

**MODEL:  
KINO-EHL Series**

**Mini-ITX SBC Supports Intel® Celeron® J6412 on-board SoC  
with 8GB LPDDR4x memory on board default, with HDMI, DP,  
iDPM, 2.5GbE LAN, M.2, PCIe x4 Slot, SATA 6Gb/s, COM, USB  
3.2 Gen 2, iAUDIO, 0°C~60°C and RoHS**

# User Manual

# Revision

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December 14, 2022	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

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## 1.1 Introduction



**Figure 1-1: KINO-EHL-J6412**

The KINO-EHL-J6412 is a Mini-ITX form factor single board computer. It has an on-board 10nm Intel® Celeron® processor, and supports on-board 8GB 3200 MHz LPDDR4X (system max. 16GB).

The KINO-EHL-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, one SATA 6Gb/s with 5V SATA power connector, four RS-422/285 serial ports, and two RS-232 serial ports.

## KINO-EHL-J6412 Mini-ITX SBC

### 1.2 Benefits

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

- Mini-ITX form factor
- RoHS compliant
- On-board 10nm Intel® Celeron® processor
- On-board 8GB 3200 MHz LPDDR4X (system max. 16GB)
- iDPM, DP and HDMI interfaces for triple independent displays
- Two 2.5 GbE connectors
- One 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
- Two RS-232 serial ports and four RS-422/485 serial ports
- One IEI iAUDIO, support IEI AC-KIT-888S Audio Module

## 1.4 Connectors

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

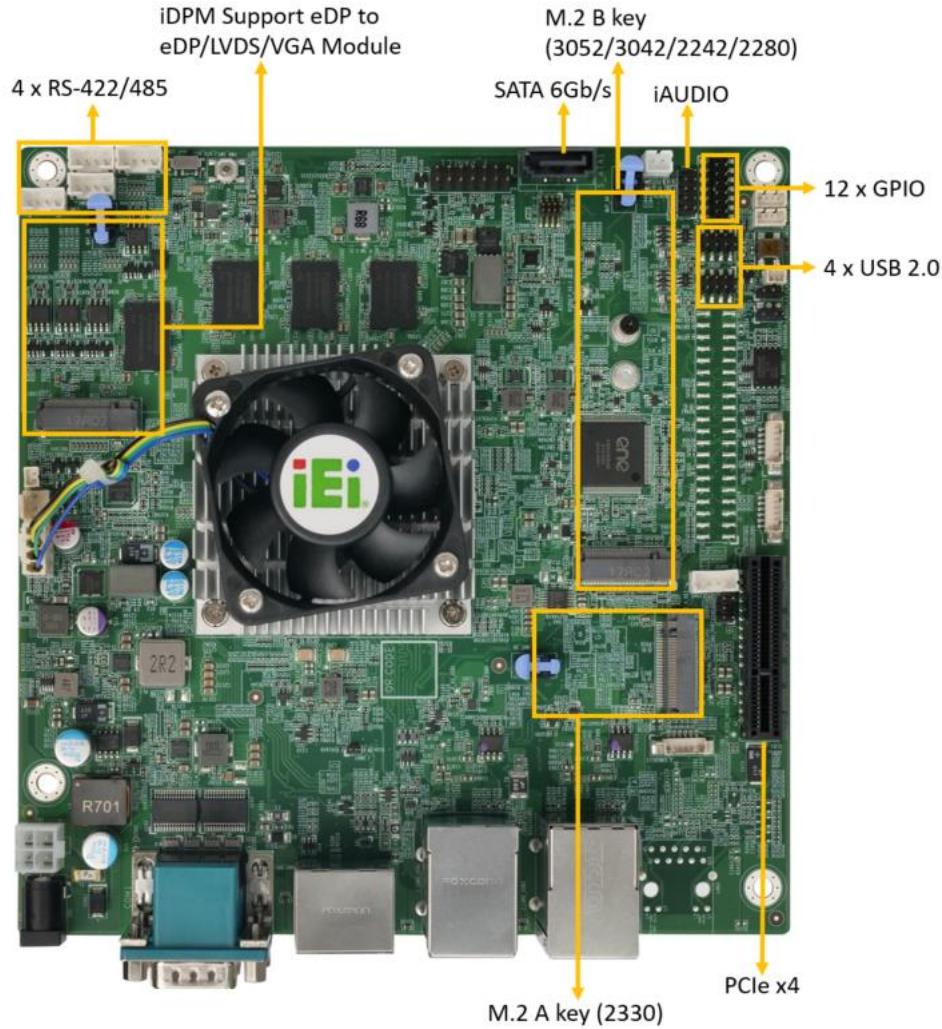


Figure 1-2: Connectors

## KINO-EHL-J6412 Mini-ITX SBC

### 1.5 Dimensions

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

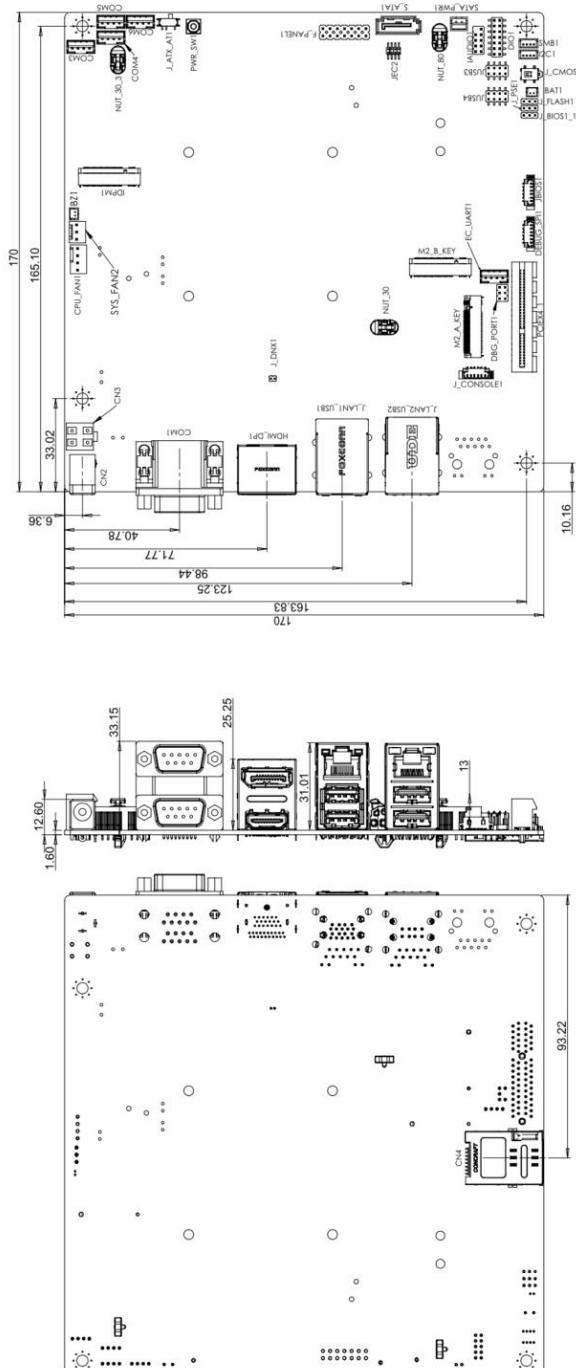


Figure 1-3: KINO-EHL-J6412 Series Main Dimensions (mm)

## 1.6 Data Flow

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

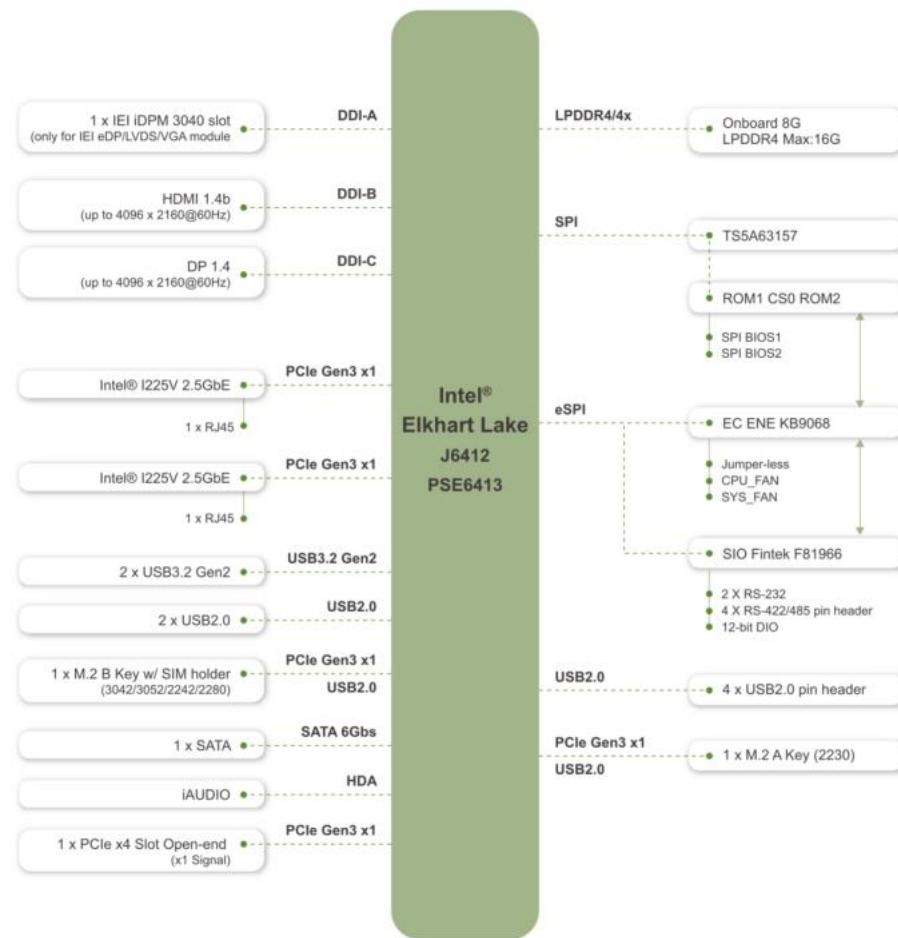


Figure 1-4: Data Flow Diagram

## 1.7 Technical Specifications

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

Specification/Model	KINO-EHL-J6412 Series
<b>Form Factor</b>	Mini-ITX
<b>On-board SoC</b>	Intel® Celeron® J6412 on-board SoC

## KINO-EHL-J6412 Mini-ITX SBC

Specification/Model	KINO-EHL-J6412 Series
<b>Memory</b>	On-board 8GB 3200 MHz LPDDR4X (system max. 16GB)
<b>Integrated Graphics</b>	Intel® UHD Graphics for 10th Gen Intel® Processors
<b>Audio</b>	1 x iAUDIO (2x5 pin), supporting IEI AC-KIT-888S kit
<b>BIOS</b>	UEFI BIOS
<b>Ethernet Controllers</b>	2 x PCIe 2.5GbE with Intel® I225V
<b>Digital I/O</b>	1 x 12-bit digital I/O
<b>Super I/O Controller</b>	Fintek F81966D-I
<b>Watchdog Timer</b>	Software programmable supports 1 sec–255 sec system reset
<b>Expansion</b>	
<b>PCIe</b>	One PCIe x4 (PCIe Gen3 x1 signal) slot
<b>M.2 A key</b>	1 x M.2 2230 A key (PCIe x1 / USB 2.0 signal)
<b>M.2 B key</b>	1 x M.2 3052/3042/2242/2280 B key with SIM slot (PCIe x2 / USB 2.0 signal)
<b>I/O Interface Connectors</b>	
<b>Audio Connector</b>	1 x iAUDIO (2x5 pin), supporting IEI AC-KIT-888S kit
<b>Display Ports</b>	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)
<b>Ethernet</b>	Two RJ-45 2.5 GbE ports
<b>Serial Ports</b>	Four RS-422/485 via internal wafer connector Two RS-232 via D-sub 9 connector

Specification/Model	KINO-EHL-J6412 Series
<b>USB Ports</b>	Two external USB 3.2 Gen 2 (10Gb/s) ports Two external USB 2.0 ports Four USB 2.0 ports by two 8-pin headers
<b>Serial ATA</b>	One SATA 6Gb/s connector with one SATA power connector
<b>SMBus</b>	Supported by one 4-pin wafer connector
<b>Environmental and Power Specifications</b>	
<b>Power Supply</b>	ATX/AT power supported 12 V DC input
<b>Power Consumption</b>	12V@2.78A (Intel® Celeron® J6412 2.0GHz with 8GB 3200MHz LPDDR4X memory and EUP enabled)
<b>Operating Temperature</b>	0°C–60°C
<b>Storage Temperature</b>	-30°C–70°C
<b>Humidity</b>	5%–95% (non-condensing)
<b>Physical Specifications</b>	
<b>Dimensions</b>	170 mm x 170 mm
<b>Weight GW/NW</b>	900 g / 400 g

Table 1-1: KINO-EHL-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-EHL-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.

**KINO-EHL-J6412 Mini-ITX SBC**

## 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-EHL-J6412 series was purchased from or contact an IEI sales representative directly by sending an email to [sales@ieiworld.com](mailto:sales@ieiworld.com)

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

Quantity	Item and Part Number	Image
1	KINO-EHL-J6412 single board computer	
1	SATA and power cable	
1	I/O shielding	
1	Quick Installation Guide	<p>Mini-ITX SBC Aspera Intel® Core™ i3 J6412 on board SoC with HDMI, DP, DVI, 2.5GbE LAN, M.2 PCIe x4 Slot, SATA 6Gb/s, COM, USB 3.2 Gen 1, BiSLED, PTC-40T 2-wire Resist.</p> <p><b>KINO-EHL-J6412</b> <b>Quick Installation Guide</b> Version 1.0 June 9, 2022</p> <p><b>Packaging List</b> The KINO-EHL-J6412 package includes the following items: ■ 1 x KINO-EHL-J6412 single board computer ■ 1 x SATA cable ■ 1 x I/O panel ■ 1 x QIG</p> <p><b>IEI</b> ©2022 Copyright by IEI Integration Corp. All rights reserved.</p>

**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/N : CB-USB02A-RS)	
RS-422/485 cable, 200mm  (P/N: 32205-003800-300-RS)	
IEI audio module  (P/N: AC-KIT-888S-R10)	
eDP to eDP converter board (for IEI iDPM connector)  (P/N: iDPM-eDP-R10)	
eDP to LVDS converter board (for IEI iDPM connector)  (P/N: iDPM-LVDS-R10)	

Chapter

3

# Connectors

---

### 3.1 Peripheral Interface Connectors

This chapter details all the jumpers and connectors.

#### 3.1.1 KINO-EHL-J6412 Layout

The figures below show all the connectors and jumpers.

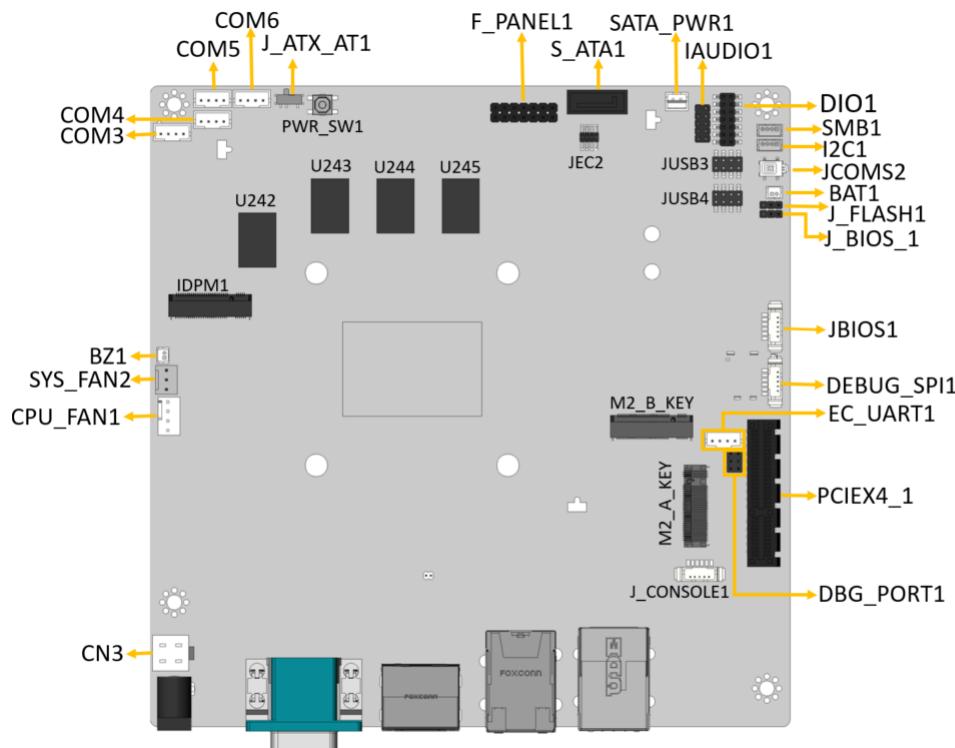


Figure 3-1: Connectors and Jumpers

#### 3.1.2 Peripheral Interface Connectors

The table below lists all the connectors on the board.

Connector	Type	Label
Audio connector	10-pin header	IAUDIO1
Battery connector	2-pin wafer	BAT1
Buzzer connector	2-pin header	BZ1

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Connector	Type	Label
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(s)	On-board LPDDR4X	U242, U243, U244, U245
microSD card slot	microSD slot	CN4
PCIe x4 slot (x1 signal)	PCIe x4 slot	PCIE_X4_1
M.2 2230 A-key slot	M.2 A-key slot	M2_A_KEY
M.2 3052/2042 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
SATA power connector (5 V)	2-pin wafer	SATA_PWR1
Serial port, RS-422/485	4-pin wafer	COM3, COM4, COM5, COM6
SMBus connector	4-pin wafer	SMB1
I2C connector	4-pin wafer	I2C1
Flash SPI ROM Connector	6-pin wafer	JBIOS1
Flash EC ROM Connector	8-pin header	JEC2
BIOS Debug Connector	6-pin wafer	J_CONSOLE1
EC Debug Connector	6-pin wafer	DEBUG_SPI1
EC SMBus debug port connector	5-pin header	DBG_PORT1
EC UART Debug Port Connector	4-pin wafer	EC_UART1

Connector	Type	Label
Flash Setting Jumper	3-pin header	J_FLASH1
USB 2.0 connectors	8-pin header	JUSB3, JUSB4
Clear CMOS Button	Press button	J_CMOS2

**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	J_LAN2_USB2
Ethernet and USB 3.2 Gen 2 connector	RJ-45 and USB Type-A	J_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

**Table 3-2: Rear Panel Connectors**

## 3.2 Internal Peripheral Connectors

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

### 3.2.1 Audio Connector

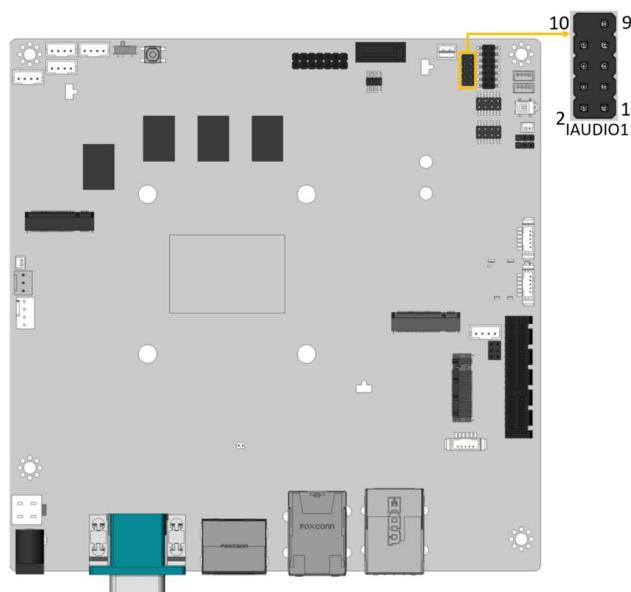
**CN Label:** IAUDIO1

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

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

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

The audio connector can be connected with IEI AC-KIT-888S HD audio module to provide audio input and output to and from the system.

