IPC920 series

Industrial Computers

User's Manual

AXIOMTEK

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Safety Precautions

Before getting started, please read the following important safety precautions.

1. The IPC920 Series does not come equipped with an operating system. An operating system must be loaded first before installing any software into the computer.

2. Be sure to ground yourself to prevent static charge when installing the internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.

3. Disconnect the power cord from the IPC920 Series before making any installation. Be sure both the system and the external devices are turned OFF. A sudden surge of power could ruin sensitive components. Make sure the IPC920 Series is properly grounded.

4. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.

5. Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.

6. Do not leave this equipment in an uncontrolled environment where the storage temperature is below -20℃ or above 80℃. It may damage the equipment.

7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:

   ■ Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help to discharge any static electricity on your body.

   ■ When handling boards and components, wear a grounding wrist strap, available from most electronic component stores.

Classification

1. Degree of production against electric shock: not classified

2. Degree of protection against the ingress of water: none

3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with oxygen or nitrous oxide.

4. Mode of operation: Continuous

5. Type of protection against electric shock: Class I equipment

General Cleaning Tips

You may need the following precautions before you begin to clean the computer. When you clean any single part or component for the computer, please read and understand the details below fully.

When you need to clean the device, please rub it with a piece of dry cloth.

1. Be cautious of the tiny removable components when you use a vacuum cleaner to absorb the dirt on the floor.

2. Turn the system off before you start to clean up the component or computer.

3. Never drop the components inside the computer or get circuit board damp or wet.

4. Be cautious of all kinds of cleaning solvents or chemicals when you use it for the sake of cleaning. Some individuals may be allergic to the ingredients.

5. Try not to put any food, drink or cigarette around the computer.

Cleaning Tools

Although many companies have created products to help improve the process of cleaning your computer and peripherals users can also use household items to clean their computers and peripherals. Below is a listing of items you may need or want to use while cleaning your computer or computer peripherals.

Keep in mind that some components in your computer may require designated products for cleaning. If this is the case it will be mentioned in the cleaning instructions.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, we still recommend you to rub it with a piece of cloth.

- Water or rubbing alcohol: You may moisten a piece of cloth a bit with some water or rubbing alcohol and rub it on the computer. Unknown solvents may be harmful to the plastic parts.

- Vacuum cleaner: Vacuuming the dust, dirt, hair, cigarette particles, and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items can restrict the airflow in a computer and cause circuitry to corrode.

- Cotton swabs: Cotton swabs moistened with rubbing alcohol or water are excellent tools for wiping hard to reach areas in your keyboard, mouse, and other locations.

- Foam swabs: Whenever possible it is better to use lint free swabs such as foam swabs.

Note: It is strongly recommended that you should shut down the system before you start to clean any single components.

Note: Please check the temperature of system surface before maintenance.

Please follow the steps below:

1. Close all application programs;

2. Close operating software;

3. Turn off power switch;

4. Remove all device;

5. Pull out the power cable.

Scrap Computer Recycling

Please inform the nearest Axiomtek distributor as soon as possible for suitable solutions in case computers require maintenance or repair; or for recycling in case computers are out of order or no longer in use.

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SECTION 1
INTRODUCTION

This chapter contains general information and detailed specifications of theIPC920 Series. Chapter 1 includes the following sections:

- General Description
- System Specifications
- Dimensions
- I/O Outlets
- Jumper Settings
- Connectors
- Package List

1.1   General Description

The IPC920 series is a fan-less systems that can support LGA1700 socket for 13th/12th generation Intel® Core™ i9/ i7/i5/i3 processors. The IPC920 are also built with a rugged design that makes the system suitable for the most endurable operation.

For operation systems, the IPC920 series not only supports Windows® 11 64-bit, Windows® 10 64-bit and Ubuntu, but also supports embedded OS.

The IPC920 Series supports two hard-drive bays to make it easy for customers to install and maintain the system.

1.2   System Specifications

1.2.1   System Features

● Intelligent power management:

- Ignition

- USB power on/off control

● Supports Intel® RAID (R680E)

● Easy expansion via flexible I/O window

● Supports connectors with pull-resistance design

● Optional din-rail kit, bookshelf kit and wall mount kit

● EN 61000-6-2 certified

1.2.2   CPU Level

● Socket LGA1700 for 13th/12th Generation Intel® Core™ i9/i7/i5/i3 processors, up to 65W

● Below is a list of supported CPUs.

Generation	Proc No	WATT	Performance-core base frequency	Efficient-core base frequency
Raptor Lake	i9-13900E	65W	1.8 GHz	1.3 GHz
Raptor Lake	i9-13900TE	35W	1.0 GHz	800 MHz
Raptor Lake	i7-13700E	65W	1.9 GHz	1.3 GHz
Raptor Lake	i7-13700TE	35W	1.1 GHz	800 MHz
Raptor Lake	i5-13500E	65W	2.4 GHz	1.5 GHz
Raptor Lake	i5-13500TE	35W	1.3 GHz	1.1 GHz
Raptor Lake	i3-13100E	65W	3.3 GHz	3.3 GHz
Raptor Lake	i3-13100TE	35W	2.4 GHz	2.4 GHz
Alder Lake	i9-12900E	65W	2.3 GHz	1.7 GHz
Alder Lake	i9-12900TE	35W	1.1 GHz	1.0 GHz
Alder Lake	i7-12700E	65W	2.1 GHz	1.6 GHz
Alder Lake	i7-12700TE	35W	1.4 GHz	1.0 GHz
Alder Lake	i5-12500E	65W	2.9 GHz	
Alder Lake	i5-12500TE	35W	1.9 GHz	
Alder Lake	i3-12100E	60W	3.2 GHz	
Alder Lake	i3-12100TE	35W	2.1 GHz	
Alder Lake	G7400E	46W	3.6 GHz	
Alder Lake	G7400TE	35W	3.0 GHz	
Alder Lake	G6900E	46W	3.0 GHz	
Alder Lake	G6900TE	35W	2.4 GHz	

1.2.3 Specification

	IPC920-R-F1	IPC920-R-F1E	IPC920-H-F1	IPC920-H-F1E
System chipset	R680E		H610E	
BIOS	AMI BIOS with Smart View and Customer CMOS Backup			
System memory	2x DDR5 4800/4000 un-buffered SO-DIMM, **max up to 64GB**			
Ethernet	2 x RJ45 2.5GbE Intel I226-V 1 x RJ45 1GbE Intel I219-LM; w/ Intel AMT(R680E)			
Serial	2 x RS232(4-wire)/422/485 (default RS232)			
USB	4 x USB3.2 Gen2x1(10G) 1 x USB2.0 (internal, type A, up to 30 mm)		4 x USB3.2 Gen1x1(5G) 1 x USB2.0 (internal, type A, up to 30 mm)	
Display	1 x HDMI 1.4b with 4096 x 2160 resolution supported 1 x DP++ 1.2 with 4096 x 2160 resolution supported			
TPM	1 x TPM 2.0 on board			
Expansions	1 x mini PCIe socket w/ SIM slot 1 x M.2 Key E 2230			
Expansions	N/A	EIO110-B (1 x PCIe x16 Gen3)	N/A	EIO110-B (1 x PCIe x16 Gen3)
Storage	2 x 2.5" HDD/SSD tray (7/9.5mm height) 1 x M.2 key M 2280 socket (PCIe x4 Gen4)			
System indicator	1 x HDD/SSD access LED 3 x user's LED			
Power input	Power input 18 to 36 Vdc 1 x 3-pin terminal block for DC input, ignition control, AT/ATX mode by BIOS setting 1 x Switch w/LED for power on/off control (default ATX) 1 x Remote power switch			
Typical	24 Vdc			
Inrush current	24Vdc / 4A			
Power rating	18-36Vdc, 6-3A	18-36Vdc, 14-7.16A	18-36Vdc, 6-3A	18-36Vdc, 14-7.16A
Storage temperature	-20℃-80℃			
Humidity	10%-90% (non-condensing)			

Vibration	IPC920-H-F1, IPC920-R-F1: IEC 60068-2-64 (with SSD: 3Grms STD, random, 5 to 500 Hz, 1 hr/axis)
	IPC920-H-F1E, IPC920-R-F1E: IEC 60068-6-4 (W/SSD: 1Grms STD, random, 5-500 Hz, 1 hr/axis)
Shock	IEC 60068-2-27 (with SSD: 50G, half sine, 11 ms duration)
Dimensions	IPC920-H-E, IPC920-R-E: 83.5 x 192 x 230 mm
	IPC920-H-F1E, IPC920-R-F1E: 118.5 x 192 x 230 mm

Note: *Since Gen. 2 SSD with JMicron controller has a compatibility issue with Intel PCH, it is strongly recommended to use Gen. 3 SSD on system.*

Note: *Please fix the system power input in 24Vdc when plugging an add-on card.*

Note: *The maximum power rating for expansion slots at 70℃ cannot exceed the following value:*

The maximum loading of +3.3V+5V+12V<150W (EIO110-B)

Note: *12V maximum loading for 2 x 8-pin connectors (ATX2-3) are 120W. (EIO110-B)*

Note: The system power rating may thus be changed based on differing combinations ofattached devices.

1.2.4 Operating Temperature

● Below is a list of IPC920 series operating temperature w/ Intel® Core™ processor and industrial wide-temp SSD.

Generation	Proc No	WATT	Operating Temperature (0.7 m/s air flow)	Performance-core base frequency	Efficient-core base frequency
Raptor Lake	i9-13900E	65W	-20℃-50℃	1.8 GHz	1.3 GHz
Raptor Lake	i9-13900TE	35W	-20℃-60℃	1.0 GHz	800 MHz
Raptor Lake	i7-13700E	65W	-20℃-50℃	1.9 GHz	1.3 GHz
Raptor Lake	i7-13700TE	35W	-20℃-60℃	1.1 GHz	800 MHz
Raptor Lake	i5-13500E	65W	-20℃-50℃	2.4 GHz	1.5 GHz
Raptor Lake	i5-13500TE	35W	-20℃-60℃	1.3 GHz	1.1 GHz
Raptor Lake	i3-13100E	65W	-20℃-50℃	3.3 GHz	3.3 GHz
Raptor Lake	i3-13100TE	35W	-20℃-60℃	2.4 GHz	2.4 GHz
Alder Lake	i9-12900E	65W	-20℃-50℃	2.3 GHz	1.7 GHz
Alder Lake	i9-12900TE	35W	-20℃-60℃	1.1 GHz	1.0 GHz
Alder Lake	i7-12700E	65W	-20℃-50℃	2.1 GHz	1.6 GHz
Alder Lake	i7-12700TE	35W	-20℃-60℃	1.4 GHz	1.0 GHz
Alder Lake	i5-12500E	65W	-20℃-50℃	2.9 GHz	
Alder Lake	i5-12500TE	35W	-20℃-60℃	1.9 GHz	
Alder Lake	i3-12100E	60W	-20℃-50℃	3.2 GHz	
Alder Lake	i3-12100TE	35W	-20℃-60℃	2.1 GHz	
Alder Lake	G7400E	46W	-20℃-50℃	3.6 GHz	
Alder Lake	G7400TE	35W	-20℃-60℃	3.0 GHz	
Alder Lake	G6900E	46W	-20℃-50℃	3.0 GHz	
Alder Lake	G6900TE	35W	-20℃-60℃	2.4 GHz	

● IPC920 series supports -10℃ to 70℃(with optional system fan module, Intel® Core™ processor and industrial wide-temp SSD; 0.7m/s air flow (support by project)

Note: The IPC system may cause CPU frequency hopping when operating in an extremely high temperature environment, and thermal throttling may occur when the system remains in full loading conditions.

Note: The performance of the system might be adversely affected when operating at a temperature above the system's limitation or with an unrecommended processor.

 Note: *If the operating temperature is above 35℃, it is recommended to use a wide temperature SSD on the device.*

1.2.5　Certification

- CE (EN 61000-6-4, EN 61000-6-2)
- FCC

 Note: All specifications and images are subject to change without notice.

1.3   System Dimensions

The following diagrams show you dimensions and outlines of theIPC920 Series.

IPC920-R-F1 / IPC920-H-F1

IPC920-R-F1E / IPC920-H-F1E

Introduction
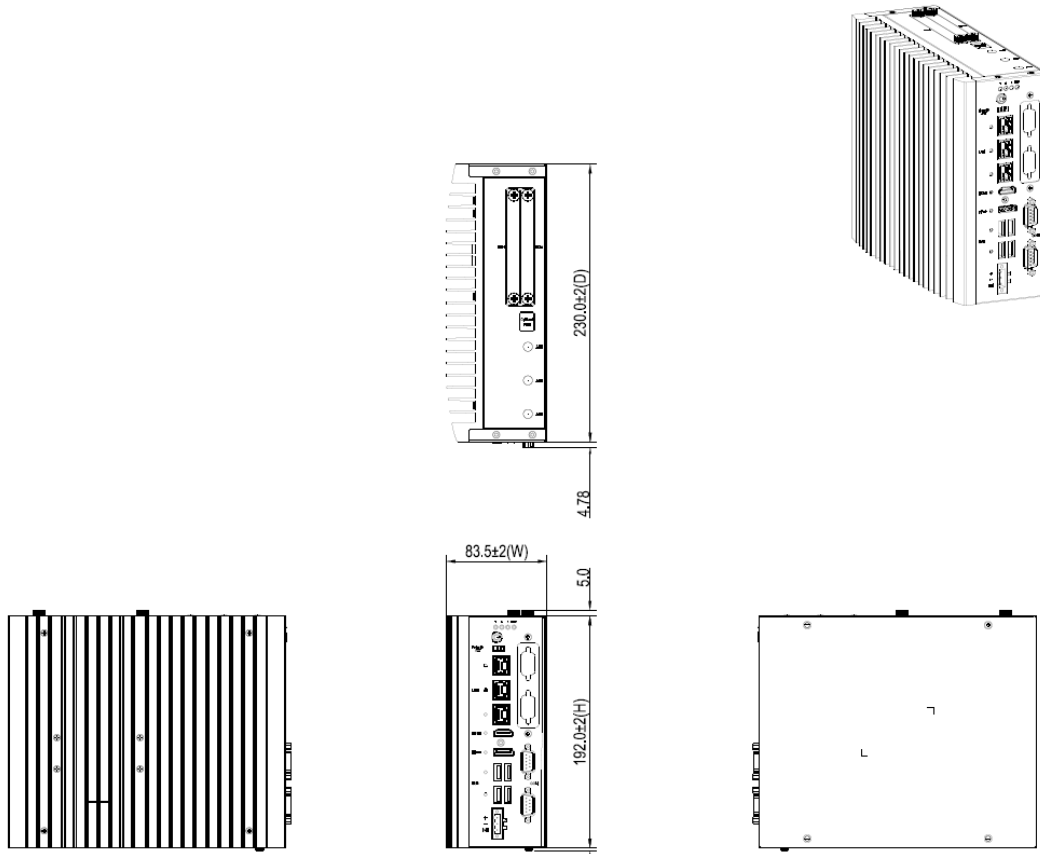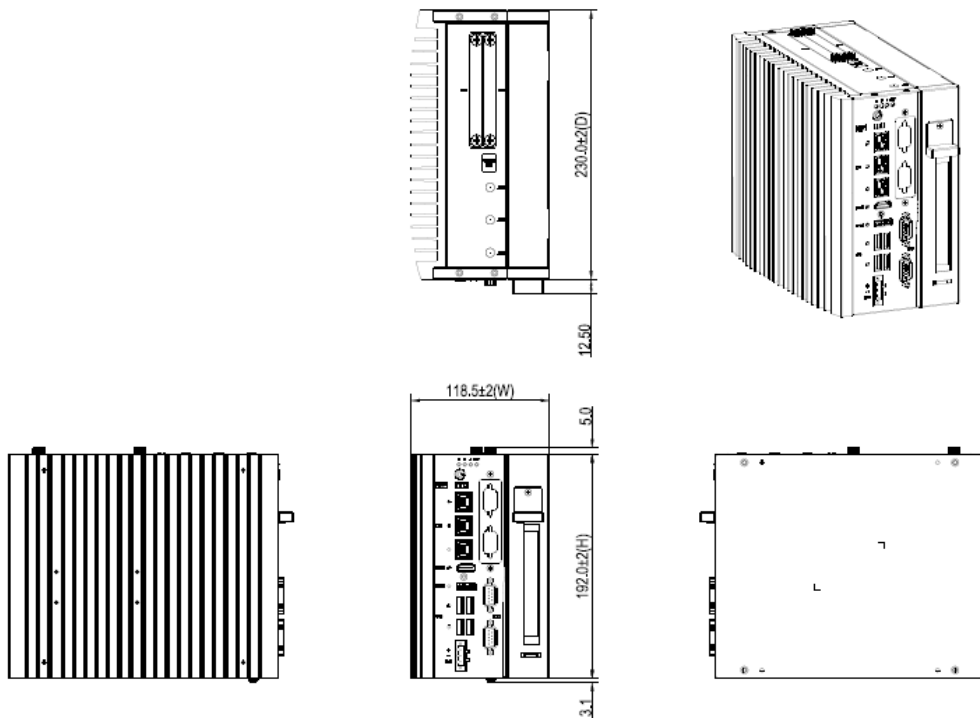
1.4   System Outlets

