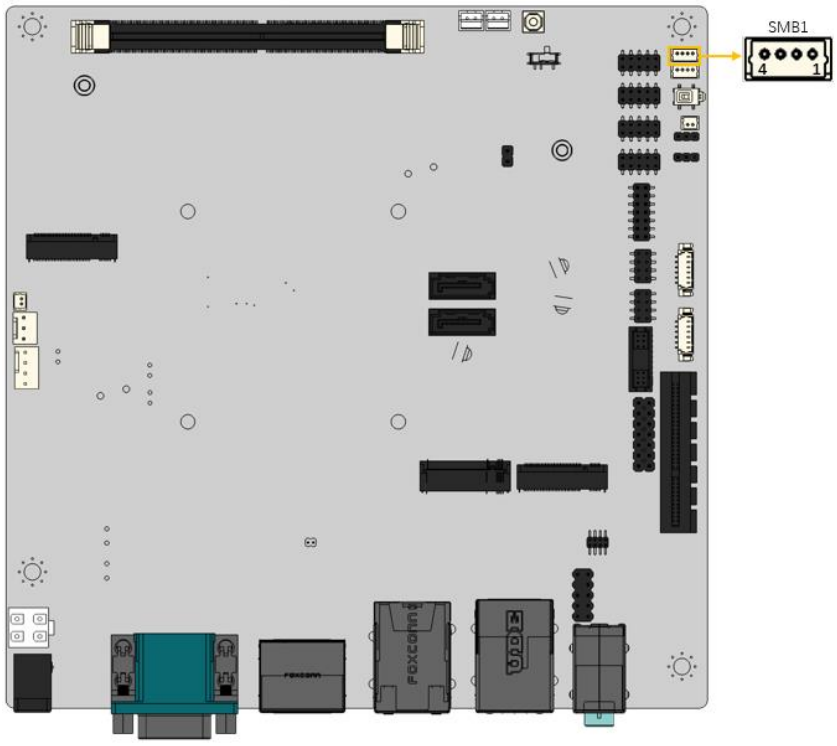


Figure 3-19: SMBus Connector Location

PIN	DESCRIPTION
1	GND
2	SMB_DATA
3	SMB_CLK
4	+5 V

Table 3-18: SMBus Connector Pinouts

3.2.19 I2C Connector

CN Label: **I2C1**

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

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

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

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

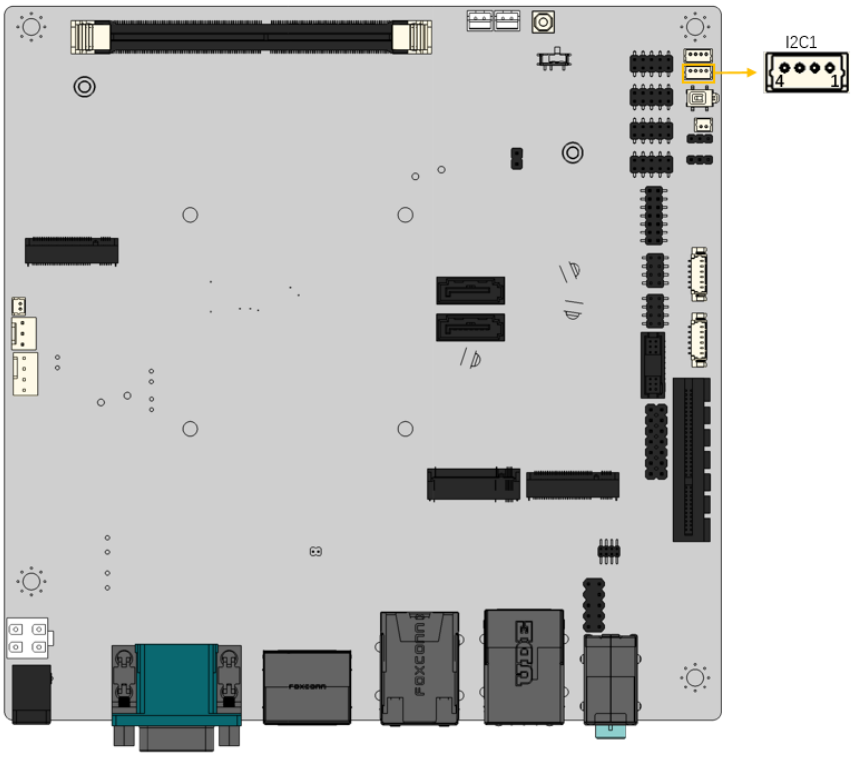


Figure 3-20: I2C Connector Location

Pin	Description
1	GND
2	I2C_DATA
3	I2C_CLK
4	**+5V**

Table 3-19: I2C Connector Pinouts

3.2.20 Flash Descriptor Override Setting Jumper

CN Label: **J_FLASH1**

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

CN Location: See Figure 3-21

CN Pinouts: See Table 3-20

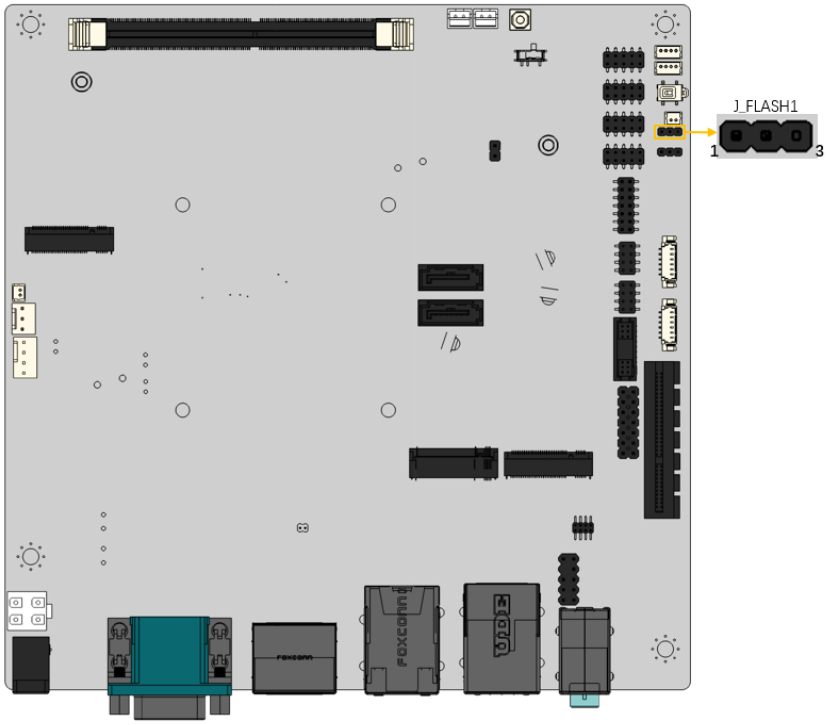


Figure 3-21 Flash Setting Jumper Connector Locatio

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

Table 3-20 Flash Setting Jumper Connector Pinouts

3.2.21 Flash EC ROM Connector

CN Label: **JEC2**

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

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

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

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

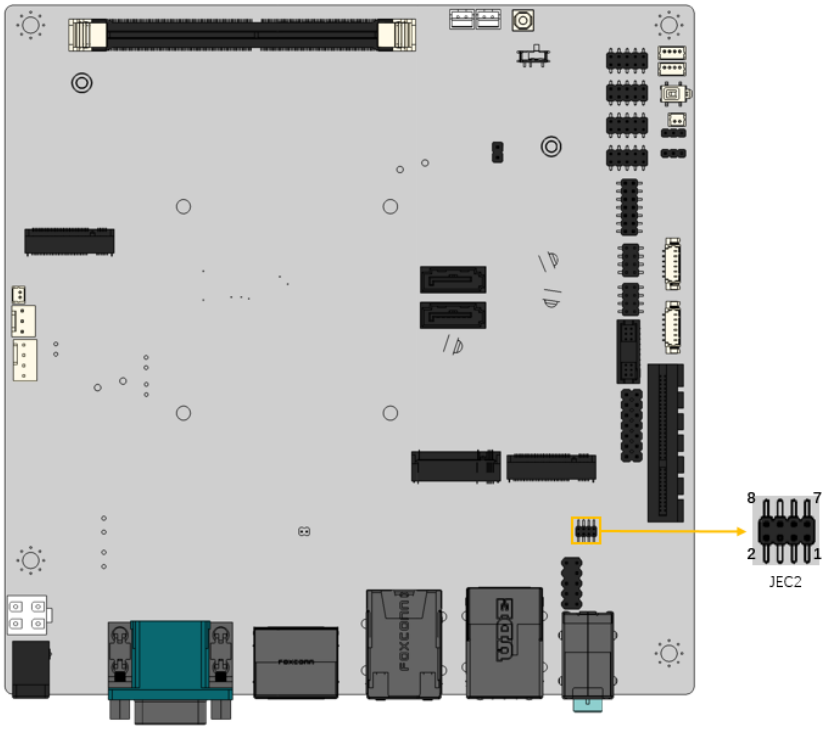


Figure 3-22: Flash EC ROM Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	SPI_CS#	2	+3.3V
3	SPI_SO	4	NC
5	EC_DET_FLASH	6	SPI_CLK
7	GND	8	SPI_SI

Table 3-21: Flash EC ROM Connector Pinouts

3.2.22 DNX mode setting jumper

CN Label: **J_DNX1**

CN Type: 2-pin header, p=1.27 mm

CN Location: See Figure 3-23

CN Pinouts: See Table 3-22

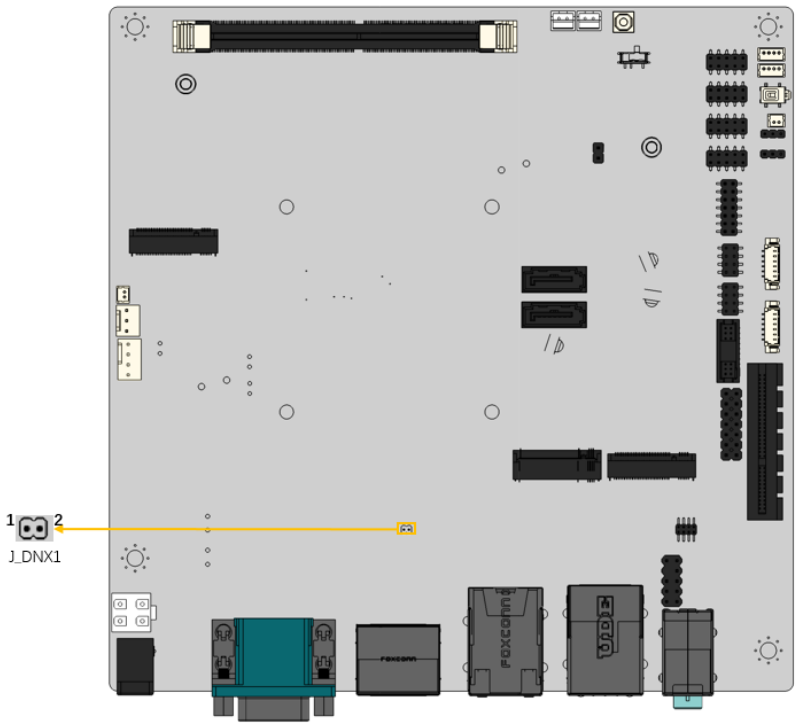


Figure 3-23 DNX mode setting jumper Connector Location

PIN NO.	DESCRIPTION
Open	Normal(default)
Short	Enable DNX Boot

Table 3-22 DNX Mode Setting Jumper Connector Ponout

3.2.23 EC Debug Connector

CN Label: **JEC1**

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

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

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

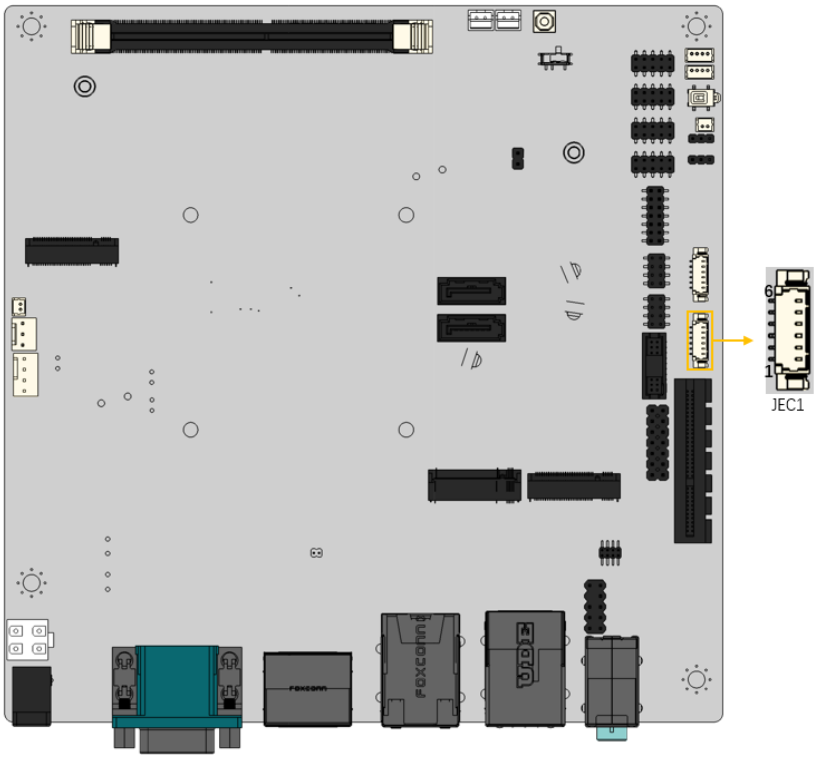


Figure 3-24: EC Debug Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	NC	4	EDICLK
2	EDICS	5	EDIDI
3	EDIDO	6	GND

Table 3-23: EC Debug Connector Pinouts

3.2.24 USB 2.0 Connectors

CN Label: **JUSB3, JUSB4**

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

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

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

The USB 2.0 connector connects to USB 2.0 devices. Each pin header provides two USB 2.0 ports.

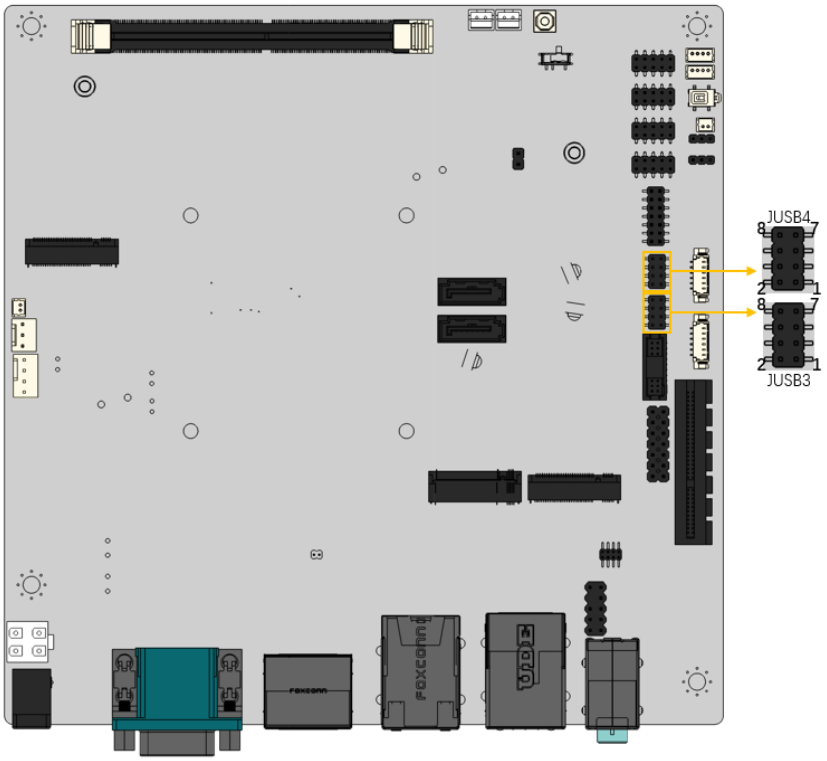


Figure 3-25: USB 2.0 Connector Locations

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	VCC	2	GND
3	USB_DATA-	4	USB_DATA+
5	USB_DATA+	6	USB_DATA-
7	GND	8	VCC