**KINO-EHL-J6412 Mini-ITX SBC****Figure 3-2: Audio Connector Location**

Pin	Description	Pin	Description
1	HDA_SYNC	2	HDA_CLK
3	HDA_SDOUT	4	HDA_SPKR
5	HDA_SDIN	6	HDA_RST#
7	+5V	8	GND
9	+12V	10	GND

**Table 3-3: Audio Connector Pinouts****3.2.2 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.

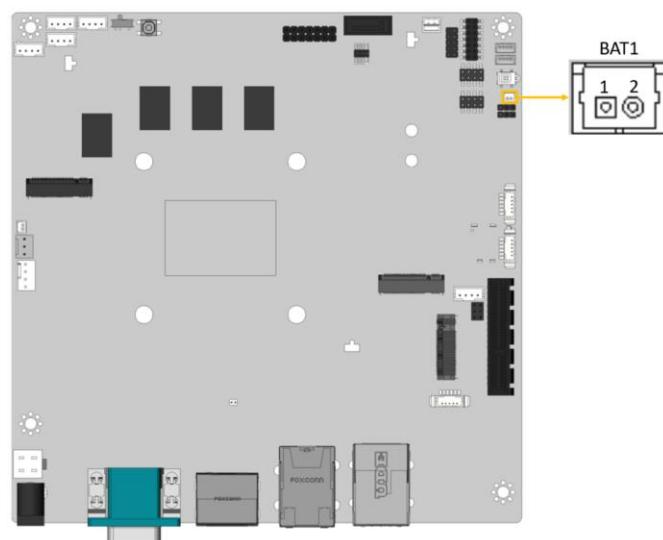
**CN Label:** BAT1

**CN Type:** 2-pin wafer, p=1.25 mm

**CN Location:** See [Figure 3-3](#)

**CN Pinouts:** See [Table 3-4](#)

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-EHL-J6412 is installed.**



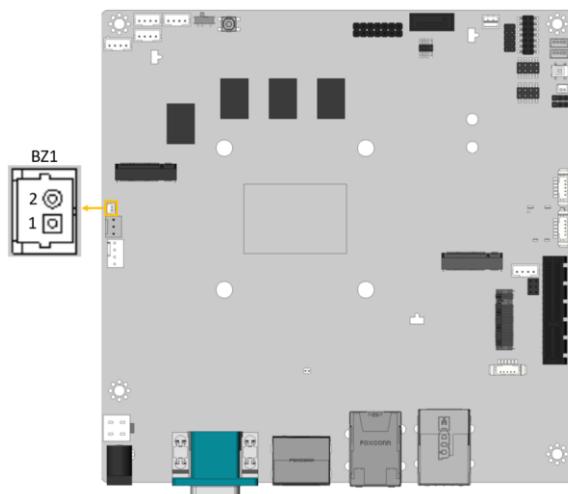
**Figure 3-3: Battery Connector Location**

Pin	Description
1	VBATT
2	GND

**Table 3-4: Battery Connector Pinouts**

**KINO-EHL-J6412 Mini-ITX SBC****3.2.3 Buzzer Intrusion Connector****CN Label:** BZ1**CN Type:** 2-pin header, p=1.25 mm**CN Location:** See [Figure 3-4](#)**CN Pinouts:** See [Table 3-5](#)

The buzzer connector is connected to a buzzer.

**Figure 3-4: Buzzer Connector Location**

Pin	Description
1	+5V
2	PC_BEEP

**Table 3-5: Buzzer Connector Pinouts**

### 3.2.4 Digital I/O Connector

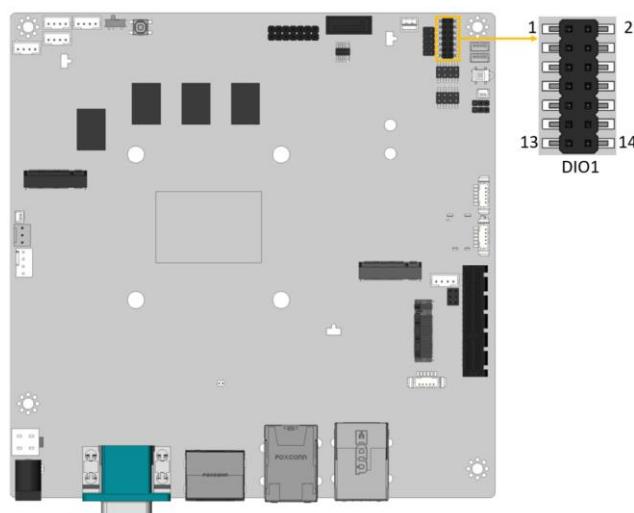
**CN Label:** DIO1

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

**CN Location:** See [Figure 3-5](#)

**CN Pinouts:** See [Table 3-6](#)

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



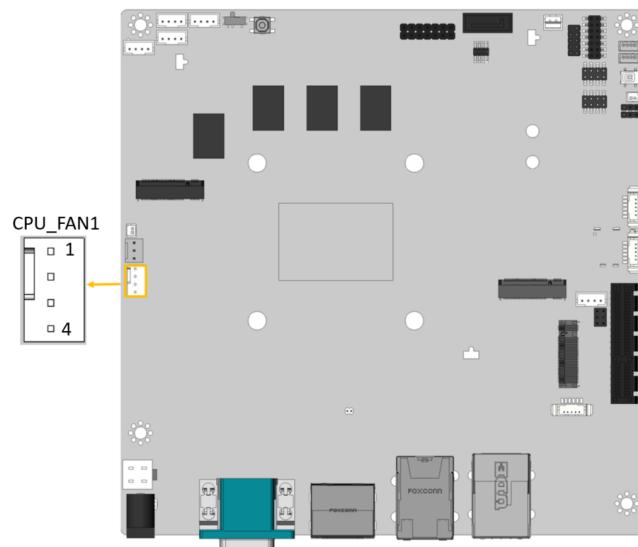
**Figure 3-5: Digital I/O Connector Location**

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 3-6: Digital I/O Connector Pinouts**

**KINO-EHL-J6412 Mini-ITX SBC****3.2.5 Fan Connector (CPU)****CN Label:** CPU\_FAN1**CN Type:** 4-pin wafer, p=2.54 mm**CN Location:** See **Figure 3-6****CN Pinouts:** See **Table 3-7**

The fan connector attaches to a CPU cooling fan.

**Figure 3-6: CPU Fan Connector Location**

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

**Table 3-7: CPU Fan Connector Pinouts**

### 3.2.6 Fan Connector (System)

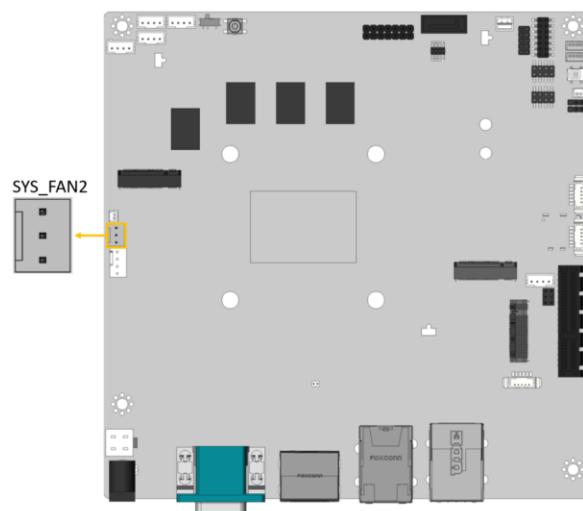
**CN Label:** **SYS\_FAN2**

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

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

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

Each fan connector attaches to a system cooling fan.



**Figure 3-7: System Fan Connector Location**

PIN NO.	DESCRIPTION
1	FANIO
2	PWM
3	GND

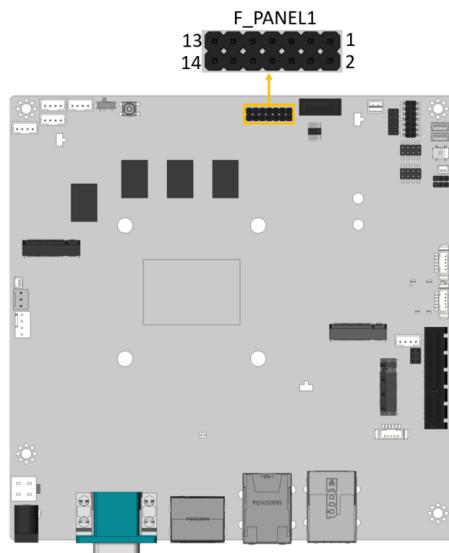
**Table 3-8: System Fan Connector Pinouts**

## KINO-EHL-J6412 Mini-ITX SBC

## 3.2.7 Front Panel Connector

**CN Label:** F\_PANEL1**CN Type:** 14-pin header, p=2.54 mm**CN Location:** See Figure 3-8**CN Pinouts:** See Table 3-9

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

**Figure 3-8: Front Panel Connector Location**

FUNCTION	PIN	DESCRIPTION	FUNCTION	PIN	DESCRIPTION
Power LED	1	PWR_LED+	IPMI LED	2	Speaker+
	3	NC		4	NC
	5	PWR_LED-		6	NC
Power Button	7	PWR_BTN+	Speaker	8	Speaker-
	9	PWR_BTN-		10	NC
HDD LED	11	HDD_LED+	Reset Button	12	Reset+
	13	HDD_LED-		14	Reset-

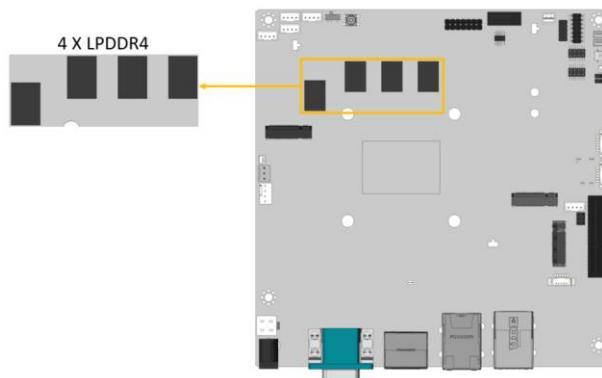
**Table 3-9: Front Panel Connector Pinouts**

### 3.2.8 On-board LPDDR4 (s)

**CN Label:** U242, U243, U244, U245

**CN Type:** On-board LPDDR4X

**CN Location:** See [Figure 3-9](#)



**Figure 3-9: On-board LPDDR4 Locations**

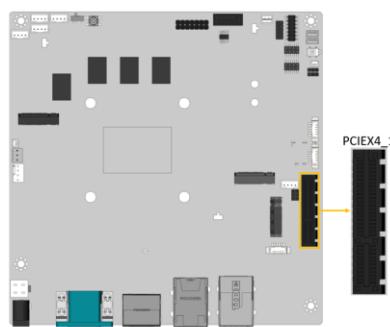
### 3.2.9 PCIe x4 Slot

**CN Label:** PCIEX4\_1

**CN Type:** PCIe x4 slot

**CN Location:** See [Figure 3-10](#)

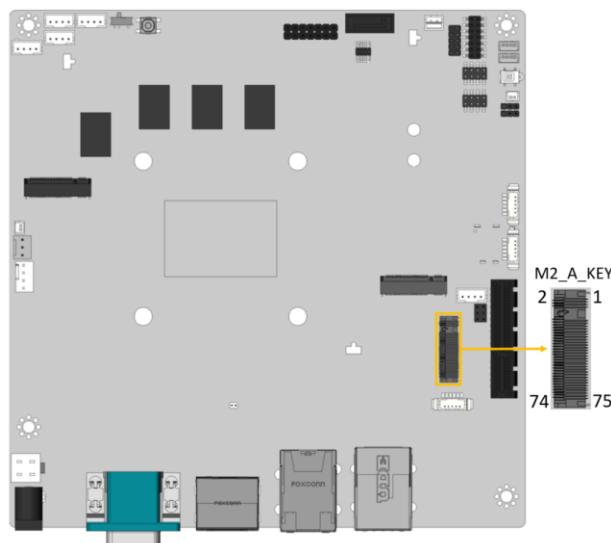
The PCIe x4 interface provides x1 signal for PCIe expansion cards.



**Figure 3-10: PCIe x4 Slot Location**

**KINO-EHL-J6412 Mini-ITX SBC****3.2.10 M.2 Slot, A-key****CN Label:** M2\_A\_KEY**CN Type:** M.2 A-key slot**CN Location:** See [Figure 3-11](#)**CN Pinouts:** See [Table 3-10](#)

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 3-11: M.2 A-key Slot Location**

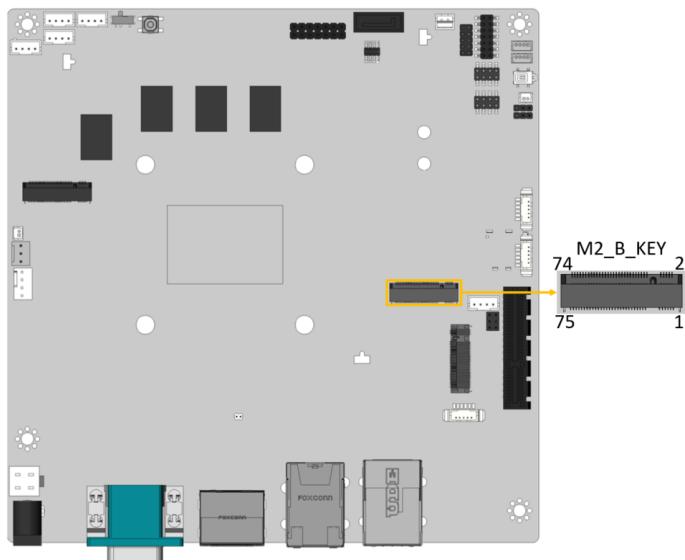
<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
1	GND	2	+V3.3A
3	USB+	4	+V3.3A
5	USB-	6	NC
7	GND	8	Module Key
9	Module Key	10	Module Key
11	Module Key	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	NC

Pin	Description	Pin	Description
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
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 3-10: M.2 A-key Slot Pinouts

**KINO-EHL-J6412 Mini-ITX SBC****3.2.11 M.2 Slot, B-key****CN Label:** M2\_B\_KEY**CN Type:** M.2 B-key slot**CN Location:** See **Figure 3-12****CN Pinouts:** See **Table 3-11**

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 3-12: M.2 B-key Slot Location**

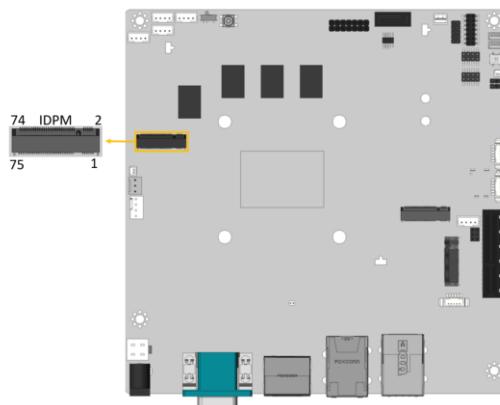
PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	WWAN_CONFIG3	2	+3.3V_WWAN
3	GND	4	+3.3V_WWAN
5	GND	6	WWAN_FCP_OFF
7	USB_D+	8	WWAN_DISABLE
9	USB_D-	10	NC
11	GND	12	Module Key
13	Module Key	14	Module Key
15	Module Key	16	Module Key

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 3-11: M.2 B-key Slot Pinouts

**KINO-EHL-J6412 Mini-ITX SBC****3.2.12 IDPM Slot****CN Label:** IDPM**CN Type:** M.2 B-key slot**CN Location:** See **Figure 3-13****CN Pinouts:** See **Table 3-12**

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

**Figure 3-13: 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_P IN21	22	+3.3VS

23	DISPLAY_DETECT_P IN23	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 3-12: IDPM Connector Pinouts**

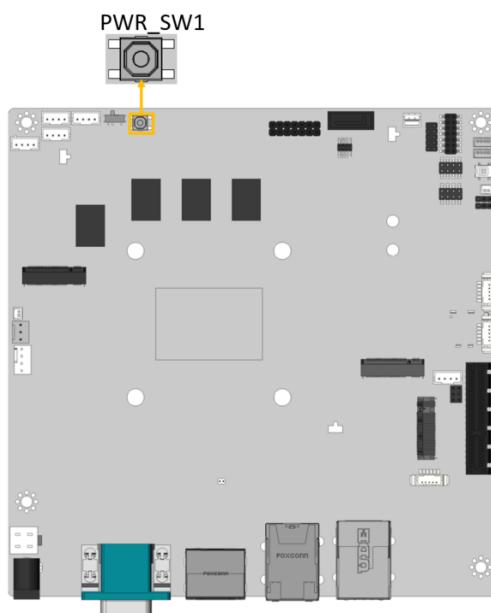
**KINO-EHL-J6412 Mini-ITX SBC****3.2.13 Power Button**

**CN Label:** PWR\_SW1

**CN Type:** Push button

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

The on-board power button controls system power.



**Figure 3-14: Power Button Location**

### 3.2.14 Power Connector

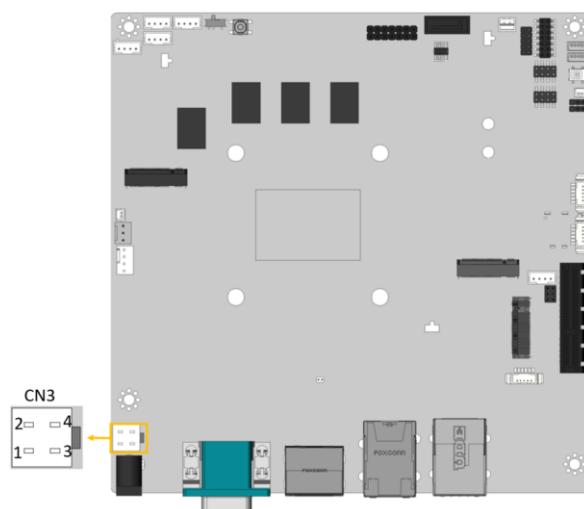
**CN Label:** CN3

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

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

**CN Pinouts:** See Table 3-13

The power input connector provides power to the system.



**Figure 3-15: Power Connector Location**

<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
1	GND	3	+12 V
2	GND	4	+12 V

**Table 3-13: Power Connector Pinouts**

### 3.2.15 SATA 6Gb/s Drive Connector

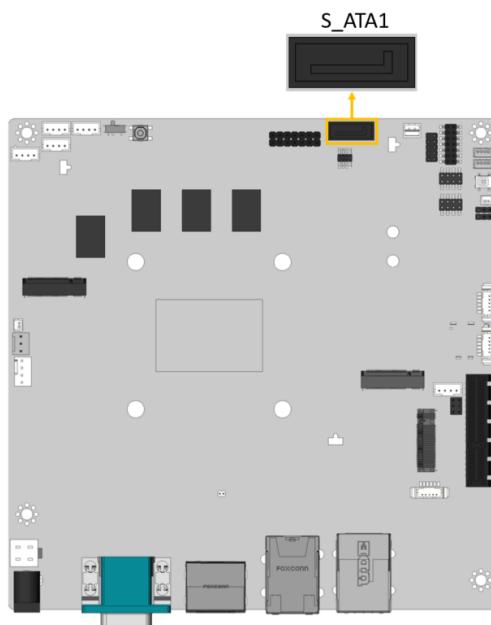
**CN Label:** S\_ATA1

**CN Type:** 7-pin SATA drive connectors

**CN Location:** See [Figure 3-16](#)

**CN Pinouts:** See [Table 3-14](#)

The SATA drive connector can be connected to SATA drives.



**Figure 3-16: 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

**Table 3-14: SATA 3Gb/s Drive Connector Pinouts**

### 3.2.16 SATA Power Connector

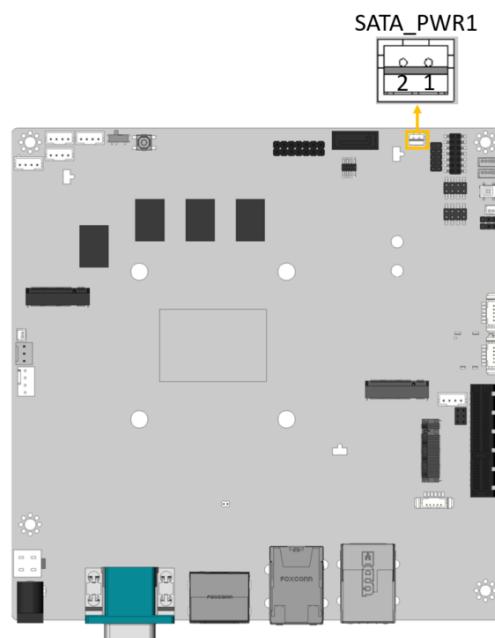
**CN Label:** **SATA\_PWR1**

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

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

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

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



**Figure 3-17: SATA Power Connector Location**

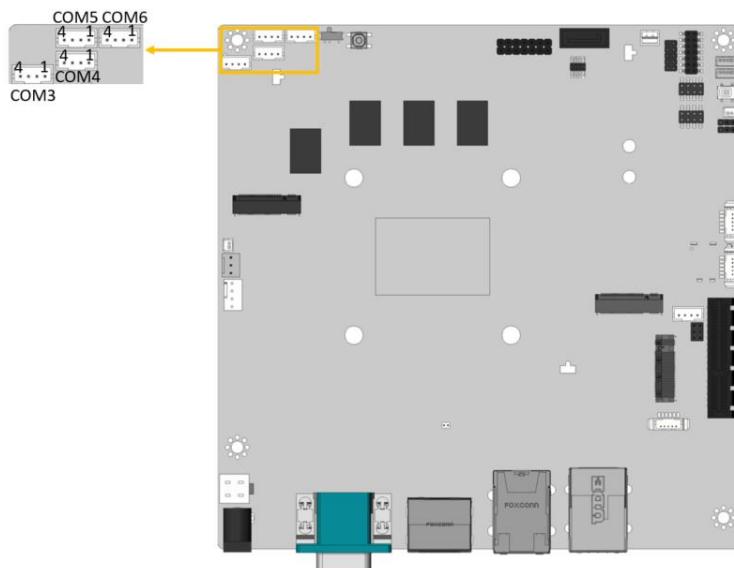
Pin	Description
1	+5 V
2	GND

**Table 3-15: SATA Power Connector Pinouts**

## KINO-EHL-J6412 Mini-ITX SBC

**3.2.17 Serial Port Connector, RS-422/485****CN Label:** COM3, COM4, COM5, COM6**CN Type:** 4-pin wafer, p=2.00 mm**CN Location:** See **Figure 3-18****CN Pinouts:** See **Table 3-16**

Used for RS-422/485 communications.