The following figures show locations of the IPC920 series system outlets.
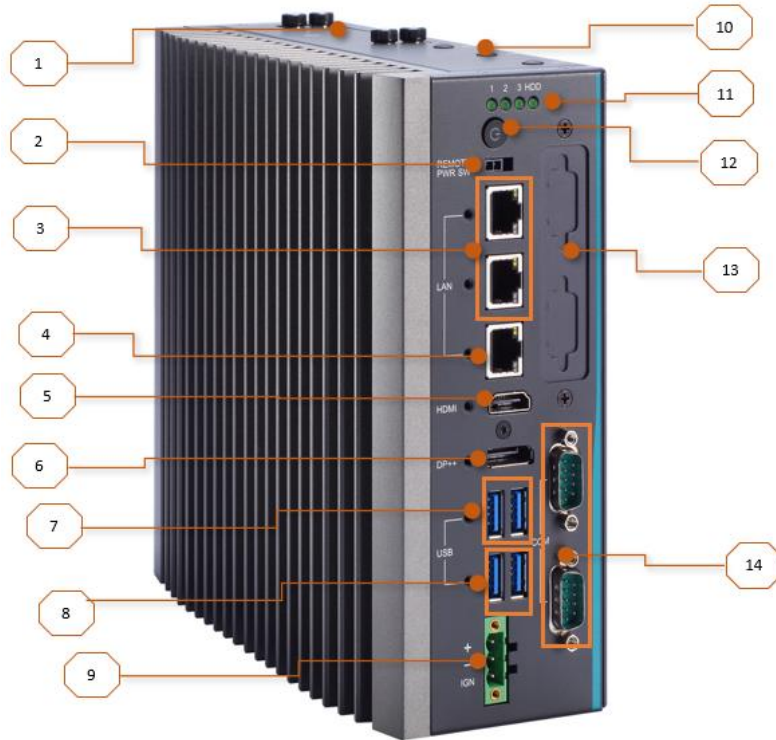
Mark	Description
1	2 x 2.5" HDD/SSD tray
2	Remote power switch
3	2 x 2.5GbE Intel I226-V
4	1GbE Intel I219-LM
5	HDMI 1.4b with 4096 x 2160 resolution
6	DP++ 1.2 with 4096 x 2160 resolution
7	2 x USB3.2 Gen2x1 10G
8	2 x USB3.2 Gen2x1 10G (R680E) or 2 x USB3.2 Gen1x1 5G (H610E)
9	Switch for power on/off with LED (default ATX)
10	3 x antenna opening
11	1 x HDD/SSD access LED 3 x user's LED
12	1 x Power switch w/ LED
13	Flexible I/O window
14	2 x RS232(4-wire)/422/485
15	PCIe x16 slot (EIO110-B, riser card)

1.5   Packing List

The package bundled with your IPC920 Series should contain the following items:

- IPC920 Series unit x 1

- Screw pack x 1

- Foot pad x 4

- CPU Thermal grease x 1

- Terminal block x 1

- Remote power switch cable x1

If you cannot find this package or any items are missing, please contact Axiomtek distributors immediately.

1.6 M/B Block Diagram

The following diagram shows you the M/B block diagram of PSB526.
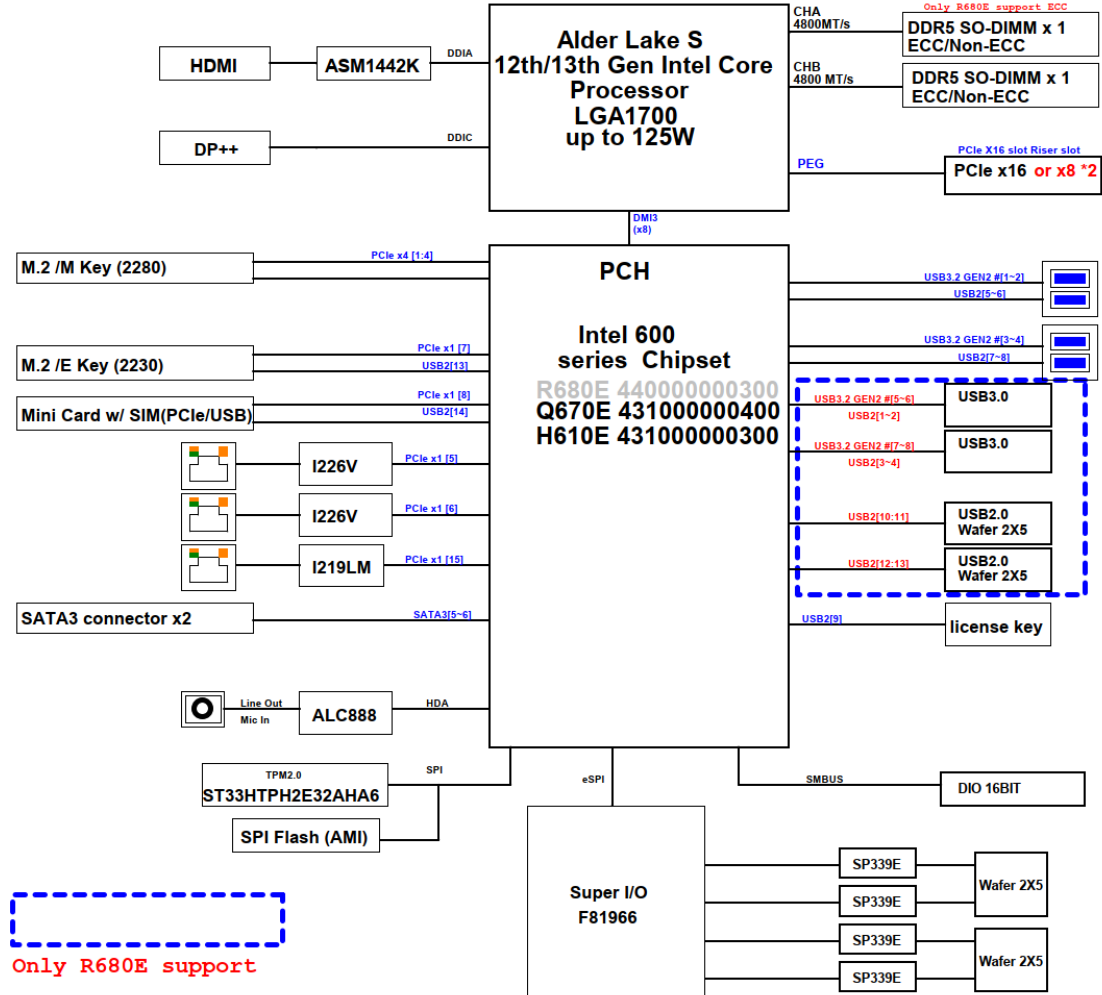
1.7　Switch & LED Settings

Properly configure switch settings on the PSB526 to meet your application purpose. Below you can find a summary table of all Switches and onboard default settings.

1.7.1　Restore BIOS Optimal Defaults (SW1)

Open system cover, then press touch switch for 5 seconds to restore BIOS optimal defaults.

Function	Setting
Normal operation (Default)	OPEN
Restore BIOS optimal defaults	Push (down) 5s
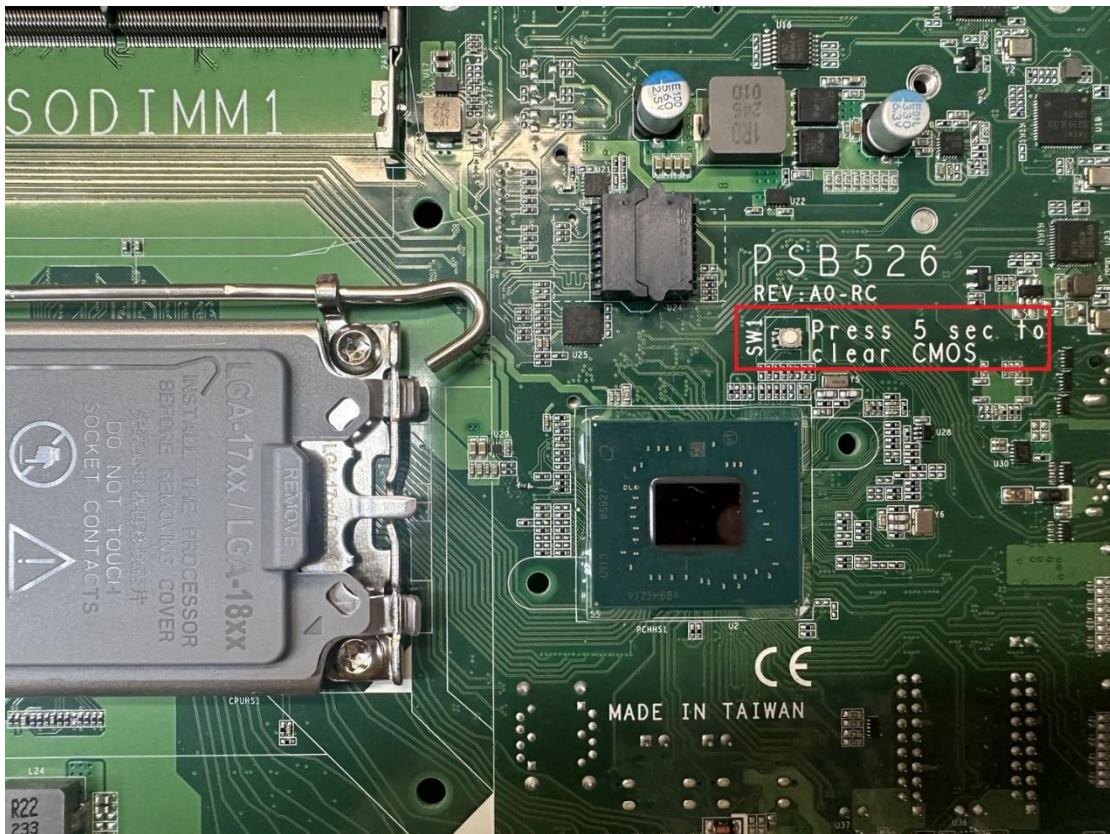
1.7.2 Power On/OFF Button (SW2) & LED (LED1)

The power button is on the I/O side. It allows users to control IPC920 power on/off, The LED displays the current status, refer to the table below for information.

Function	Description
On	Turn on/off system
Off	Keep system status

Power button LED	Description
Orange	System shut down
Blue	System power on
Blinking 4 times on cycle	Input power under Low Voltage

Function	Description
Program LED 1	User defined green (On/Off/Blinking) *1
Program LED 2	User defined green (On/Off/Blinking) *1
Program LED 3	User defined green (On/Off/Blinking) *1
HDD LED	HDD Read/Write, Green blinking
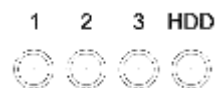
1.8　Connectors

Connectors connect the board with other parts of the system. Loose or improper connection might cause problems. Make sure all connectors are properly and firmly connected.

Here is a table summarizing all connectors on the board.

Connector	Description
BAT1	RTC battery connector
CN1, CN3	COM port wafer connector (RS-232/422/485)
CN4, CN5	Digital I/O connector
CN6, CN7	RJ45 LAN 2.5G Ethernet
CN9	RJ45 LAN Gigabit Ethernet
CN10	HDMI connector
CN11, CN17	Dual USB 3.2 Gen2 Type-A connector
CN12	Reset wafer connector
CN13, CN14	SATA power wafer connector
CN18	Terminal block (Pitch 5.08mm / 3pin)
CN20	DP connector
SATA1, SATA2	SATA III connector
SCN1	M.2 Key M 2280 connector
SCN7	M.2 Key E 2230 connector
SCN8	Mini card connector
PWRBT1	Remote power switch connector
PCIE1	Riser card - EIO110 1 PCIe x16 Gen3

1.8.1　RTC battery connector (BAT1)

This connector is for RTC battery.

Pin	Signal
1	BAT+
2	GND
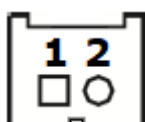
1.8.2   COM port wafer connector (CN1, CN3)

The pin assignments of RS-232/422/485 are listed in the below table.

Set COM signals to operate in RS-232/422/485 by BIOS.

Supports High-Speed Mode 115.2 Kbps, up to 1.5 Kbps

Pin	RS-232	RS-422	RS-485
1	RTS	RX-	N.C.
3	TXD	RX+	N.C.
5	CTS	TX-	D-
7	RXD	TX+	D+
9	GND	GND	GND
2	RTS	RX-	N.C.
4	TXD	RX+	N.C.
6	CTS	TX-	D-
8	RXD	TX+	D+
10	GND	GND	GND
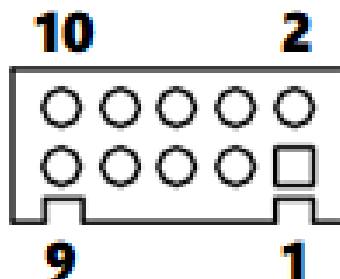
Pins	RS-232	RS-422	RS-485
1	No use	No use	No use
2	RXD, Receive Data	TX+	Data+
3	TXD, Transmit Data	RX+	No use
4	No use	No use	No use
5	GND, Ground	No use	No use
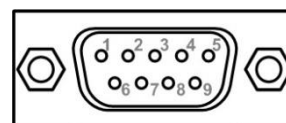
1.8.3   Digital I/O connector (CN4, CN5)

This header (5x2-pin p=2.00mm) is for digital I/O interface.

● The voltage of TTL is 5V

● The programming is as follow:

   - I/O sink current is 8~10mA

   - Input/Output can be programmed

Pin	Signal	Pin	Signal
1	DIO1	2	DIO8
3	DIO2	4	DIO7
5	DIO3	6	DIO6
7	DIO4	8	DIO5
9	GND	10	+5V
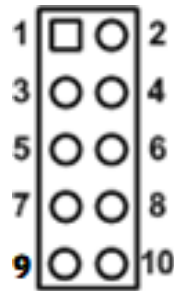
1.8.4   RJ45 LAN 2.5G Ethernet (CN6, CN7)

The system has two RJ-45 connectors: CN6, CN7. Ethernet connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 2500/1000/100-Base-T hub.

Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI2+
5	MDI2-	6	MDI1-
7	MDI3+	8	MDI3-
L	Active LED (Yellow)	R	Speed LED (2500M: Green 1000M: Orange 100M: off)
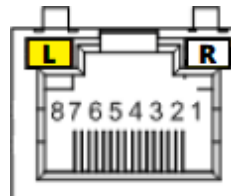
1.8.5 RJ45 LAN Gigabit Ethernet (CN9)

The system has one RJ-45 connectors: CN9. Ethernet connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end (phone jack) to a 1000/100/10-Base-T hub.