Table 3-24: USB 2.0 Connector Pinouts

3.2.25 Clear CMOS Button

CN Label: **J_COMS2**

CN Type: Push button

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

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

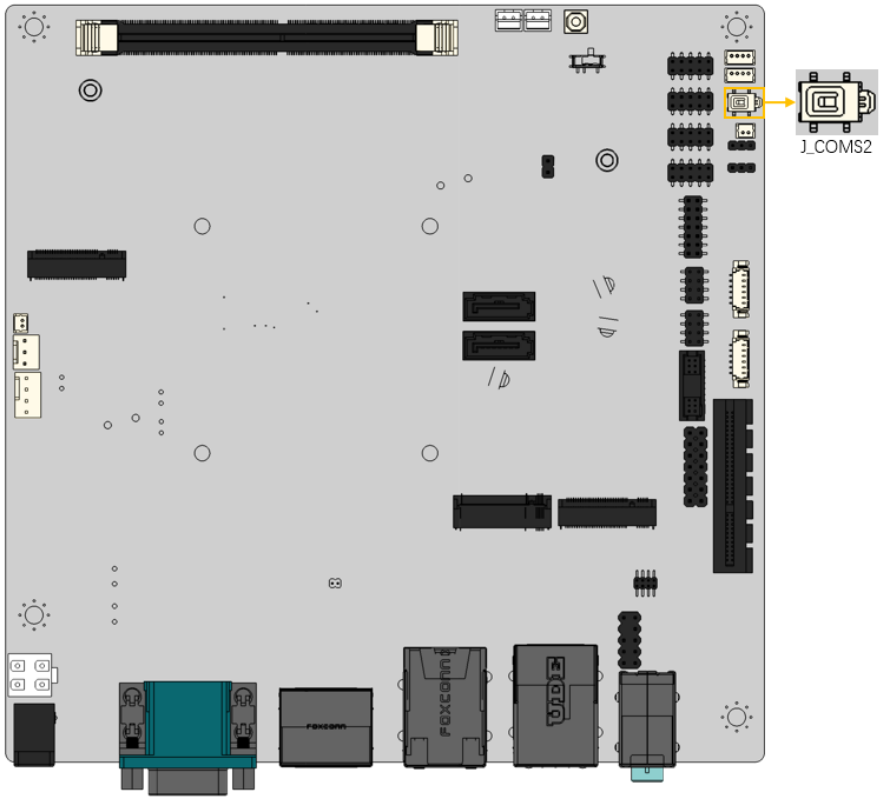


Figure 3-26 Clear CMOS Button Location

PIN NO.	DESCRIPTION
NC(default)	Keep CMOS Setup (Mormal Operation)
Press button	Clear CMOS Setup

Table 3-25 Clear CMOS Button Pinout

3.2.26 AT/ATX power mode setting switch

CN Label: **J_ATX_AT1**

CN Type: Toggle switch

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

CN Pinouts: See **Table 3-26**

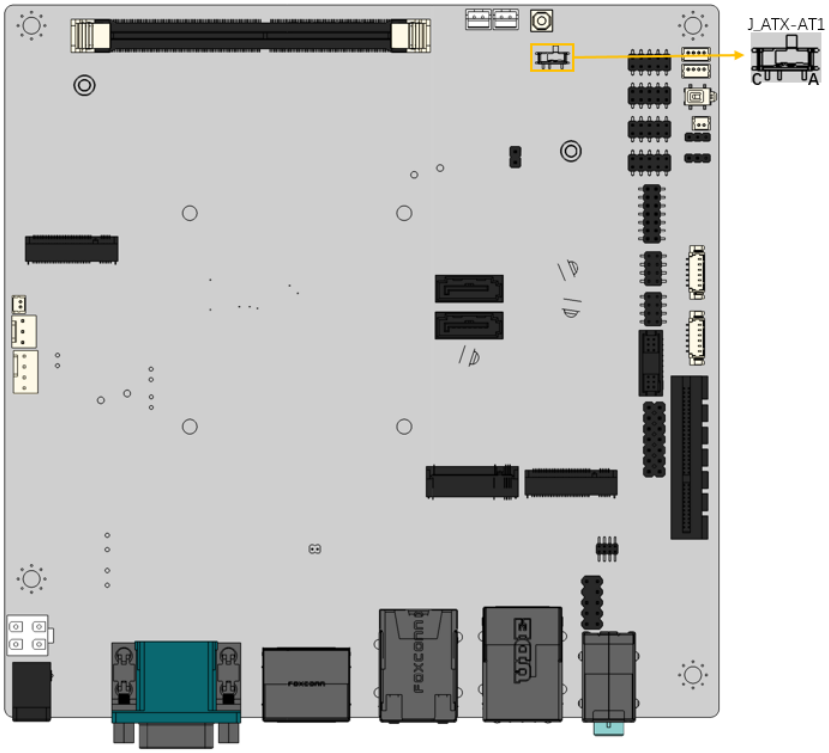


Figure 3-27 AT/ATX power mode setting Location

PIN NO.	DESCRIPTION
Short A-B	ATX Power Mode(default)
Short B-C	AT Power Mode

Table 3-26 AT/AYX Power Mode Setting Switch Pinout

3.2.27 Chassis intrusion connector

CN Label: **CHASSIS1**

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

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

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

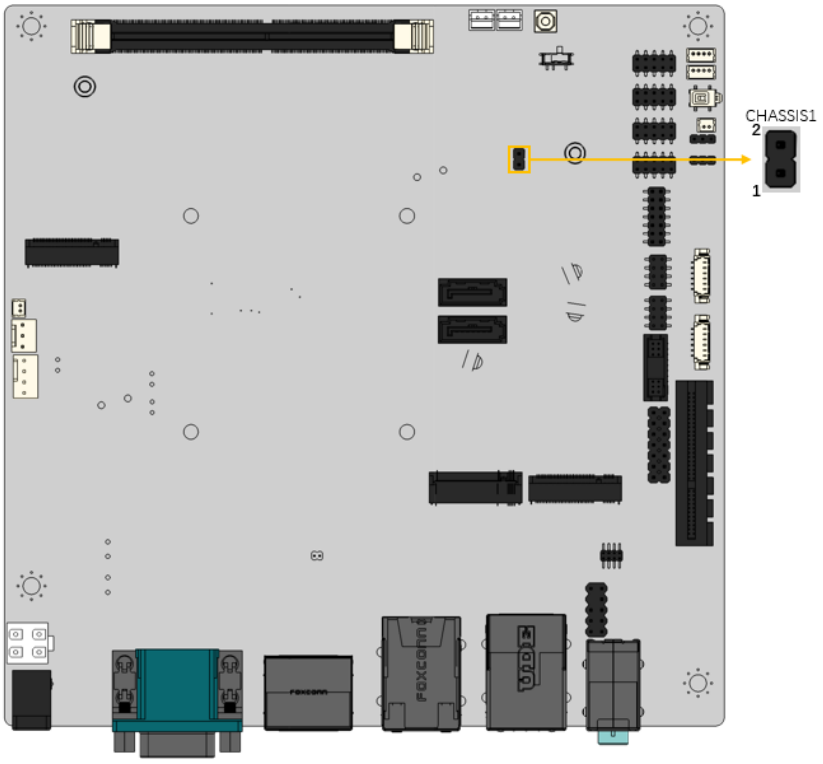


Figure 3-28 Chassis Intrusion Connector Location

PIN NO.	DESCRIPTION
1	-CASEOPEN
2	GND

Table 3-27 Chassis Intrusion Connector Connector Pinout

3.2.28 SIM Card Slot

CN Label: **SIM1**

CN Type: 7-pin SIM holder

CN Location: See **Figure 3-29**

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

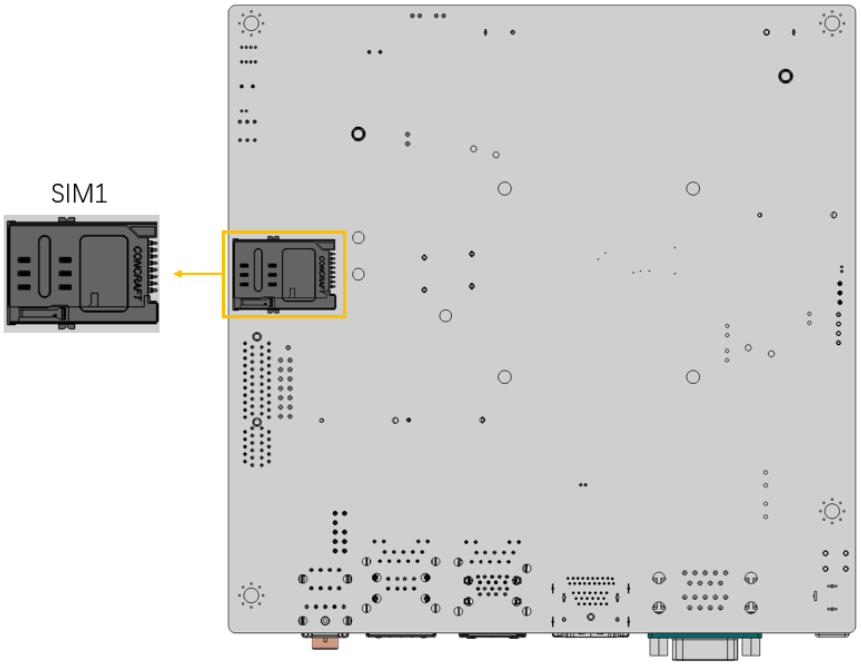


Figure 3-29 SIM Card Slot Location

PIN NO.	DESCRIPTION
C1	SIM_VCC
C2	SIM_RST
C3	SIM_Clock
C5	GND
C6	NC
C7	SIM_DATA

Table 3-28 SIM Card Slot 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:

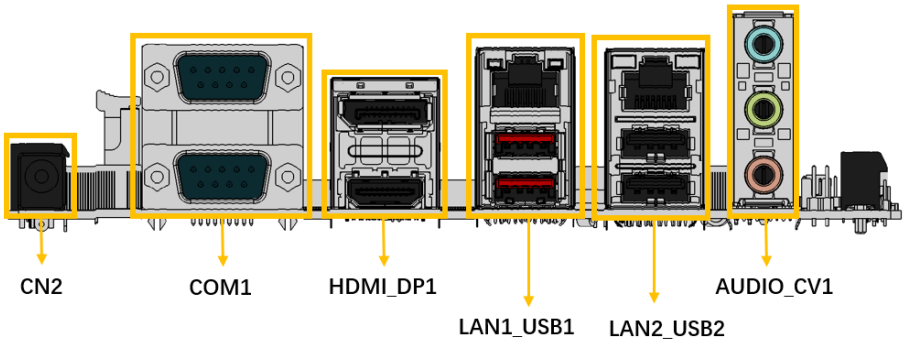


Figure 3-30: External Peripheral Interface Connector

3.3.1 Ethernet and USB 2.0 Combo Connector

CN Label: **J_LAN2_USB2**

CN Type: RJ-45 and USB Type-A connector

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

CN Pinouts: See **Table 3-29** and **Table 3-31**

A 10/100/1000 Mb/s connection can be made to a Local Area Network.

Pin	Description	Pin	Description
1	LAN2_MDI0P	5	LAN2_MDI2P
2	LAN2_MDI0N	6	LAN2_MDI2N
3	LAN2_MDI1P	7	LAN2_MDI3P
4	LAN2_MDI1N	8	LAN2_MDI3N

Table 3-29: LAN2 Ethernet Connector Pinouts

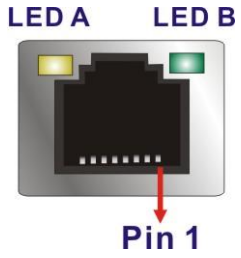


Figure 3-31: Ethernet Connector

LED	Description	LED	Description
A	on: linked blinking: data is being sent/received	B	off: 100 Mb/s green: 1000 Mb/s orange: 2500 Mb/s

Table 3-30: Connector LEDs

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

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

Table 3-31: USB 2.0 Port Pinouts

3.3.2 Ethernet and USB 3.2 Gen 2 Combo Connector

CN Label: **J_LAN1_USB1**

CN Type: RJ-45 and USB Type-A connector

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

CN Pinouts: See **Table 3-32** and **Table 3-34**

A 10/100/1000 Mb/s connection can be made to a Local Area Network.

Pin	Description	Pin	Description
1	LAN1_MDI0P	5	LAN1_MDI2P

Pin	Description	Pin	Description
2	LAN1_MDI0N	6	LAN1_MDI2N
3	LAN1_MDI1P	7	LAN1_MDI3P
4	LAN1_MDI1N	8	LAN1_MDI3N

Table 3-32: LAN1 Ethernet Connector Pinouts

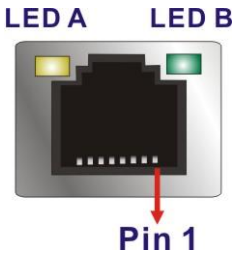


Figure 3-32: Ethernet Connector

LED	Description	LED	Description
A	on: linked blinking: data is being sent/received	B	off: 100 Mb/s green: 1000 Mb/s orange: 2500 Mb/s

Table 3-33: Connector LEDs

The USB 3.2 Gen 2 (10Gb/s) connector can be connected to a USB device.

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 3-34: USB 3.2 Gen 2 Port Pinouts

3.3.3 Serial Port Connectors (COM1 and COM2)

CN Label: **COM1**

CN Type: D-sub 9

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

CN Pinouts: See **Table 3-35** and **Figure 3-33**

The serial port connects to a RS-232 serial communications device.

Pin	Description	Pin	Description
1	DCD1	10	DCD2
2	RXD1	11	RXD2
3	TXD1	12	TXD2
4	DTR1	13	DTR2
5	GND1	14	GND2
6	DSR1	15	DSR2
7	RTS1	16	RTS2
8	CTS1	17	CTS2
9	RI1	18	RI2

Table 3-35: Serial Port Pinouts

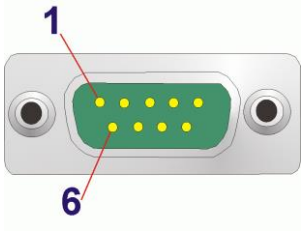


Figure 3-33: Serial Port Pinouts

3.3.4 Power Connector

CN Label: **CN2**

CN Type: 4-pin DIN

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

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

The connector supports the 28V power adapter.

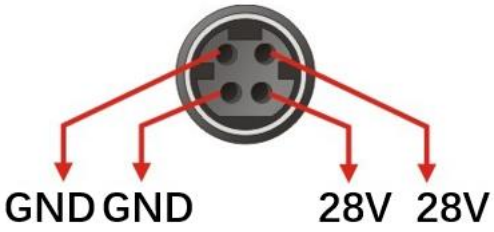


Figure 3-34: Power Connector (4-pin DIN)

3.3.5 HDMI and DP Connector

CN Label: **HDMI_DP1**

CN Type: HDMI and DP connector

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

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

The HDMI connector can connect to HDMI devices, The DP connector can connect to display devices with DisplayPort interface.

External DP Connector			
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	DATA_0P	11	GND
2	GND	12	DATA_3N
3	DATA_0N	13	CONFIG1
4	DATA_1P	14	CONFIG2
5	GND	15	AUX_P
6	DATA_1N	16	GND
7	DATA_2P	17	AUX_N
8	GND	18	DP HPD
9	DATA_2N	19	GND
10	DATA_3P	20	DP PWR
External HDMI Connector			

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	HDMI2_DATA2	2	GND
3	HDMI2_DATA2#	4	HDMI2_DATA1
5	GND	6	HDMI2_DATA1#
7	HDMI2_DATA0	8	GND
9	HDMI2_DATA0#	10	HDMI2_CLK
11	GND	12	HDMI2_CLK#
13	N/C	14	N/C
15	HDMI2_SCL	16	HDM2I_SDA
17	GND	18	+5V
19	HDMI2_HPD		

Table 3-36: HDMI and DP Connector Pinouts

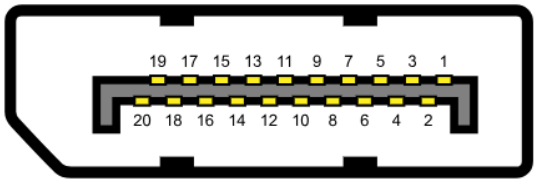


Figure 3-35: DP Connector Pinout Locations

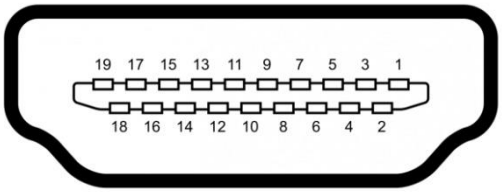


Figure 3-36: HDMI Connector Pinout Locations

3.3.6 External audio jack

CN Label:	**AUDIO_CV1**
CN Type:	Audio jack
CN Location:	See **Figure 3-30**

The audio jacks connect to external audio devices.

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

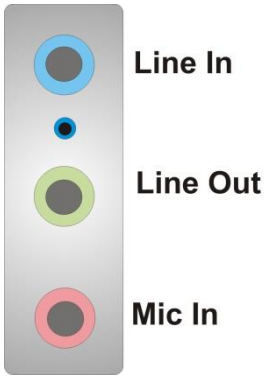


Figure 3-37 Audio Connect

Chapter

4

Installation

4.1 Anti-static Precautions

WARNING:

Failure to take ESD precautions during the installation of the KINO-EHL2-J6412 may result in permanent damage to the KINO-EHL2-J6412 and severe injury to the user.

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the KINO-EHL2-J6412. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the KINO-EHL2-J6412 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 KINO-EHL2-J6412, place it on an anti-static pad. This reduces the possibility of ESD damaging the KINO-EHL2-J6412.
- ***Only handle the edges of the PCB***:-: When handling the PCB, hold the PCB by the edges.

4.2 Installation Considerations

NOTE:

The following installation notices and installation considerations should be read and understood before installation. All installation notices must be strictly adhered to. Failing to adhere to these precautions may lead to severe damage and injury to the person performing the installation.

WARNING:

The installation instructions described in this manual should be carefully followed in order to prevent damage to the components and injury to the user.