**Figure 3-18: RS-422/485 Connector Location**

PIN NO.	DESCRIPTION
1	RX-
2	RX+
3	TX+
4	TX-

**Table 3-16: RS-422/485 Connector Pinouts**

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

RS-422 Pinouts	RS-485 Pinouts

Table 3-17: RS-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.

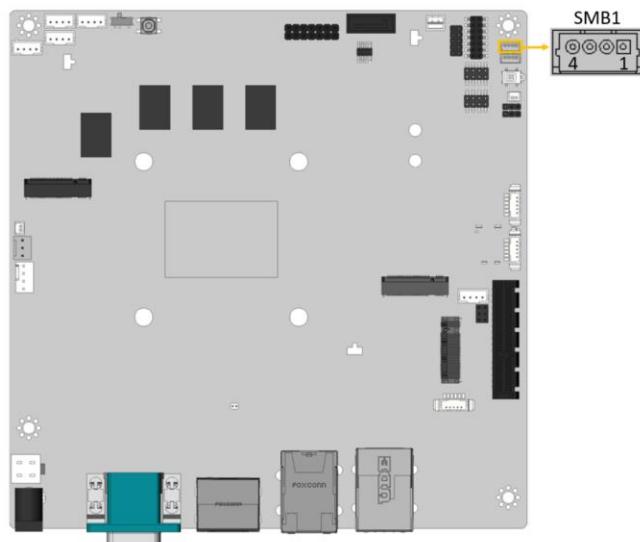


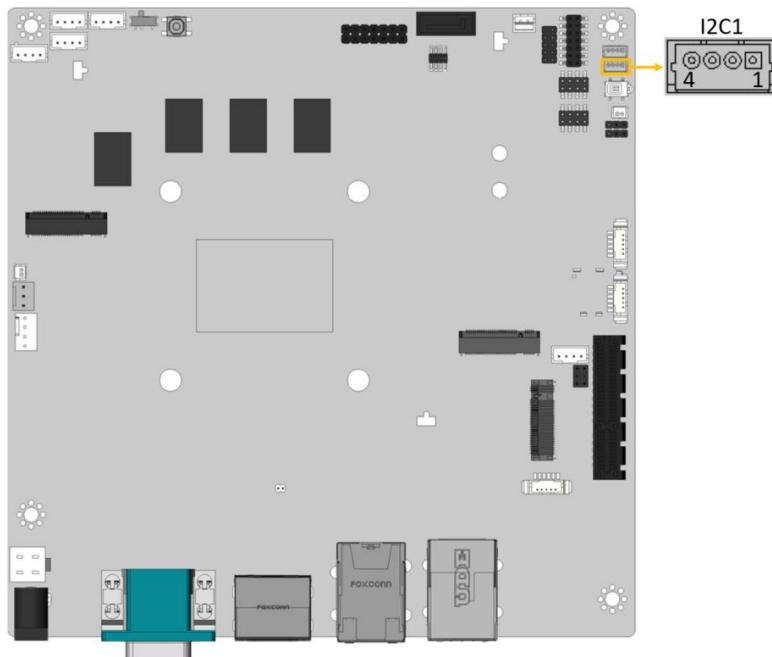
Figure 3-19: SMBus Connector Location

**KINO-EHL-J6412 Mini-ITX SBC**

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

**Table 3-18: SMBus Connector Pinouts****3.2.19 I<sup>2</sup>C Connector****CN Label:** I<sup>2</sup>C1**CN Type:** 4-pin wafer, p=1.25 mm**CN Location:** See **Figure 3-20****CN Pinouts:** See **Table 3-19**

The I<sup>2</sup>C connector is used to connect I<sup>2</sup>C-bus devices to the motherboard.

**Figure 3-20: I<sup>2</sup>C Connector Location**

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

Table 3-19: I2C Connector Pinouts

### 3.2.20 Flash SPI ROM Connector

**CN Label:** JBIOS1

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

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

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

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

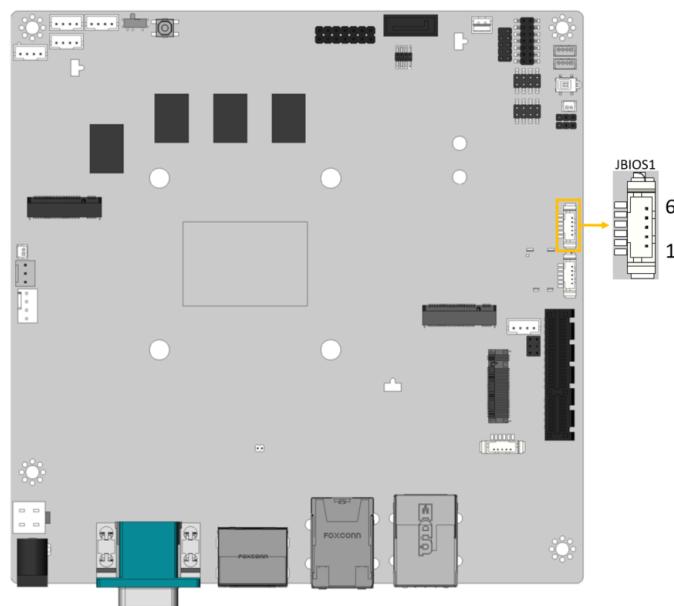


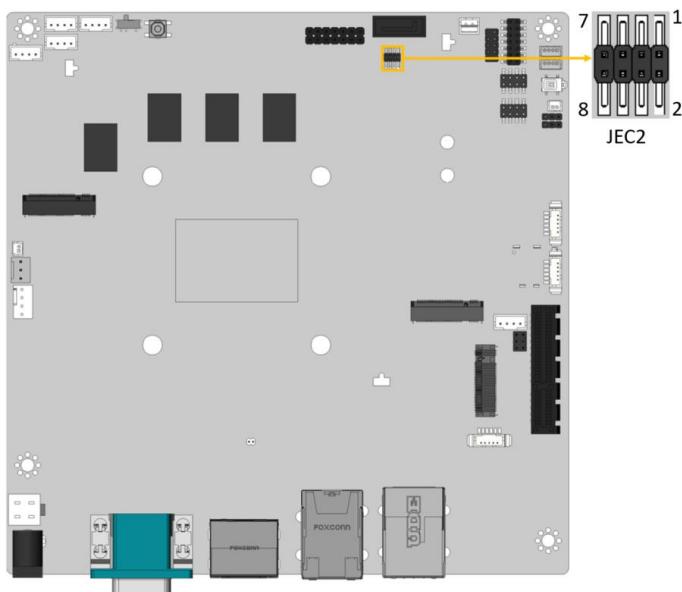
Figure 3-21: Flash SPI ROM Connector Location

**KINO-EHL-J6412 Mini-ITX SBC**

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

**Table 3-20: Flash SPI ROM 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 BIOS Debug Connector

**CN Label:** J\_CONSOLE1

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

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

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

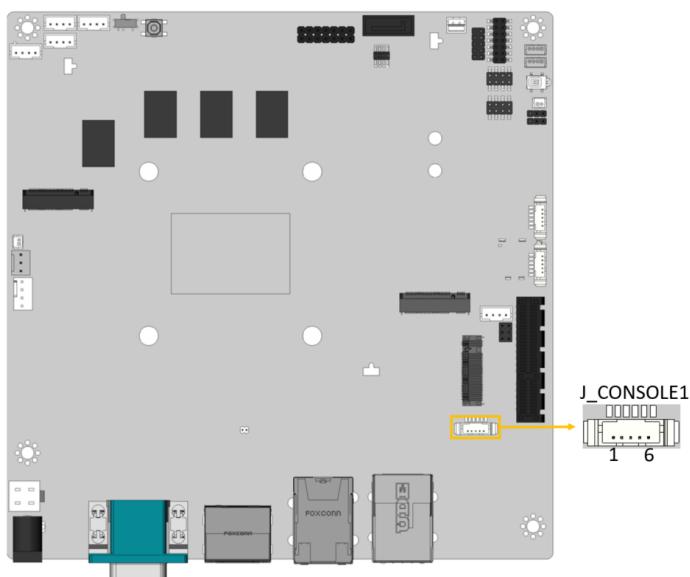


Figure 3-23: BIOS Debug Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+3.3V	4	PSE_UART4_CTS
2	PSE_UART4_TX	5	PSE_UART4_RTS
3	PSE_UART4_RX	6	GND

Table 3-22: BIOS Debug Connector Pinouts

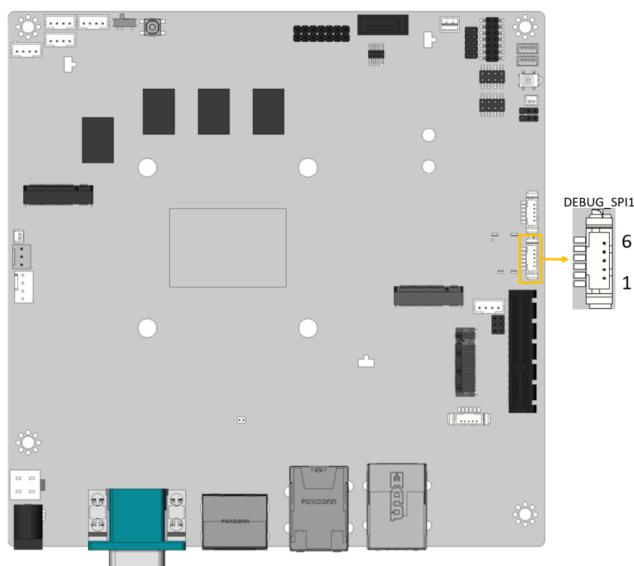
**KINO-EHL-J6412 Mini-ITX SBC****3.2.23 EC Debug Connector**

**CN Label:** DEBUG\_SPI1

**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 EC SMBus Debug Port Connector**

**CN Label:** DBG\_PORT1

**CN Type:** 6-pin wafer, p=2.0 mm

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

CN Pinouts: See Table 3-24

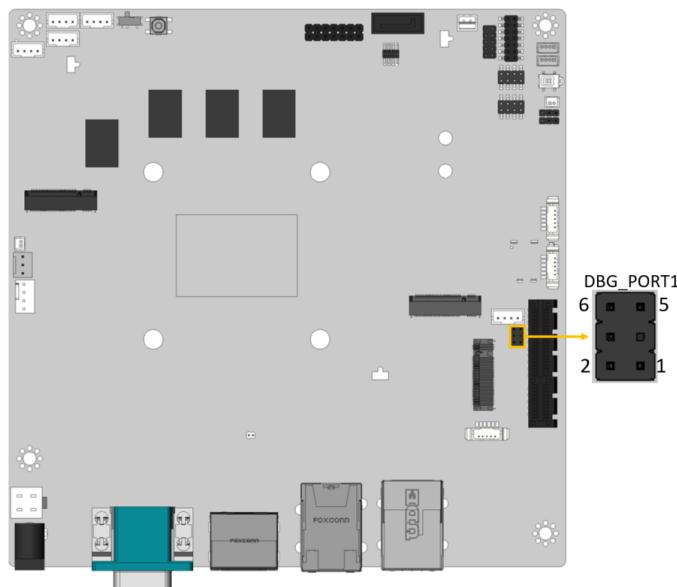


Figure 3-25: EC SMBus Debug Port Connector Location

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	+V5A	4	SMDAT0_EC
2	SMCLK0_EC	5	GND
3	NC	6	PLT_RST_N

Table 3-24: EC SMBus Debug Port Connector Pinouts

### 3.2.25 EC UART Debug Port Connector

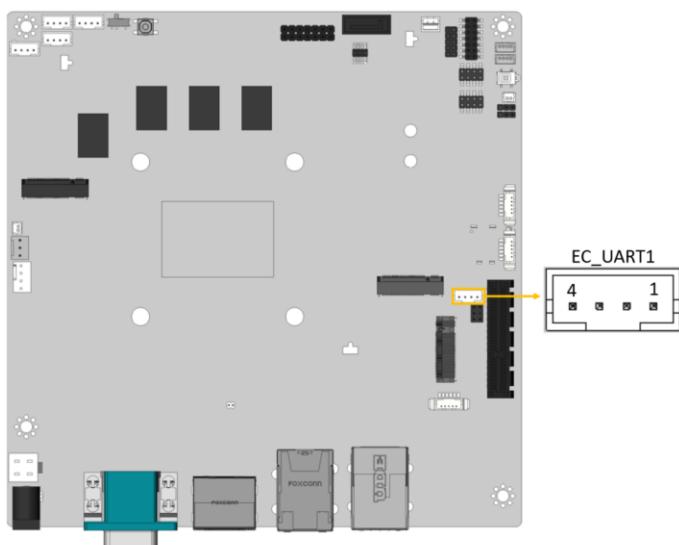
CN Label: **EC\_UART1**

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

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

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

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

**KINO-EHL-J6412 Mini-ITX SBC****Figure 3-26: EC UART Debug Port Connector Location**

PIN NO.	DESCRIPTION	PIN NO.	DESCRIPTION
1	UART_TX	3	UART_RX
2	+3.3V	4	GND

**Table 3-25: EC UART Debug Port Connector Pinouts****3.2.26 USB 2.0 Connectors****CN Label:** JUSB3, JUSB4**CN Type:** 8-pin header, p=2.00 mm**CN Location:** See **Figure 3-27****CN Pinouts:** See **Table 3-26**

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

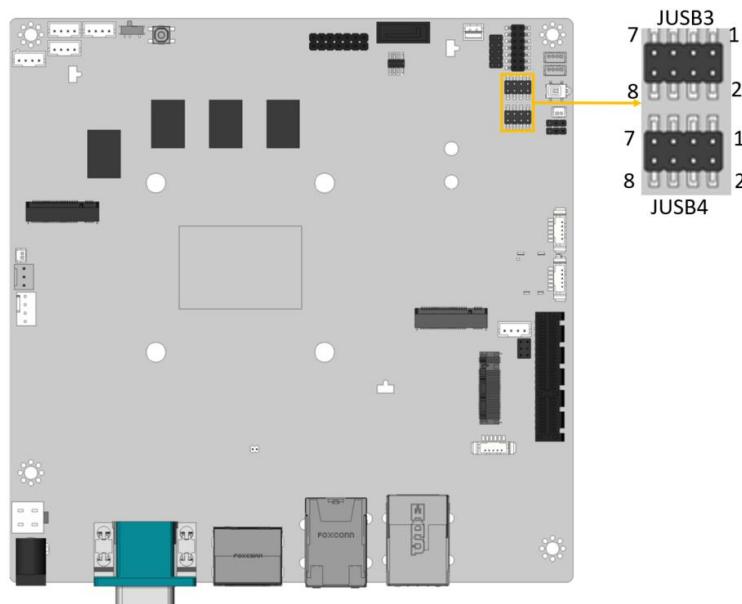


Figure 3-27: USB 2.0 Connector Locations

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 3-26: USB 2.0 Connector Pinouts

### 3.3 External Peripheral Interface Connector Panel

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

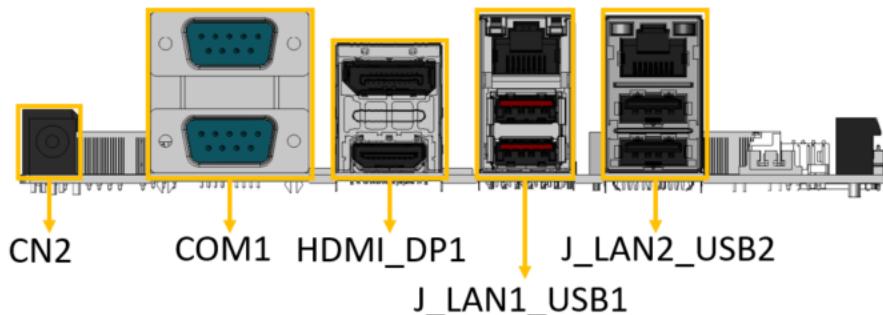


Figure 3-28: External Peripheral Interface Connector

#### 3.3.1 Ethernet and USB 2.0 Combo Connector

**CN Label:** J\_LAN2\_USB2

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

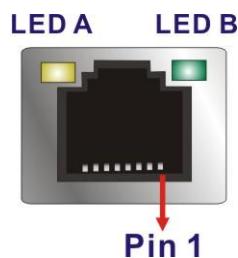
**CN Location:** See **Figure 3-28**

**CN Pinouts:** See **Table 3-27** and **Table 3-29**

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

Pin	Description	Pin	Description
1	LAN2_MDIOP	5	LAN2_MDI2P
2	LAN2_MDI0N	6	LAN2_MDI2N
3	LAN2_MDI1P	7	LAN2_MDI3P
4	LAN2_MDI1N	8	LAN2_MDI3N

Table 3-27: LAN2 Ethernet Connector Pinouts



**Figure 3-29: 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 3-28: 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 3-29: 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 3-28**

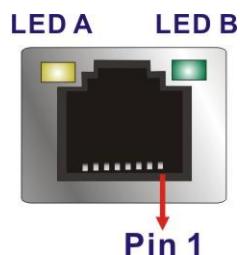
**CN Pinouts:** See **Table 3-30** and **Table 3-32**

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

Pin	Description	Pin	Description
1	LAN1_MDIOP	5	LAN1_MDI2P

**KINO-EHL-J6412 Mini-ITX SBC**

<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
2	LAN1_MDI0N	6	LAN1_MDI2N
3	LAN1_MDI1P	7	LAN1_MDI3P
4	LAN1_MDI1N	8	LAN1_MDI3N

**Table 3-30: LAN1 Ethernet Connector Pinouts****Figure 3-30: Ethernet Connector**

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

**Table 3-31: Connector LEDs**

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

<b>Pin</b>	<b>Description</b>	<b>Pin</b>	<b>Description</b>
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 3-32: USB 3.2 Gen 2 Port Pinouts**

### 3.3.3 Serial Port Connectors (COM1 and COM2)

**CN Label:** COM1

**CN Type:** D-sub 9

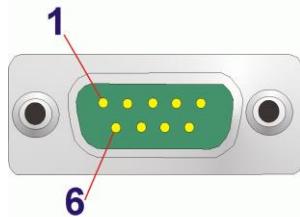
**CN Location:** See Figure 3-28

**CN Pinouts:** See Table 3-33 and Figure 3-31

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 3-33: Serial Port Pinouts**



**Figure 3-31: Serial Port Pinouts**

### 3.3.4 Power Connector

**CN Label:** PWR1

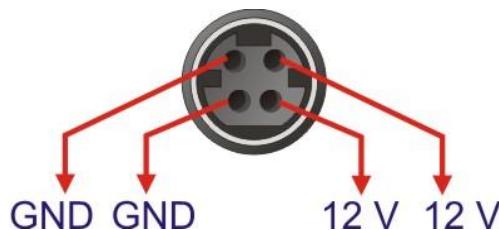
**CN Type:** 4-pin DIN

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

**KINO-EHL-J6412 Mini-ITX SBC**

**CN Pinouts:** See [Figure 3-32](#)

The connector supports the 12V power adapter.



**Figure 3-32: 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 3-28](#)

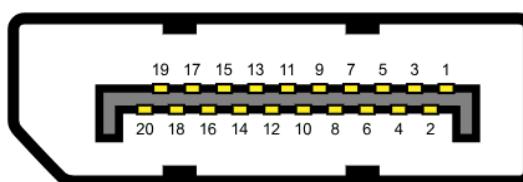
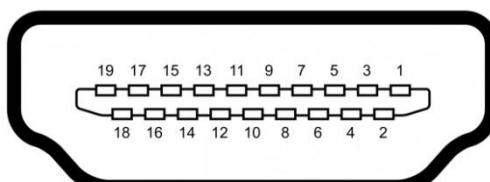
**CN Pinouts:** See [Table 3-34](#)

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 3-34: HDMI and DP Connector Pinouts****Figure 3-33: DP Connector Pinout Locations****Figure 3-34: HDMI Connector Pinout Locations**

Chapter

4

# Installation

---

## 4.1 Anti-static Precautions



### WARNING:

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

Electrostatic discharge (ESD) can cause serious damage to electronic components, including the KINO-EHL-J6412. Dry climates are especially susceptible to ESD. It is therefore critical that whenever the KINO-EHL-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-EHL-J6412, place it on an anti-static pad. This reduces the possibility of ESD damaging the KINO-EHL-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.