Pin	Signal	Pin	Signal
1	MDI0+	2	MDI0-
3	MDI1+	4	MDI2+
5	MDI2-	6	MDI1-
7	MDI3+	8	MDI3-
L	Active LED (Yellow)	R	Speed LED (1000M: Orange 100M: Green 10M: off)
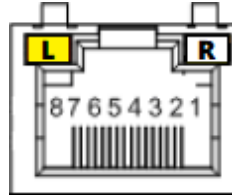
1.8.6 HDMI Connector (CN10)

The HDMI (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pins	Signals	Pins	Signals
1	HDMI OUT_DATA2+	11	GND
2	GND	12	HDMI OUT Clock-
3	HDMI OUT_DATA2-	13	N.C.
4	HDMI OUT_DATA1+	14	N.C.
5	GND	15	HDMI OUT_SCL
6	HDMI OUT_DATA1-	16	HDMI OUT_SDA
7	HDMI OUT_DATA0+	17	GND
8	GND	18	+5V
9	HDMI OUT_DATA0-	19	HDMI_HTPLG
10	HDMI OUT Clock+		
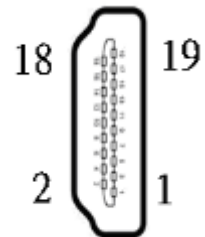
1.8.7 Dual USB 3.2 Type-A connector (CN11, CN17)

The Universal Serial Bus connectors are compliant with USB3.2 and ideal for installing USB peripherals such as scanners, cameras and USB devices.

H610E=USB3.2 GEN1 (5Gbps) + USB3.2 GEN2 (10Gbps)

R680E=USB3.2 GEN2 (10Gbps)

Pins	Signal USB Port 0	Pins	Signal USB Port 1
1	USB_VCC (+5V level standby power)	10	USB_VCC (+5V level standby power)
2	USB1_Data-	11	USB2_Data-
3	USB1_Data+	12	USB2_Data+
4	GND	13	GND
5	SSRX1-	14	SSRX2-
6	SSRX1+	15	SSRX2+
7	GND	16	GND
8	SSTX1-	17	SSTX2-
9	SSTX1+	18	SSTX2+
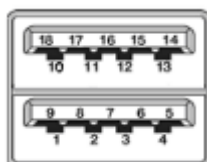
1.8.8   DP connector (CN20)

The DP++ is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable.

Pin	Signal	Pin	Signal
1	LANE 0	2	GND
3	LANE 0#	4	LANE 1
5	GND	6	LANE 1#
7	LANE 2	8	GND
9	LANE 2#	10	LANE 3
11	GND	12	LANE 3#
13	Detect Pin	14	GND
15	AUX CH	16	GND
17	AUX CH#	18	Hot Plug Detect
19	GND	20	DP_PWR (3.3V)
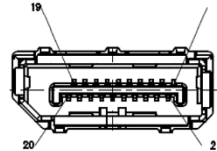
1.8.9   Terminal block (Pitch 5.08mm / 3pin) (CN18)

The system supports 18VDC-36VDC Phoenix DC-in connector for system power input.

Pin	Signal
1	DC+
2	DC-
3	IGN
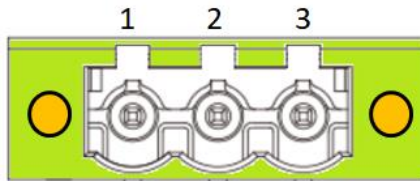
Note: For detailed functions, refer to the IGN chapter

1.8.10 SATA power wafer connector (CN13, CN14)

The SATA power connector is used for interfacing SATA 2.5" HDD/SSD power supply.

Pin	Signal
1	+5V
2	GND
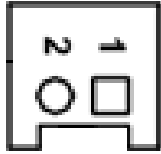
1.8.11 SATA Connector (SATA1, SATA2)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are used as high-speed SATA interfaces. They are computer bus interfaces for connecting to devices such as hard disk drives. This board has two SATA 3.0 ports with 6Gb/s performance.

Pins	Signals
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND
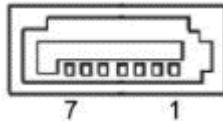
1.8.12 M.2 Key M 2280 connector (SCN1)

The M.2 2280 Key M NVM Express SSD for storage.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	+3.3V	3	GND	4	+3.3V
5	PERn3	6	NC	7	PERp3	8	NC
9	GND	10	LED_1#	11	PETn3	12	+3.3V
13	PETp3	14	+3.3V	15	GND	16	+3.3V
17	PERn2	18	+3.3V	19	PERp2	20	NC
21	GND	22	NC	23	PETn2	24	NC
25	PETp2	26	NC	27	GND	28	NC
29	PERn1	30	NC	31	PERp1	32	NC
33	GND	34	NC	35	PETn1	36	NC
37	PETp1	38	NC	39	GND	40	NC
41	PERn0	42	NC	43	PERp0	44	NC
45	GND	46	NC	47	PETn0	48	NC
49	PETp0	50	PERST#	51	GND	52	CLKREQ#
53	REFCLKn	54	PEWAKE#	55	REFCLKp	56	NC
57	GND	58	NC	59	CONNECTOR Key M	60	CONNECTOR Key M
61	CONNECTOR Key M	62	CONNECTOR Key M	63	CONNECTOR Key M	64	CONNECTOR Key M
65	CONNECTOR Key M	66	CONNECTOR Key M	67	NC	68	NC
69	NC	70	+3.3V	71	GND	72	+3.3V
73	GND	74	+3.3V	75	GND		
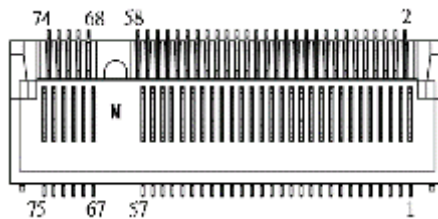
1.8.13 M.2 Key E 2230 connector (*SCN7)

SCN7 for PCI-Express and USB signals interface supported Key E , type 2230.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	+3.3V	3	USB_D+	4	+3.3V
5	USB_D-	6	NC	7	GND	8	NC
9	NC	10	NC	11	NC	12	NC
13	NC	14	NC	15	NC	16	NC
17	NC	18	GND	19	NC	20	NC
21	NC	22	NC	23	NC	24	CONNECTOR KEY E
25	CONNECTOR KEY E	26	CONNECTOR KEY E	27	CONNECTOR KEY E	28	CONNECTOR KEY E
29	CONNECTOR KEY E	30	CONNECTOR KEY E	31	CONNECTOR KEY E	32	NC
33	GND	34	NC	35	PETp0	36	NC
37	PETn0	38	NC	39	GND	40	NC
41	PERp0	42	NC	43	PERn0	44	NC
45	GND	46	NC	47	REFCLKp0	48	NC
49	REFCLKn0	50	SUSCLK	51	GND	52	PERST0#
53	CLKREQ0#	54	W_DISABLE2#	55	PEWAKE0#	56	W_DISABLE1#
57	GND	58	I2C_DATA	59	NC	60	I2C_CLK
61	NC	62	ALERT#	63	GND	64	NC
65	NC	66	NC	67	NC	68	NC
69	GND	70	NC	71	NC	72	+3.3V
73	NC	74	+3.3V	75	GND		
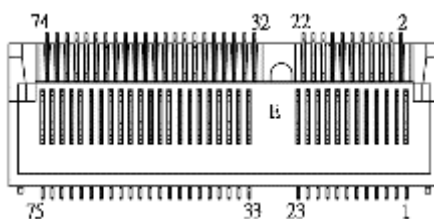
1.8.14 Mini card connector (SCN8)

A PCI-Express Mini Card connector is located on the top side. It complies with PCI-Express Mini Card Spec. V1.2.

Pins	Signals	Pins	Signals
1	WAKE#	2	+3.3VSB
3	No use	4	GND
5	No use	6	+1.5V
7	CLKREQ#	8	No use
9	GND	10	No use
11	REFCLK-	12	No use
13	REFCLK+	14	No use
15	GND	16	No use
17	No use	18	GND
19	No use	20	W_DISABLE#
21	GND	22	PERST#
23	PE_RXN3/	24	+3.3VSB
25	PE_RXP3/	26	GND
27	GND	28	+1.5V
29	GND	30	SMB_CLK
31	PE_TXN3/	32	SMB_DATA
33	PE_TXP3/	34	GND
35	GND	36	USB_D8-
37	GND	38	USB_D8+
39	+3.3VSB	40	GND
41	+3.3VSB	42	No use
43	GND	44	No use
45	No use	46	No use
47	No use	48	+1.5V
49	No use	50	GND
51	No use	52	+3.3VSB
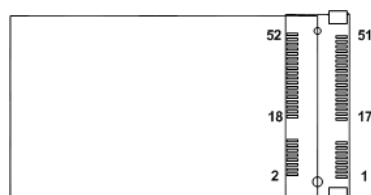
1.8.15 Remote power switch connector (PWRBT1)

The system has one 2-pin connector output for remote power on/off switch.

Function	Description
Short (1-2)	Turn on/off system
Open	Keep system status
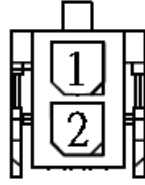
1.8.16 Riser card – EIO110

IPC920-R-F1E and IPC920-H-F1E have a riser module to support PCIe slots.

Expansion Power Input Connectors (ATX1)

This ATX1 connector for reserved uses. (Black color)

Pins	Signals
1	GND
2	GND
3	+12V
4	+12V

Note: ATX1 is reserved, please contact Axiomtek before using it.

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SECTION 2
HARDWARE INSTALLATION

The IPC920 Series products are convenient for your various hardware configurations, such as CPU (Central Processing Unit), memory module, HDD (Hard Disk Drive) and PCIe/PCI card. Chapter 2 will show you how to install these hardware parts.

2.1   Installing the Processor

The Intel® Core™ i9/i7/i5/i3 processors are available as a boxed processor for the IPC960A / IPC962A / IPC964A system. Intel recommends the processors should be installed by a qualified computer professional since this electronic device may cause serious damage to the installer, system and processor if installed improperly.

Note: *Before attempting to install a new processor, carefully review the documentation that came with your system and make sure that you will not be voiding your warranty by opening the computer or replacing your processor.*

Instructions:

1.   Make sure that your system can accommodate the Intel® Core™ i9 i7/i5/i3/Celeron® processor that you want to install. Check for CPU card, BIOS, and thermal compatibility by using the manufacturer's documentation for the system, or by contacting the vendor if necessary. This processor should only be installed in systems supporting the Intel® Core™ i9/i7/i5/i3/Celeron® processors.

2.   Obtain access to your processor socket as described in the documentation for your system.

3.   If the cooling solution prevents you from accessing the processor socket, you may need to remove it. Instructions on how to remove your cooling solution should be provided in the documentation that came with the system.

2.2 Procedure of Installation

This chapter will guide you on installing a processor.

Step 1   Turn off the system.

Step 2   Disconnect the power connector.

Step 3   Loosen eight screws to remove the heatsink cover from the chassis.
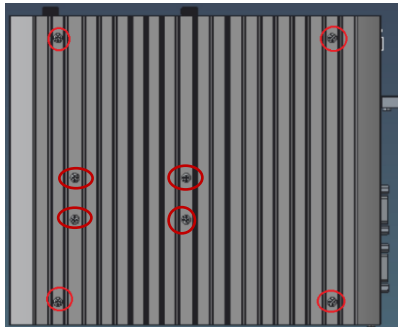
Note: *To avoid damage, never touch the pins of socket and the processor at any time during installation.*

Step 4   Remove protective cover carefully.
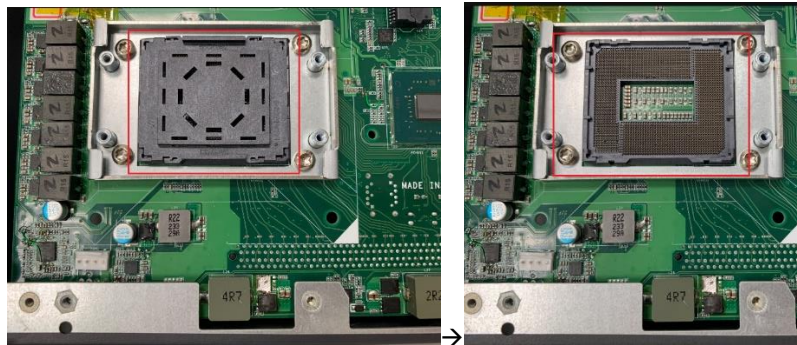
Step 5   CPU installation steps:

➢ Lift the processor package from the shipping media by carefully grasping its substrate edges.

➢ Scan the processor package gold contacts for any presence of foreign material.

➢ Locate connection 1 indicator on the processor which aligns with connection 1 indicator chamfer on the socket and notice processor keying features that line up with posts along socket walls.

➢ Grasp the processor with the thumb and index fingers along the top and bottom edges.

The socket will have cutouts for your fingers to fit into.

➢ Carefully place the processor into the socket vertically.
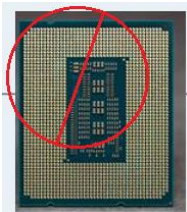
Note: To avoid damage never touch the pins of socket and the processor at any time during installation.

Step 6   When installing the CPU, pay attention to the CPU's orientation and align the arrow mark on the CPU with the arrow key on the socket. And apply the thermal paste on the top of the processor.

Step 7   Put the top cover back onto the system and fasten all screws.
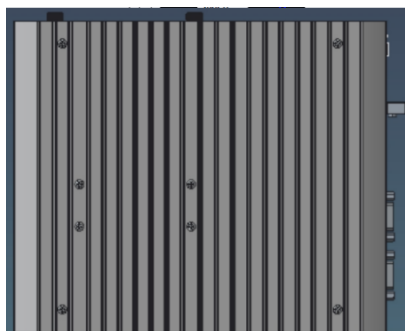
Note: When removing the top cover to change CPU, the CPU will stick on the underside of the cover. To avoid damaging the CPU coming off from heatsink or squeezing, please put the heatsink downwards and remove the expansion box upwards, then take it down carefully by holding the edges of the CPU and follow section 2.2 to reinstall.
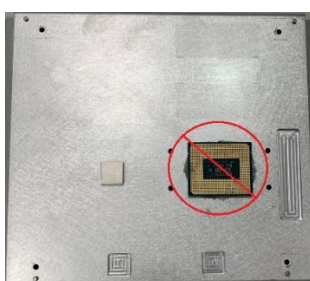
2.3 Installing the Memory Module

Step 1   Paste the thermal pad on the bottom side of the module. Remember to remove the protective film from the thermal pad.

Step 2   Turn off the system.

Step 3   Disconnect the power connector.

Step 4   Loosen eight screws and remove the heatsink cover from the chassis.
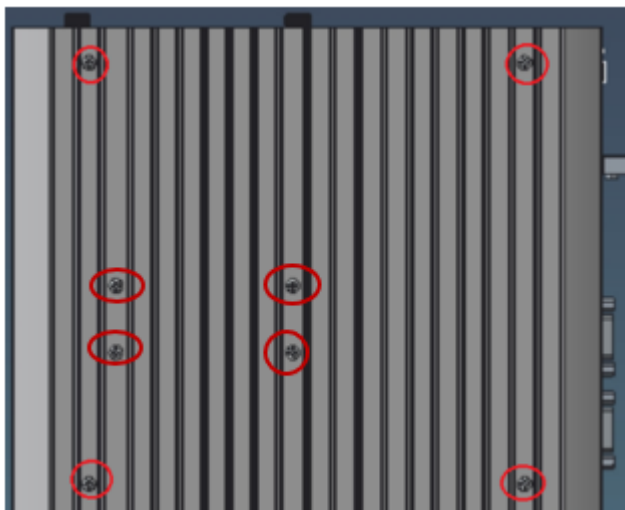
Step 5   Insert the module to slot and push it down firmly.
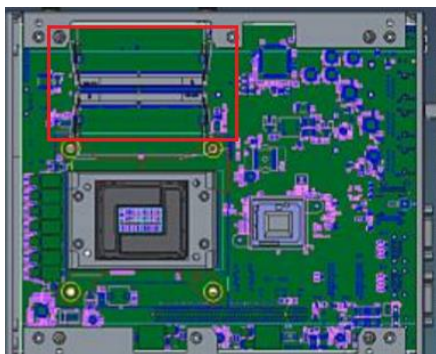
Step 6   Close the heatsink cover back to the chassis and fasten all screws. The installation is complete.