Before and during the installation please **DO** the following:

- Read the user manual:
  - The user manual provides a complete description of the KINO-EHL2-J6412 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 KINO-EHL2-J6412 on an antistatic pad:
  - When installing or configuring the motherboard, place it on an antistatic pad. This helps to prevent potential ESD damage.
- Turn all power to the KINO-EHL2-J6412 off:
  - When working with the KINO-EHL2-J6412, 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 KINO-EHL2-J6412 **DO NOT:**

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

4.3 M.2 Module Installation

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

Mode One: Using screw

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

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

Step 3: Line up the notch on the module with the notch on the slot. Slide the M.2 module into the socket at an angle of about 20º (**Figure 4-1)**.

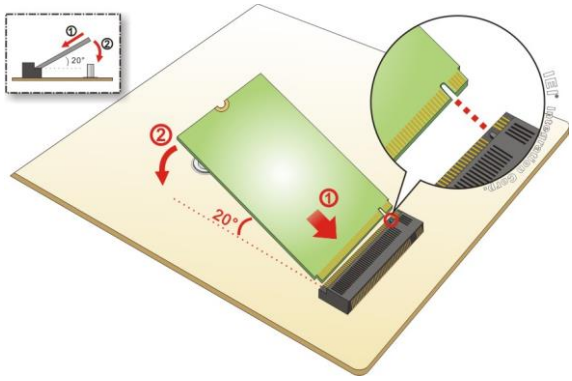


Figure 4-1: Inserting the M.2 Module into the Slot at an Angle

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

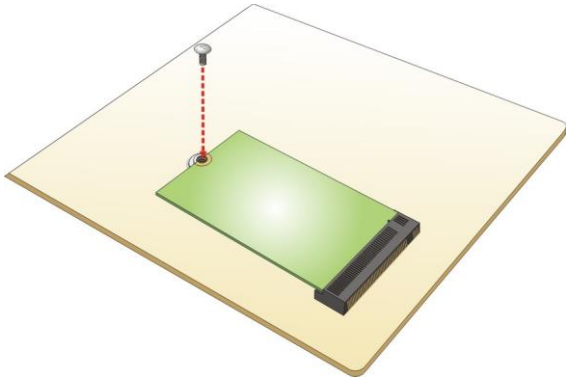


Figure 4-2: Securing the M.2 Module

4.4 System Configuration

The KINO-EHL2-J6412 is a jumperless single board computer. The system configuration is controlled by buttons and switches. The system configuration must be performed before installation.

4.4.1 AT/ATX Power Mode Setting

The AT and ATX power mode selection is made through the AT/ATX power mode switch which is shown in **Figure 4-3**.

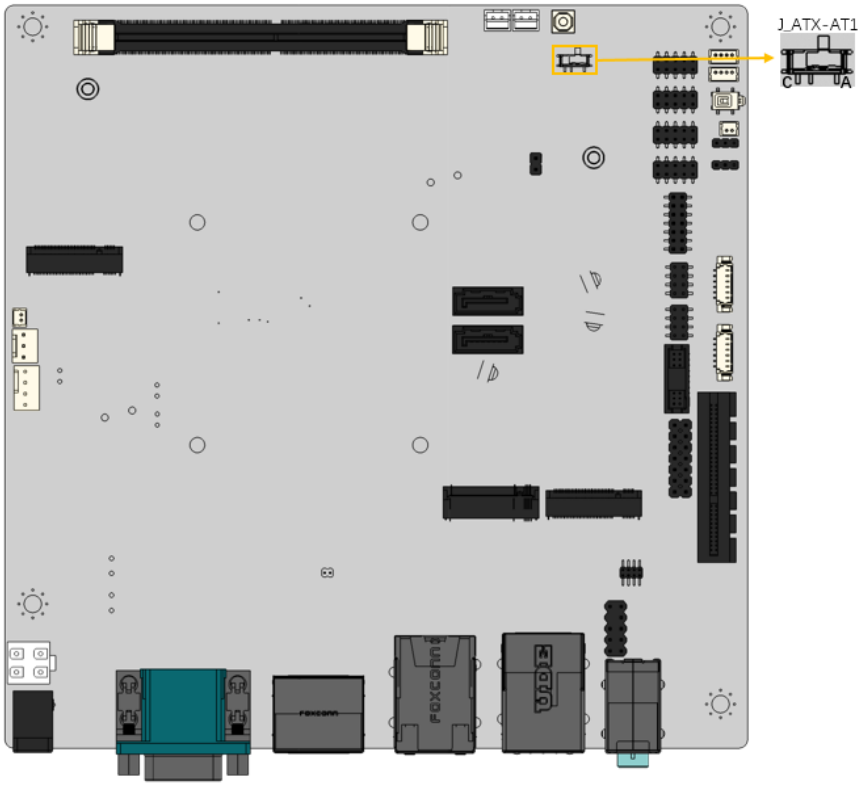


Figure 4-3: AT/ATX Power Mode Locations

4.4.2 DNX Mode Setting Jumper

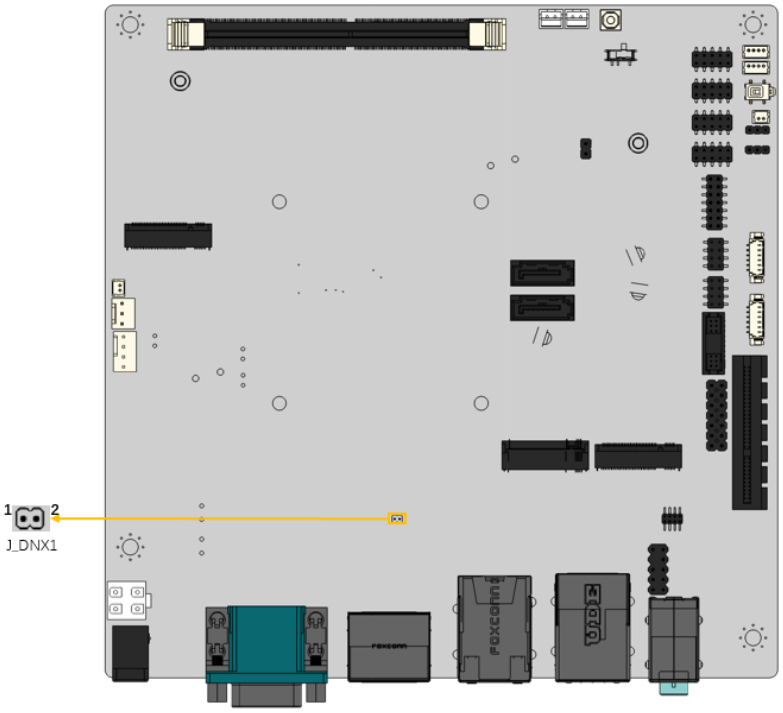


Figure 4-4 DNX Mode Setting Locations

Setting	DESCRIPTION
Open	Normal (default)
Short	Enable DNX Boot

Table 4-1 DNX Mode Jumper Settings

4.4.3 Clear CMOS Button

To reset the BIOS, remove the on-board battery and press the clear CMOS button for three seconds or more. The clear CMOS button location is shown in **Figure 4-5**.

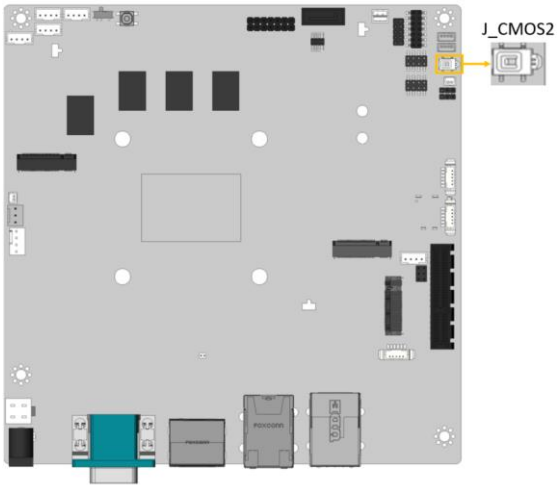


Figure 4-5: Clear CMOS Button Location

4.4.4 Flash Descriptor Security Override

The Flash Descriptor Security Override jumper (J_FLASH1) specifies whether to override the flash descriptor.

Setting	Description
Short 1-2	Disable (default)
Short 2-3	Enable

Table 4-2: Flash Descriptor Security Override Jumper Settings

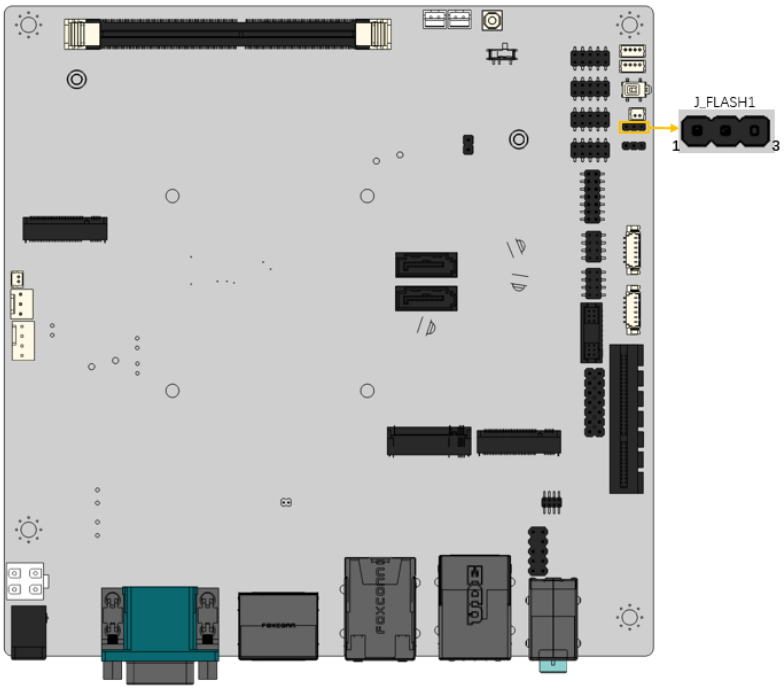


Figure 4-6: Flash Descriptor Security Override Jumper Location

4.5 Internal Peripheral Device Connections

This section outlines the installation of peripheral devices to the on-board connectors.

4.5.1 SATA Drive Connection

The KINO-EHL2-J6412 is shipped with one SATA drive cable. To connect the SATA drive to the connector, please follow the steps below.

Step 1: Locate the SATA connector and the SATA power connector. The locations of the connectors are shown in Chapter 3.

Step 2: **Insert the cable connector**. Insert the cable connector into the on-board SATA drive connector and the SATA power connector. See **Figure 4-7**.

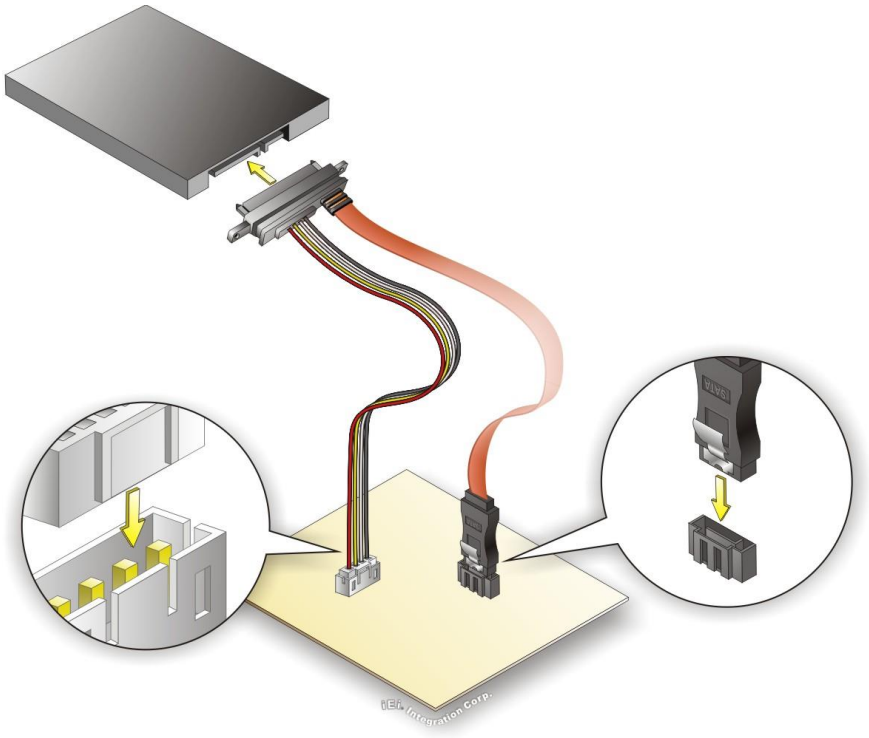


Figure 4-7: SATA Drive Cable Connection

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 4-7**.

Step 4: To remove the SATA cable from the SATA connector, press the clip on the connector at the end of the cable.

4.5.2 USB Cable Connection

To connect the USB cable connector, please follow the steps below.

Step 1: **Locate the connectors**. The locations of the USB connectors are shown in **Chapter 3**.

WARNING:

If the USB pins are not properly aligned, the USB device can burn out.

Step 2: **Align the connectors**. The cable has two connectors. Correctly align pin 1on each cable connector with pin 1 on the KINO-EHL2-J6412 USB connector.

Step 3: **Insert the cable connectors**. Once the cable connectors are properly aligned with the USB connectors on the KINO-EHL2-J6412, connect the cable connectors to the on-board connectors. See Figure 4-8.

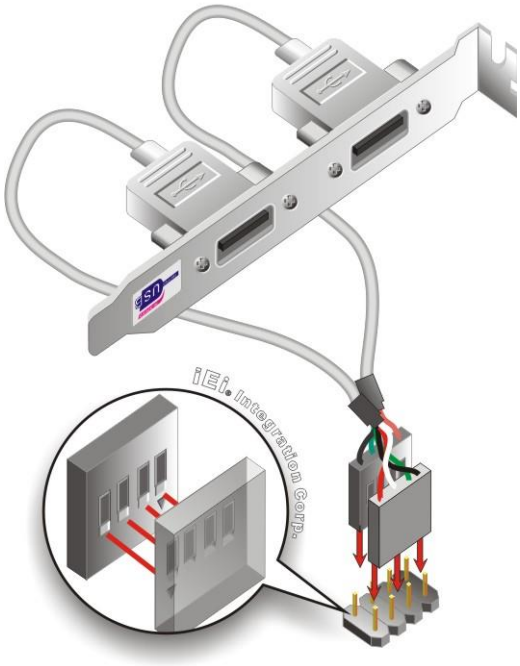


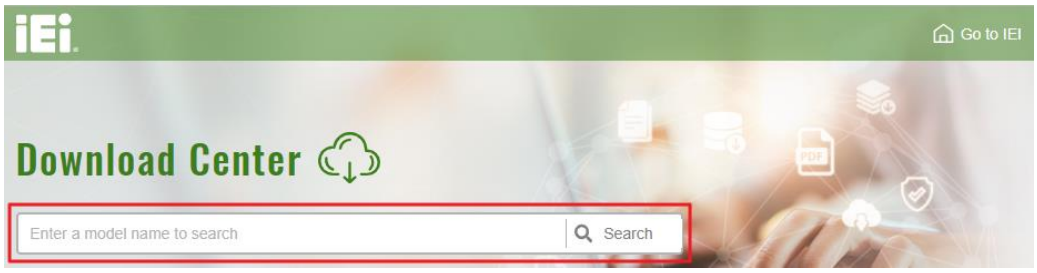
Figure 4-8: Dual USB Cable Connection

Step 4: **Attach the bracket to the chassis**. The USB 2.0 connectors are attached to a bracket. To secure the bracket to the chassis please refer to the installation instructions that came with the chassis.

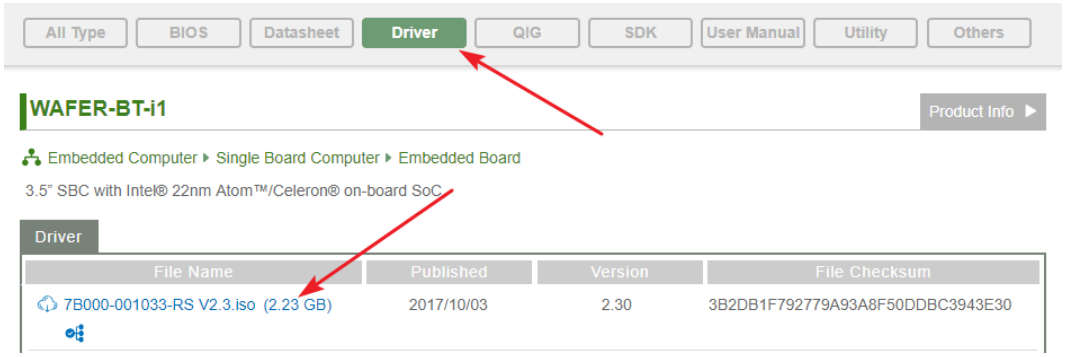
4.6 Driver Download

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

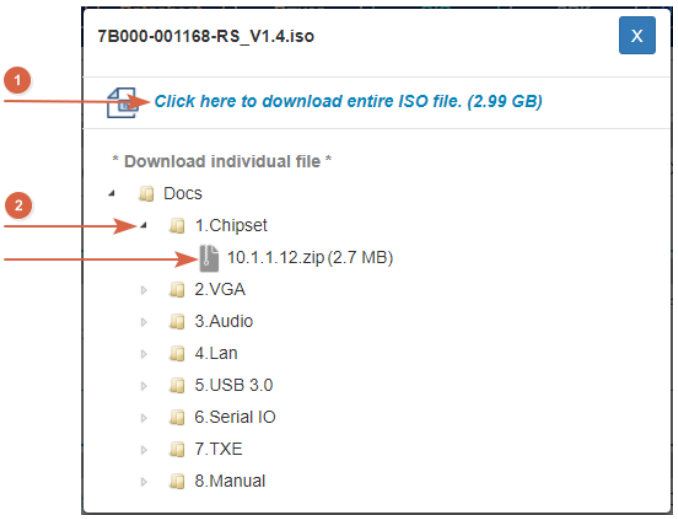
Step 1: Go to https://download.ieiworld.com. Type KINO-EHL2-J6412 and press Enter.