## KINO-EHL-J6412 Mini-ITX SBC



### **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-EHL-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-EHL-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-EHL-J6412 off:
  - When working with the KINO-EHL-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-EHL-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

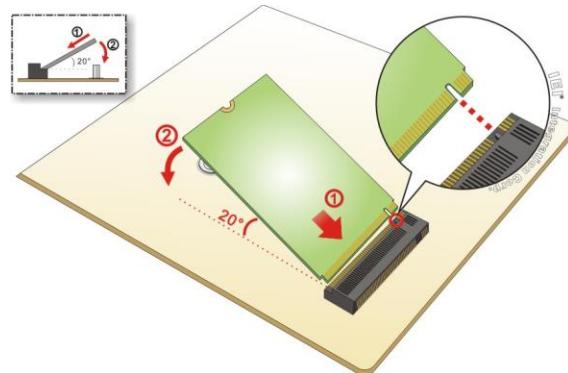
The KINO-EHL provide two ways to install the M.2 expansion card. One is using screw, and the other is using the retainer. Please follow the steps below.

### Mode One: Using screw

**Step 1:** Locate the M.2 module slot. See [Chapter 3](#).

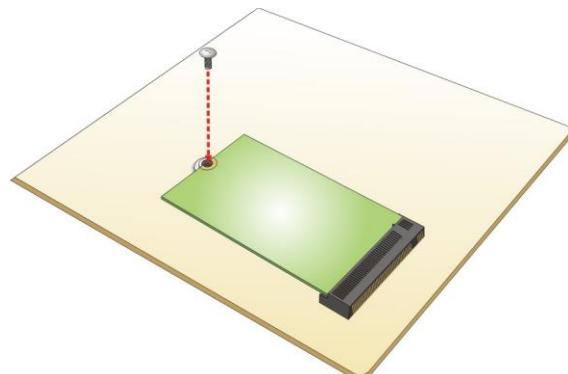
**Step 2:** Remove the retention screw secured on the motherboard.

**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 20° ([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](#)).

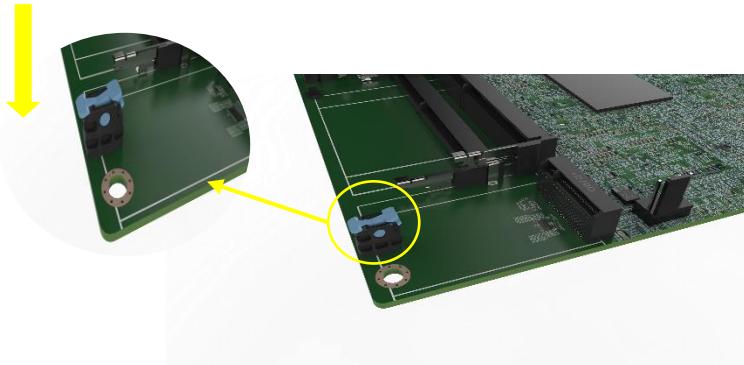


**Figure 4-2: Securing the M.2 Module**

## KINO-EHL-J6412 Mini-ITX SBC

### Mode Two: Using the Retainer

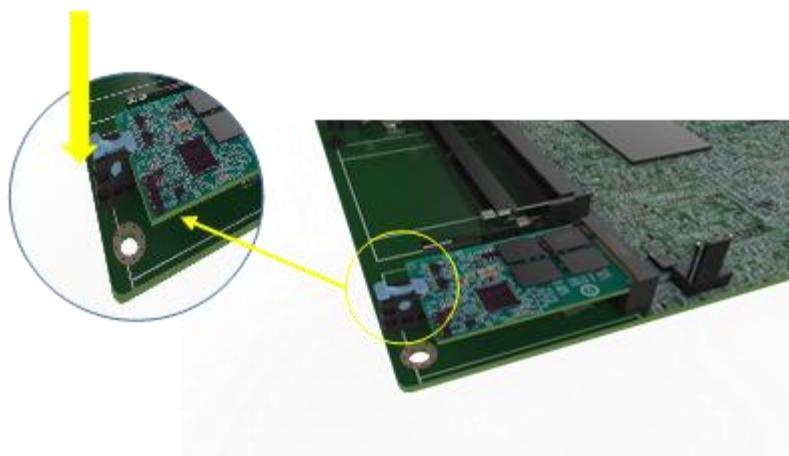
**Step 1:** Press the retainer down as shown below. (See **Figure 4-3**)



**Figure 4-3: Press the Retainer**

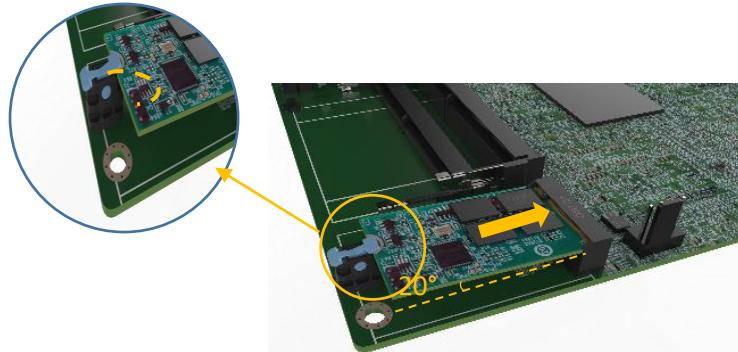
**Step 2:** Line up the notch on the M.2 module with the notch on the slot. Slide the M.2 module into the socket at an angle of about 20°. (See **Figure 4-1**)

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



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

**Step 4:** Press the M.2 module down until it is secured into place by the retainer. (See **Figure 4-5**)



**Figure 4-5: Securing the M.2 Module**

**Step 5:** If you want to remove the M.2 module, you should press the retainer down as described in Step 1 to release the M.2 module.. (See **Figure 4-3**)

## 4.4 System Configuration

The KINO-EHL-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 4-6**.

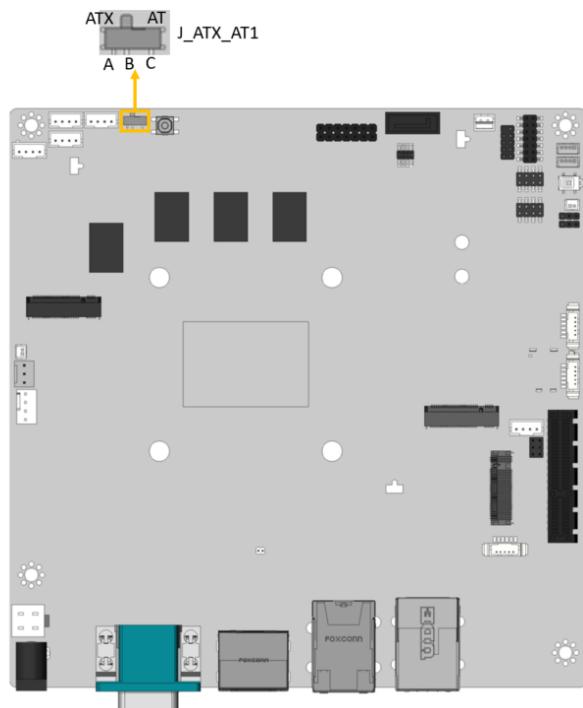
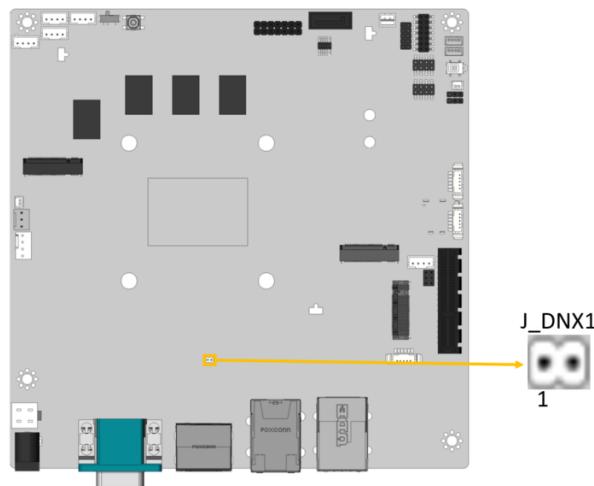


Figure 4-6: AT/ATX Power Mode Locations

#### 4.4.2 DNX Mode Setting Jumper



Setting	DESCRIPTION
Open	Normal (default)
Short	Enable DNX Boot

#### 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 4-7**.

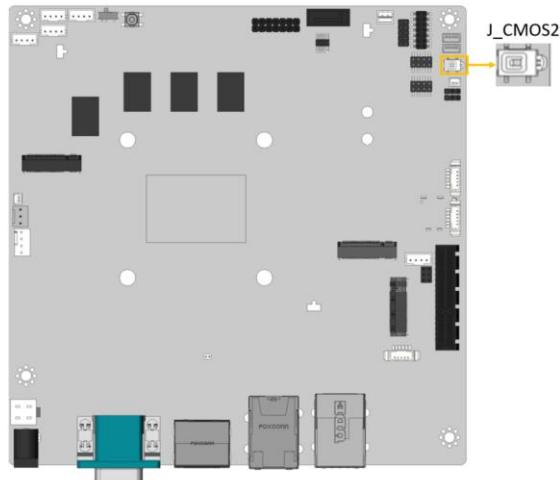


Figure 4-7: Clear CMOS Button Location

#### 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 4-1: Flash Descriptor Security Override Jumper Settings

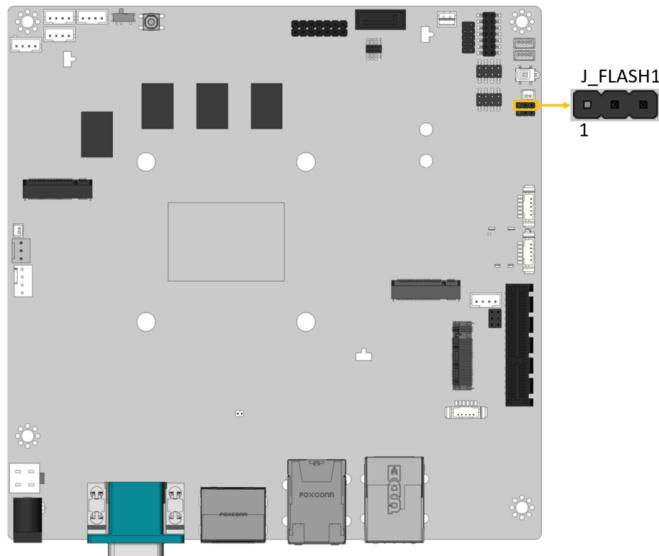


Figure 4-8: Flash Descriptor Security Override Jumper Location

#### 4.4.5 BIOS1/BIOS2 Select Jumper

Use the BIOS1/BIOS2 Select jumper (J BIOS1) to select BIOS1 or BIOS2.

Setting	Description
Short 1-2	BIOS1 (default)
Short 2-3	BIOS2

Table 4-2: BIOS1/BIOS2 Select Jumper Settings

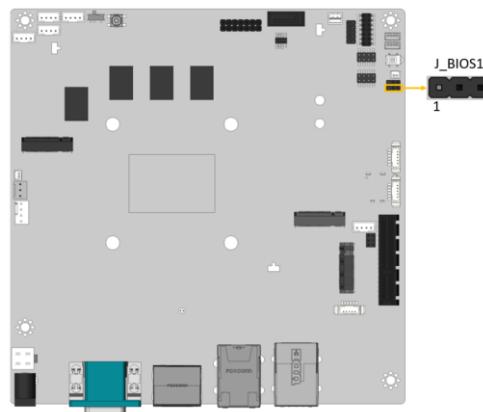


Figure 4-9: BIOS1/BIOS2 Select Jumper Location

## 4.5 Internal Peripheral Device Connections

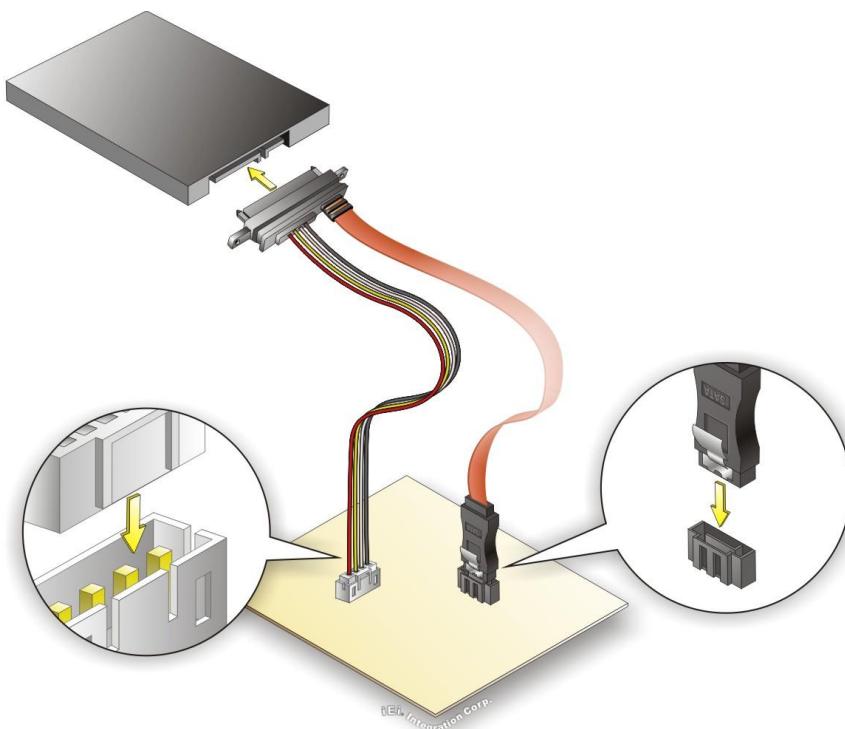
This section outlines the installation of peripheral devices to the on-board connectors.

### 4.5.1 SATA Drive Connection

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

**Step 6:** Locate the SATA connector and the SATA power connector. The locations of the connectors are shown in Chapter 3.

**Step 7: Insert the cable connector.** Insert the cable connector into the on-board SATA drive connector and the SATA power connector. See **Figure 4-10**.

**KINO-EHL-J6412 Mini-ITX SBC**

**Figure 4-10: SATA Drive Cable Connection**

**Step 8:** 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 4-10**.

**Step 9:** 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 10: Locate the connectors.** The locations of the USB connectors are shown in **Chapter 3**.



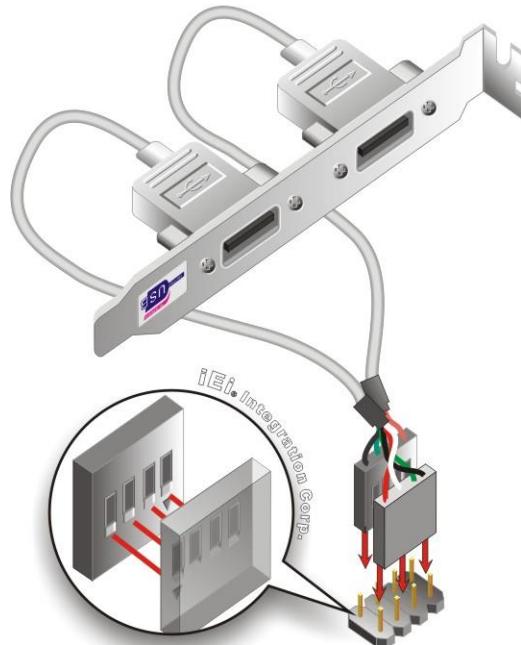
**WARNING:**

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

---

**Step 11: Align the connectors.** The cable has two connectors. Correctly align pin 1 on each cable connector with pin 1 on the KINO-EHL-J6412 USB connector.

**Step 12: Insert the cable connectors.** Once the cable connectors are properly aligned with the USB connectors on the KINO-EHL-J6412, connect the cable connectors to the on-board connectors. See Figure 4-11.



**Figure 4-11: Dual USB Cable Connection**

**Step 13: 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.ieeworld.com>. Type KINO-EHL-J6412 and press Enter.

## KINO-EHL-J6412 Mini-ITX SBC

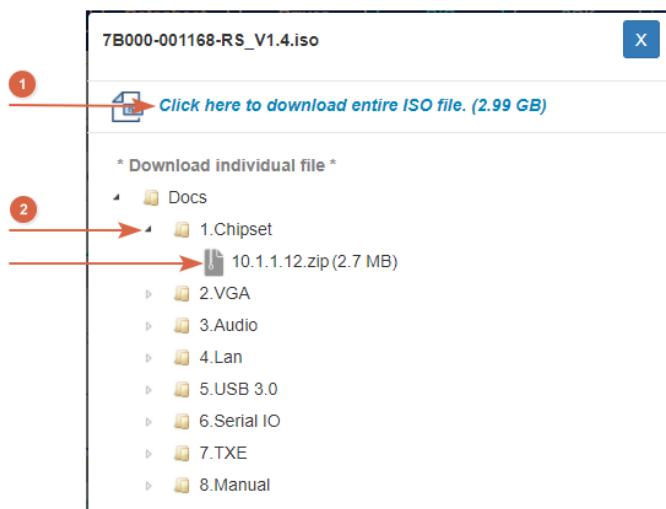
The screenshot shows the IEI Download Center homepage. At the top, there's a green header with the IEI logo and a 'Go to IEI' link. Below the header is a banner with the text 'Download Center' and a cloud icon. A red box highlights a search bar containing the placeholder 'Enter a model name to search'. To the right of the search bar is a 'Search' button with a magnifying glass icon. Below the banner, there are several download icons representing different file types like PDFs, spreadsheets, and drivers.

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

The screenshot shows a product page for the 'WAFER-BT-i1'. At the top, there are several filter buttons: 'All Type', 'BIOS', 'Datasheet', 'Driver' (which is highlighted in green), 'QIG', 'SDK', 'User Manual', 'Utility', and 'Others'. An arrow points from the text above to the 'Driver' button. Below the buttons, the product name 'WAFER-BT-i1' is displayed in a green box. To the right is a 'Product Info' button. Underneath the product name, it says 'Embedded Computer > Single Board Computer > Embedded Board' and '3.5" SBC with Intel® 22nm Atom™/Celeron® on-board SoC'. A red arrow points from the text above to the 'Driver' section of the table below. The table has columns for 'File Name', 'Published', 'Version', and 'File Checksum'. It lists one item: '7B000-001033-RS V2.3.iso (2.23 GB)'.

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

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



**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.

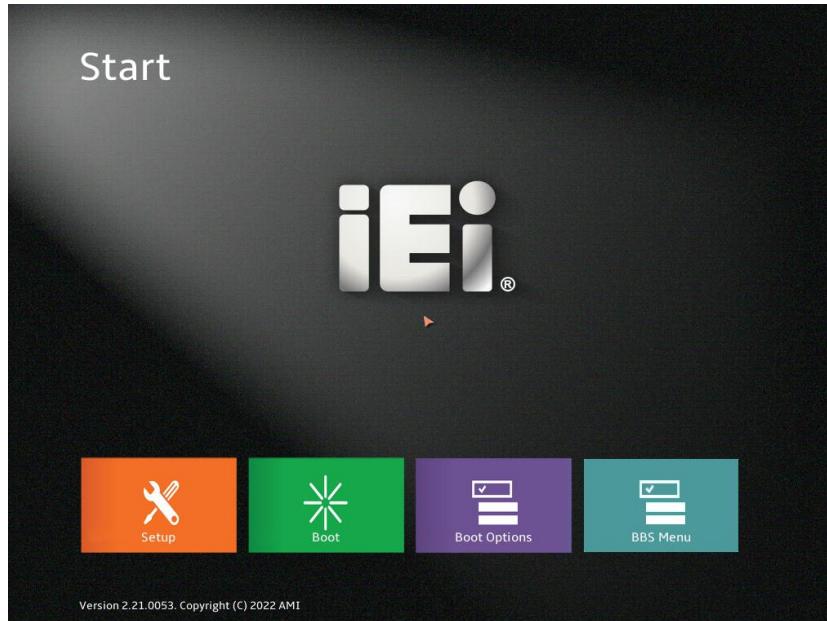


Figure 5-1: BIOS Starting Menu

## 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

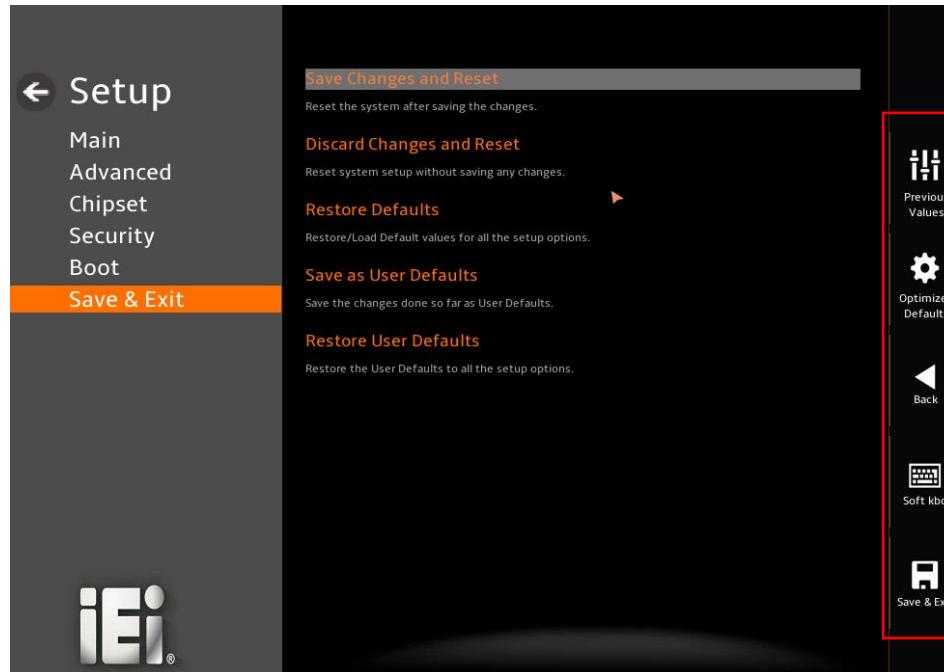
For keyboard navigation, use the navigation keys shown in **Table 5-1**.