2.4   Installing the Hard Disk Drive

The IPC920 series offers two convenient drive trays modules for users to install HDD/SSD. Please follow the steps to install:

Step 1   Turn off the system.

Step 2   Disconnect the power connector.

Step 3   Unscrew 2 screws for each HDD tray and pull out the HDD tray from the chassis.
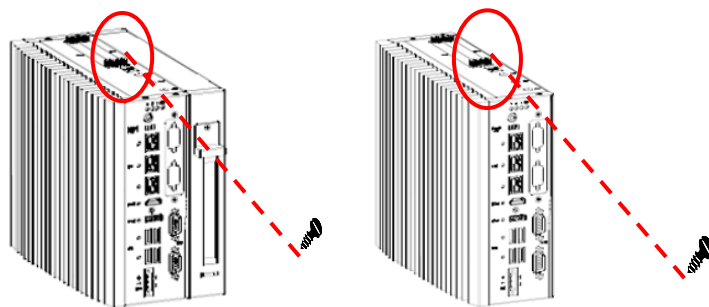
Step 4   Fix HDD/SSD to the HDD tray with four screws
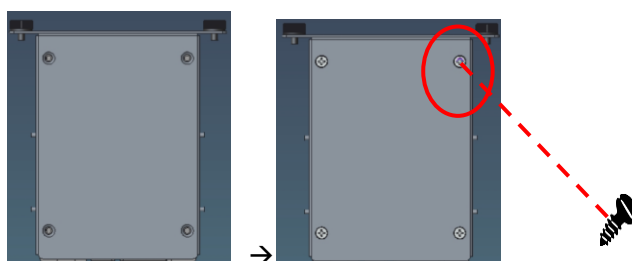
Step 5   Insert HDD tray into the system, then screw 2 screws for each HDD tray. Installation is complete.
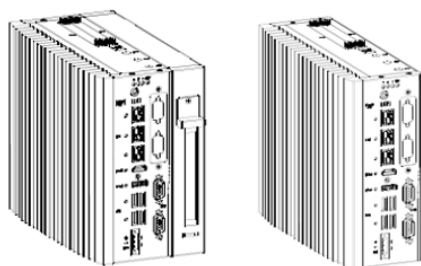
2.5   Installing the flexible I/O

The IPC920 provides a flexible I/O window for expansion. The procedures of installing I/O cable or module into system is instructed below.
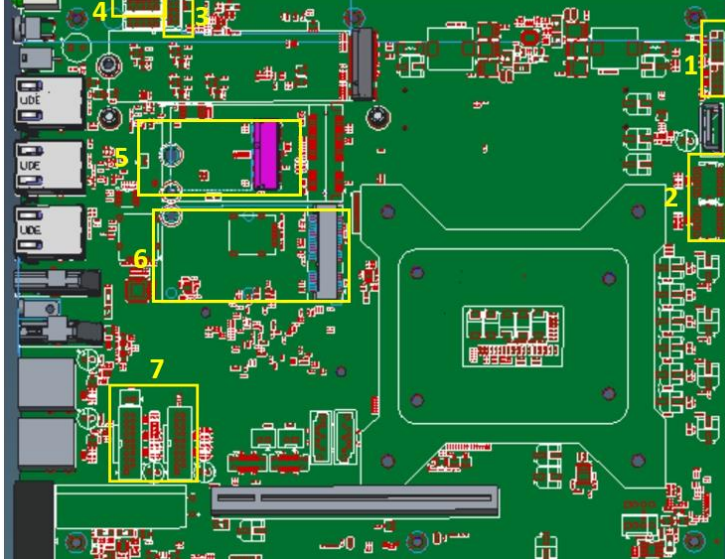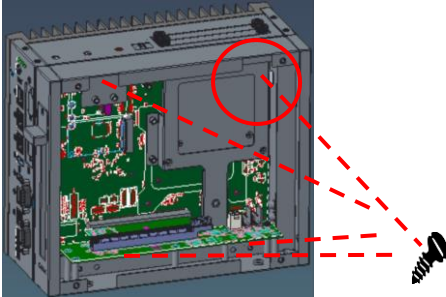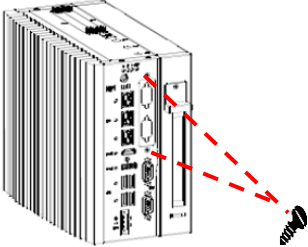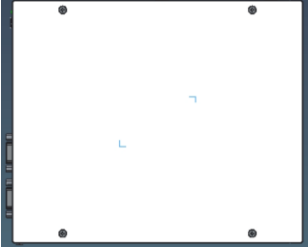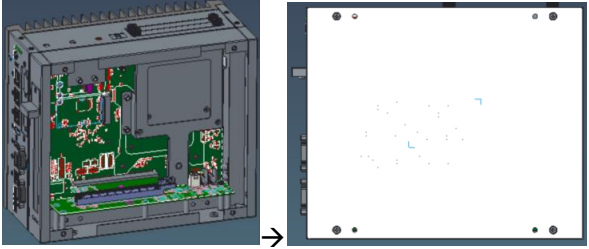
	IPC920-R-F1 / IPC920-R-F1E	IPC920-H-F1 / IPC920-H-F1E
1	2 x 8-bit programmable DIO	2 x 8-bit programmable DIO
2	2 x 2 USB 2.0	2 x 2 USB 2.0
3	Mic in & Line out (by project request)	Mic in & Line out (by project request)
4	1 x 2 RS-232(4-wire)/422/485	1 x 2 RS-232(4-wire)/422/485
5	1 x M.2 key E 2230	1 x M.2 key E 2230
6	1 x mini PCIe	1 x mini PCIe
7	2 x USB3.1 Gen1x1 (5G)	

Step 1   Turn off the system.

Step 2   Disconnect the power connector.

Step 3   Complete the flexible I/O installation as the below procedure illustrates.

IPC920-R-F1 / IPC920-H-F1	IPC920-R-F1E / IPC920-H-F1E
Unscrew the four screws and separate the cover from the chassis.	Unscrew the four screw and separating the cover from the expansion box.
	Unscrew four screws and separate the expansion box from the main chassis.

Loosen Unscrew the two screws and separate the flexible window cover from the chassis.

Note: Do not need to remove flexible window cover when install two DB9 connectors.

> *Remove the DB9 brackets carefully, then screw the DB9 connectors into flexible window cover.*

> *Screw flexible window cover to chassis.*

Screw I/O cable(s) to flexible window cover, then screw the cover to chassis.

Install flexible windows cover to chassis, then fasten all screws. The installation is complete	Attach the flexible window cover to the main chassis. Then, insert and secure the expansion box into the main chassis using screws. Fasten four screws to fix the cover. The installation is complete.

2.6   Installing USB dongle

The IPC920 provides an internal USB2.0 type A connector. The procedure of installing the USB dongle into system is instructed below.

Step 1   Turn off the system.

Step 2   Disconnect the power connector.

Step 3   Loosen the system cover screw and remove the cover from the chassis.
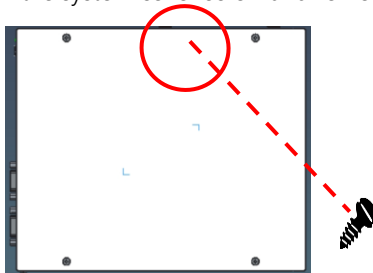
Step 4   Insert USB dongle into connector, then close the system cover back to the chassis and fasten all screws. Installation is complete.
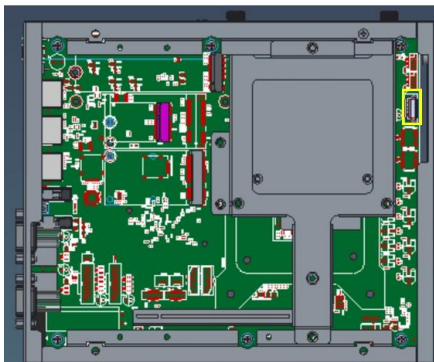
2.7   Installing PCIe Card

The IPC920-R-F1E and IPC920-H-F1E provide a PCIe x16 slot for expansion. The procedure of installing PCIe expansion card into system is instructed below.

2.7.1   Installing PCIe card

Step 1   Turn off the system.

Step 2   Disconnect the power connector.

Step 3   Loosen the system cover screw and remove the cover from the expansion box.
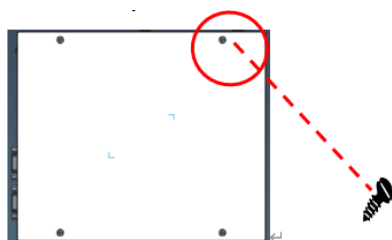
Step 4   Locate the PCIe slot and remove the slot bracket.
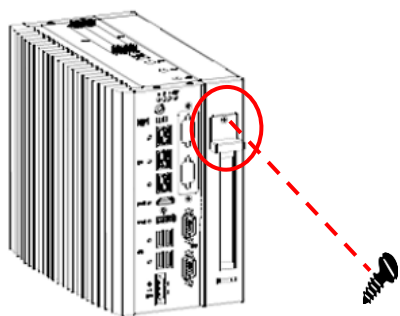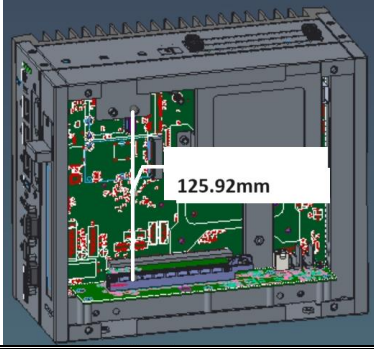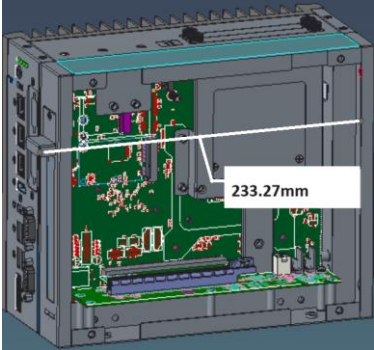
Step 5   Align the PCIe card with the slot and press the card into the slot until it is firmly seated.
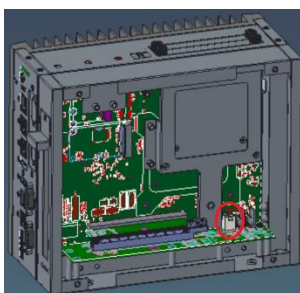
Step 6   Close the cover back to the chassis and tighten the screws. The installation is complete.

2.7.2 The limitation of an add-on card

The following figures show the limitation of an add-in card in different configuration.

	Slot (PCIe x16)
Height	125.92mm
length	233.27mm
width	1-slot

Note: Please note that above dimension is the maximum length for add-on card with I/O bracket.

Note: Considering heat dissipation potential, a space of 20mm must be left between an add-on card and system.

Note: The followings show each slot's max. dimensions for add-in card in the system, it doesn't include power cable routing length required for add-in card.

2.8   Installing the NVMe SSD, Mini Card & M.2 key E Module

The IPC920 comes equipped with a mini card slot, an optional M.2 key E/B slot and a M.2 key M slot for users to install wireless LAN cards and SSD. Please refer to the following instructions and illustrations for the installation of the wireless LAN and SSD.
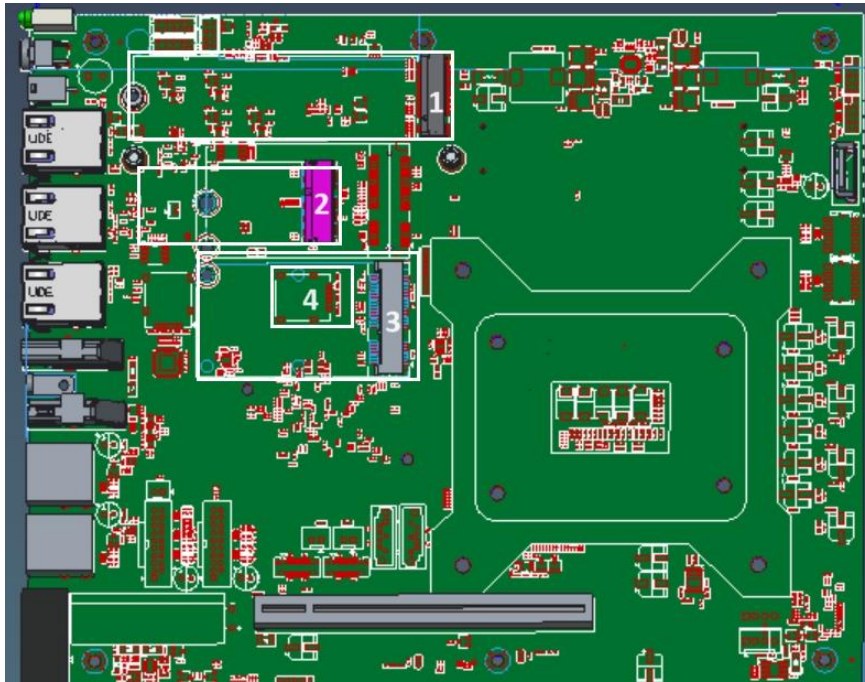
IPC920 series			
1	M.2 key M 2280 (PCIe x4 Gen3)	2	M.2 Key E slot 2232
3	Mini PCIe slot	4	SIM socket for mini PCIe

Step 1   Turn off the system.

Step 2   Disconnect the power connector.

IPC920-R-F1 / IPC920-H-F1	IPC920-R-F1E / IPC920-H-F1E
Unscrew the four screws and separate the cover from the chassis.	Unscrew the four screw and separating the cover from the expansion box.

Unscrew the four screws and separate the expansion box from the main chassis.
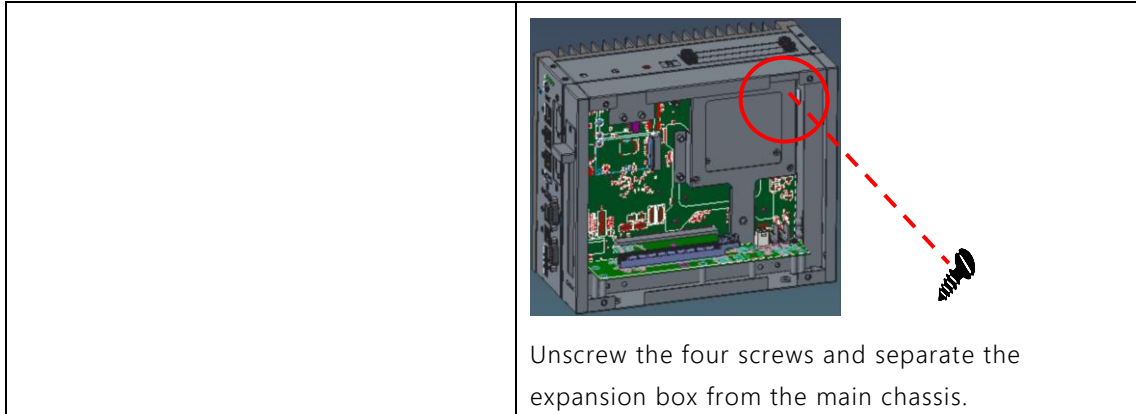
Step 4   Please follow the steps below to install modules.

M.2 key M
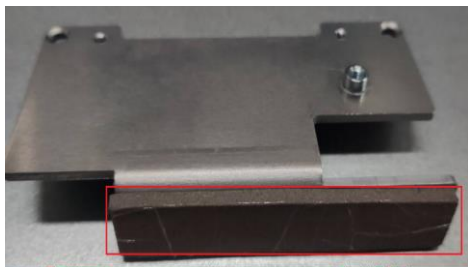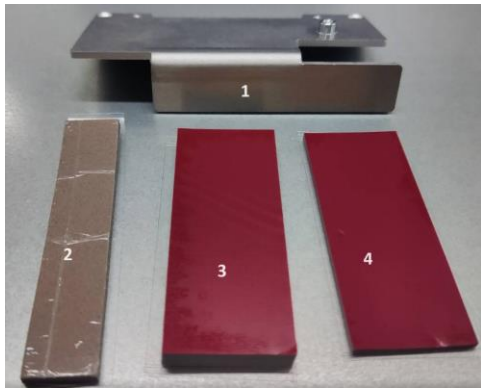
➢   Paste the thermal pad(2) on the bracket(1) and tear the protective cover.