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



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



NOTE:

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

Chapter

5

BIOS

5.1 Introduction

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

NOTE:

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

5.1.1 Starting Setup

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

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

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

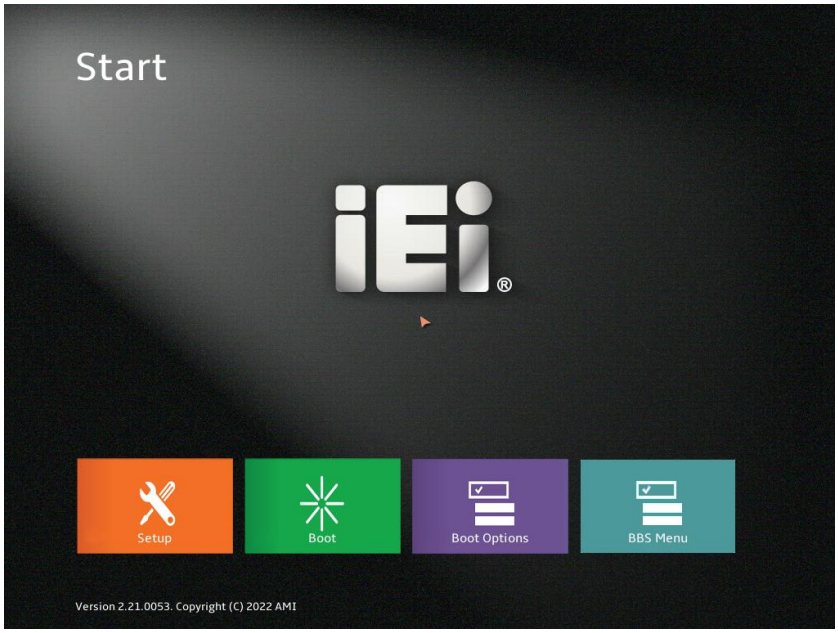


Figure 5-1: BIOS Starting Menu

5.1.2 Using Setup

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

5.1.2.1 Keyboard Navigation

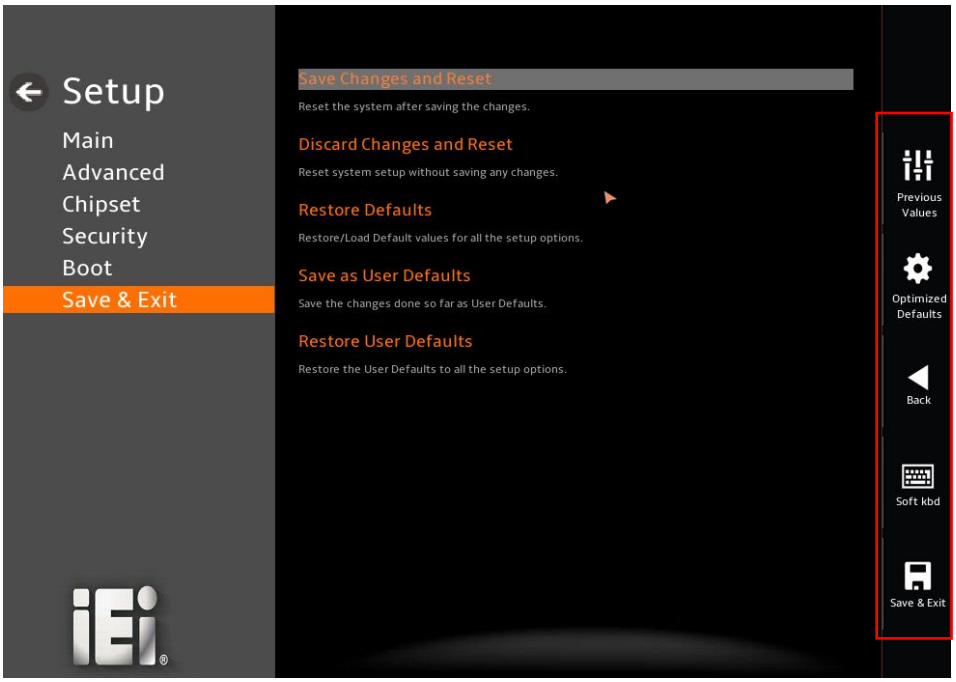
For keyboard navigation, use the navigation keys shown in **Table 5-1**.

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

Table 5-1: BIOS Navigation Keys

5.1.2.2 Touch Navigation

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



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

Table 5-2: BIOS On-screen Navigation Keys

5.1.3 Getting Help

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

5.1.4 Unable to Reboot after Configuration Changes

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

5.1.5 BIOS Menu Bar

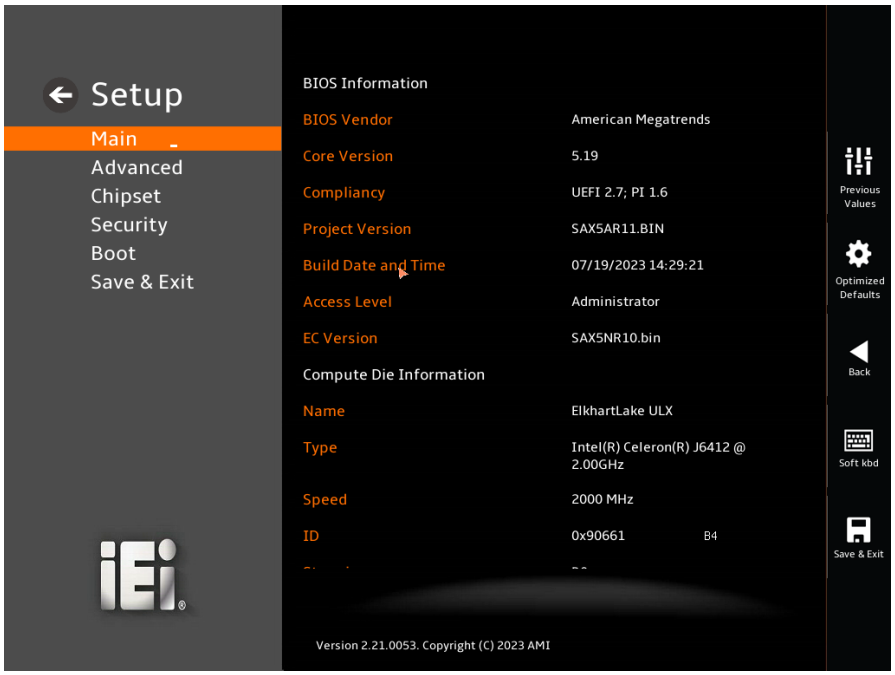
The **menu bar** on top of the BIOS screen has the following main items:

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

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

5.2 Main

The **Main** BIOS menu (**BIOS Menu 1 & BIOS Menu 2**) appears when the **BIOS Setup** program is entered. The **Main** menu gives an overview of the basic system information.



BIOS Menu 1: Main (1/2)

BIOS Menu 2: Main (2/2)

➔ **BIOS Information**

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

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

➔ **Compute Die Information**

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

- **Name:** Displays the Processor Details
- **Type:** Displays the Processor Type
- **Speed:** Displays the Processor Speed
- **ID:** Displays the Processor ID
- **Stepping:** Displays the Processor Stepping
- **Number of Processors:** Displays number of CPU cores
- **Microcode Revision:** CPU Microcode Revision
- **Total Memory:** Total Memory in the System
- **Memory Data Rate:** Displays the Data Rate of Memory

➔ **PCH Information**

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

- **Name:** Displays the PCH Name
- **Stepping:** Displays the PCH Stepping
- **ME FW Version:** Displays the ME Firmware Version
- **ME Firmware SKU:** Displays the ME Firmware SKU

The System Overview field also has two user configurable fields:

➔ **System Date [xx/xx/xx]**

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

➔ **System Time [xx:xx:xx]**

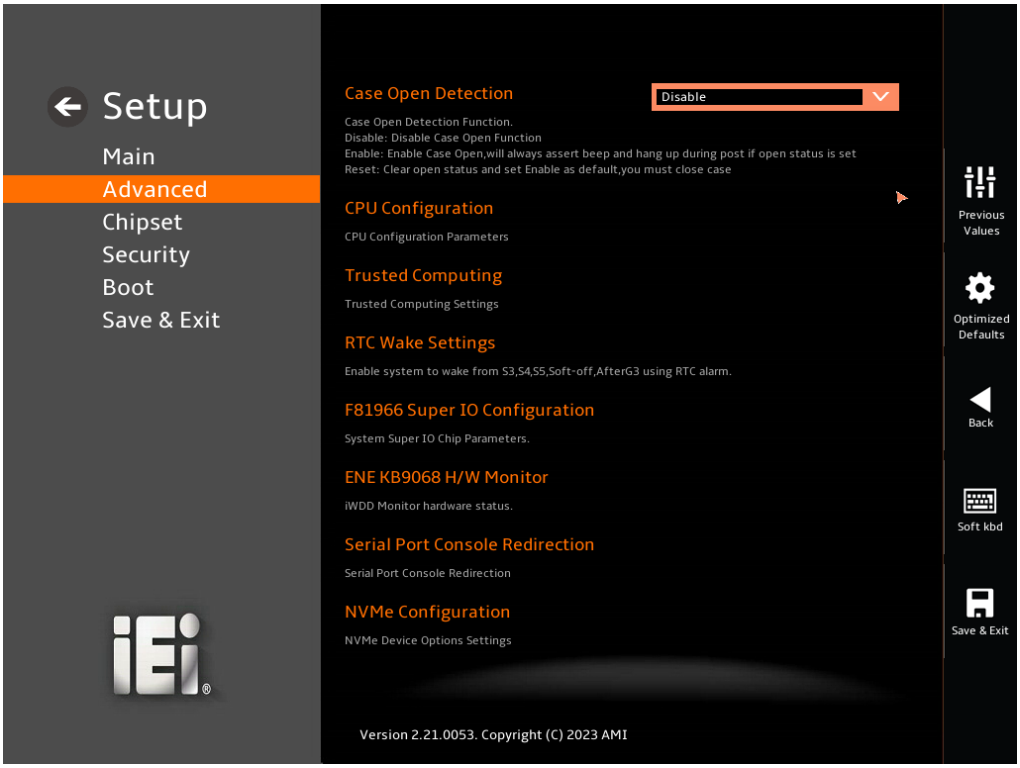
Use the **System Time** option to set the system time. Manually enter the hours, minutes and seconds.

5.3 Advanced

Use the **Advanced** menu (**BIOS Menu 3**) to configure the CPU and peripheral devices through the following sub-menus:

WARNING!

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

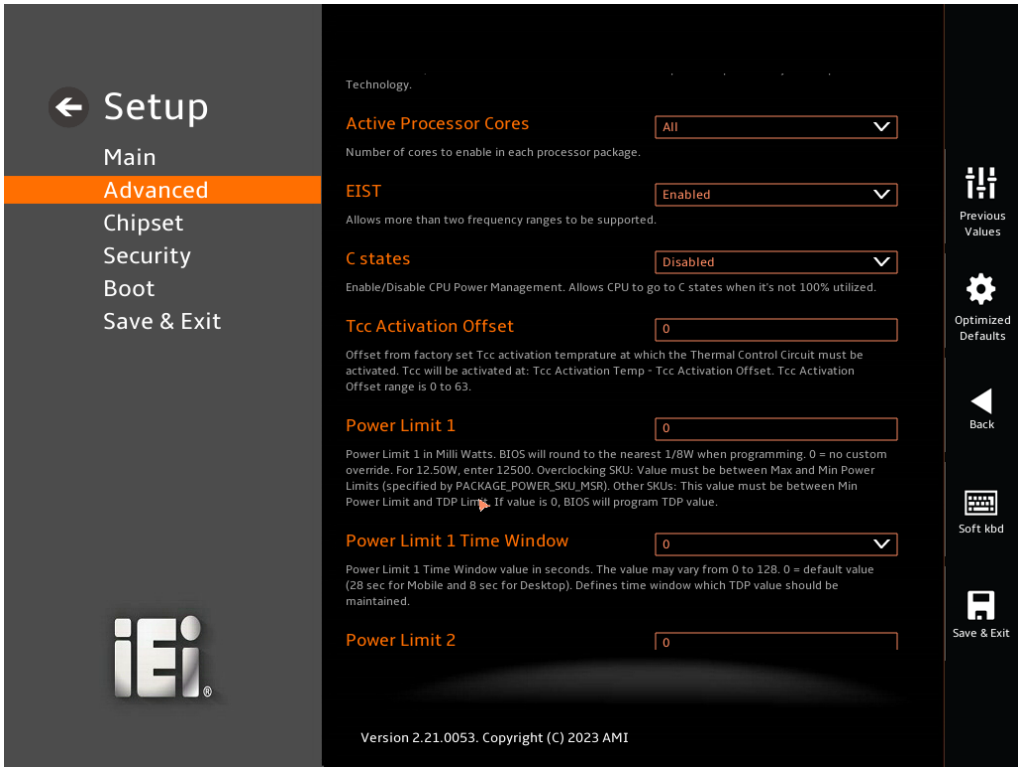


BIOS Menu 3: Advanced

5.3.1 CPU Configuration

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

BIOS Menu 4: CPU Configuration (1/3)



BIOS Menu 5: CPU Configuration (2/3)

BIOS Menu 6: CPU Configuration (3/3)

➔ **Intel (VMX) Virtualization Technology [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 cores in the processor package.

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

➔ **EIST [Enable]**

Use the **EIST** option to enable more than two frequency ranges to be supported.

➔	**Disabled**		Disables more than two frequency ranges
➔	**Enabled**	**DEFAULT**	Enables more than two frequency ranges

➔ **C states [Disabled]**

Use the **C states** option to enable or disable the CPU Power Management.

➔	**Disabled**	**DEFAULT**	Disables CPU to go to C states when it's not 100% utilized.
➔	**Enabled**		Enables CPU to go to C states when it's not 100% utilized.

➔ **Tcc Activation Offset**

Use the **Tcc Activation** option to set Tcc activation temprature 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**

Use the **Power Limit 1** to set Power Limit 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. Other SKUs: This value must be between Min Power limit and TDP Limit. If value is 0, BIOS will program TDP value.

➔ **Power Limit 1 Time Window**

Power Limit 1 Time Window value in second. The value may vary from 0 to 128.0, 0 = default value (28 sec for mobile and 8 sec for desktop). Defines time window which TDP value should be maintained.

➔ **Power Limit 2**

Use the **Power Limit 2** to set Power Limit 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.

➔ **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 7**) to configure settings related to the Trusted Computing Group (TCG) Trusted Platform Module (TPM).

BIOS Menu 7: PCH-FW Configuration

➔ **TPM Support [Enable]**

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

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

➔ **Pending Operation [None]**

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

- ➔ **None** **DEFAULT** TPM information is previous.S
- ➔ **TPM Clear** TPM information is cleared

5.3.3 RTC Wake Settings

The **RTC Wake Settings** menu (**BIOS Menu 8**) configures RTC wake event.

BIOS Menu 8: RTC Wake Settings

➔ **Wake system with Fixed Time [Disabled]**

Use the **Wake system with Fixed Time** option to enable or disable the system wake on alarm event.

➔ **Disabled** **DEFAULT** The real time clock (RTC) cannot generate a wake event

➔ **Enabled** If selected, the **Wake up every day** option appears allowing you to enable to disable the system to wake every day at the specified time. Besides, the following options appear with values that can be selected:

Wake up date

Wake up hour

Wake up minute

Wake up second

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

5.3.4 F81966 Super IO Configuration

Use the **F81966 Super IO Configuration** menu (**BIOS Menu 9**) to set or change the configurations for the serial ports.