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

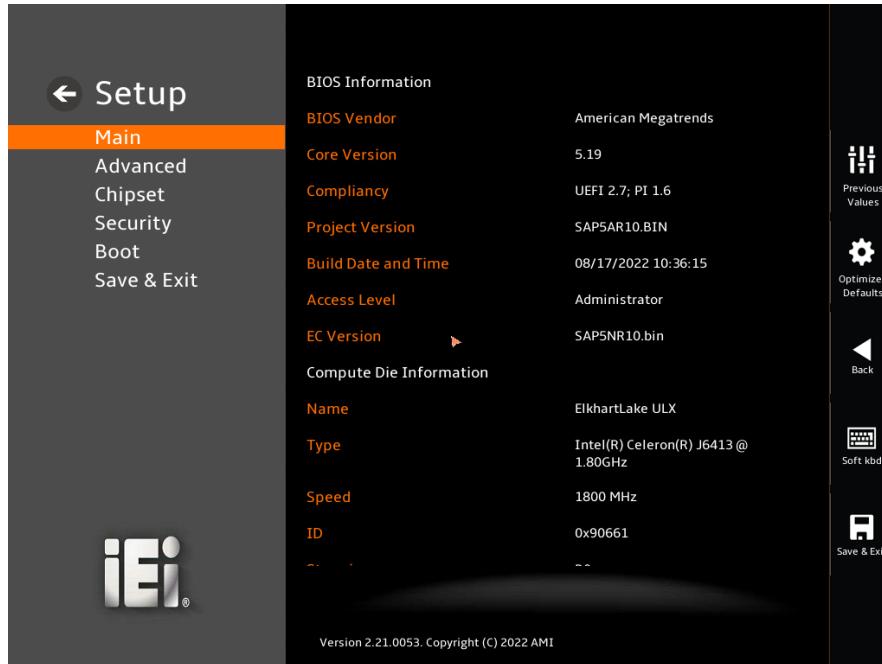
The **menu bar** on top of the BIOS screen has the following main items:

- 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

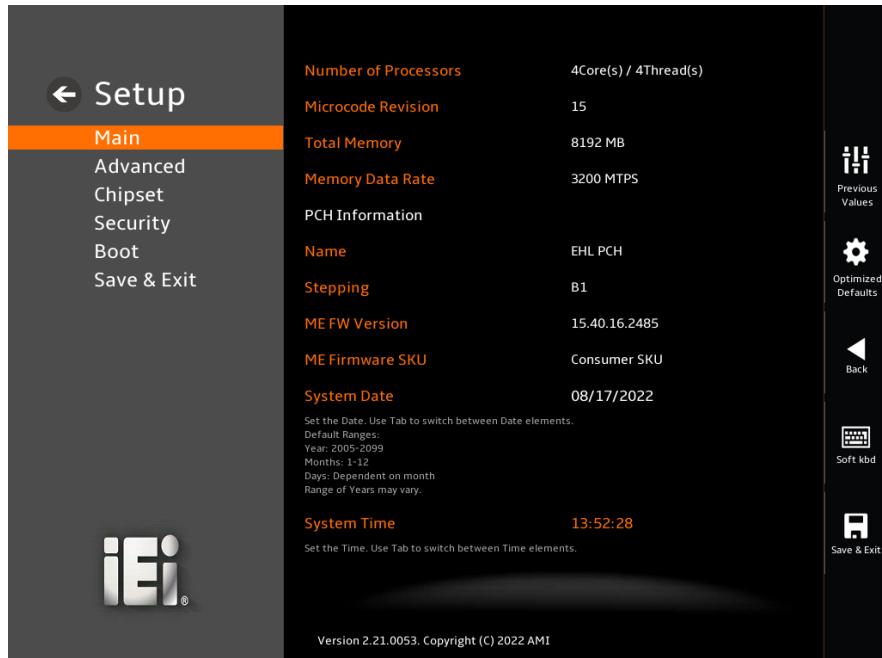
The following sections completely describe the configuration options found in the menu items at the top of the BIOS screen and listed above.

## 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)**

## KINO-EHL-J6412 Mini-ITX SBC

### → BIOS Information

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

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

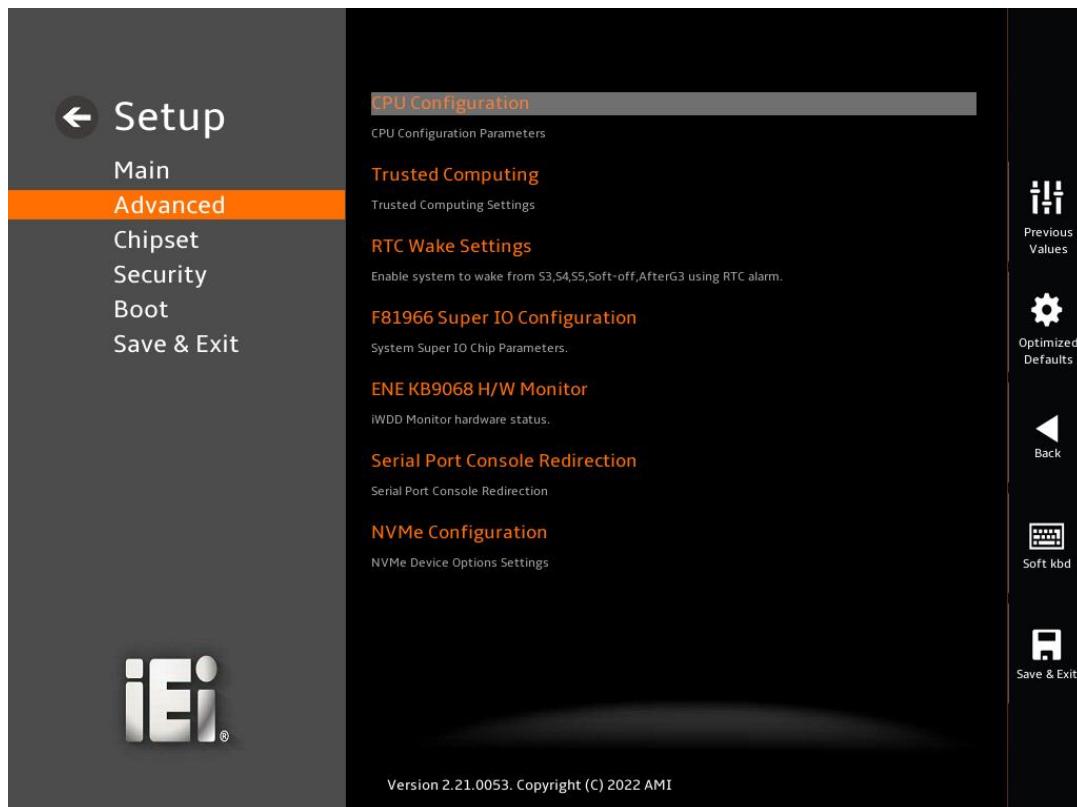
## 5.3 Advanced

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)**

## KINO-EHL-J6412 Mini-ITX SBC

**Setup**

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

**Power Limit 2** 20.0

**Intel (VMX) Virtualization Technology** Enabled

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

**Active Processor Cores** All

Number of cores to enable in each processor package.

**EIST** Enabled

Allows more than two frequency ranges to be supported.

**C states** Disabled

Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

**Tcc Activation Offset** 0

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

**Power Limit 1** 20000

Power Limit 1 in Milli Watts. BIOS will round to the nearest 1/BW when programming. 0 = no custom override. For 12.50W, enter 12500. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE\_POWER\_SKU\_MSR). Other SKUs: This value must be between Min Power Limit and TDP Limit. If value is 0, BIOS will program TDP value.

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 Previous Values
  
 Optimized Defaults
  
 Back
  
 Soft kbd
  
 Save & Exit

### BIOS Menu 5: CPU Configuration (2/3)

**Setup**

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

**C states** Disabled

Allows more than two frequency ranges to be supported.

**Tcc Activation Offset** 0

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

**Power Limit 1** 20000

Power Limit 1 in Milli Watts. BIOS will round to the nearest 1/BW when programming. 0 = no custom override. For 12.50W, enter 12500. Overclocking SKU: Value must be between Max and Min Power Limits (specified by PACKAGE\_POWER\_SKU\_MSR). Other SKUs: This value must be between Min Power Limit and TDP Limit. If value is 0, BIOS will program TDP value.

**Power Limit 1 Time Window** 0

Power Limit 1 Time Window value in seconds. The value may vary from 0 to 128. 0 = default value (28 sec for Mobile and 8 sec for Desktop). Defines time window which TDP value should be maintained.

**Power Limit 2** 0

Power Limit 2 value in Milli Watts. BIOS will round to the nearest 1/BW 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

Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.

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 Previous Values
  
 Optimized Defaults
  
 Back
  
 Soft kbd
  
 Save & Exit

### 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.

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### → Tcc Activation Offset

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

### → Power Limit 1

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.

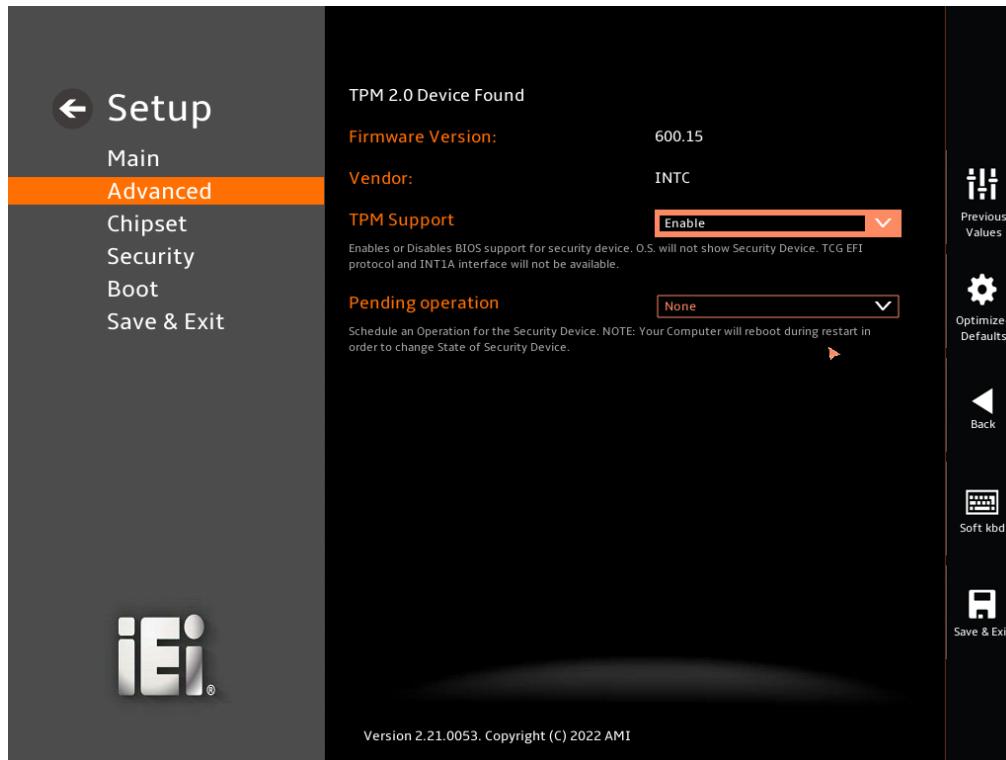
### → Turbo Mode [Enabled]

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.

- |                   |  |
|-------------------|--|
| → <b>Disabled</b> | Disables Turbo Mode Technology               |
| → <b>Enabled</b>  | <b>DEFAULT</b> 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.

- |                  |                          |                         |
|------------------|--------------------------|-------------------------|
| <b>→ Disable</b> | TPM support is disabled. |                         |
| <b>→ Enable</b>  | <b>DEFAULT</b>           | TPM support is enabled. |

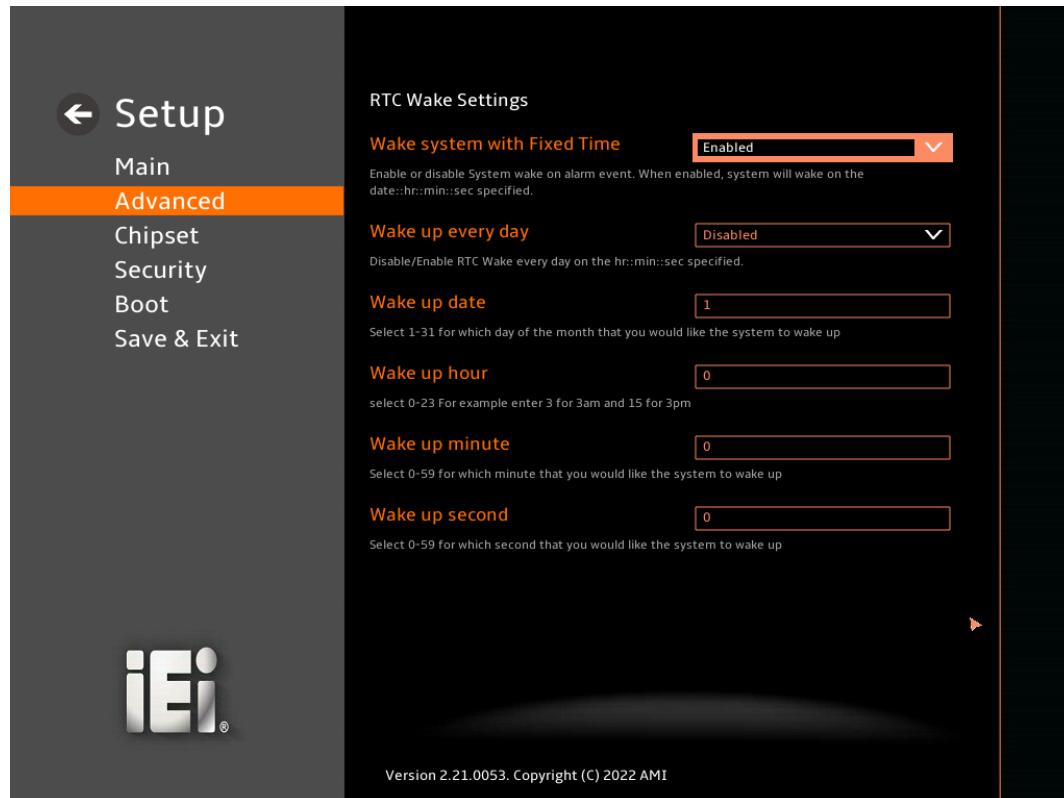
##### → **Pending Operation [None]**

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

- |                    |                |                              |
|--------------------|----------------|------------------------------|
| <b>→ None</b>      | <b>DEFAULT</b> | TPM information is previous. |
| <b>→ TPM Clear</b> |                | 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

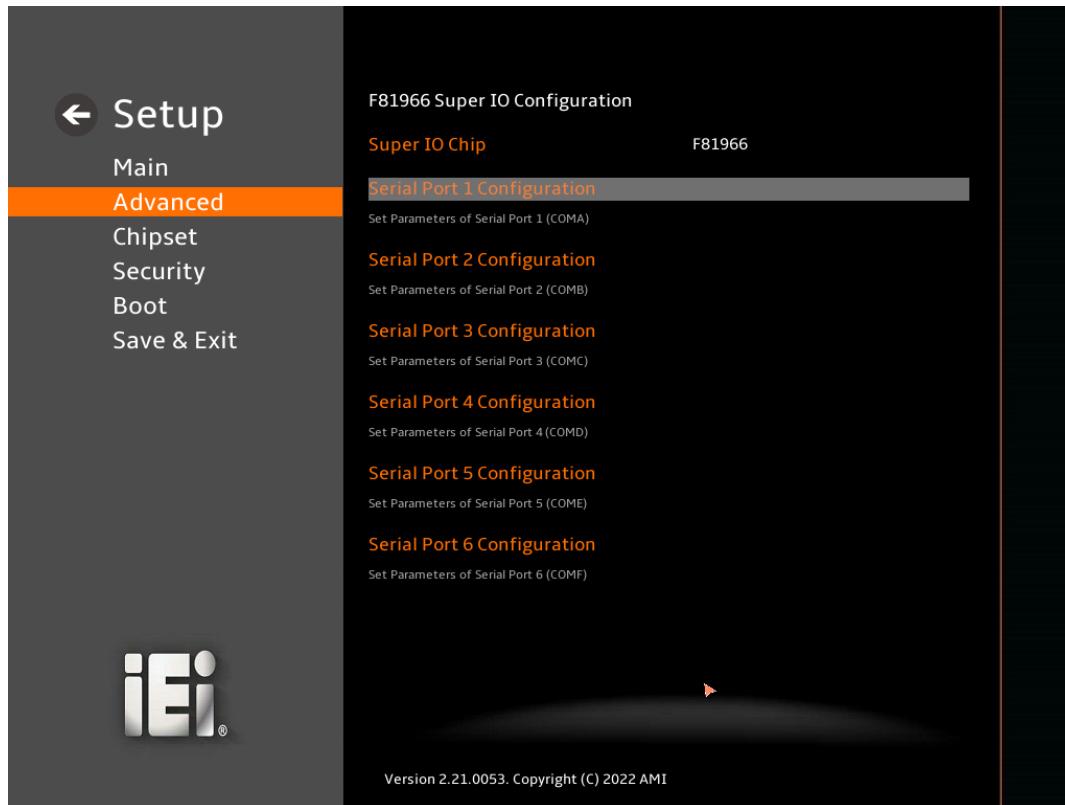
Wake up minute

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

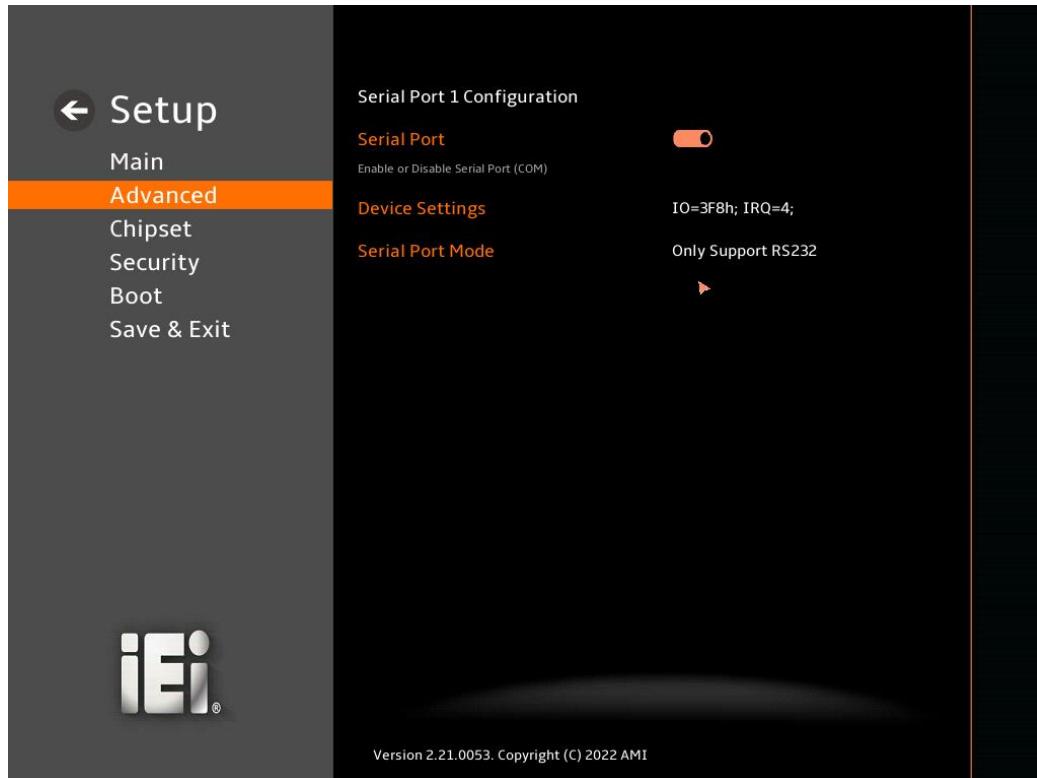
Use the **F81966 Super IO Configuration** menu (**BIOS Menu 9**) to set or change the configurations for the serial ports.