➢   Paste the thermal pad(3) on the main board and tear the protective cover.

➢   Insert the SSD module into Key M slot and push it down firmly.

➢   Paste the thermal pad (4) on the top of SSD module and tear the protective cover.

➢ Tight the bracket. The installation is complete.,
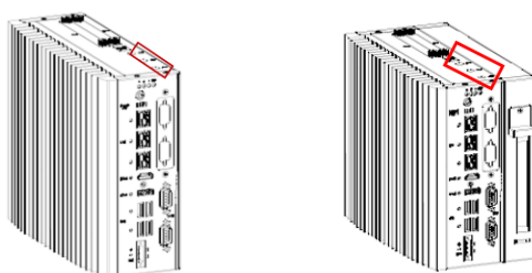
Mini PCIe / M.2 key E
➢ Carefully insert the wireless LAN card into its designated slot on the motherboard. Gently press down until it clicks or locks into place.
➢ Connect the internal wireless cable(s) to the wireless LAN card. Then, detach the antenna plug(s) and screw the antenna(s) securely onto the system.
➢ Close the cover back (and expansion box) to the main chassis and tighten the screws. The installation is complete.

Note: *Please use an extended bracket when using a half-size Mini card*

Note: *There are three antenna holes in the system, please adjust the antenna placement according to the environment.*

2.9　Using the Cable Tie

The IPC920 provides cable tie (1) and cable holder (2) for optional selection, using the cable tie, it helps you to ensure your I/O cable is secure. To use the cable tie, do the following:
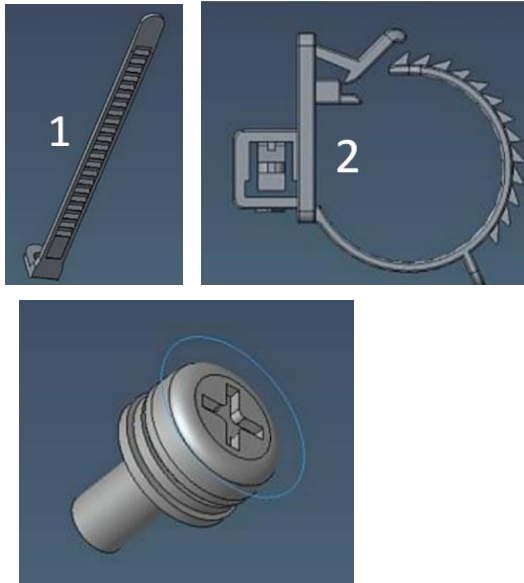
Step 1　Turn off the system.

Step 2　Disconnect the power connector.

Step 3　Connect the I/O cable(s) to the system connector. Then, securely fasten the cable tie (1) using the provided screws.
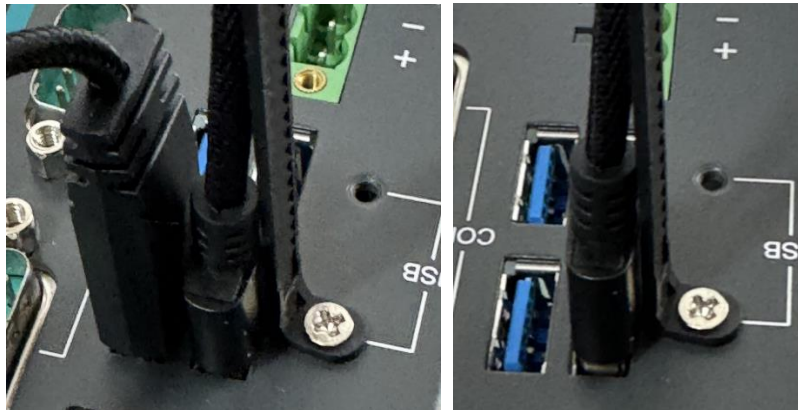
Step 4   Attach the cable holder (2) to the I/O cable(s) and thread the cable tie (1) through the
                holder. (as shown in the illustration below in red rectangle)
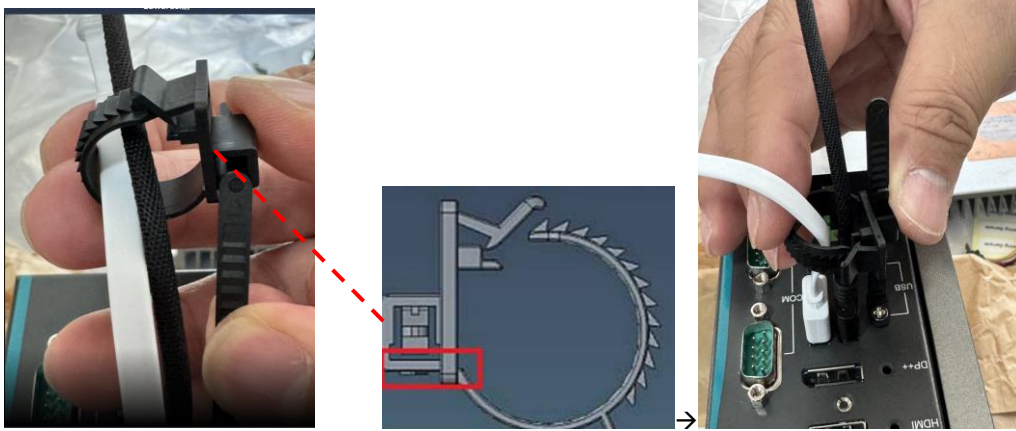
Step 5   Open the latch (A) of cable holder and thread cable holder (B) through the latch (as shown
            below in read rectangle), tighten the cable holder to encircle the I/O cable(s). The
            installation is completed.
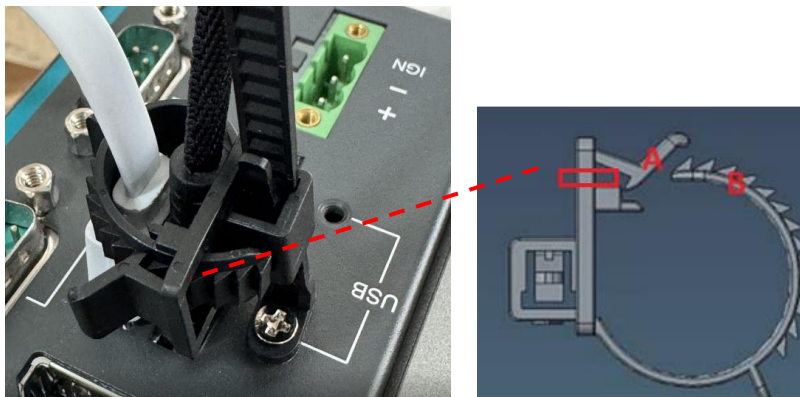
2.10   Mounting

The IPC920 provides optional mount kits for different deployment field sites .

<u>DIN rail mount</u>
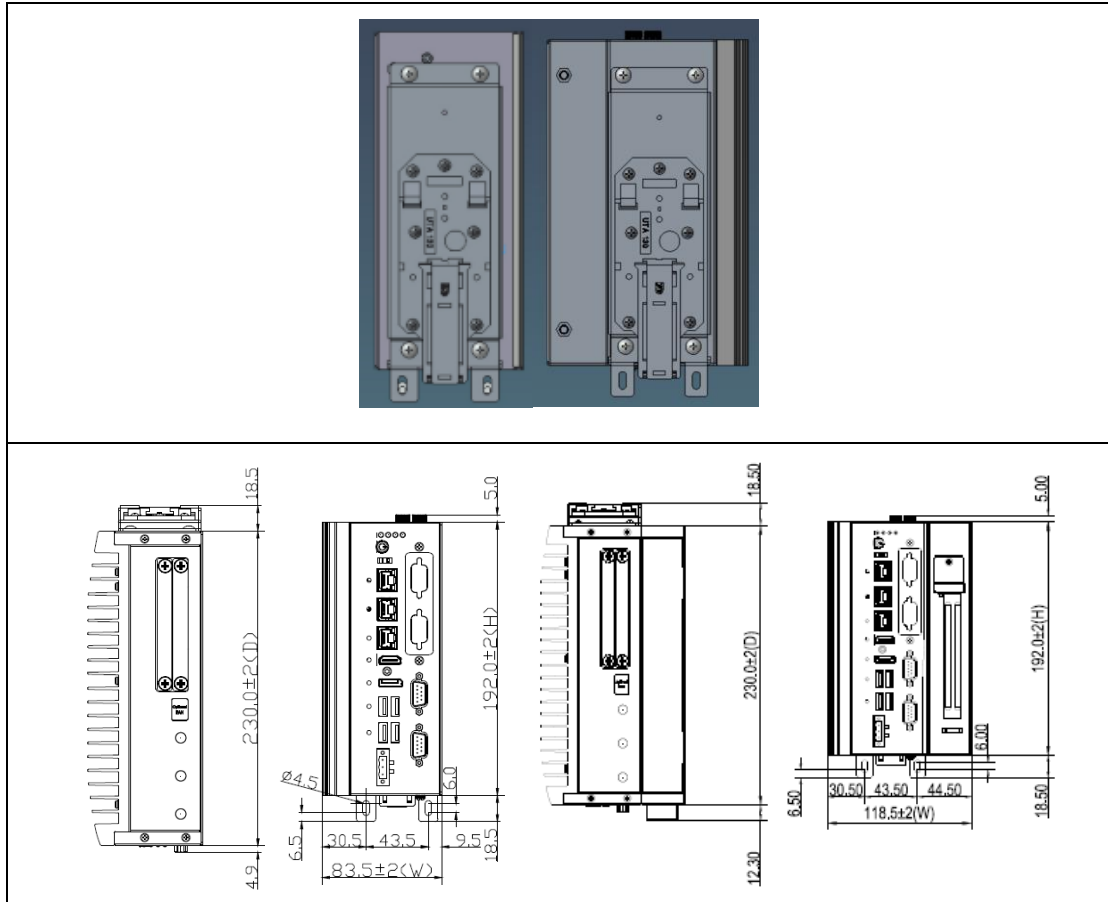
*Note: The DIN rail kit can be installed in IPC920-R-F1 **and IPC920-H-F1** only.*

Bookshelf mount
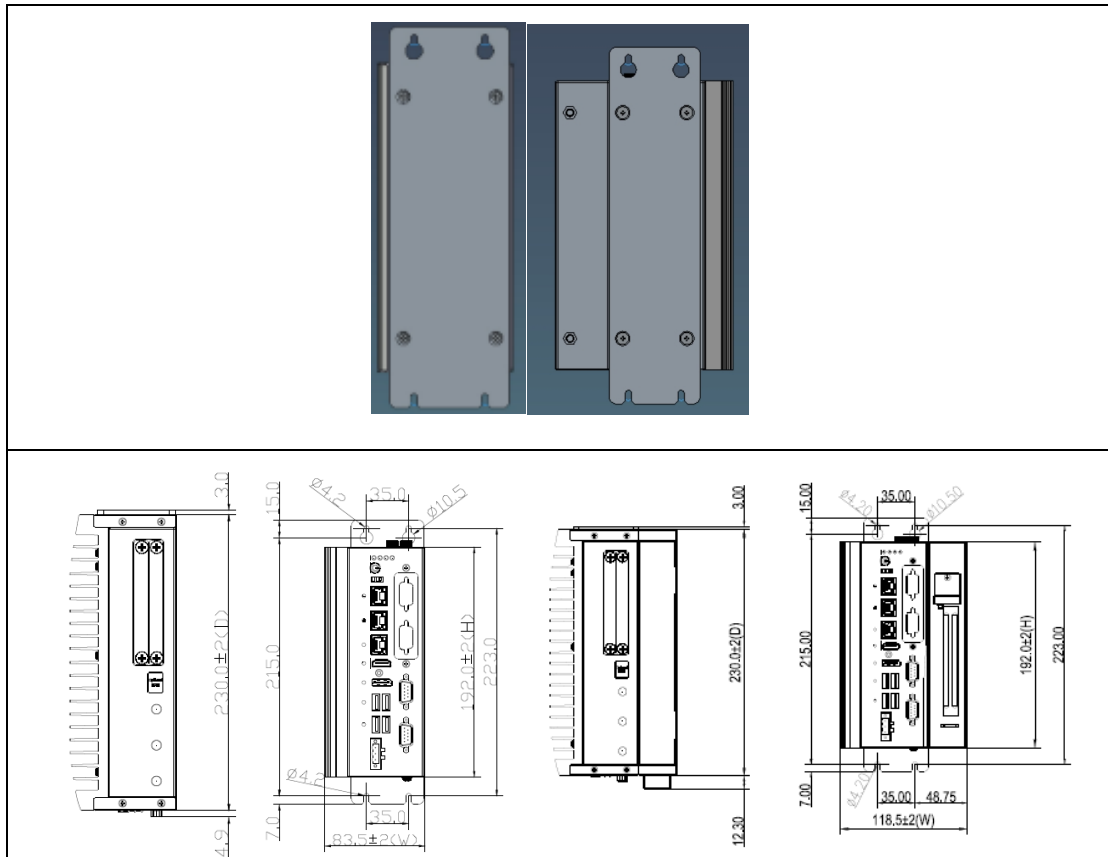
Note: The bookshelf mount kit can be installed in IPC920-R-F1 and IPC920-H-F1 only.

Note: The IPC920-R(H)-F1 supports DIN rail kit, bookshelf kit or wall mount kit.