BIOS Menu 9: F81866 Super IO Configuration

5.3.4.1 Serial Port 1 Configuration

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

BIOS Menu 10: Serial Port 1 Configuration Menu

➔ **Serial Port [Enabled]**

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

➔ **Disabled** Disable the serial port

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

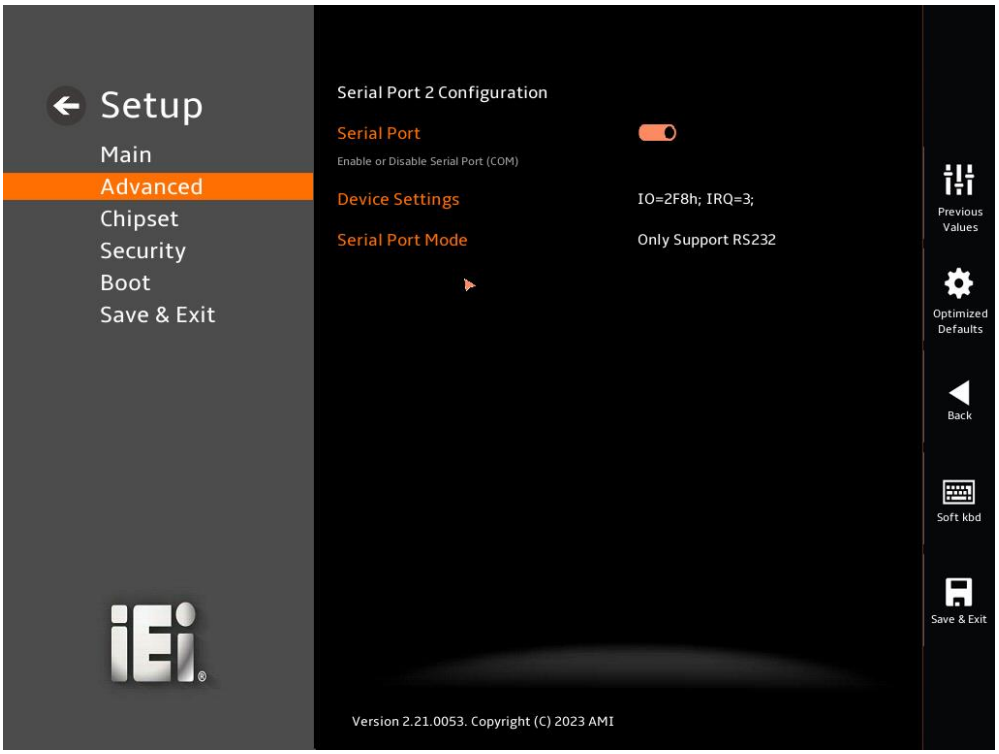
➔ **Device Settings**

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

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

5.3.4.2 Serial Port 2 Configuration

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



BIOS Menu 11: Serial Port 2 Configuration Menu

➔ **Serial Port [Enabled]**

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

➔ **Disabled** Disable the serial port

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

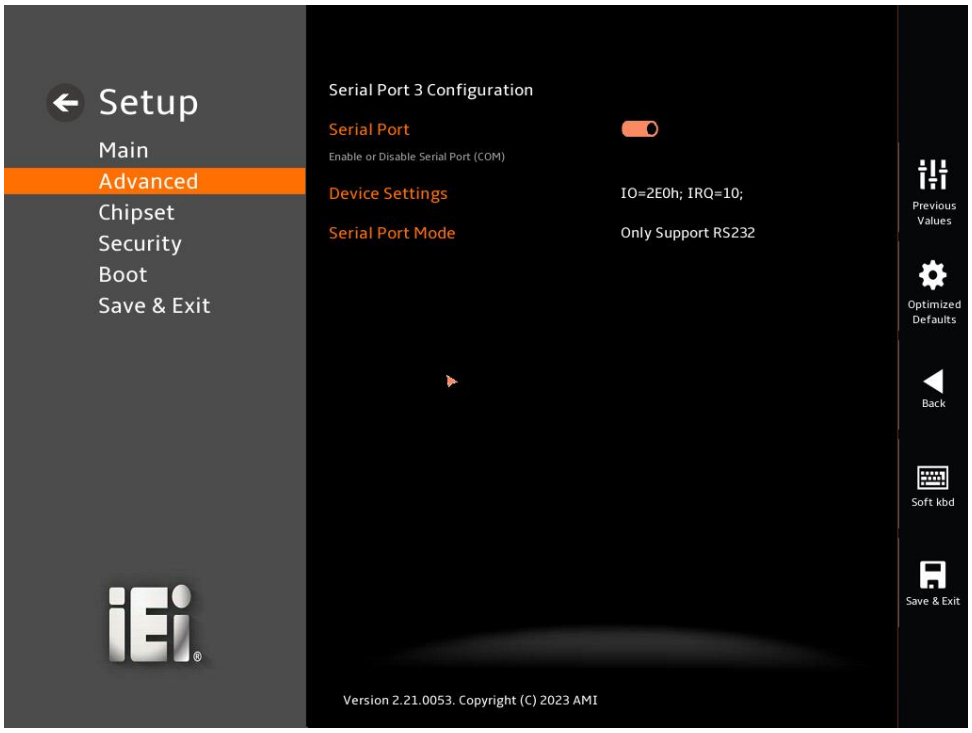
➔ **Device Settings**

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

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

5.3.4.3 Serial Port 3 Configuration

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



BIOS Menu 12: Serial Port 3 Configuration Menu

➔ **Serial Port [Enabled]**

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

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

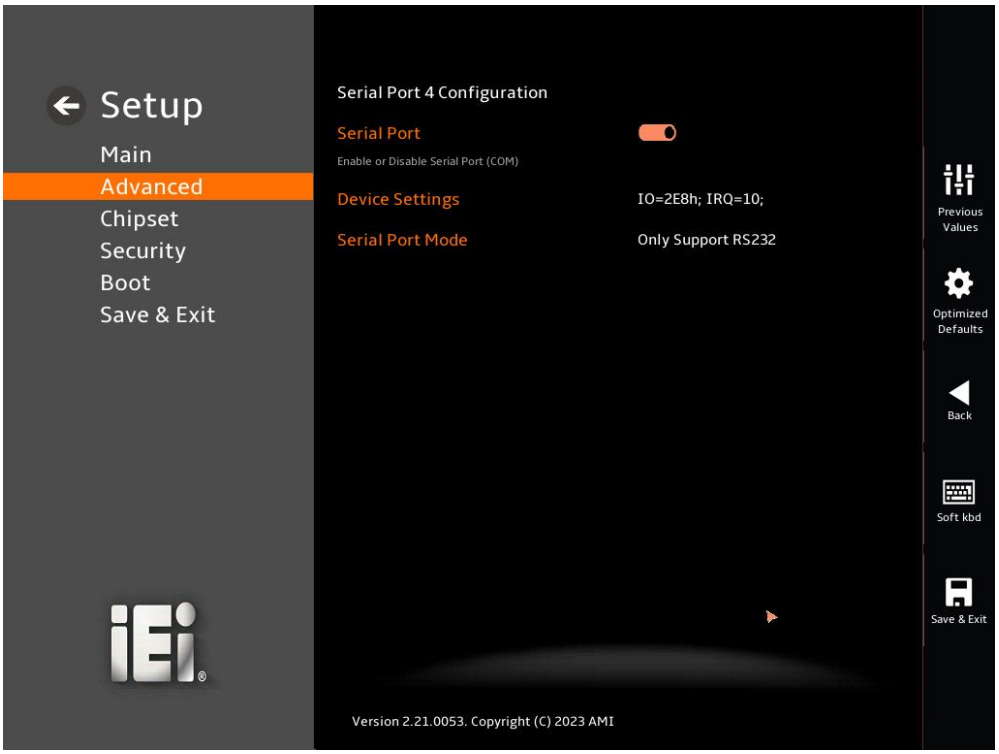
➔ **Device Settings**

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

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

5.3.4.4 Serial Port 4 Configuration

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



BIOS Menu 13: Serial Port 4 Configuration Menu

➔ **Serial Port [Enabled]**

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

➔ **Disabled** Disable the serial port

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

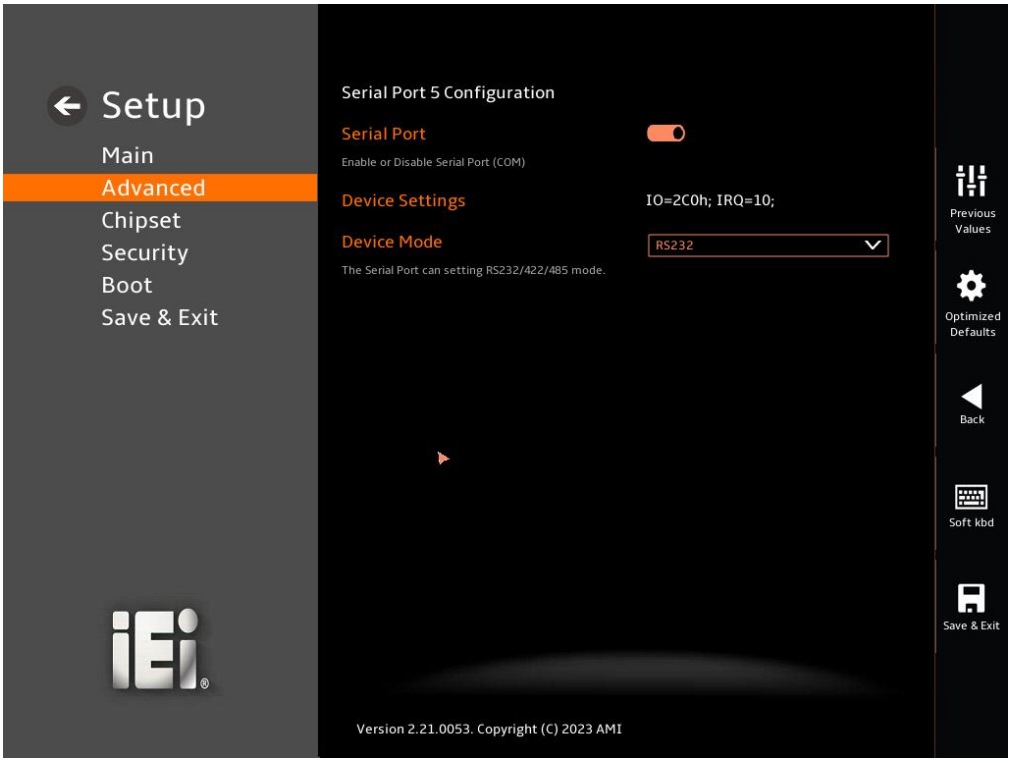
➔ **Device Settings**

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

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

5.3.4.5 Serial Port 5 Configuration

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



BIOS Menu 14: Serial Port 5 Configuration Menu

➔ **Serial Port [Enabled]**

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

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

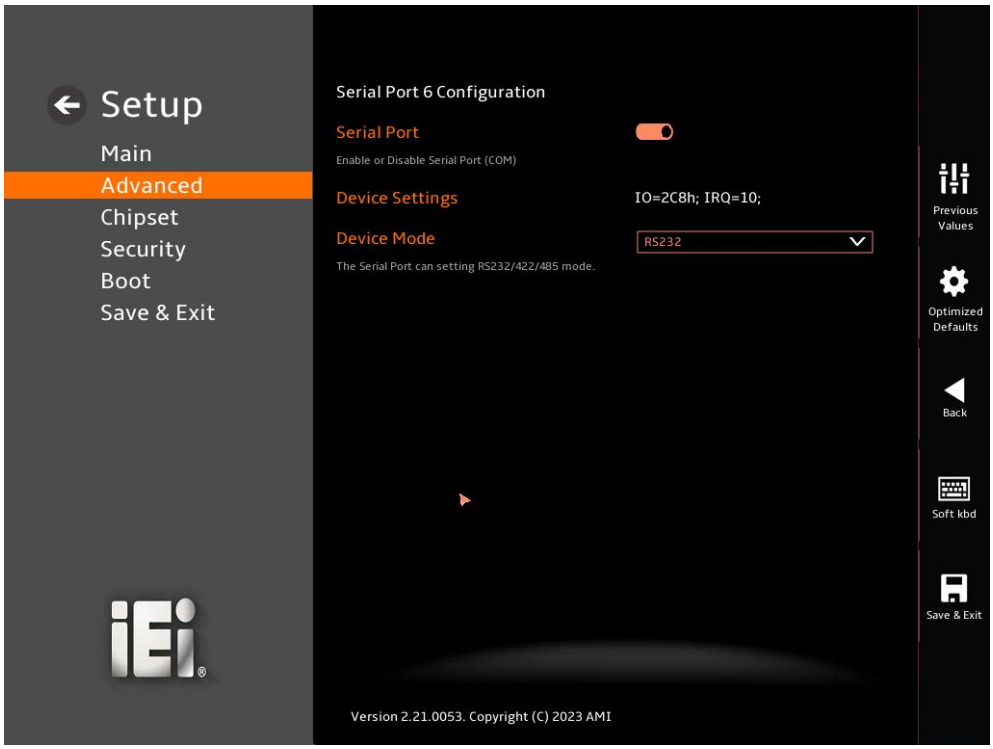
➔ **Device Settings**

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

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

5.3.4.6 Serial Port 6 Configuration

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



BIOS Menu 15: Serial Port 6 Configuration Menu

➔ **Serial Port [Enabled]**

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

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

➔ **Device Settings**

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

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

5.3.5 ENE KB9068 Monitor

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

BIOS Menu 16: ENE KB9068 Monitor

➔ PC Health Status

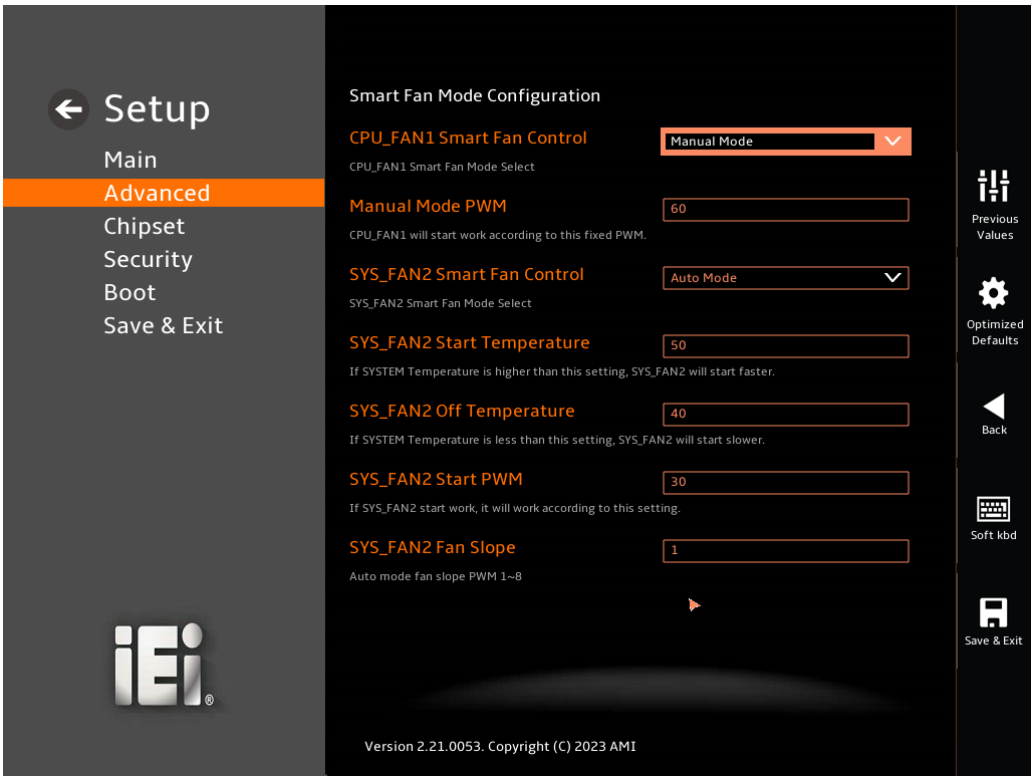
The following system parameters and values are shown. The system parameters that are monitored are:

- System Temperatures:
  - CPU Temperature
  - System Temperature
- Fan Speeds:
  - Fan1 Speed
  - Fan2 Speed
- Voltages:

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

5.3.5.1 Smart Fan Mode Configuration

Use the **Smart Fan Mode Configuration** submenu (**BIOS Menu 17**) to configure the CPU/system fan start/off temperature and control mode.



BIOS Menu 17: Smart Fan Mode Configuration

➔ **CPU_FAN1 Smart Fan Control [Manual 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.

➔ **Manual Mode PWM**

CPU_FAN1 will start work according to this fixed PWM.