**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

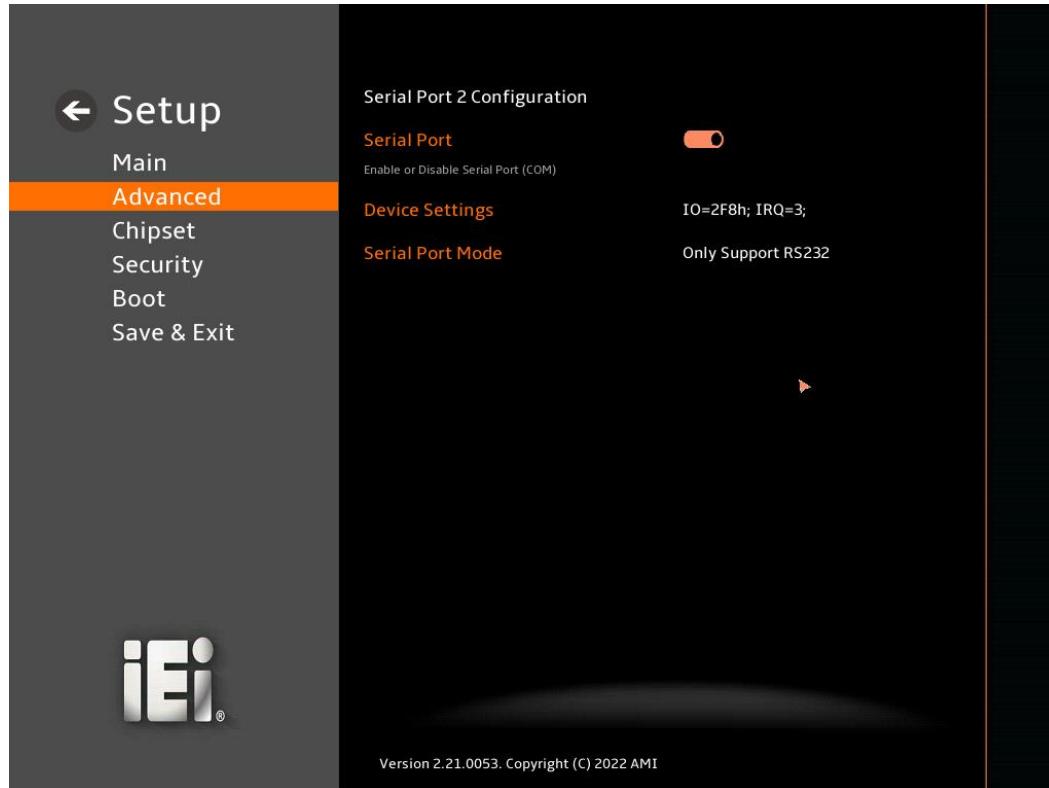
##### → **Device Settings**

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

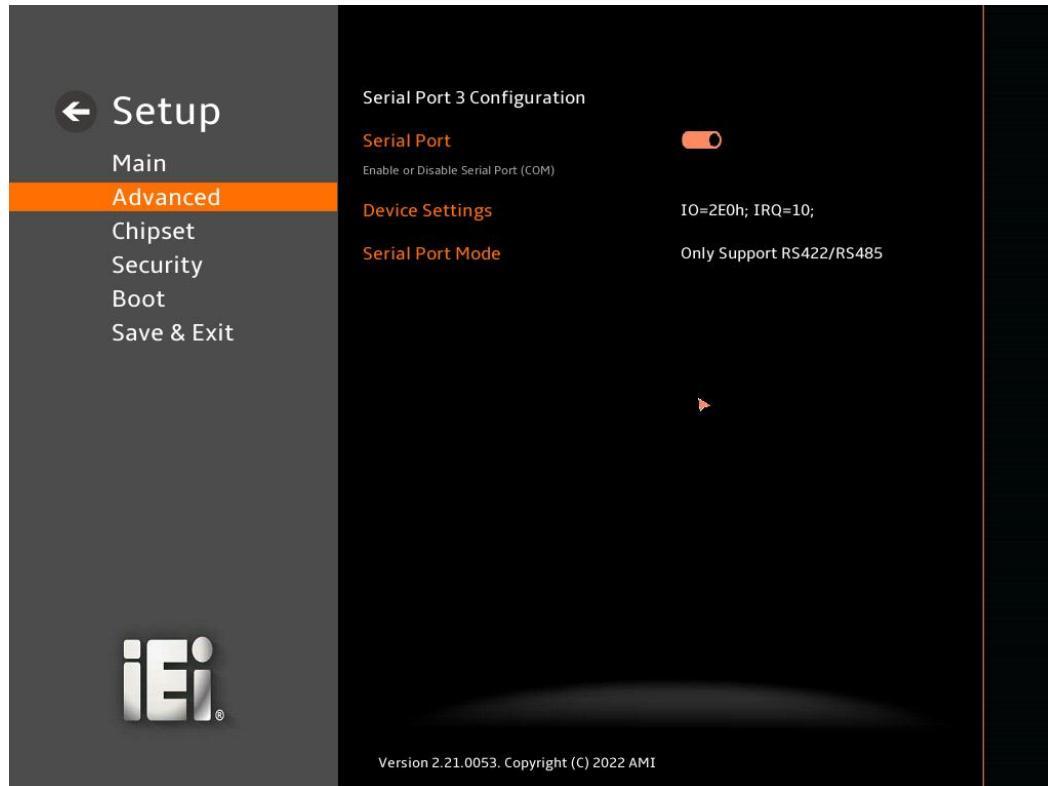
##### → **Device Settings**

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

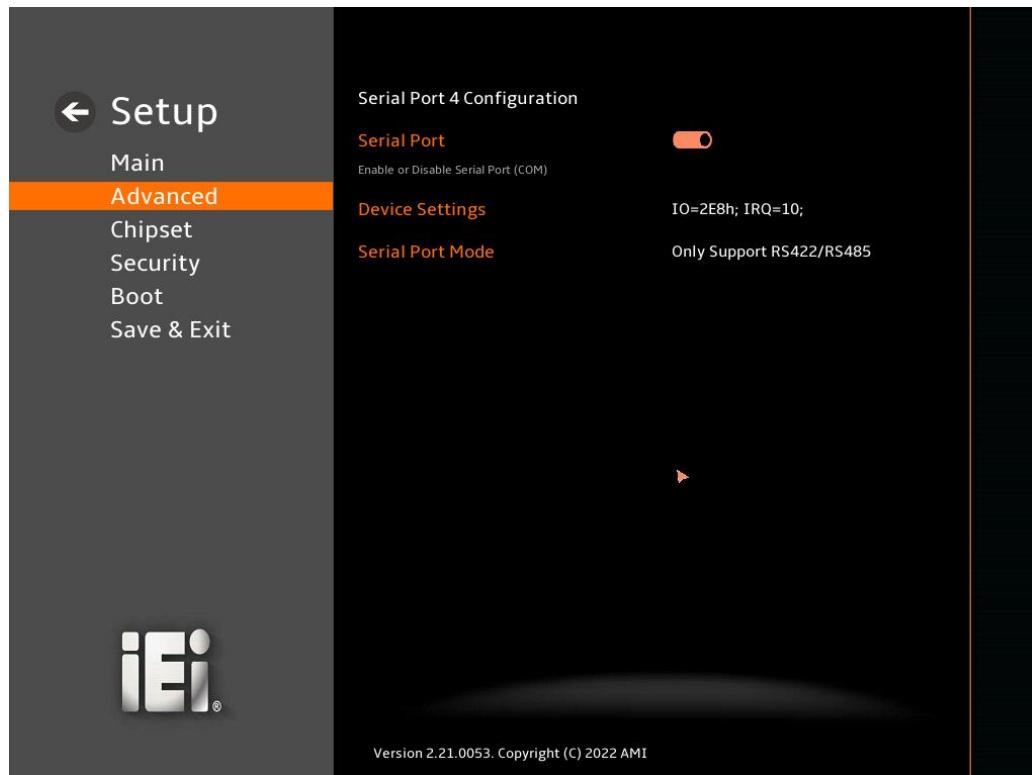
##### → **Device Settings**

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

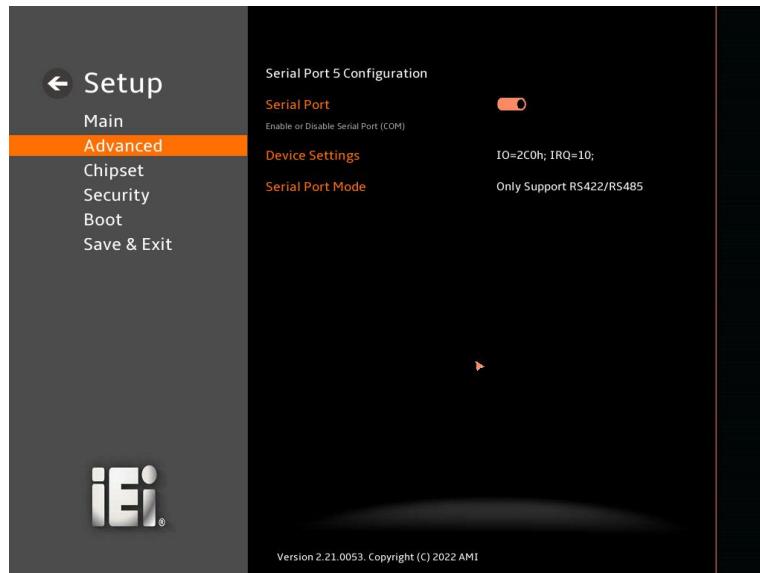
##### → **Device Settings**

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

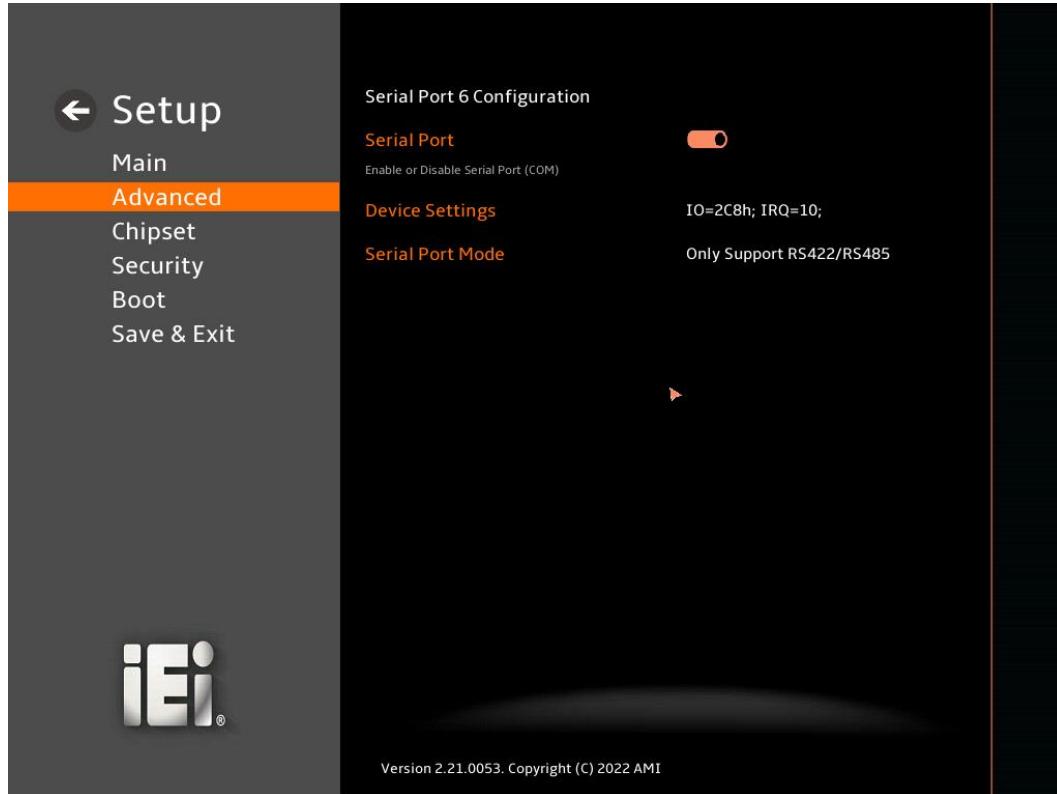
→ **Device Settings**

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

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### 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

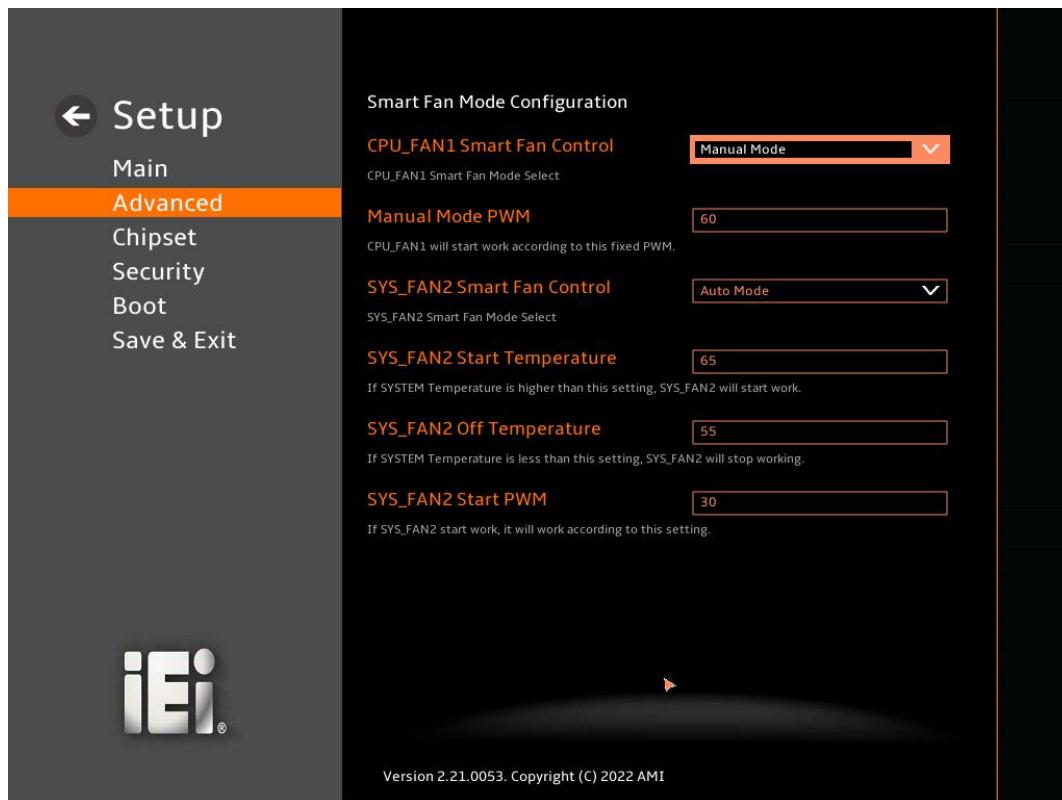
The following system parameters and values are shown. The system parameters that are monitored are:

- 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.

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### → 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.

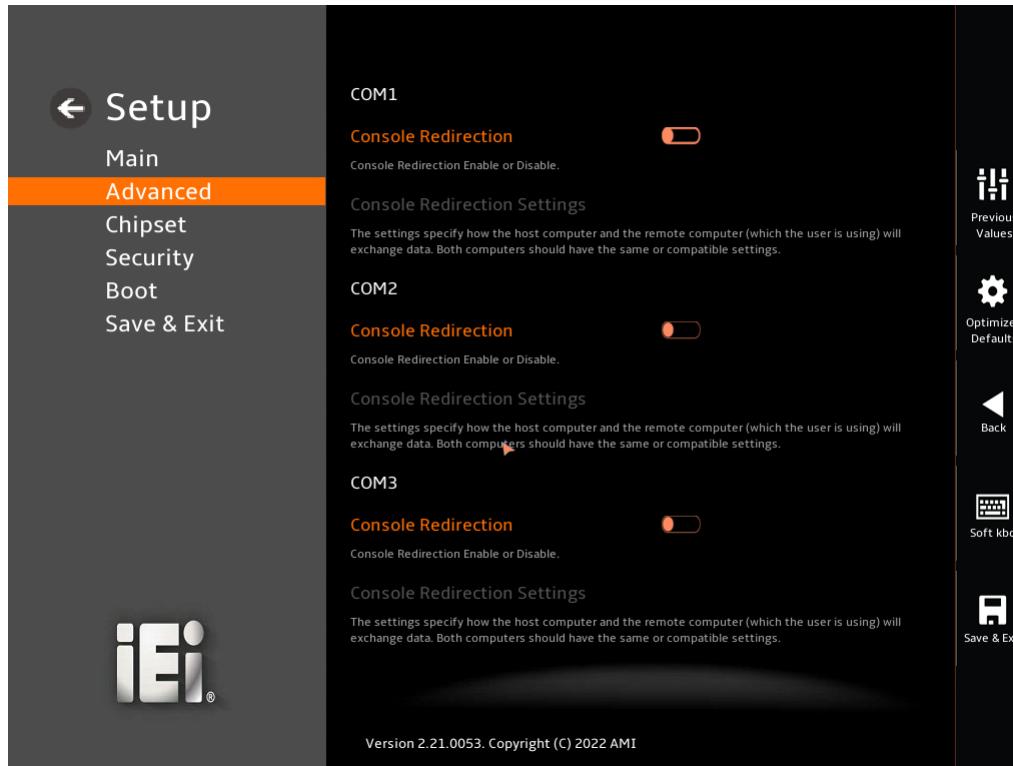
### → SYS\_FAN2 Start PWM

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

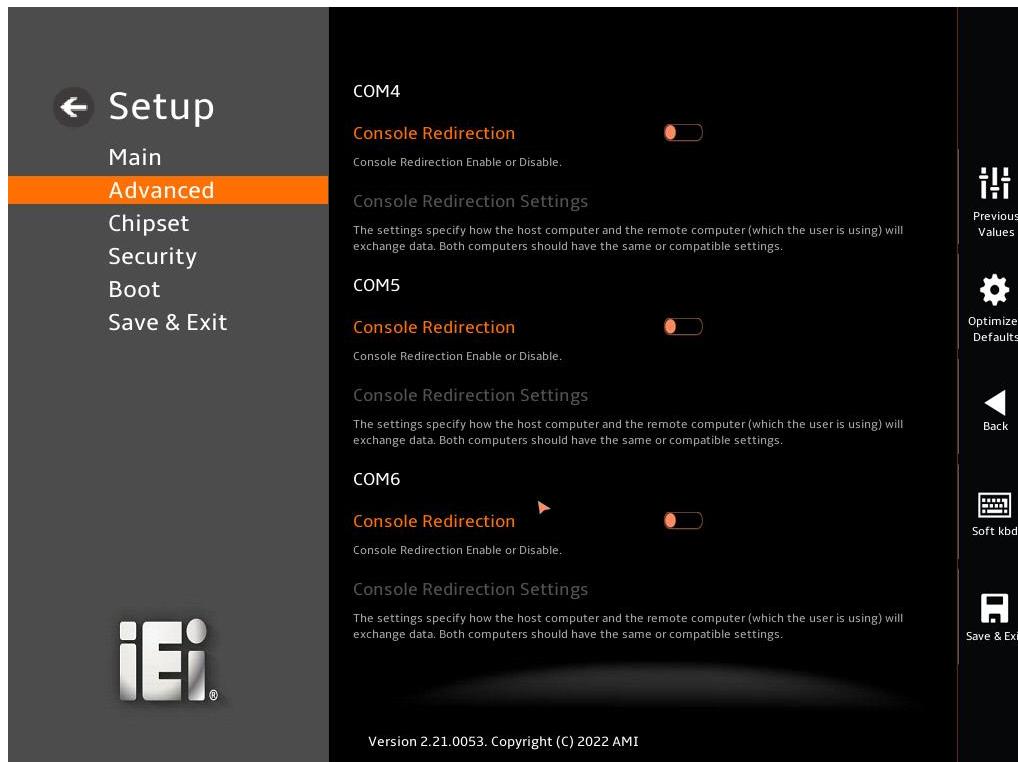
The **Serial Port Console Redirection** menu (**BIOS Menu 18 & BIOS Menu 19**) allows the console redirection options to be configured. Console Redirection allows users to

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)

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**BIOS Menu 19: Serial Port Console Redirection (2/2)****→ Console Redirection [Disabled]**

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

- |                   |                |   |
|-------------------|----------------|---|
| <b>→ Disabled</b> | <b>DEFAULT</b> | Disabled the console redirection function |
| <b>→ Enabled</b>  |                | 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.

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- ➔ **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.