Wall mount

Hardware Installation

Minimum diameter:Ø5.5mm

Minimun Length:1.6mm+ Wall's hole depth

Thread type should be decide accordingly.
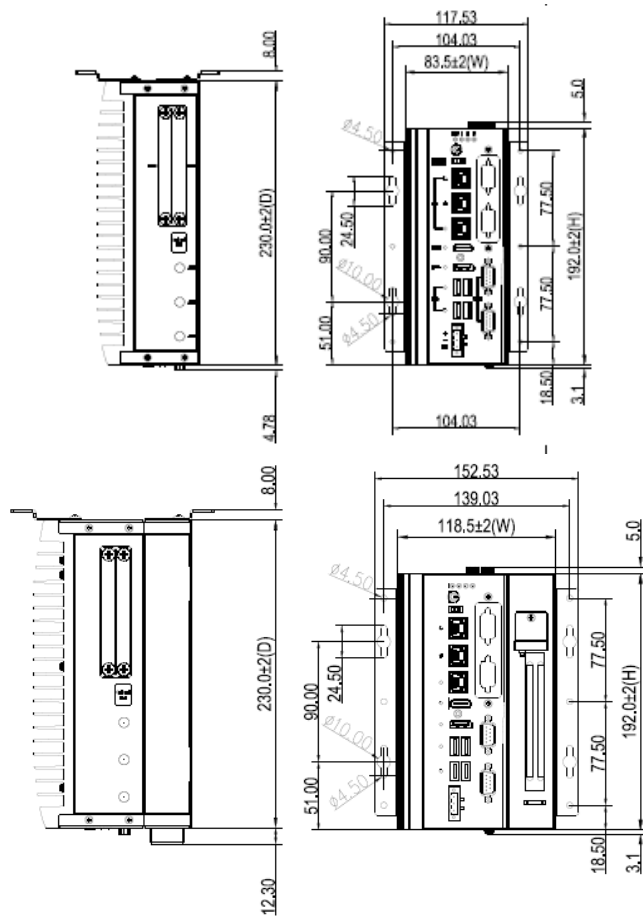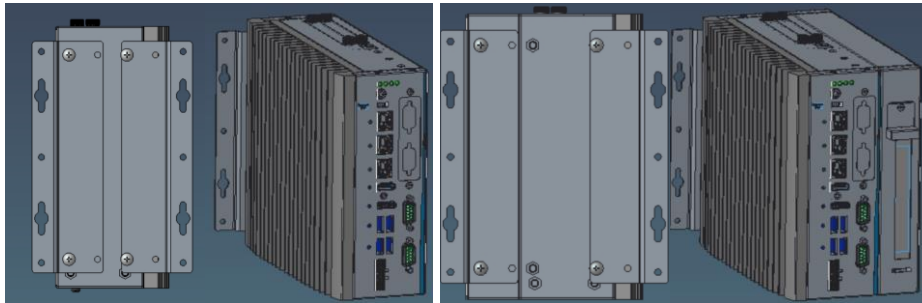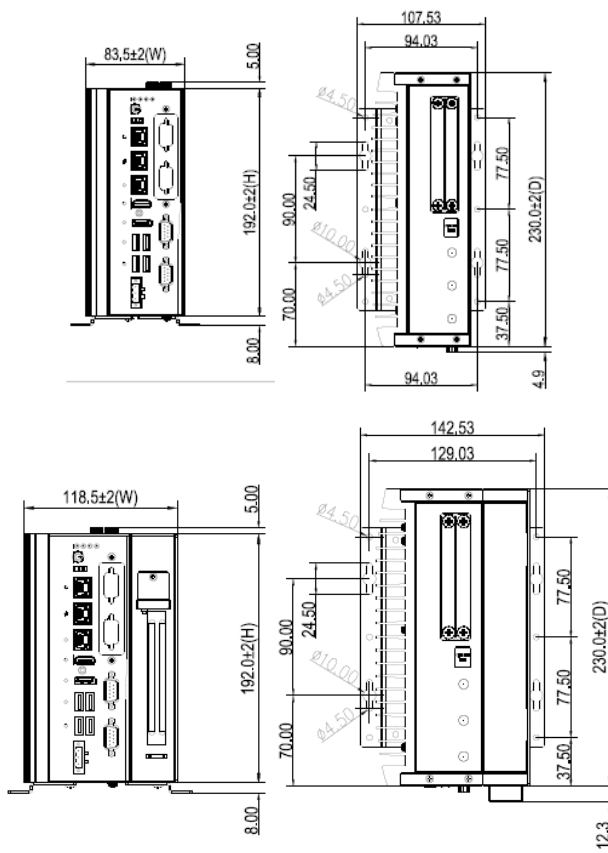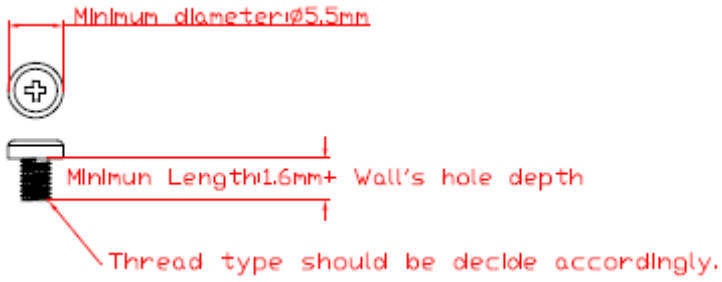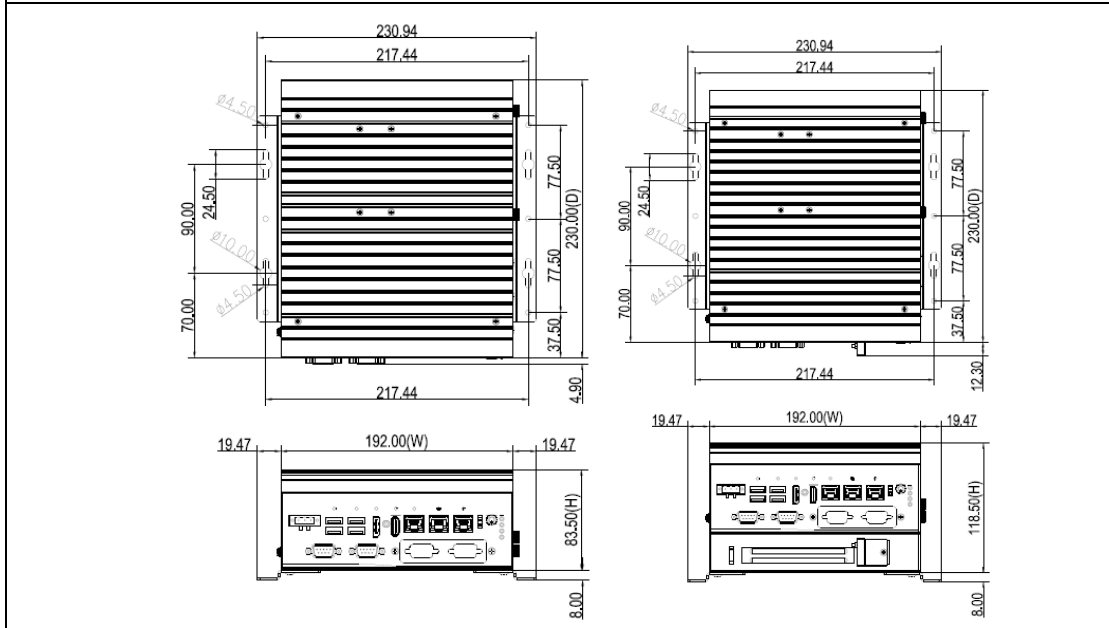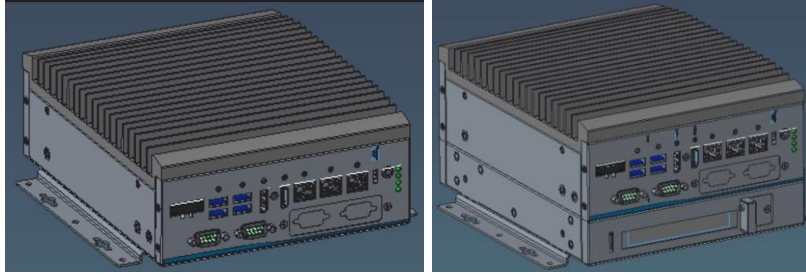
Note: The IPC920 supports any of din rail kit, book*shelf* mount kit or wall mount kit.

SECTION 3
AMI BIOS UTILITY

The AMI UEFI BIOS provides users with a built-in setup program to modify basic system configuration. All configured parameters are stored in a 16MB flash chip to save the setup information whenever the power is turned off. This chapter provides users with detailed description about how to set up basic system configuration through the AMI BIOS setup utility.

3.1   Starting

To enter the setup screens, follow the steps below:

1.   Turn on the computer and press the <Del> key immediately.

2.   After you press the <Del> key, the main BIOS setup menu displays. You can access the other setup screens from the main BIOS setup menu, such as the Advanced and Chipset menus.

Note: If your computer cannot boot after making and saving system changes with Setup, you can restore BIOS optimal defaults by setting JP1 (see section 1.6.2).

It is strongly recommended that you should avoid changing the chipset's defaults. Both AMI and your system manufacturer have carefully set up these defaults that provide the best performance and reliability.

3.2   Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

Note: Some of the navigation keys differ from one screen to another.

Hot Keys	Description
→← Left/Right	The Left and Right <Arrow> keys allow you to select a setup screen.
↑↓ Up/Down	The Up and Down <Arrow> keys allow you to select a setup screen or sub-screen.
+− Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
Tab	The <Tab> key allows you to select setup fields.
F1	The <F1> key allows you to display the General Help screen.
F2	The <F2> key allows you to Load Previous Values.
F3	The <F3> key allows you to Load Optimized Defaults.
F4	The <F4> key allows you to save any changes you have made and exit Setup. Press the <F4> key to save your changes.
Esc	The <Esc> key allows you to discard any changes you have made and exit the Setup. Press the <Esc> key to exit the setup without saving your changes.
Enter	The <Enter> key allows you to display or change the setup option listed for a particular setup item. The <Enter> key can also allow you to display the setup sub- screens.

3.3   Main Menu

When you first enter the setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is shown below.

```
                          Aptio Setup - AMI
   Main  Advanced  Chipset  Security  Boot  Save & Exit

   BIOS Information                                    Set the Date. Use Tab to
   Build Date and Time        10/18/2023 08:54:21      switch between Date elements.
   Project Version            PSB526 X203 CRB          Default Ranges:
                                                       Year: 1998-9999
   Firmware Information                                Months: 1-12
   ME Firmware Version        16.1.25.2020             Days: Dependent on month
   ME Firmware Mode           Normal Mode              Range of Years may vary.
   ME Firmware SKU            Consumer SKU

   Board Information
    Processor Name            AlderLake DT
             Type             12th Gen Intel(R)
                              Core(TM) i9-12900
             Stepping         C0                       →←: Select Screen
                                                       ↑↓: Select Item
    PCH      Name             PCH-S                     Enter: Select
             SKU              Q670E                     +/-: Change Opt.
             Stepping         B1                        F1: General Help
    Memory   Size             32768 MB                  F2: Previous Values
             Frequency         4000 MHz                 F3: Optimized Defaults
                                                        F4: Save & Exit
   System Date                [Mon 10/16/2023]          ESC: Exit
   System Time                [04:38:35]
   Access Level               Administrator


                    Version 2.22.1287 Copyright (C) 2023 AMI
```

➢   BIOS Information

Display the BIOS information.

➢   System Date/Time

Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in HH:MM:SS format.

➢   Access Level

Display the access level of current user.

3.4 Advanced

● Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. You can select any of the items in the left frame of the screen to go to the sub menus:

- ● Smart Ignition Management

- ● ACPI Settings

- ● Trusted Computing

- ● Platform Misc Configuration

- ● CPU Configuration

- ● Storage Configuration

- ● NVMe Configuration

- ● AMT Configuration

- ● F81966 Super IO configuration

- ● Hardware Monitor

- ● USB Configuration

For items marked with "▶", please press <Enter> for more options.

*For H610E platform

```
                          Aptio Setup - AMI
        Main  Advanced  Chipset  Security  Boot  Save & Exit

  ▶ Smart Ignition Management                    Setup or restore settings
  ▶ ACPI Settings                                - You may Save custom On/Off
  ▶ Trusted Computing                            settings or Restore factory
  ▶ Platform Misc Configuration                  default settings
  ▶ CPU Configuration
  ▶ Storage Configuration
  ▶ NVMe Configuration
  ▶ F81966 Super IO Configuration
  ▶ Hardware Monitor
  ▶ USB Configuration



                                                 →←: Select Screen
                                                 ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Opt.
                                                 F1: General Help
                                                 F2: Previous Values
                                                 F3: Optimized Defaults
                                                 F4: Save & Exit
                                                 ESC: Exit



                   Version 2.22.1287 Copyright (C) 2023 AMI
```

*For Q670E platfomr

```
                            Aptio Setup - AMI
        Main  Advanced  Chipset  Security  Boot  Save & Exit  MEBx

    ▶ Smart Ignition Management                    Setup or restore settings
    ▶ ACPI Settings                                - You may Save custom On/Off
    ▶ Trusted Computing                            settings or Restore factory
    ▶ Platform Misc Configuration                  default settings
    ▶ CPU Configuration
    ▶ Storage Configuration
    ▶ NVMe Configuration
    ▶ AMT Configuration
    ▶ F81966 Super IO Configuration
    ▶ Hardware Monitor
    ▶ USB Configuration

                                                   ↔: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Opt.
                                                   F1: General Help
                                                   F2: Previous Values
                                                   F3: Optimized Defaults
                                                   F4: Save & Exit
                                                   ESC: Exit




                    Version 2.22.1287 Copyright (C) 2024 AMI
```

- **Smart Ignition Configuration**

Press Enter to access the sub-menu. Calculated based on the 24-hour military-time clock.

```
                            Aptio Setup - AMI
        Advanced

Smart Ignition Management                             Change power mode
Manufacturer                  Axiomtek               Enabled  : In-Vehicle
Model                         PSB526                 Disabled : AT/Raiway
Firmware Version              V101                   *PSU and system would reset
                                                     after save setting
PSU State                     N/A
Power Mode                    AT Mode
Vin Voltage(V)                N/A
IGN Signal                    N/A

Shutdown Delay Timer (IGN Off)    N/A
Shutdown Delay Timer (Low Voltage)  N/A
                                                     ++: Select Screen
Ignition Management           [Disabled]             ↑↓: Select Item
                                                     Enter: Select
Auto Power On                 [Enabled]              +/-: Change Opt.
                                                     F1: General Help
▶ Advance Setting                                    F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
▶ Save Settings                                      ESC: Exit
▶ Restore Factory Settings



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```

BIOS menu item	Description
Ignition Management	Enabled Switch to ACC mode *Note: IGN signal will only be triggered when DCIN Terminal Block 4-Pin IGN is connected with VCC. Disabled Switch to AT mode *Note: System will be reset after Ignition Management setting has been changed and saved.
Auto Power On	Enabled System will turn on automatically under following conditions - Manually disconnects and reconnects system power - Power interruption: Resumes power after power failure Disabled System will not turn on automatically when power is connected or when power resumes from a power failure

Advance Setting	Set system on/off timing and voltage threshold levels
Save Settings	Save the current settings
Restore Factory Settings	Restores factory defaults to remove any incorrect or corrupt settings that might have prevented the system from properly powering on/off.

```
            Aptio Setup Utility - Copyright (C) 2022 American Megatrends, Inc.
     Advanced

  ======== Voltage      ========                          The counter will be activated
  Activate Voltage Trigger(V)        9                    once power source voltage is
  Low Voltage Trigger(V)             8                    smaller than the value of [Low
                                                           Voltage Trigger],then, system
  Shutdown Delay Timer (Low Voltage)                       will be forced to turn off
  Minuium Timer                      00:01:00             when time's up
  Maximum Timer                      03:00:00
    Hour                             0
    Minute                           3
    Second                           0
  ======== IGN Function  ========
  IGN Trigger                        [Enabled]
                                                           ++: Select Screen
  System Turn On Delay Timer(IGN On)                       ↑↓: Select Item
  Minuium Timer                      00:00:02             Enter: Select
  Maximum Timer                      00:30:00             +/-: Change Opt.
    Hour                             0                     F1: General Help
    Minute                           0                     F2: Previous Values
    Second                           2                     F3: Optimized Defaults
  Shutdown Delay Timer (IGN Off)                           F4: Save & Exit
  Minuium Timer                      00:00:01             ESC: Exit
  Maximum Timer                      06:00:00
    Hour                             0
    Minute                           0
    Second                           2

            Version 2.10.1263. Copyright (C) 2022 American Megatrends, Inc.
```

BIOS menu item	Description
Activate Voltage Trigger	The system only turns on when the voltage delivered by the power source is higher than the value you set here.
Low Voltage Trigger	The system will begin countdown stage once voltage drops below the value you set here. If the power source voltage does not come back above the value of [Activate Voltage Trigger] within the time you set for [Shutdown Delay Time (Low Voltage)], the system will shut down and remain off.
Shutdown Delay Timer (Low Voltage)	The counter will be activated once power source voltage drops below the value defined in [Low Voltage Trigger]. The system will be forced to turn off once timer completes countdown.
IGN Trigger	Enable [System Turn on Delay] and [Shutdown Delay] will be trigged by IGN. Disable IGN signal will not affect any power management.

● ACPI Settings

ACPI configuration can be configured in ACPI Settings. A description of the selected item appears on the right side of the screen.

```
                              Aptio Setup – AMI
       Advanced

   ACPI Settings                                          Select the highest ACPI sleep
                                                          state the system will enter
   ACPI Sleep State              [S3 (Suspend to RAM)]    when the SUSPEND button is
                                                          pressed.