➔ **SYS_FAN2 Smart Fan Control [Auto Mode]**

Use the **SYS_FAN2 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_FAN2 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_FAN2 Off Temperature**

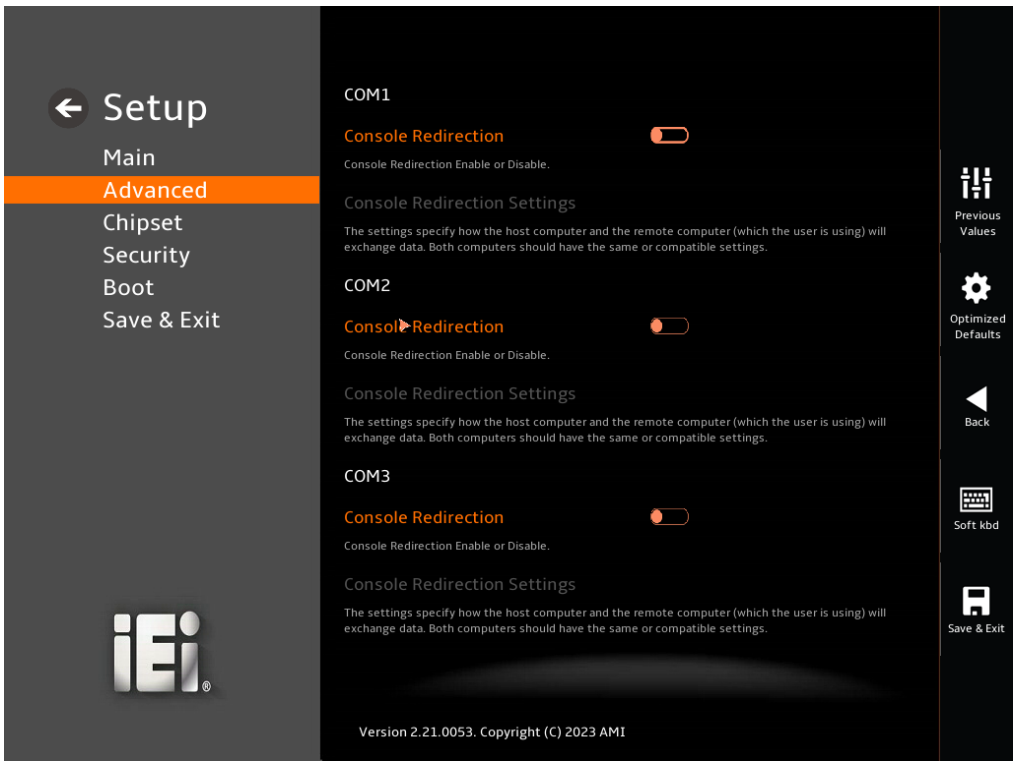
If the System temperature is lower than the value set this option, the fan speed change to be lowest. To set a value, Use the + or – key to change the value or enter a decimal number between 1 and 100.

➔ **SYS_FAN2 Start PWM**

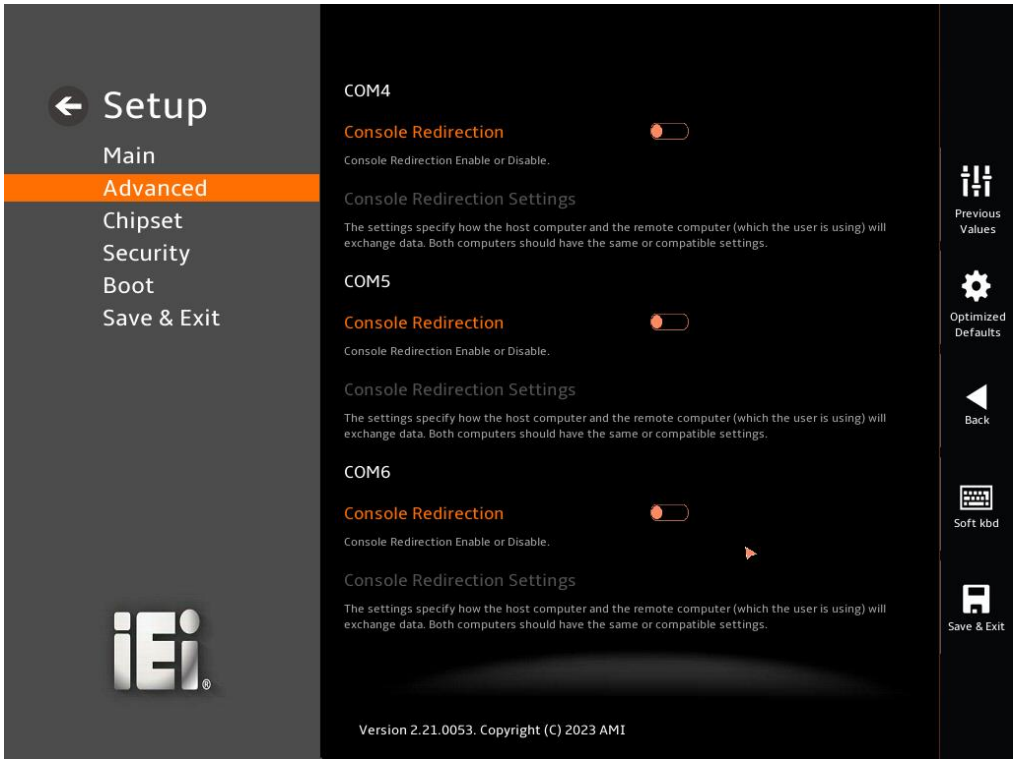
Use the **SYS_Fan2 Start PWM** option to set the PWM start value. Use the + or – key to change the value or enter a decimal number between 1 and 100.

5.3.6 Serial Port Console Redirection

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



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



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

➔ **Console Redirection [Disabled]**

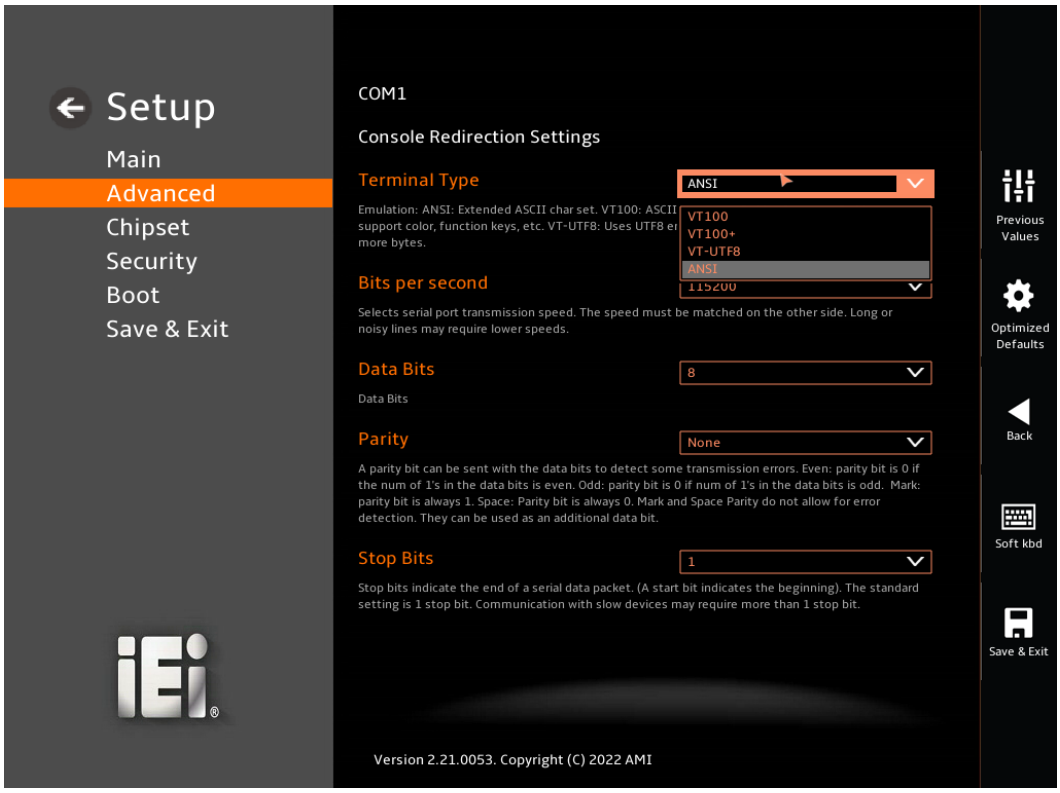
Use **Console Redirection** option to enable or disable the console redirection function.

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

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

5.3.6.1 Console Redirection Settings

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



BIOS Menu 20: COM Console Redirection Settings

➔ Terminal Type [ANSI]

Use the **Terminal Type** option to specify the remote terminal type.

➔ **VT100**		The target terminal type is VT100
➔ **VT100+**		The target terminal type is VT100+
➔ **VT-UTF8**		The target terminal type is VT-UTF8
➔ **ANSI**	**DEFAULT**	The target terminal type is ANSI

➔ Bits per second [115200]

Use the **Bits per second** option to specify the serial port transmission speed. The speed must match on the other side. Long or noisy lines may require lower speeds.

➔ **9600**	Sets the serial port transmission speed at 9600.

- ➔ **19200** — Sets the serial port transmission speed at 19200.
- ➔ **38400** — Sets the serial port transmission speed at 38400.
- ➔ **57600** — Sets the serial port transmission speed at 57600.
- ➔ **115200** **DEFAULT** — Sets the serial port transmission speed at 115200.

➔ **Data Bits [8]**

Use the **Data Bits** option to specify the number of data bits.

- ➔ **7** — Sets the data bits at 7.
- ➔ **8** **DEFAULT** — Sets the data bits at 8.

➔ **Parity [None]**

Use the **Parity** option to specify the parity bit that can be sent with the data bits for detecting the transmission errors.

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

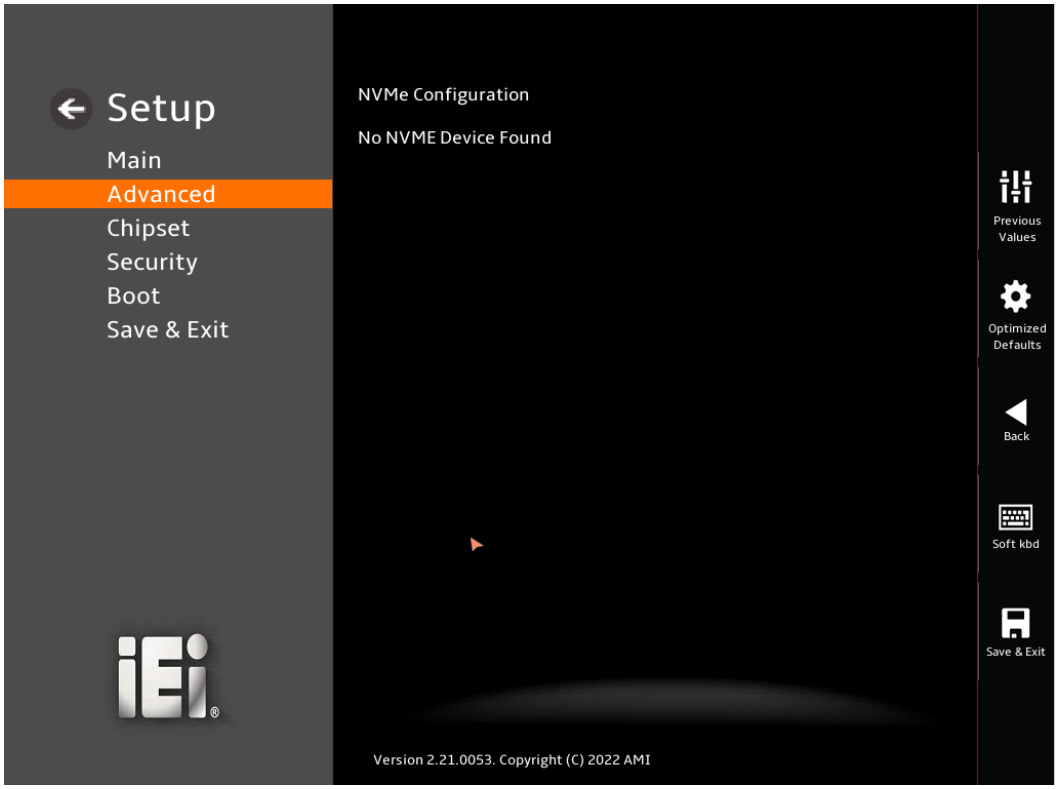
➔ **Stop Bits [1]**

Use the **Stop Bits** option to specify the number of stop bits used to indicate the end of a serial data packet. Communication with slow devices may require more than 1 stop bit.

- ➔ **1** **DEFAULT** — Sets the number of stop bits at 1.
- ➔ **2** — Sets the number of stop bits at 2.

5.3.7 NVMe Configuration

Use the **NVMe Configuration** (**BIOS Menu 21**) menu to display the NVMe controller and device information.



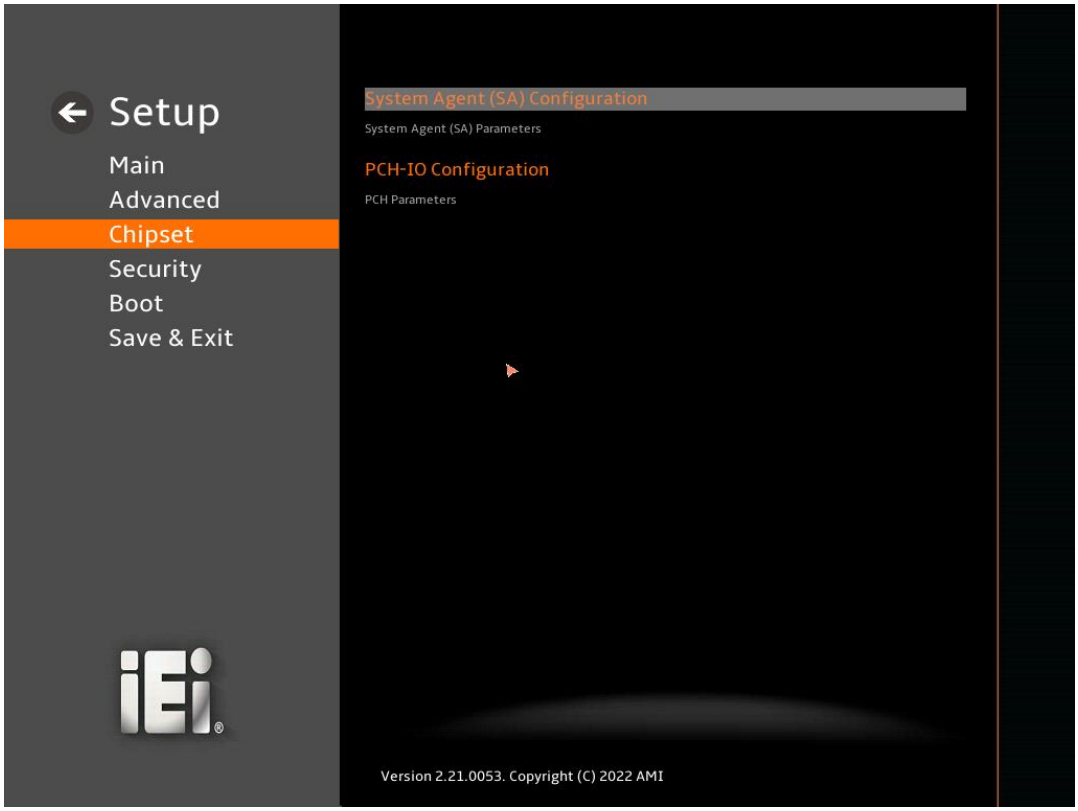
BIOS Menu 21: NVMe Configuration

5.4 Chipset

Use the **Chipset** menu (**BIOS Menu 22**) to access the PCH IO and System Agent (SA) configuration menus.

WARNING!

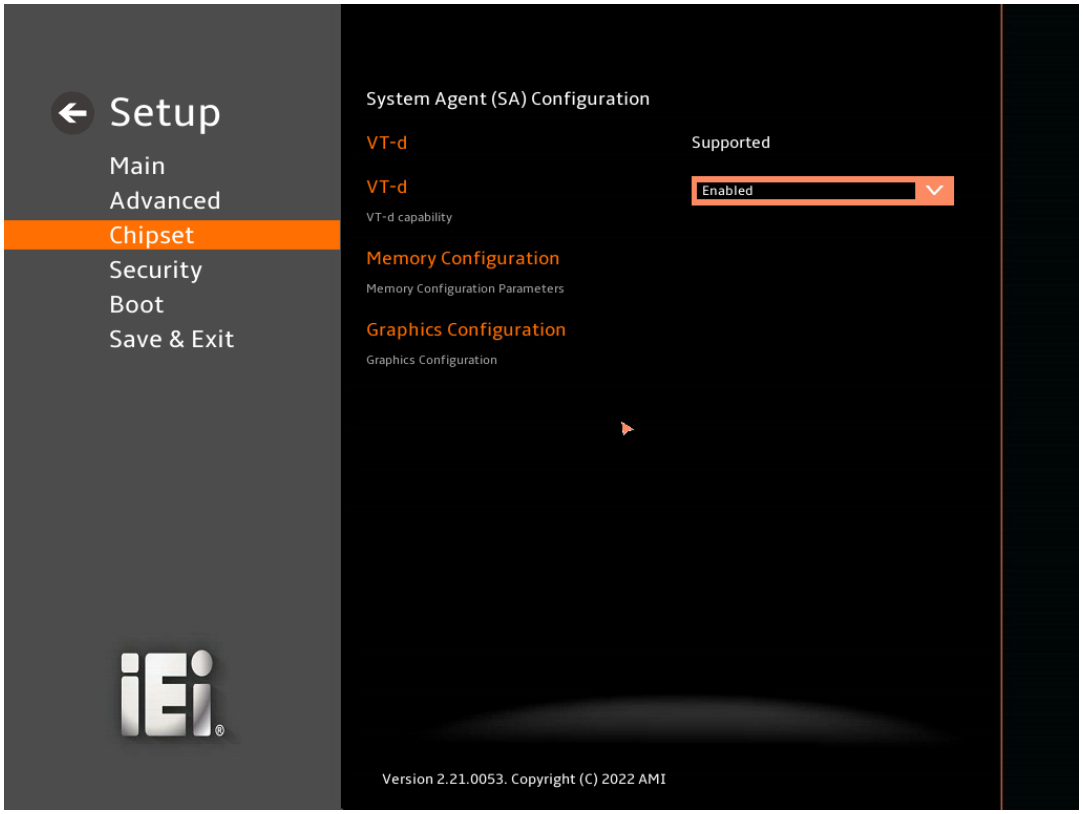
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



BIOS Menu 22: Chipset

5.4.1 System Agent (SA) Configuration

Use the **System Agent (SA) Configuration** menu (**BIOS Menu 23**) to configure the System Agent (SA) parameters.