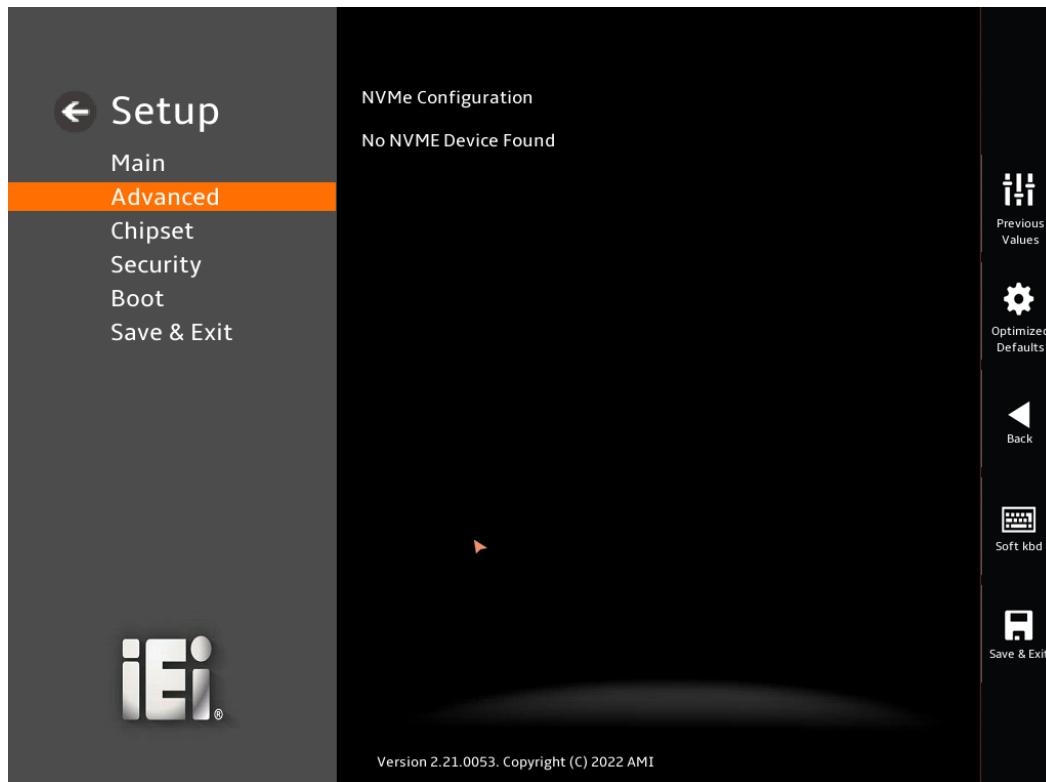
### ➔ **Stop Bits [1]**

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**

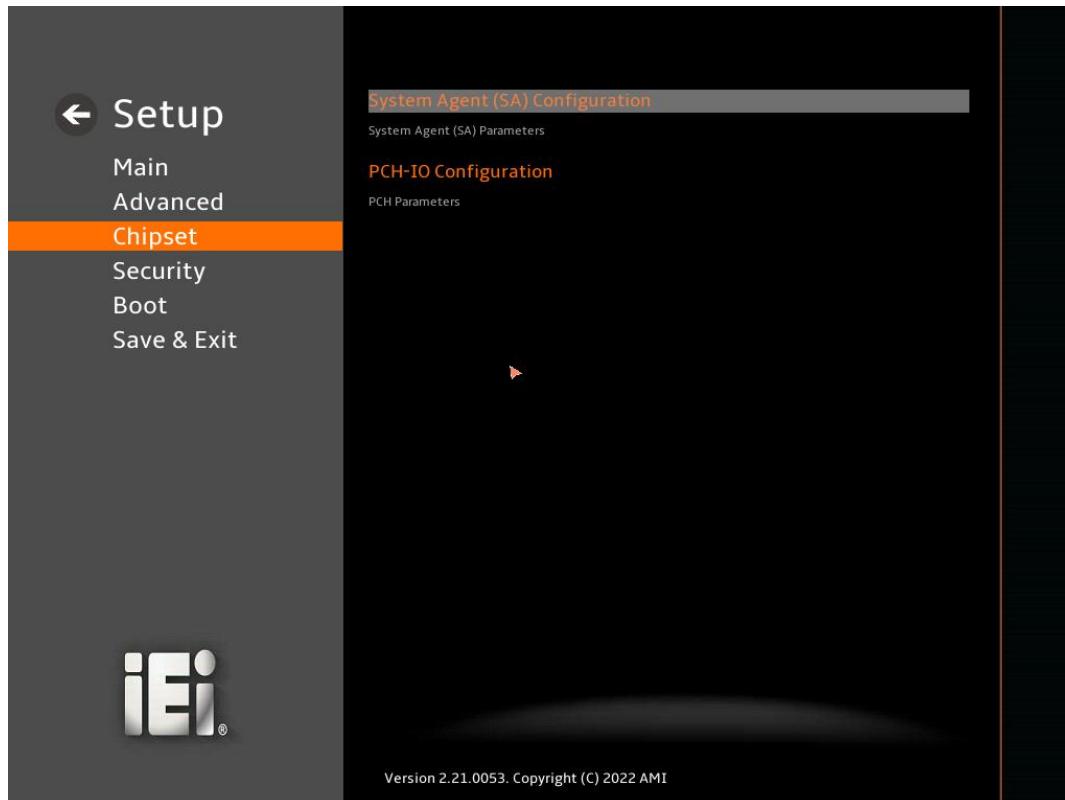
## 5.4 Chipset

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



### WARNING!

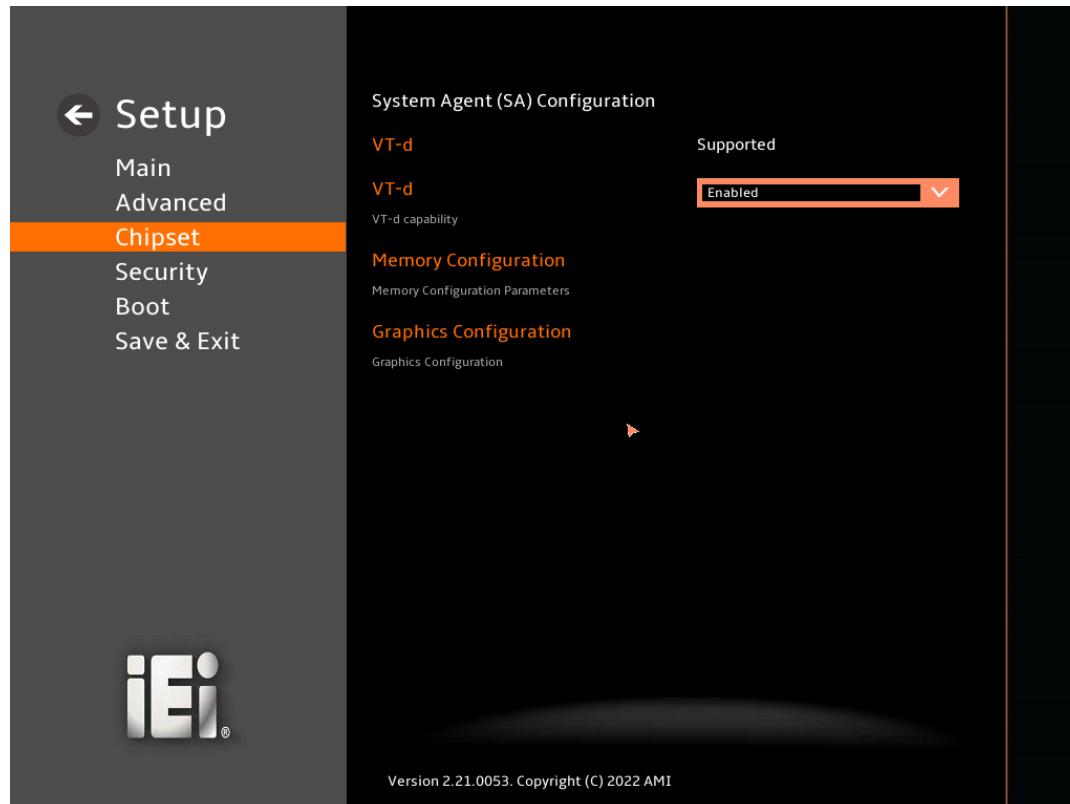
Setting the wrong values for the Chipset BIOS selections in the Chipset BIOS menu may cause the system to malfunction.



**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

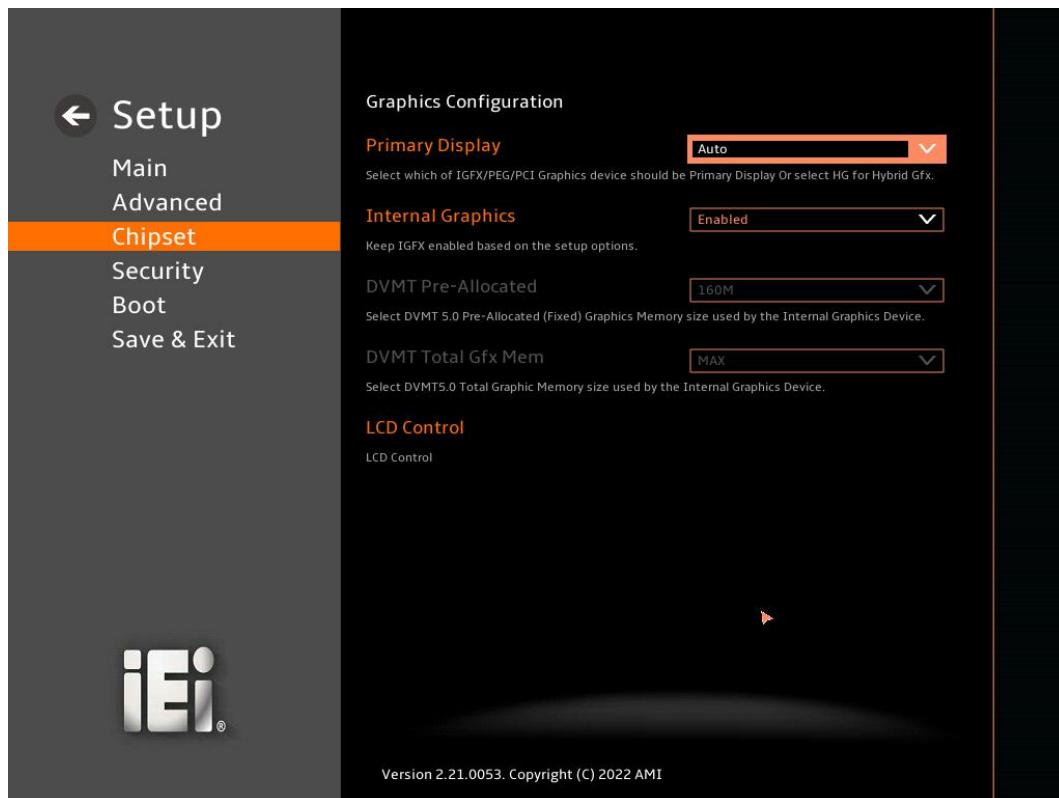
Use the **Memory Configuration** submenu (**BIOS Menu 24**) to view memory information.



**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

## KINO-EHL-J6412 Mini-ITX SBC

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:

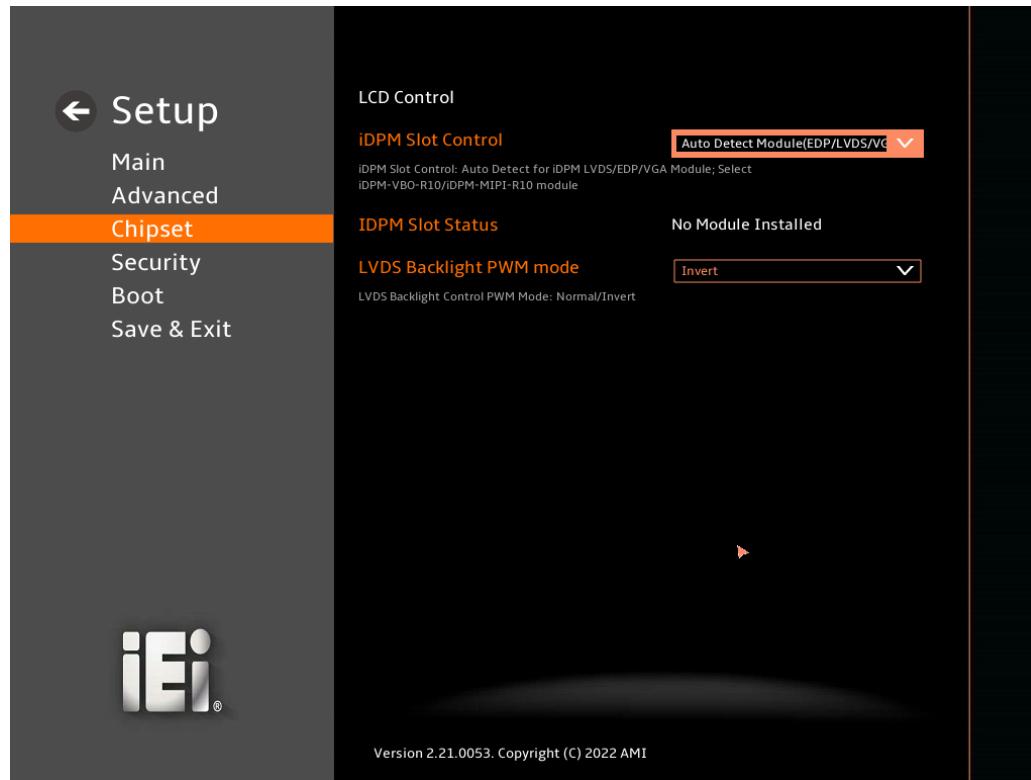
- 80M
- 160M **Default**

### ➔ 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 DEFAULT** Auto detect for iDPM LVDS/EDP/VGA Module.  
Module(EDP  
/LVDS/VGA)

→ **iDPM-VBO** Select iDPM-VBO Module  
Module

→ **iDPM-MIPI** Select iDPM-MIPI Module  
Module

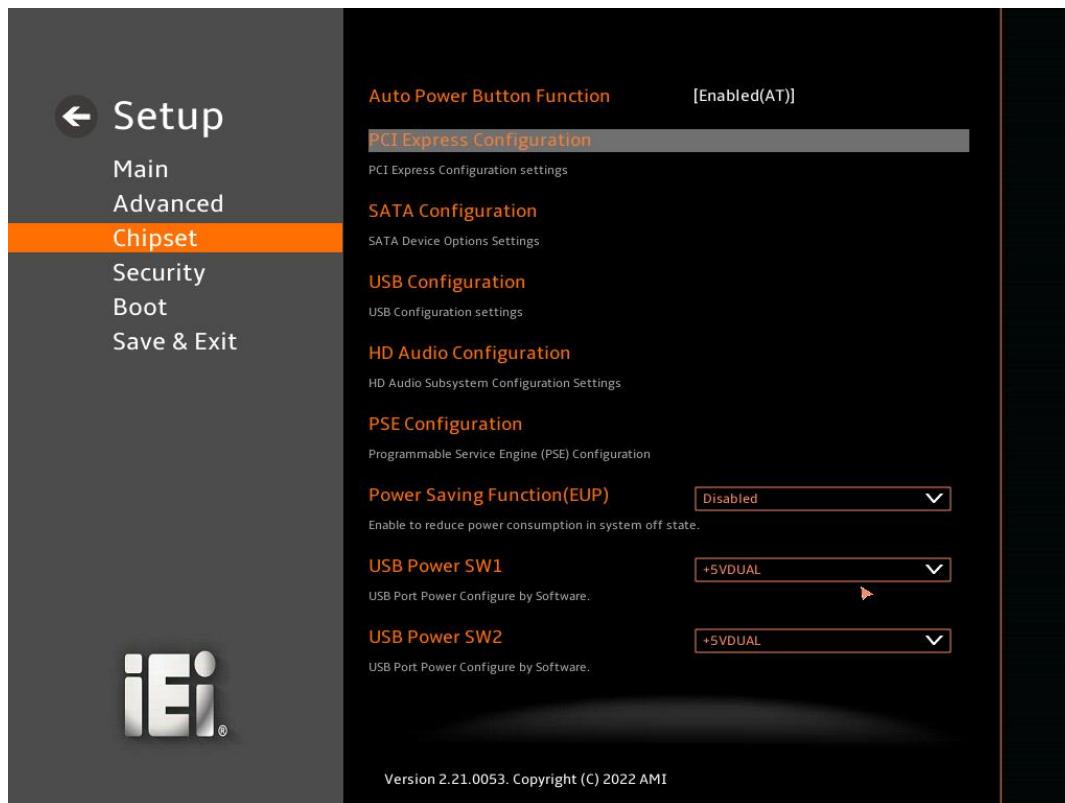
## KINO-EHL-J6412 Mini-ITX SBC

## → LVDS Backlight PWM mode[Invert]

- Invert                   **DEFAULT**     Select Invert LVDS Backlight.
- Normal                  Select normal 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).

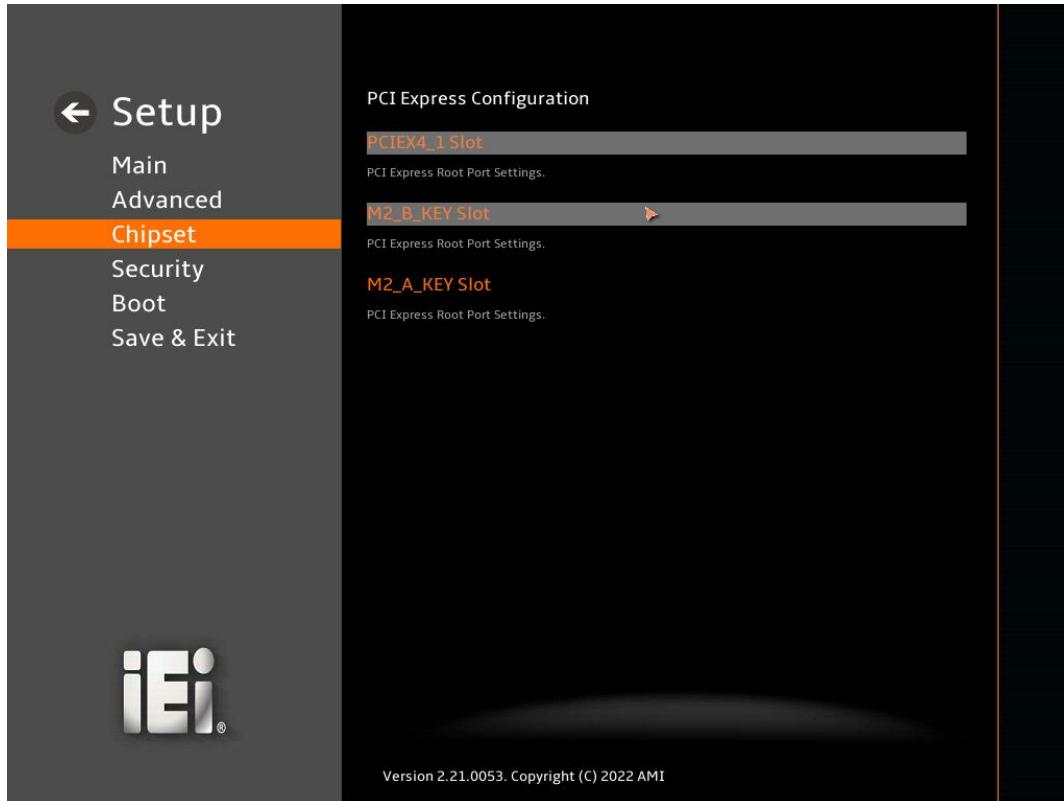
- **+5V DUAL**    **DEFAULT**    Sets the USB power source to +5V dual
- **+5V**                      Sets the USB power source to +5V

<b>BIOS Options</b>	<b>Configured USB Ports</b>
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

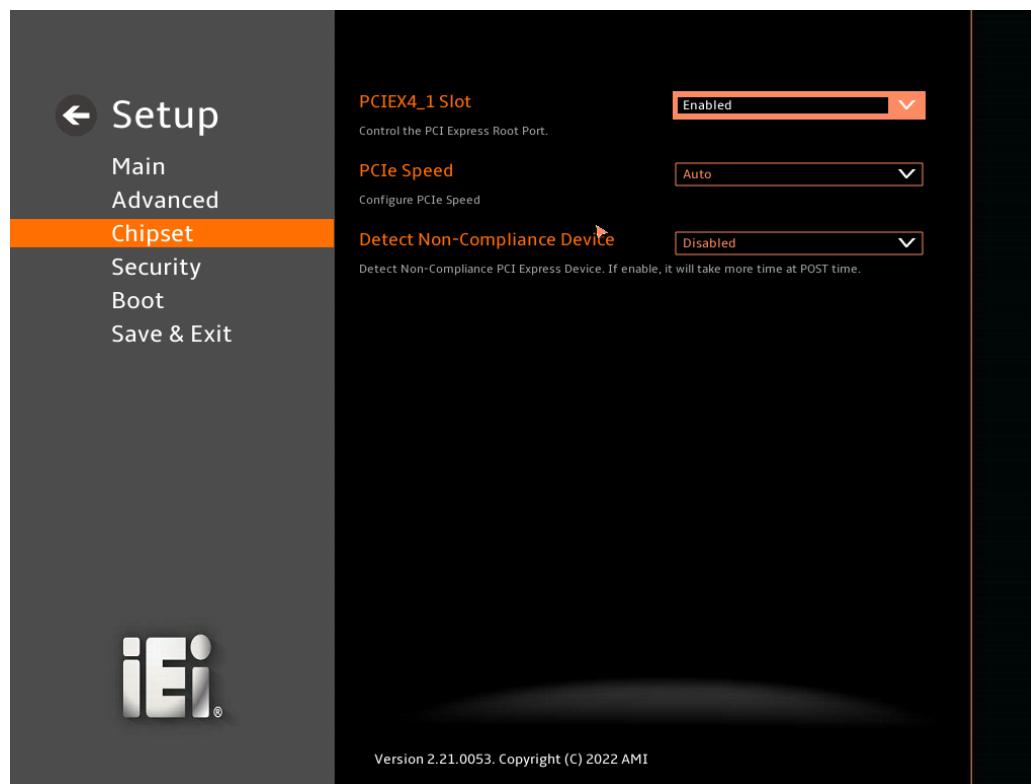
Use the **PCI Express Configuration** submenu (**BIOS Menu 27**) to configure the PCI Express slots.