                                                          →←: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
                                                          +/−: Change Opt.
                                                          F1: General Help
                                                          F2: Previous Values
                                                          F3: Optimized Defaults
                                                          F4: Save & Exit
                                                          ESC: Exit


                     Version 2.22.1287 Copyright (C) 2023 AMI
```
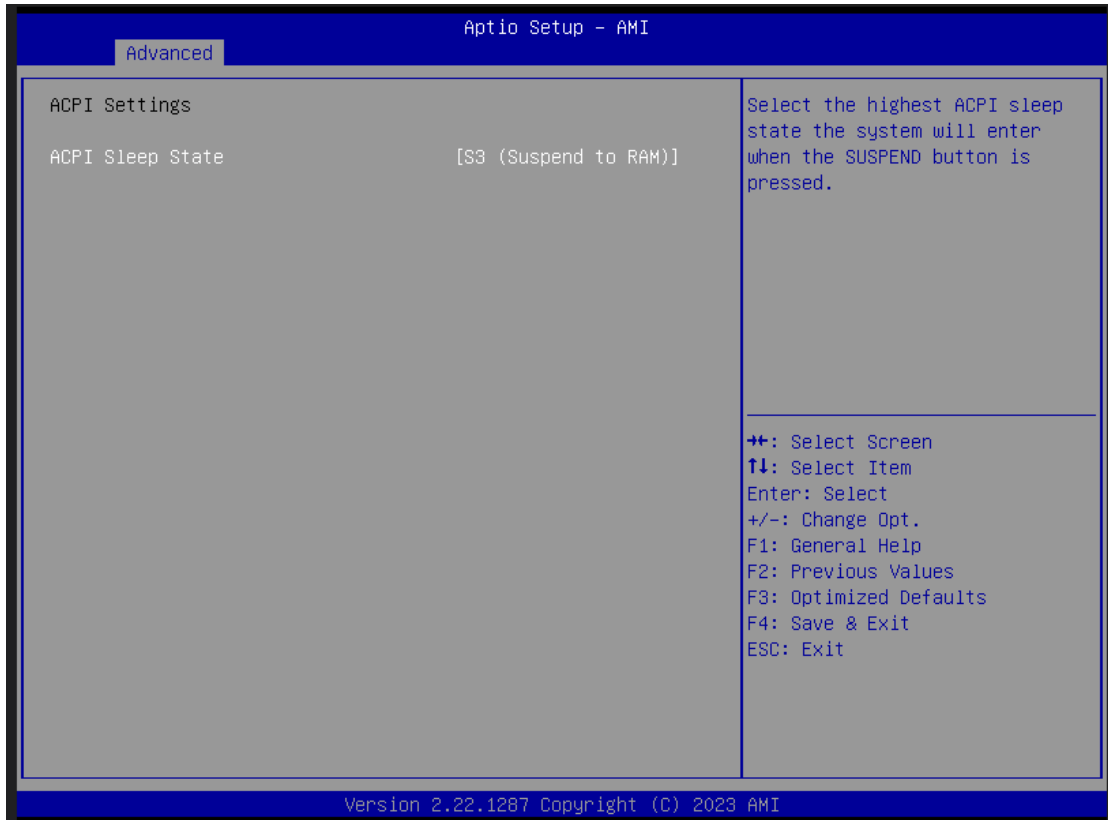
➢ ACPI Sleep State

Select the ACPI (Advanced Configuration and Power Interface) sleep state. Configuration options are Suspend Disabled and S3 (Suspend to RAM). The default is S3 (Suspend to RAM). This option selects the ACPI sleep state the system will enter when the suspend button is pressed.

● Trusted Computing

Select Security Device Support to enable or disable the TPM function.

```
                              Aptio Setup - AMI
   Advanced

   TPM 2.0 Device Found                                 Enables or Disables BIOS
   Firmware Version:          1.258                      support for security device.
   Vendor:                    STM                        O.S. will not show Security
                                                         Device. TCG EFI protocol and
   Security Device Support    [Enable]                   INT1A interface will not be
   Active PCR banks           SHA256                     available.
   Available PCR banks        SHA256




                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



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```

➢ TPM Device Selection

Select TPM device:

- PTT: Intel® built-in TPM. Enables PTT in SkuMgr.

- dTPM: External extended Infineon's TPM. Disables PTT in SkuMgr.

➢ Security Device Support

Enable or disable BIOS support for security device. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.

● Platform Misc Configuration

This screen allows you to set Platform Misc Configuration.

```
                                 Aptio Setup – AMI
  Advanced

  Platform Misc Configuration                          Bit – PCIe Native * control
                                                        0 – ~ Hot Plug
  Native PCIE Enable            [Disabled]              1 – SHPC Native Hot Plug
  Native ASPM                   [Disabled]             control
                                                        2 – ~ Power Management Events
                                                        3 – PCIe Advanced Error
                                                       Reporting control
                                                        4 – PCIe Capability Structure
                                                       control
                                                        5 – Latency Tolerance
                                                       Reporting control


                                                       ←→: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/–: Change Opt.
                                                       F1: General Help
                                                       F2: Previous Values
                                                       F3: Optimized Defaults
                                                       F4: Save & Exit
                                                       ESC: Exit




                          Version 2.22.1287 Copyright (C) 2023 AMI
```

➢ Native PCIE Enable

Enabled - Enable PCIE power saving function, Disabled - Disabled PCIE power saving function.

➢ Native ASPM

Enabled - OS Controlled ASPM, Disabled - BIOS Controlled ASPM.

● CPU Configuration

This screen shows the CPU configuration, and you can change the value of the selected option.

```
                          Aptio Setup - AMI
   ┌─────────┐
   │ Advanced │
   └─────────┘

 CPU Configuration                                  Maximum Package C State Limit
                                                    Setting. Cpu Default: Leaves
 Type                      12th Gen Intel(R)        to Factory default value.Auto:
                           Core(TM) i9-12900        Initializes to deepest
 ID                        0x90672                  available Package C State
 Speed                     2400 MHz                 Limit.
 L1 Data Cache             48 KB x 8
 L1 Instruction Cache      32 KB x 8
 L2 Cache                  1280 KB x 8
 L3 Cache                  30 MB
 VMX                       Supported
 SMX/TXT                   Supported

 Package C State Limit     [Disabled]              →←: Select Screen
 Intel (VMX) Virtualization [Enabled]              ↑↓: Select Item
 Technology                                        Enter: Select
 Active Performance-cores  [All]                   +/-: Change Opt.
 Active Efficient-cores    [All]                   F1: General Help
 Boot performance mode     [Max Non-Turbo          F2: Previous Values
                            Performance]           F3: Optimized Defaults
 Intel(R) SpeedStep(tm)    [Disabled]              F4: Save & Exit
   Turbo Mode              [Disabled]              ESC: Exit



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```

➢ Hardware Prefetcher
Turn on/off the MLC streamer prefetcher.

➢ Adjacent Cache Line Prefetch
Turn on/off prefetching of adjacent cache lines.

➢ Package C State Limit
Maximum Package C State Limit Setting. CPU Default: Sets to Factory default value. Auto: Initializes to deepest available Package C State Limit.

➢ Hyper-Threading
Enable or disable Hyper-threading Technology, which allows a single physical processor to multitask as multiple logical processors. When disabled, only one thread per enabled core is enabled.

➢ Intel Virtualization Technology
Enable or disable Intel Virtualization Technology. When enabled, a VMM (Virtual Machine Mode) can utilize the additional hardware capabilities. It allows a platform to run multiple operating systems and applications independently, hence enabling a single computer system to work as several virtual systems.

➢ Active Performance Cores
Number of cores to enable in each processor package.

➢ Active Efficient Cores

Number of E-cores to enable in each processor package. Note: Number of P-Cores and E-cores are counted together. When both are {0,0}, P-code will enable all cores.

AES

Enable / Disable AES (Advanced Encryption Standard)

➢ Boot performance mode

Select the performance mode that the BIOS will run after the reset.

➢ Intel (R) SpeedStep(tm)

Allows more than two frequency ranges to be supported.

➢ Turbo Mode

Allows to enable processor cores to raise the operating frequency.

● Storage Configuration

This screen shows storage information.

```
                          Aptio Setup – AMI
     Advanced

  Storage Configuration                           SATA Device Options Settings

▶ SATA Configuration




                                                  ↔: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit



                   Version 2.22.1287 Copyright (C) 2023 AMI
```
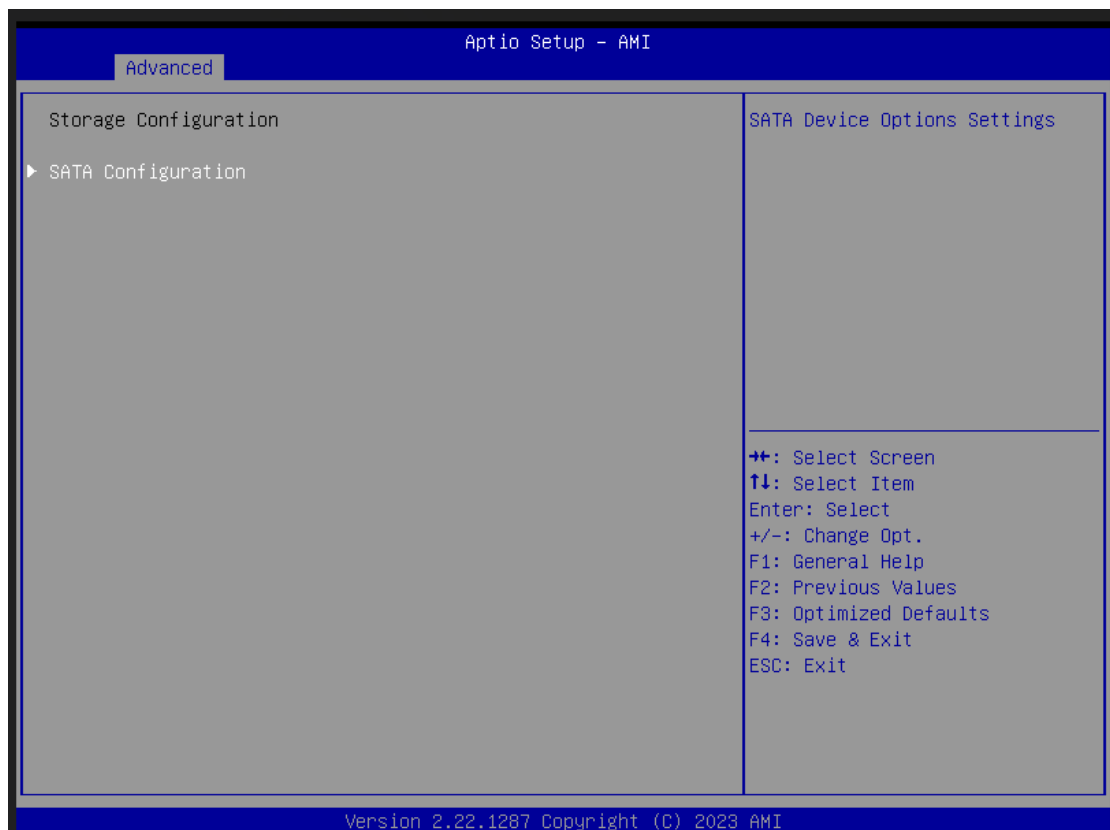
● SATA Configuration

During system boot up, the BIOS automatically detects the presence of SATA devices. In the SATA Configuration menu, you can see the hardware currently installed in the SATA ports.

```
                           Aptio Setup – AMI
        Advanced

SATA Configuration                                      Enable/Disable SATA Device.

SATA Controller(s)              [Enabled]

Serial ATA Port 1              Empty
  Port 1                       [Enabled]
  Hot Plug                     [Disabled]
  Spin Up Device               [Disabled]
  SATA Device Type             [Hard Disk Drive]
Serial ATA Port 2              Empty
  Port 2                       [Enabled]
  Hot Plug                     [Disabled]
  Spin Up Device               [Disabled]
  SATA Device Type             [Hard Disk Drive]
                                                        →←: Select Screen
                                                        ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit




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```

➢ SATA Controller(s)

Enable or disable the SATA Controller feature. The default is Enabled.

➢ VMD Setup Menu

VMD Configuration settings. The default is Disabled.

➢ Hot Plug

Designates this port as Hot Pluggable.

➢ Spin Up Device

Staggered Spin Up will be performed when any of the drive is enabled for the performance strategy. Otherwise, all drives spin up at boot. Only HDD supports this function.

➢ SATA Device Type

Identify the SATA port is connected to a solid-state drive (SSD) or hard disk drive (HDD).

```
                            Aptio Setup - AMI
    Advanced

 VMD Configuration                                      Enable/Disable to VMD
                                                        controller
    Enable VMD controller           [Enabled]

    Enable VMD Global Mapping       [Enabled]
    Map this Root Port under VMD    [Disabled]
    Root Port BDF details           SATA Controller

    RAID0                           [Enabled]
    RAID1                           [Enabled]
    RAID5                           [Enabled]
    RAID10                          [Enabled]
    Intel Rapid Recovery Technology [Enabled]
    RRT volumes can span internal and [Enabled]       ++: Select Screen
    eSATA drives                                      ↑↓: Select Item
    Intel(R) Optane(TM) Memory      [Enabled]         Enter: Select
                                                      +/-: Change Opt.
                                                      F1: General Help
                                                      F2: Previous Values
                                                      F3: Optimized Defaults
                                                      F4: Save & Exit
                                                      ESC: Exit




                    Version 2.22.1287 Copyright (C) 2023 AMI         B4
```

● NVMe Configuration

This screen shows NVMe device information.

```
                            Aptio Setup - AMI
      Advanced

 NVMe Configuration

 No NVME Device Found








                                                  ++: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Opt.
                                                  F1: General Help
                                                  F2: Previous Values
                                                  F3: Optimized Defaults
                                                  F4: Save & Exit
                                                  ESC: Exit



                    Version 2.22.1284 Copyright (C) 2023 AMI
```

● AMT Configuration

This screen displays Active Management Technology information.

*For Q670 platform

```
                              Aptio Setup – AMI
        Advanced

   AMT Configuration                                         When disabled AMT BIOS
                                                             Features are no longer
   AMT BIOS Features              [Enabled]                  supported and user is no
                                                             longer able to access MEBx
                                                             Setup.
                                                             Note:
                                                             This option does not disable
                                                             Manageability Features in FW.


                                                             →←: Select Screen
                                                             ↑↓: Select Item
                                                             Enter: Select
                                                             +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save & Exit
                                                             ESC: Exit


                      Version 2.22.1287 Copyright (C) 2024 AMI
```

➢ AMT BIOS Features
   Enable or disable Active Management Technology BIOS features. The default is Enabled.

- **F81966 Super IO Configuration**

You can use this screen to select options for the Super IO Configuration and change the value of the selected option. A description of the selected item appears on the right side of the screen. For items marked with "►", please press <Enter> for more options.

```
                              Aptio Setup - AMI
     Advanced

 F81966 Super IO Configuration                          Set Parameters of Serial Port
                                                         1 (COMA)
 Super IO Chip                      F81966
 ▶ Serial Port 1 Configuration
 ▶ Serial Port 2 Configuration
 ▶ Serial Port 3 Configuration
 ▶ Serial Port 4 Configuration




                                                        ➡⬅: Select Screen
                                                        ⬆⬇: Select Item
                                                        Enter: Select
                                                        +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save & Exit
                                                        ESC: Exit




                     Version 2.22.1287 Copyright (C) 2023 AMI
```

➢ Serial Port 1
    This item allows you to use it as RS232/422/485. The default is RS232.