BIOS Menu 23: System Agent (SA) Configuration

➔ **VT-d [Enabled]**

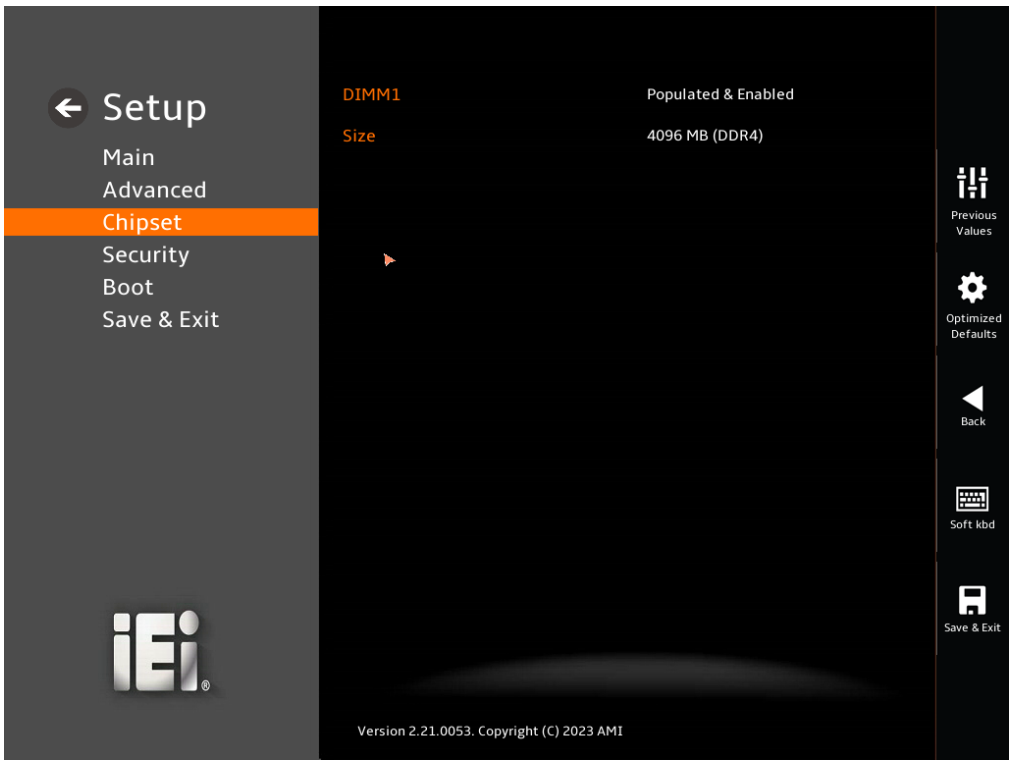
Use the **VT-d** option to enable or disable the VT-d capability.

➔ **Disabled** Disable the VT-d capability

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

5.4.1.1 Memory Configuration

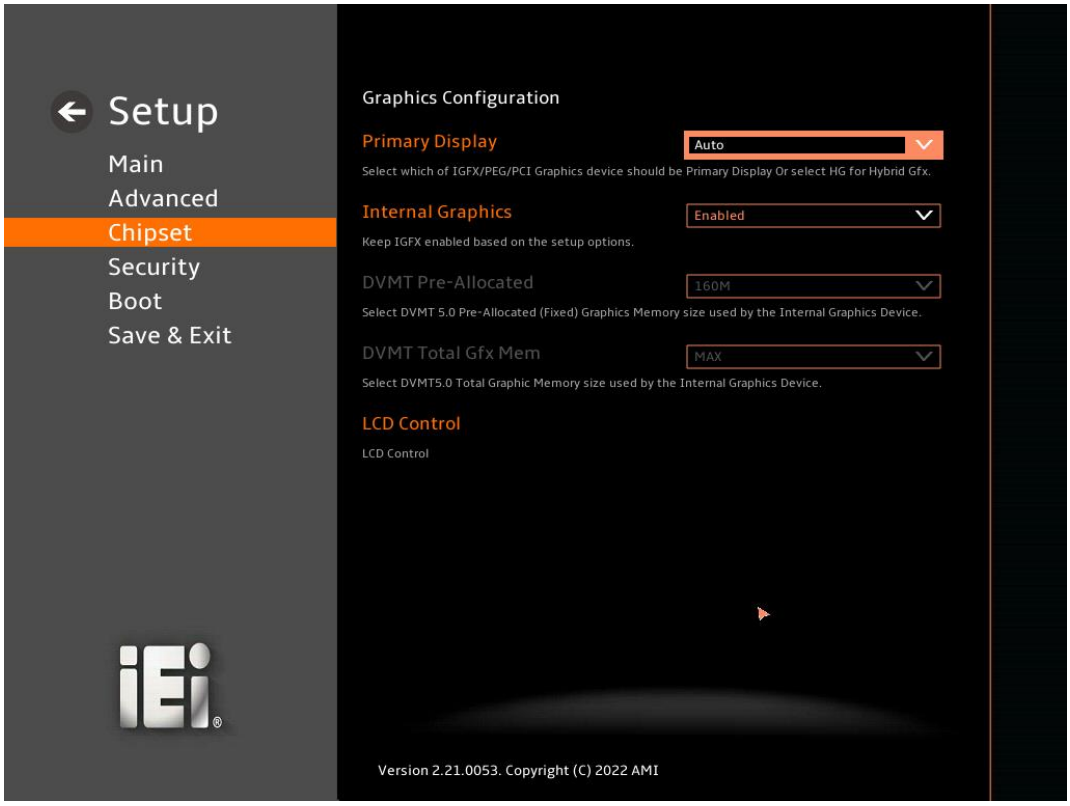
Use the **Memory Configuration** submenu (**BIOS Menu 24**) to view memory information.



BIOS Menu 24: Memory Configuration

5.4.1.2 Graphics Configuration

Use the **Graphics Configuration** (**BIOS Menu 25**) menu to configure the video device connected to the system.



BIOS Menu 25: Graphics Configuration

➔ **Primary Display [Auto]**

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

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

➔ **Internal Graphics [Enabled]**

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

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

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

➔ **DVMT Pre-Allocated [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:

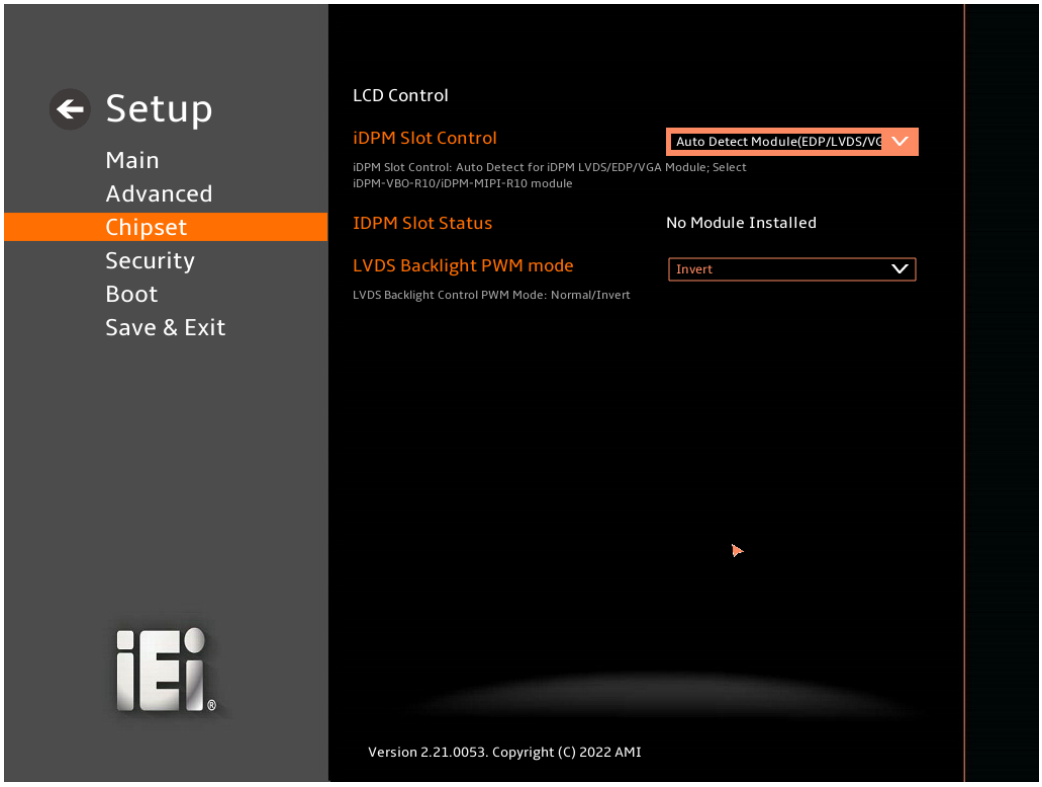
- 80M
- 160M **Default**

➔ **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**

➔ **LCD Control**



➔ **iDPM Slot Control[Auto Detect Module(EDP/LVDS/VGA)]**

Use the iDPM Slot Control option to select iDPM module or auto detect for iDPM LVDS/EDP/VGA Module.

➔ **Auto Detect Module(EDP /LVDS/VGA)** **DEFAULT**	Auto detect for iDPM LVDS/EDP/VGA Module.
➔ **iDPM-VBO Module**	Select iDPM-VBO Module
➔ **iDPM-MIPI Module**	Select iDPM-MIPI Module

➔ **LVDS Backlight PWM mode[Invert]**

➔ **Invert**	**DEFAULT**	Select Invert LVDS Backlight.
➔ **Normal**		Select normol LVDS Backlight.

5.4.2 PCH-IO Configuration

Use the **PCH-IO Configuration** menu (**BIOS Menu 26**) to configure the PCH parameters.

BIOS Menu 26: PCH-IO Configuration

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

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

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

➔ **Power Saving Function(EUP) [Disabled]**

Use the **Power Saving Function(EUP)** BIOS option to enable or disable the power saving function.

➔ **Disabled** **DEFAULT** Power saving function is disabled.

➔ **Enabled** Power saving function is enabled. It will reduce power consumption when the system is off.

➔ **USB Power SW1 [+5V DUAL]**

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

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

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

➔ **USB Power SW2 [+5V DUAL]**

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

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

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

BIOS Options	Configured USB Ports
USB Power SW1	J_LAN1_USB1 (external USB 3.2 Gen 2 ports) J_LAN2_USB2 (external USB 2.0 ports)
USB Power SW2	JUSB3 (internal USB 2.0 ports) JUSB4 (internal USB 2.0 ports)

Table 5-3: BIOS Options and Configured USB Ports

5.4.2.1 PCI Express Configuration

Use the **PCI Express Configuration** submenu (**BIOS Menu 27**) to configure the PCI Express slots.

BIOS Menu 27: PCI Express Configuration

5.4.2.1.1 PCIe Root Port Setting

Use the **PCIEX4_1, M2_B_KEY Slot, M2_A_KEY Slot,** submenu (**BIOS Menu 28**) to configure the PCI Root Port Setting.

BIOS Menu 28: PCIe Slot Configuration Submenu

➔ **PCIe Speed [Auto]**

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

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

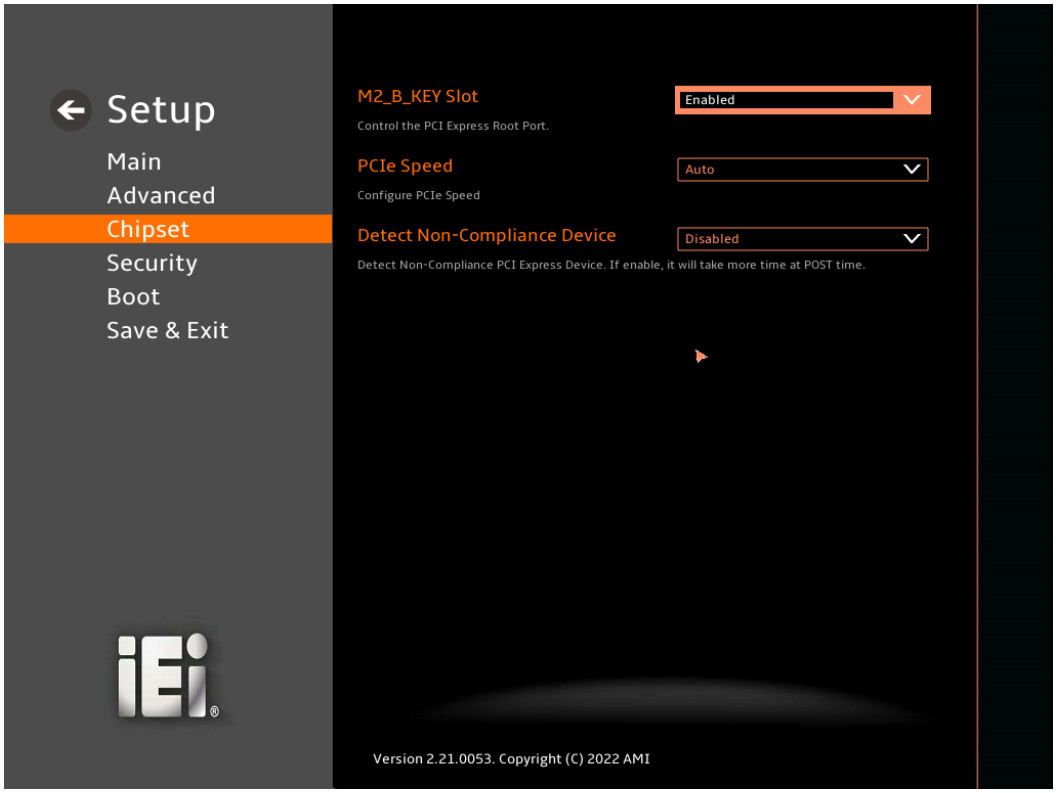
➔ **Detect Non-Compliance Device [Disabled]**

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

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

➔ **Enabled** Detect if a non-compliance PCI Express device is connected to the PCI Express port.

5.4.2.1.2 M2_B_KEY Slot



➔ **PCIe Speed [Auto]**

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

➔ **Auto** **DEFAULT** Auto mode.

➔ **Gen1** Configure PCIe Speed to Gen1.

➔ **Gen2** Configure PCIe Speed to Gen2.

➔ **Gen3** Configure PCIe Speed to Gen3.

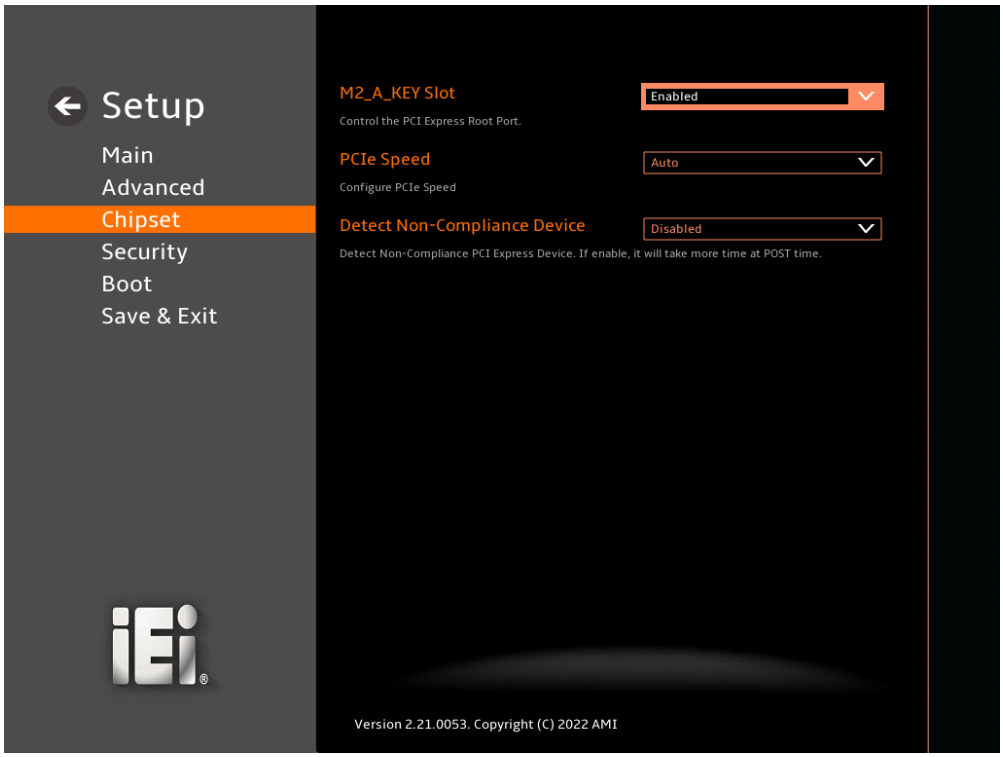
➔ **Detect Non-Compliance Device [Disabled]**

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

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

➔ **Enabled** Detect if a non-compliance PCI Express device is connected to the PCI Express port.