**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.

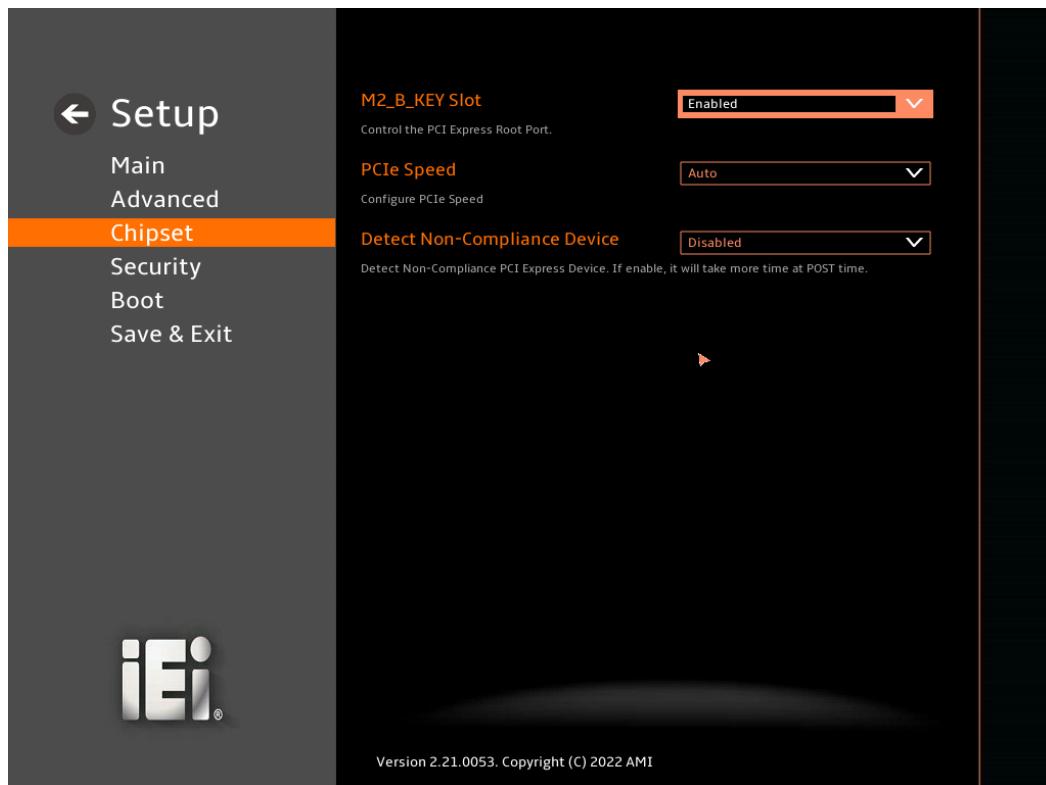
- |        |         |                               |
|--------|---------|-------------------------------|
| → Auto | DEFAULT | Auto mode.                    |
| → Gen1 |         | Configure PCIe Speed to Gen1. |
| → Gen2 |         | Configure PCIe Speed to Gen2. |
| → Gen3 |         | Configure PCIe 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.

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- ➔ **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.

- |                   |                |  |
|-------------------|----------------|--|
| → <b>Disabled</b> | <b>DEFAULT</b> | Do not detect if a non-compliance PCI Express device is connected to the PCI Express port. |
| → <b>Enabled</b>  |                | 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.

- |               |                |            |
|---------------|----------------|------------|
| → <b>Auto</b> | <b>DEFAULT</b> | Auto mode. |
|---------------|----------------|------------|

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

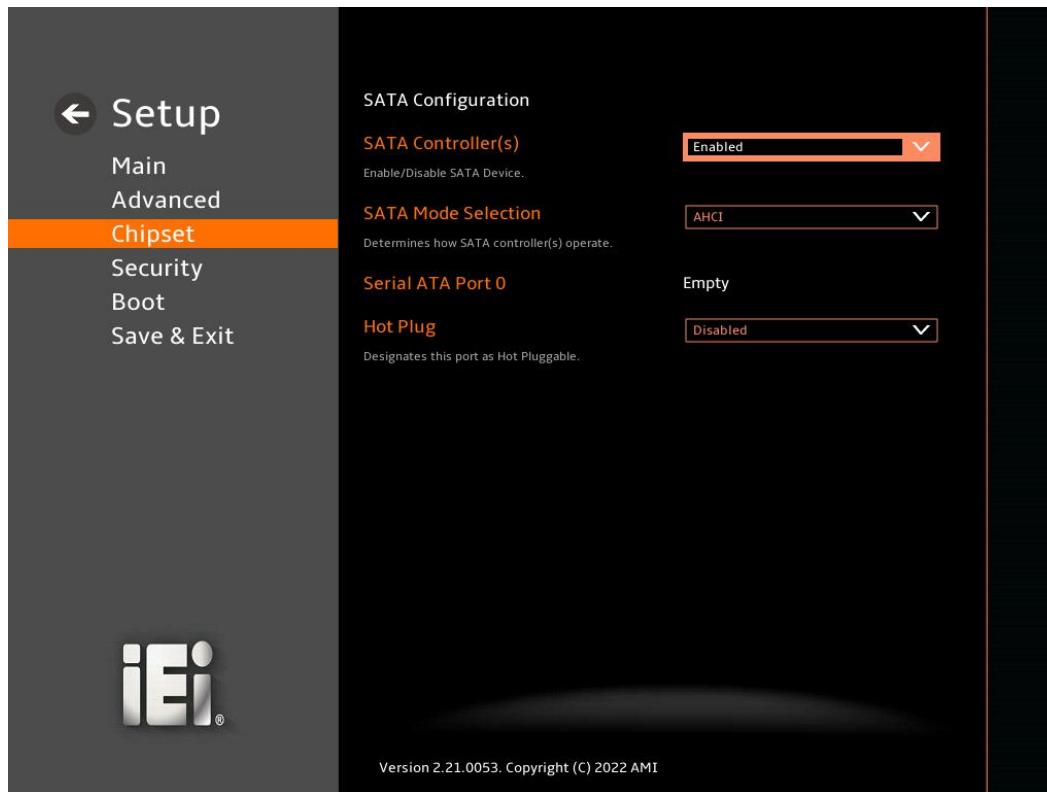
### ➔ **Detect Non-Compliance Device [Disabled]**

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.

**KINO-EHL-J6412 Mini-ITX SBC**

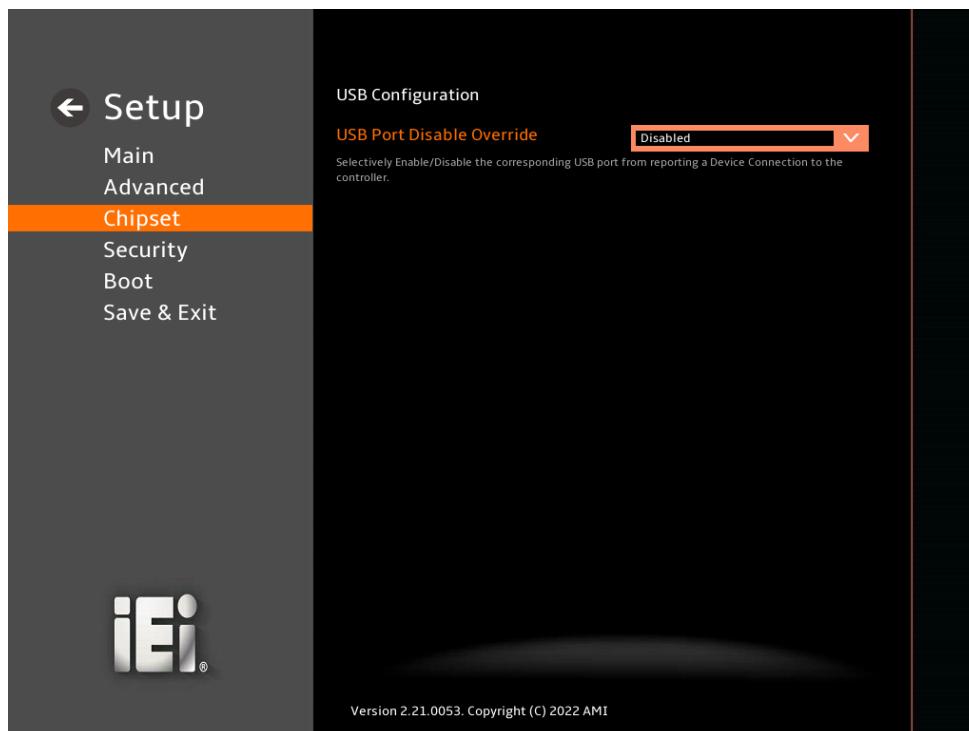
- **Intel RST Premium With Intel Optane System Acceleration** Configures SATA devices to the Intel RST Premium With Intel Optane System Acceleration mode.

→ **Hot Plug [Disabled]**

Use the **Hot Plug** option (for S\_ATA1) to designate the correspondent port as hot-pluggable.

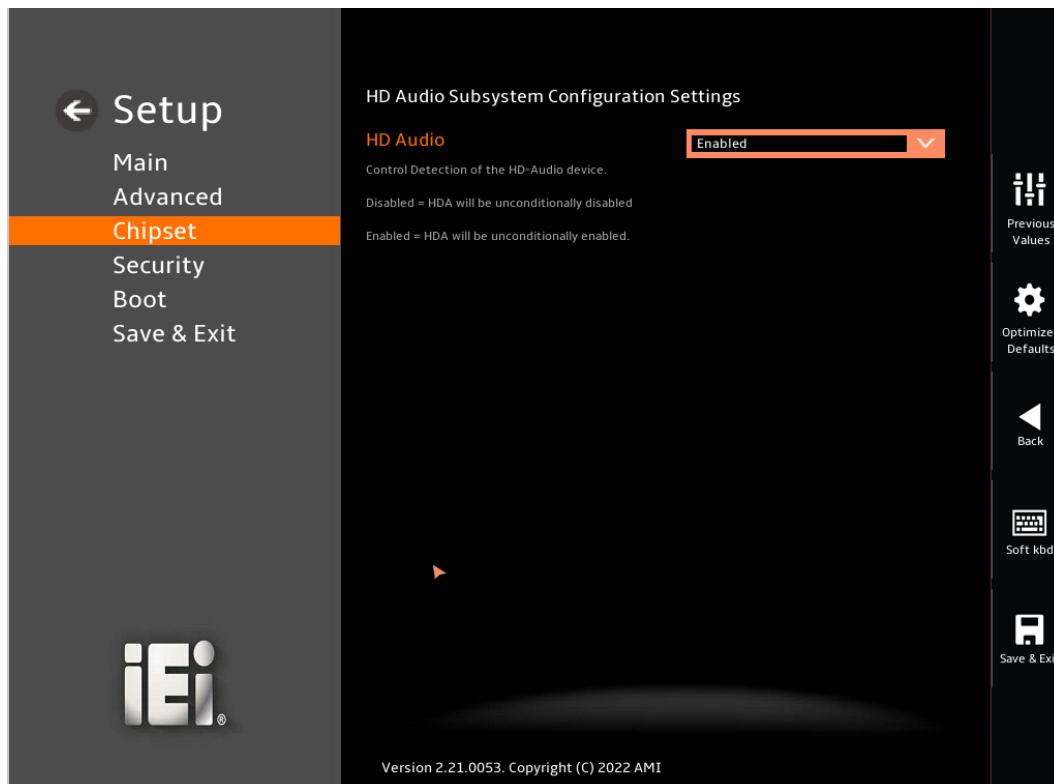
- **Disabled** **DEFAULT** Disables the hot-pluggable function of the SATA port.
- **Enabled** Designates the SATA port as hot-pluggable.

#### 5.4.2.3 USB Configuration



#### 5.4.2.4 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

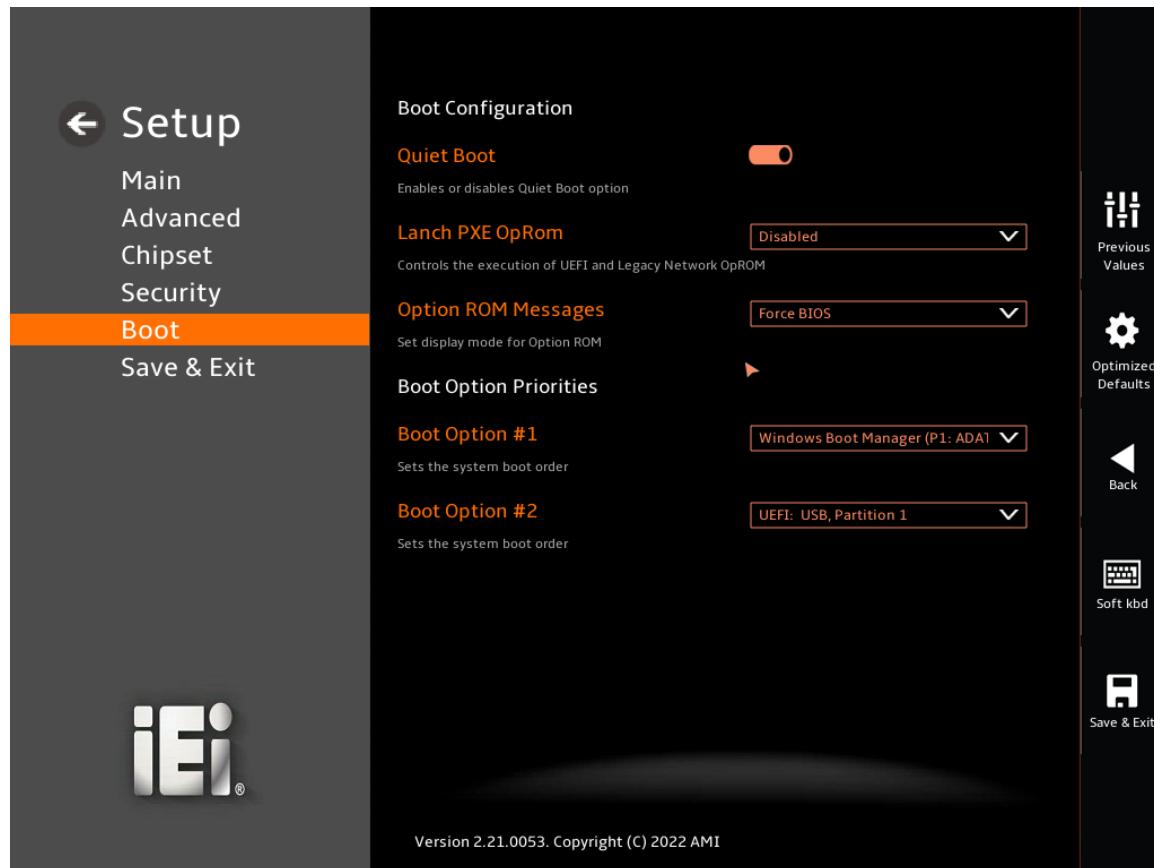
Use the **Administrator Password** to set or change a administrator password.

#### → 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

## KINO-EHL-J6412 Mini-ITX SBC

### → 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**

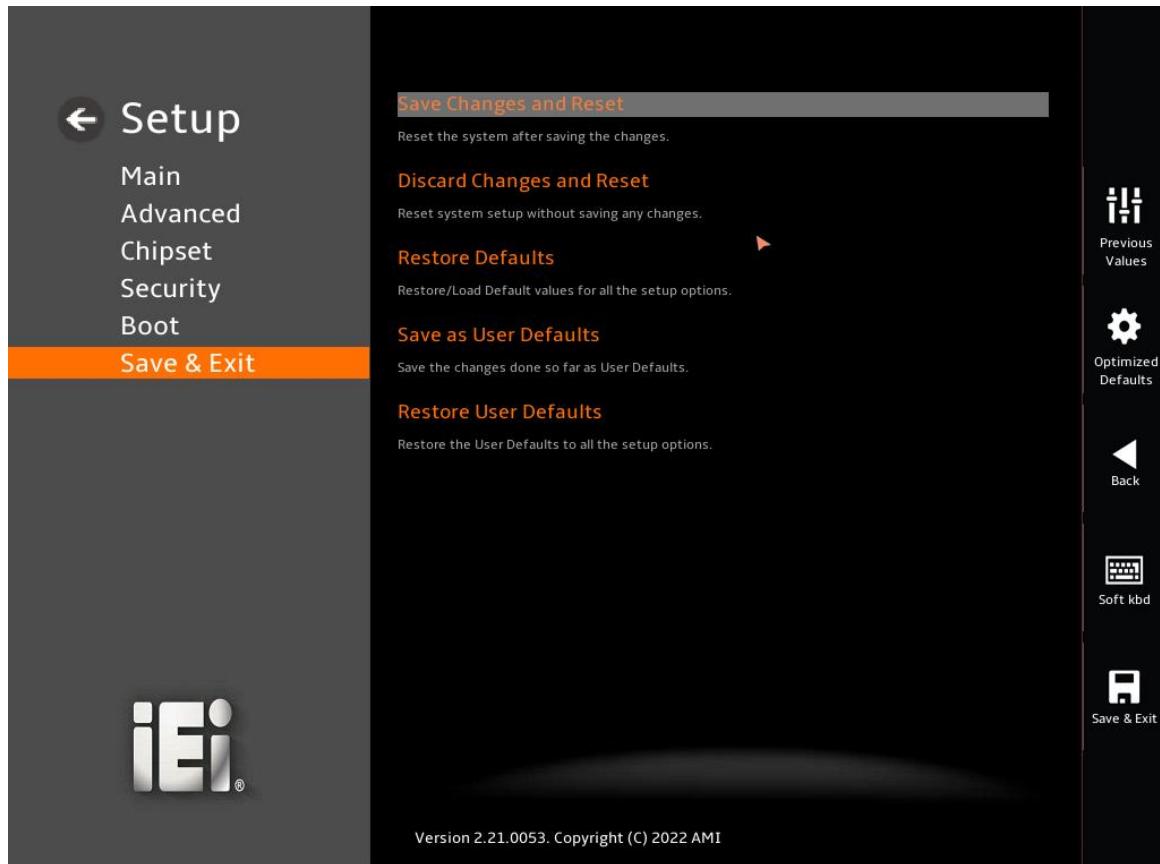
#### → Boot Option #2

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.

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### → 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

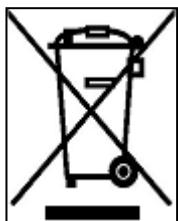
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**CAUTION:**

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

Dispose of used batteries according to instructions and local regulations.

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



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

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

Appendix

C

# BIOS Options

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## KINO-EHL-J6412 Mini-ITX SBC

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

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## KINO-EHL-J6412 Mini-ITX SBC

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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:

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

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

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

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

**NOTE:**

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

**EXAMPLE PROGRAM:**

```
; INITIAL TIMER PERIOD COUNTER  
  
;  
W_LOOP:  
;  
    MOV      AX, 6F02H      ;setting the time-out value  
    MOV      BL, 30          ;time-out value is 48 seconds  
    INT      15H  
  
;  
; ADD THE APPLICATION PROGRAM HERE  
;  
    CMP      EXIT_AP, 1      ;is the application over?  
    JNE      W_LOOP          ;No, restart the application  
  
    MOV      AX, 6F02H      ;disable Watchdog Timer  
    MOV      BL, 0           ;  
    INT      15H  
  
;  
; EXIT ;
```

Appendix

E

## Error Beep Code

---

## E.1 PEI Beep Codes

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

## E.2 DXE Beep Codes

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



### NOTE:

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

Appendix

F

# Hazardous Materials Disclosure

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## 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	○	○	○	○	○	○
印刷电路板	○	○	○	○	○	○
金属螺帽	○	○	○	○	○	○
电缆组装	○	○	○	○	○	○
风扇组装	○	○	○	○	○	○
电力供应组装	○	○	○	○	○	○
电池	○	○	○	○	○	○

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。