5.4.2.1.3 M2_A_KEY Slot



➔ **PCIe Speed [Auto]**

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

➔ **Auto** **DEFAULT** Auto mode.

➔ **Gen1**		Configure PCIe Speed to Gen1.
➔ **Gen2**		Configure PCIe Speed to Gen2.
➔ **Gen3**		Configure PCIe Speed to Gen3.

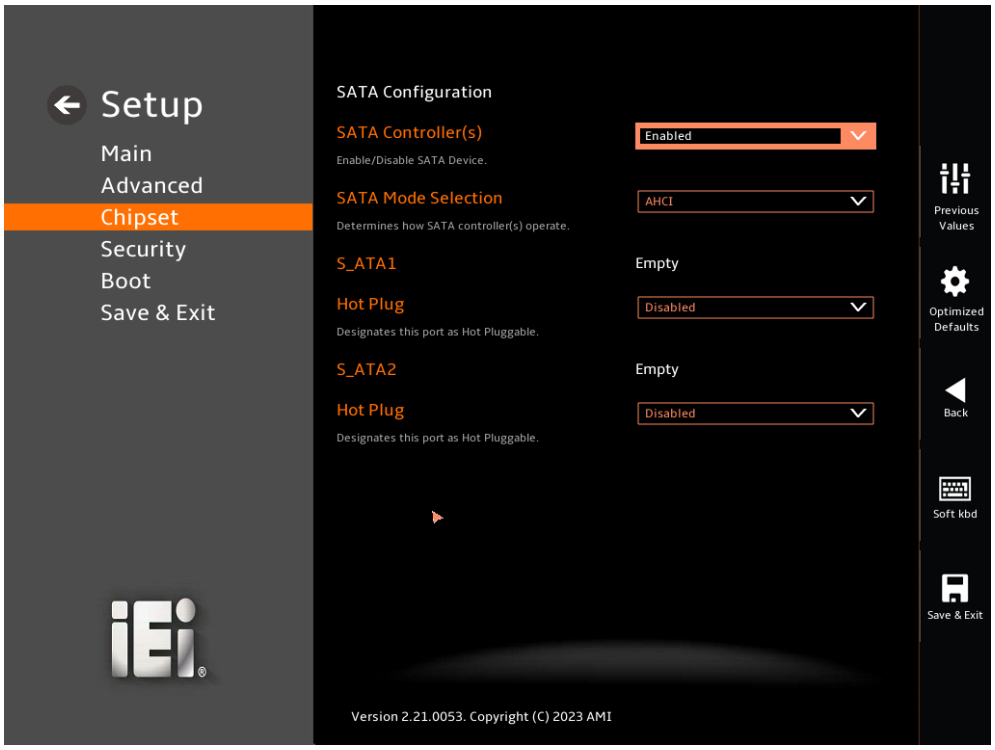
➔ **Detect Non-Compliance Device [Disabled]**

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

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

5.4.2.2 SATA Configuration

Use the **SATA Configuration** menu (**BIOS Menu 29**) to change and/or set the configuration of the SATA devices installed in the system.



BIOS Menu 29: SATA Configuration

➔ **SATA Controller(s) [Enabled]**

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

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

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

➔ **SATA Mode Selection [AHCI]**

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

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

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

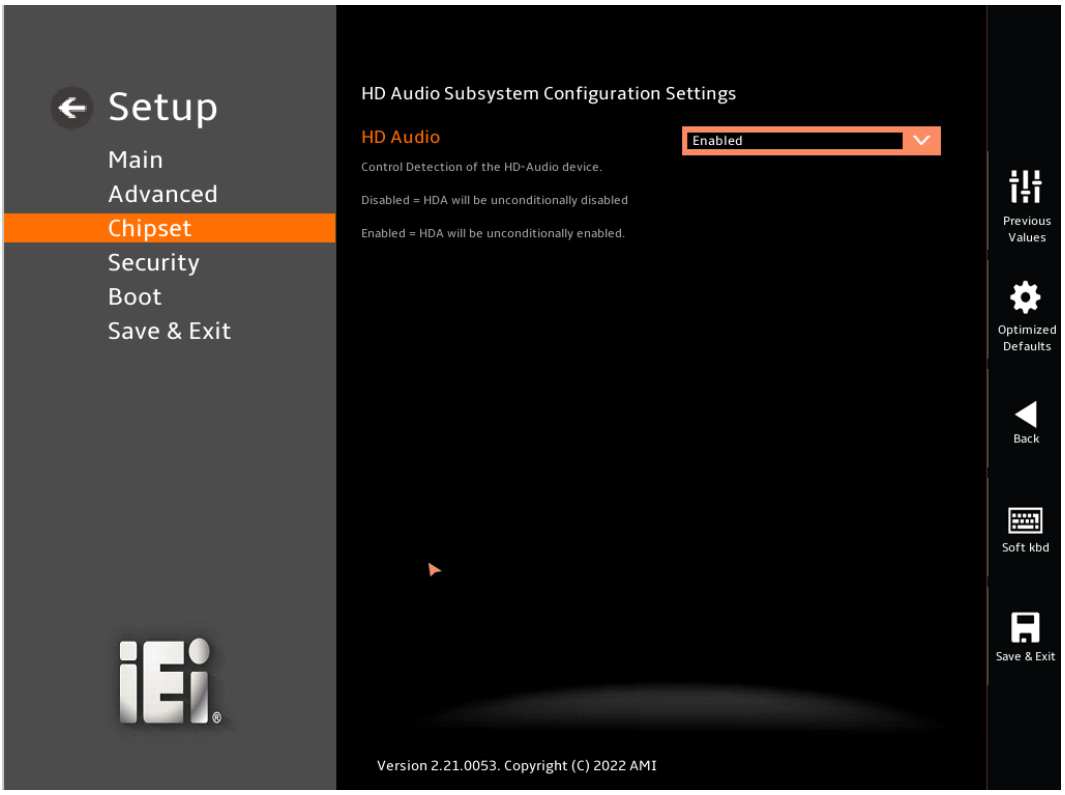
➔ **Hot Plug [Disabled]**

Use the **Hot Plug** option (for S_ATA1) to 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 30**) to configure the PCH Azalia settings.



BIOS Menu 30: HD Audio Configuration

➔ **HD Audio [Auto]**

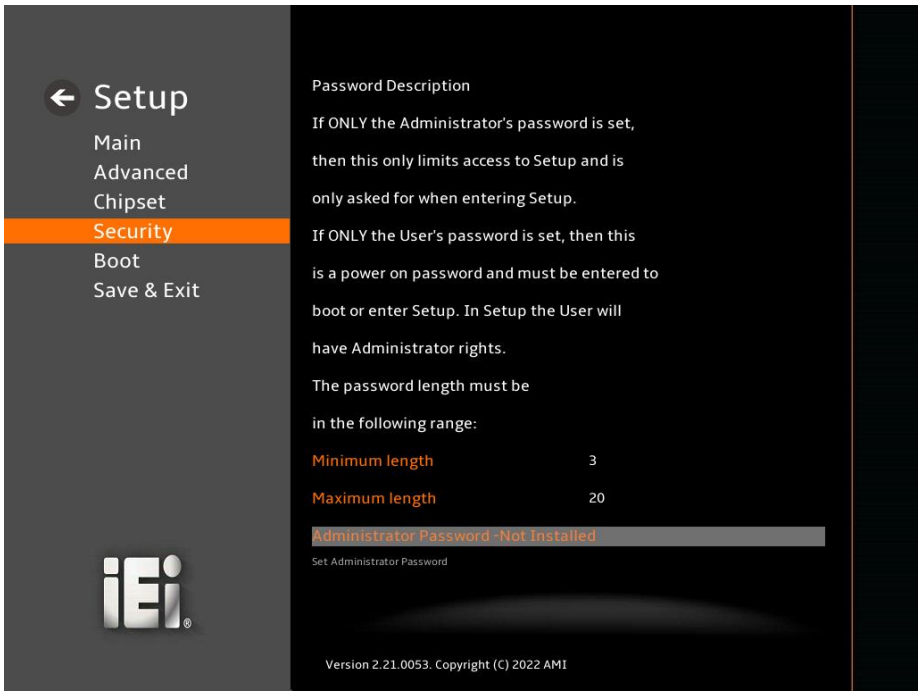
Use the **HD Audio** option to enable or disable the High Definition Audio controller.

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

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

5.5 Security

Use the **Security** menu (**BIOS Menu 31**) to set system and user passwords.



BIOS Menu 31: Security

➔ **Administrator Password**

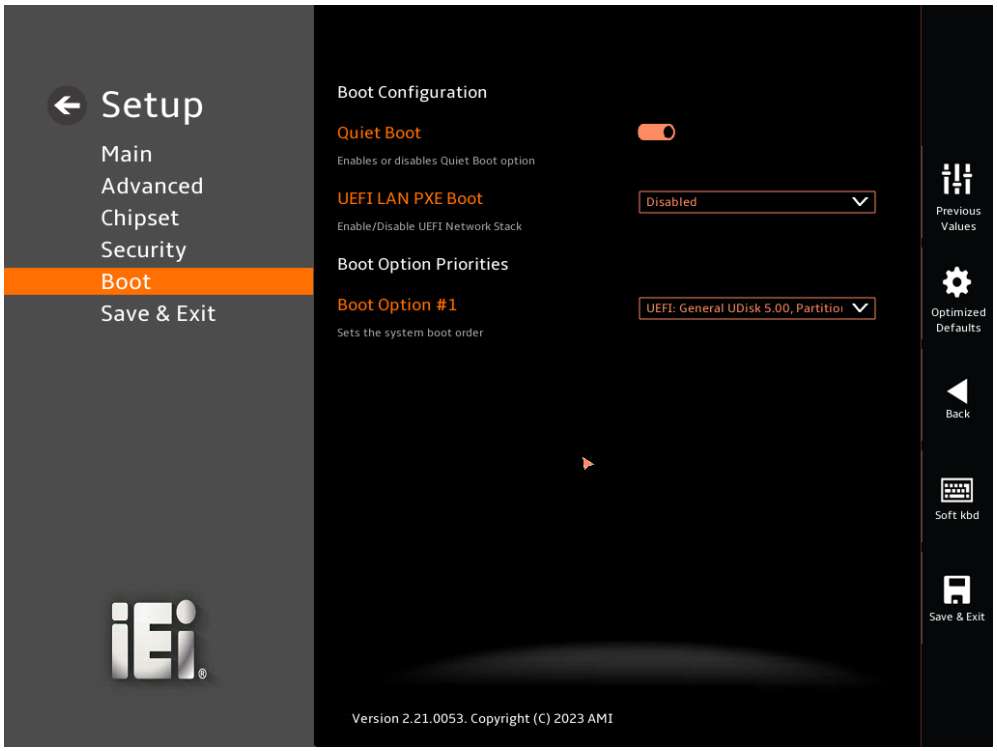
Use the **Administrator Password** to set or change a administrator password.

➔ **User Password**

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

5.6 Boot

Use the **Boot** menu (**BIOS Menu 32**) to configure system boot options.



BIOS Menu 32: 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

➔ **UEFI LAN PXE Boot [Disabled]**

Use the **UEFI LAN PXE Boot** option to enable or disable UEFI network stack.

➔ **Disabled** **DEFAULT** Ignore all PXE Option ROMs

➔ **Enabled** Load PXE Option ROMs.

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**

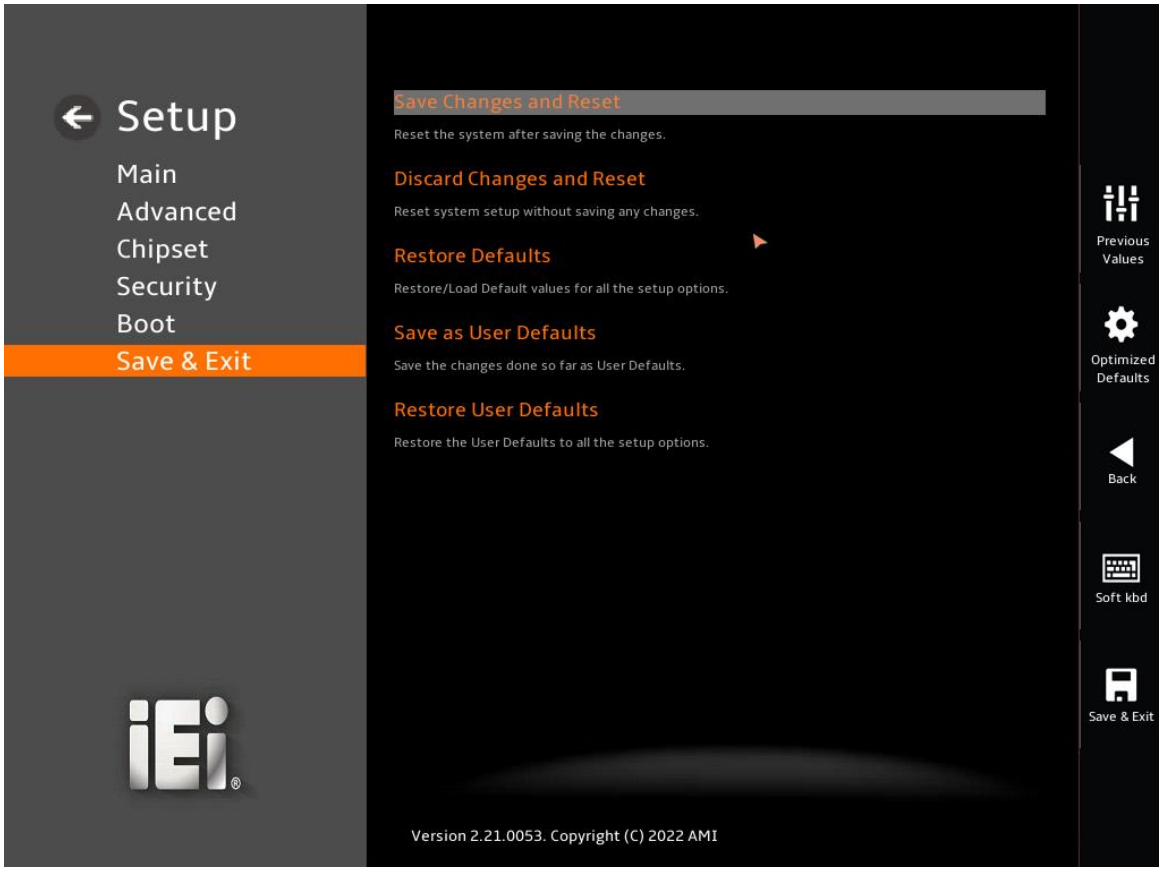
Sets the system boot order **USB Partition 1** as the second priority.

➔ **UEFI: USB, Partition 1**

➔ **Disabled**

5.7 Save & Exit

Use the **Save & Exit** menu (**BIOS Menu 33**) to load default BIOS values, optimal failsafe values and to save configuration changes.



BIOS Menu 33: Save & Exit

➔ **Save Changes and Reset**

Use the **Save Changes and Reset** option to save the changes made to the BIOS options and reset the system.

➔ **Discard Changes and Reset**

Use the **Discard Changes and Reset** option to exit the system without saving the changes made to the BIOS configuration setup program.

➔ **Restore Defaults**

Use the **Restore Defaults** option to load the optimal default values for each of the parameters on the Setup menus. **F3 key can be used for this operation.**

➔ **Save as User Defaults**

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

➔ **Restore User Defaults**

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

Appendix

A

Regulatory Compliance

DECLARATION OF CONFORMITY

This equipment has been tested and found to comply with specifications for CE marking. If the user modifies and/or installs other devices in the equipment, the CE conformity declaration may no longer apply.

FCC WARNING

This equipment complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Appendix

B

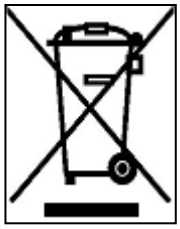
Product Disposal

CAUTION:

Risk of explosion if battery is replaced by an incorrect type. Only certified engineers should replace the on-board battery.

Dispose of used batteries according to instructions and local regulations.

- Outside the European Union–If you wish to dispose of used electrical and electronic products outside the European Union, please contact your local authority so as to comply with the correct disposal method.
- Within the European Union–The device that produces less waste and is easier to recycle is classified as electronic device in terms of the European Directive 2012/19/EU (WEEE), and must not be disposed of as domestic garbage.



EU-wide legislation, as implemented in each Member State, requires that waste electrical and electronic products carrying the mark (left) must be disposed of separately from normal household waste. This includes monitors and electrical accessories, such as signal cables or power cords. When you need to dispose of your device, please follow the guidance of your local authority, or ask the shop where you purchased the product. The mark on electrical and electronic products only applies to the current European Union Member States.

Please follow the national guidelines for electrical and electronic product disposal.

Appendix

C

BIOS Options

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

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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	DXEIPL was not found
3	DXE Core Firmware Volume was not found
4	Recovery failed
4	S3 Resume failed
7	Reset PPI is not available

E.2 DXE Beep Codes

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

NOTE:

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

Appendix

F

Hazardous Materials Disclosure

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

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

Please refer to the following table.

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

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

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

F.2 China RoHS

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

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

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

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

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