⚫ Serial Port 1 Configuration

Use these items to set parameters related to serial port 1.

```
                              Aptio Setup - AMI
  Main

  Serial Port 1 Configuration                              Enable or Disable Serial Port
                                                           (COM)
  Serial Port                        [Enabled]
  Device Settings                    IO=3F8h; IRQ=4;

  COM Port Type                      [RS232]




                                                           →←: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Opt.
                                                           F1: General Help
                                                           F2: Previous Values
                                                           F3: Optimized Defaults
                                                           F4: Save & Exit
                                                           ESC: Exit




                       Version 2.22.1287 Copyright (C) 2023 AMI
```
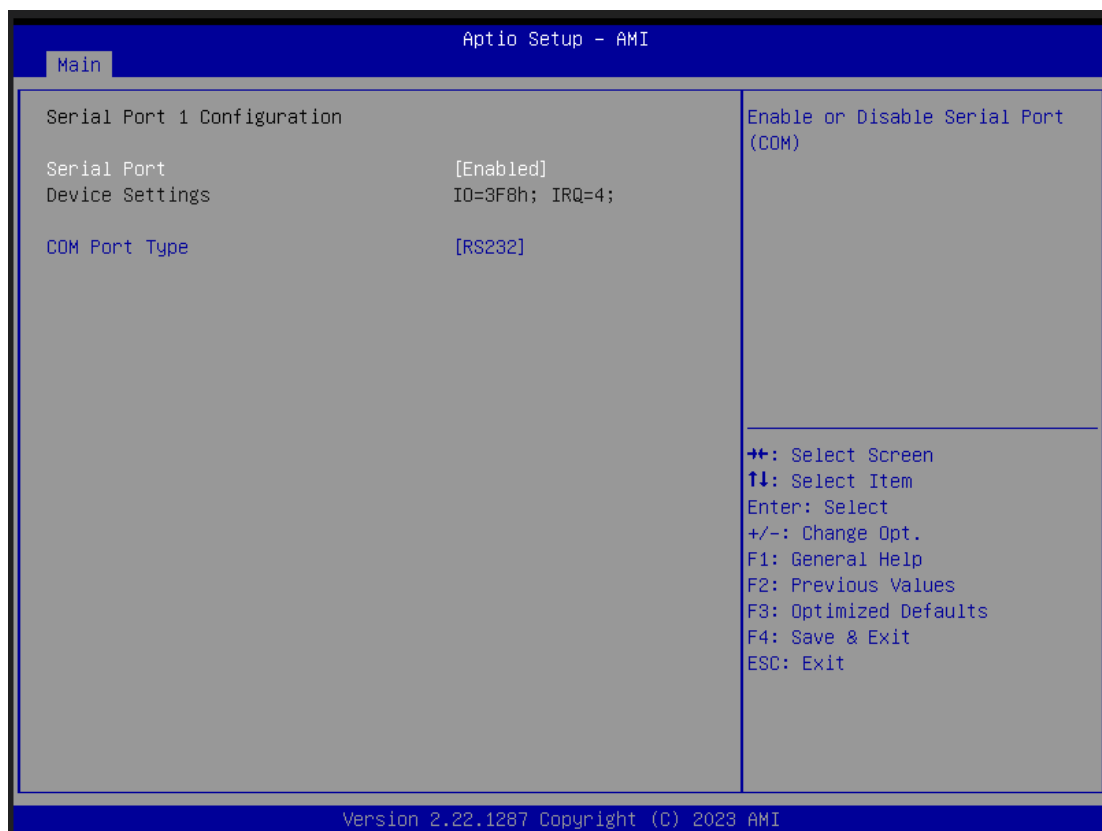
➢ Serial Port 1
This item allows you to use it as RS232/422/485. The default is RS232.

●   Hardware Monitor

This screen monitors hardware health status.

```
                              Aptio Setup - AMI
        Advanced

        Pc Health Status                                    Enable or Disable Smart Fan
                                                            Enable
        Smart Fan Function          [Enabled]                - Fan speed would change by
     ▶  Smart Fan Configuration                             temp
        CPU temperature             : +39 ℃                 Disable
        System temperature          : +38 ℃                  - Fan would keep full speed
        CPUFan Speed                : N/A
        +5VDUAL                     : +5.045 V
        VCC_RTC                     : +3.040 V
        +5V                         : +5.045 V
        VSB3V                       : +3.328 V
        VSB5V                       : +5.064 V

                                                            ←→: Select Screen
                                                            ↑↓: Select Item
                                                            Enter: Select
                                                            +/-: Change Opt.
                                                            F1: General Help
                                                            F2: Previous Values
                                                            F3: Optimized Defaults
                                                            F4: Save & Exit
                                                            ESC: Exit




                        Version 2.22.1287 Copyright (C) 2023 AMI
```

This screen displays the temperature of system and CPU, cooling fans speed in RPM and system voltages (VCC_CPU, DDR, +12V, +5V and +3.3V).

Note: Fan module is an option kit, fans speed will be displayed when it is installed in IPC962A and IPC964A.

● USB Configuration

This screen shows USB configuration.

```
                              Aptio Setup – AMI
   Advanced

  USB Configuration

  USB Module Version                    30

  USB Devices:
        1 Drive, 1 Keyboard


                                                 →←: Select Screen
                                                 ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Opt.
                                                 F1: General Help
                                                 F2: Previous Values
                                                 F3: Optimized Defaults
                                                 F4: Save & Exit
                                                 ESC: Exit




                   Version 2.22.1287 Copyright (C) 2023 AMI
```
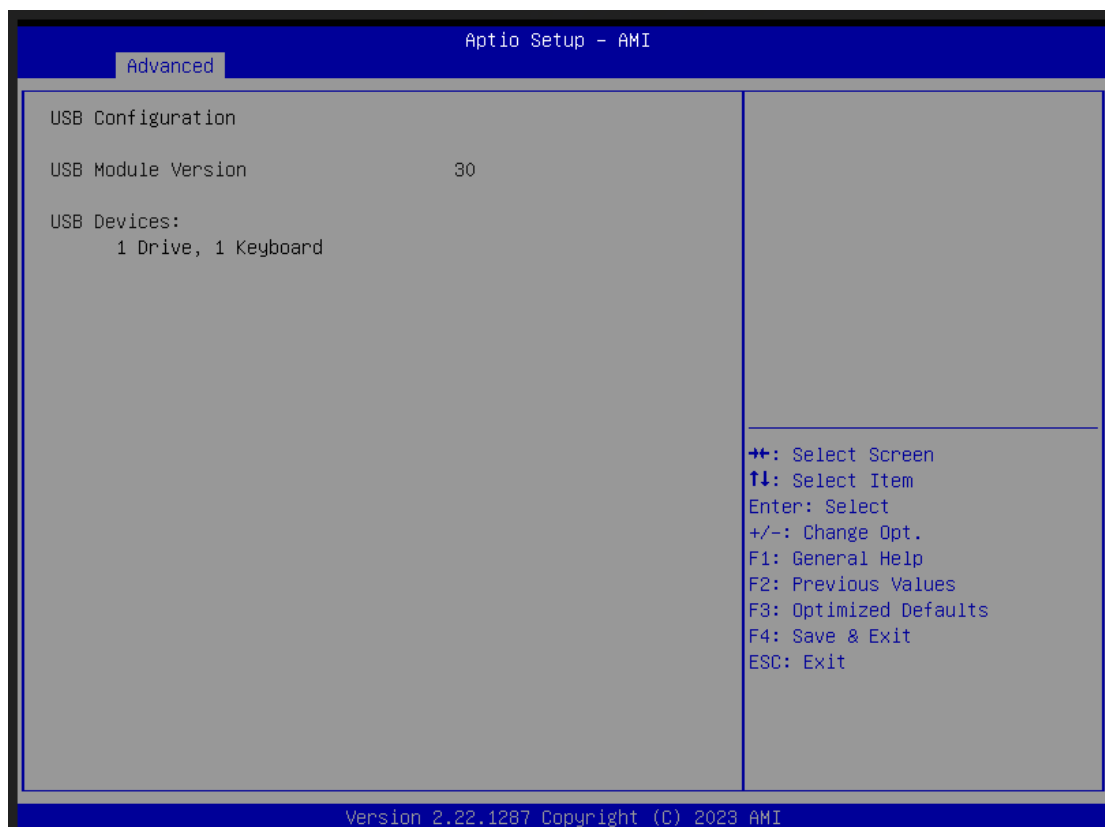
3.5   Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- System Agent (SA) Configuration

- PCH-IO Configuration

For items marked with "▶", please press <Enter> for more options.

```
                          Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit
  ┌──────────────────────────────────────────┬─────────────────────────────┐
  │▶ System Agent (SA) Configuration          │ System Agent (SA) Parameters │
  │▶ PCH-IO Configuration                     │                             │
  │                                           │                             │
  │                                           │                             │
  │                                           │                             │
  │                                           │                             │
  │                                           │                             │
  │                                           │                             │
  │                                           │ →←: Select Screen           │
  │                                           │ ↑↓: Select Item             │
  │                                           │ Enter: Select               │
  │                                           │ +/-: Change Opt.            │
  │                                           │ F1: General Help            │
  │                                           │ F2: Previous Values         │
  │                                           │ F3: Optimized Defaults      │
  │                                           │ F4: Save & Exit             │
  │                                           │ ESC: Exit                   │
  │                                           │                             │
  └──────────────────────────────────────────┴─────────────────────────────┘
              Version 2.22.1287 Copyright (C) 2023 AMI
```

- System Agent (SA) Configuration

This screen allows users to configure System Agent (SA) parameters. For items marked with "▶", please press <Enter> for more options.

```
                              Aptio Setup - AMI
      Chipset

  System Agent (SA) Configuration                        VT-d capability

  VT-d                          Supported

  VT-d                          [Enabled]
  Control Iommu Pre-boot Behavior   [Enable IOMMU during
                                boot]
  Above 4GB MMIO BIOS assignment    [Enabled]

  ▶ Graphics Configuration
  ▶ PCI Express Root Port 1

                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F3: Optimized Defaults
                                                    F4: Save & Exit
                                                    ESC: Exit

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```

➢ VT-d

   Check to enable VT-d function on MCH.

➢ Above 4GB MMIO BIOS assignment

   Enable/Disable above 4GB Memory Mapped IO BIOS assignment.This is enabled automatically when Aperture Size is set to 2048MB.

● Graphics Configuration

This screen shows graphics configuration.

➢ Internal Graphics
Keep IGFX enabled based on the setup options.

● CPU PCI Express Root Port

This screen shows CPU PCI Express root port information.

```
                            Aptio Setup – AMI
       Chipset

   PCI Express Root Port 1                               Set the ASPM Level:
                                                         Force L0s – Force all links to
   ASPM                          [Disabled]              L0s State
   PCIe Speed                    [Auto]                  AUTO – BIOS auto configure
     Advanced Error Reporting    [Disabled]              DISABLE – Disables ASPM
   Enable ClockReq Messaging     [Enabled]




                                                         →←: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/–: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



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```

➢ ASPM

Set the ASPM Level:₩nForce L0s - Force all links to L0s State₩nForce L1 - Force all links to L1 State₩nForce L0sL1 - Force all links to L0SL1 State₩nDISABLE - Disables ASPM.

➢ PCIe Speed

Configure PCIe Speed.

● PCH-IO Configuration

This screen allows you to set PCH parameters.

```
                            Aptio Setup - AMI
        Chipset

   PCH-IO Configuration                              HD Audio Subsystem
                                                     Configuration Settings
 ▶ HD Audio Configuration

   PCH LAN Controller          [Enabled]
      Wake on LAN Enable       [Enabled]




                                                     ↔: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit


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```
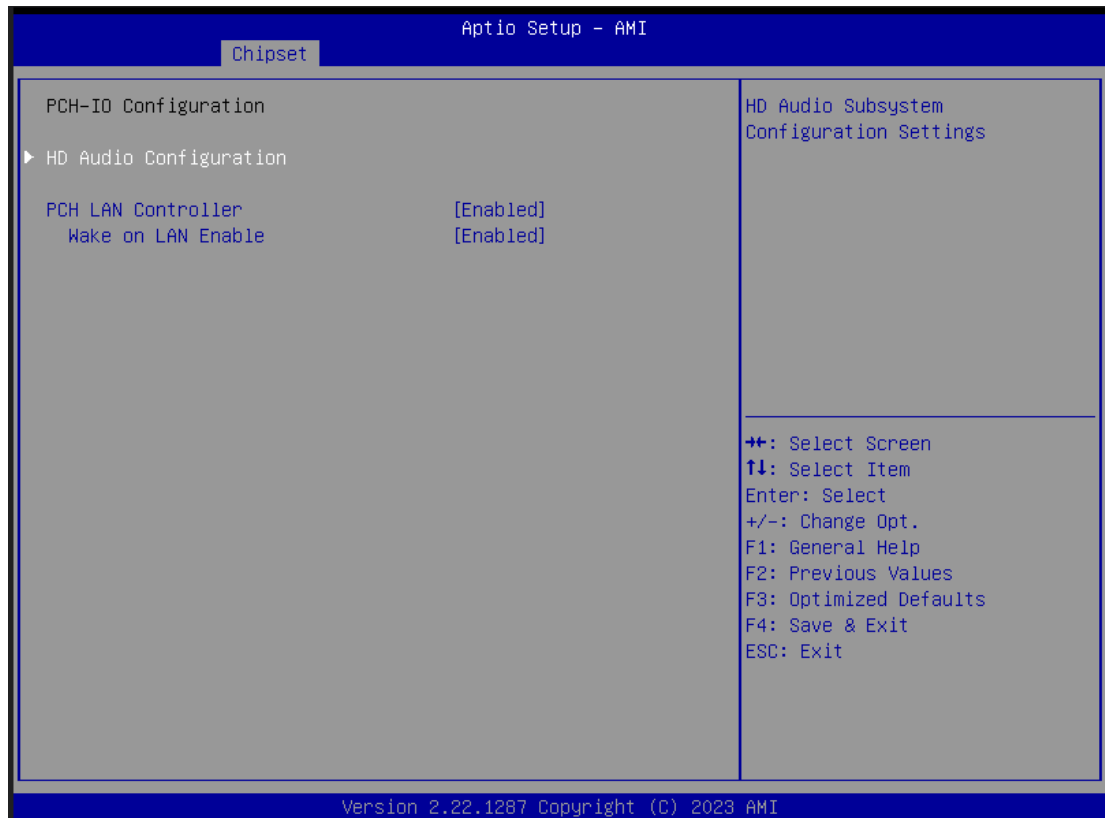
➢ PCI Express Configuration
Configure PCIe Speed.

➢ HD Audio Configuration
Enable or disable HD Audio.

➢ Wake on LAN Enable
Enable or disable integrated LAN to wake the system.

● HD Audio Configuration

This screen shows HD Audio information.

```
                              Aptio Setup - AMI
            Chipset

   HD Audio Subsystem Configuration Settings        Control Detection of the
                                                     HD-Audio device.
   HD Audio                         [Enabled]        Disabled = HDA will be
                                                     unconditionally disabled
                                                     Enabled = HDA will be
                                                     unconditionally enabled.



                                                     ++: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Opt.
                                                     F1: General Help
                                                     F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```

3.6   Security Menu

The Security menu allows users to change the security settings for the system.

```
                            Aptio Setup - AMI
     Main  Advanced  Chipset  Security  Boot  Save & Exit

   Password Description                          Set Administrator Password

   If ONLY the Administrator's password is set,
   then this only limits access to Setup and is
   only asked for when entering Setup.
   If ONLY the User's password is set, then this
   is a power on password and must be entered to
   boot or enter Setup. In Setup the User will
   have Administrator rights.
   The password length must be
   in the following range:
   Minimum length                    3
   Maximum length                    20          ──────────────────────────

                                                 ↔: Select Screen
   Administrator Password                        ↑↓: Select Item
   User Password                                 Enter: Select
                                                 +/-: Change Opt.
 ▶ Secure Boot                                   F1: General Help
                                                 F2: Previous Values
                                                 F3: Optimized Defaults
                                                 F4: Save & Exit
                                                 ESC: Exit



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```

➢   Administrator Password

  This item indicates whether an administrator password has been set (installed or uninstalled).

➢   User Password

  This item indicates whether a user password has been set (installed or uninstalled).

● Secure Boot

```
                              Aptio Setup – AMI
                  Security

     System Mode                    Setup                      Secure Boot feature is Active
                                                               if Secure Boot is Enabled,
     Secure Boot                    [Enabled]                  Platform Key(PK) is enrolled
                                    Not Active                 and the System is in User mode.
                                                               The mode change requires
     Secure Boot Mode               [Standard]                 platform reset
  ▶ Restore Factory Keys
  ▶ Reset To Setup Mode

  ▶ Key Management
                                                               _____
                                                               →←: Select Screen
                                                               ↑↓: Select Item
                                                               Enter: Select
                                                               +/-: Change Opt.
                                                               F1: General Help
                                                               F2: Previous Values
                                                               F3: Optimized Defaults
                                                               F4: Save & Exit
                                                               ESC: Exit




                     Version 2.22.1287 Copyright (C) 2024 AMI
```
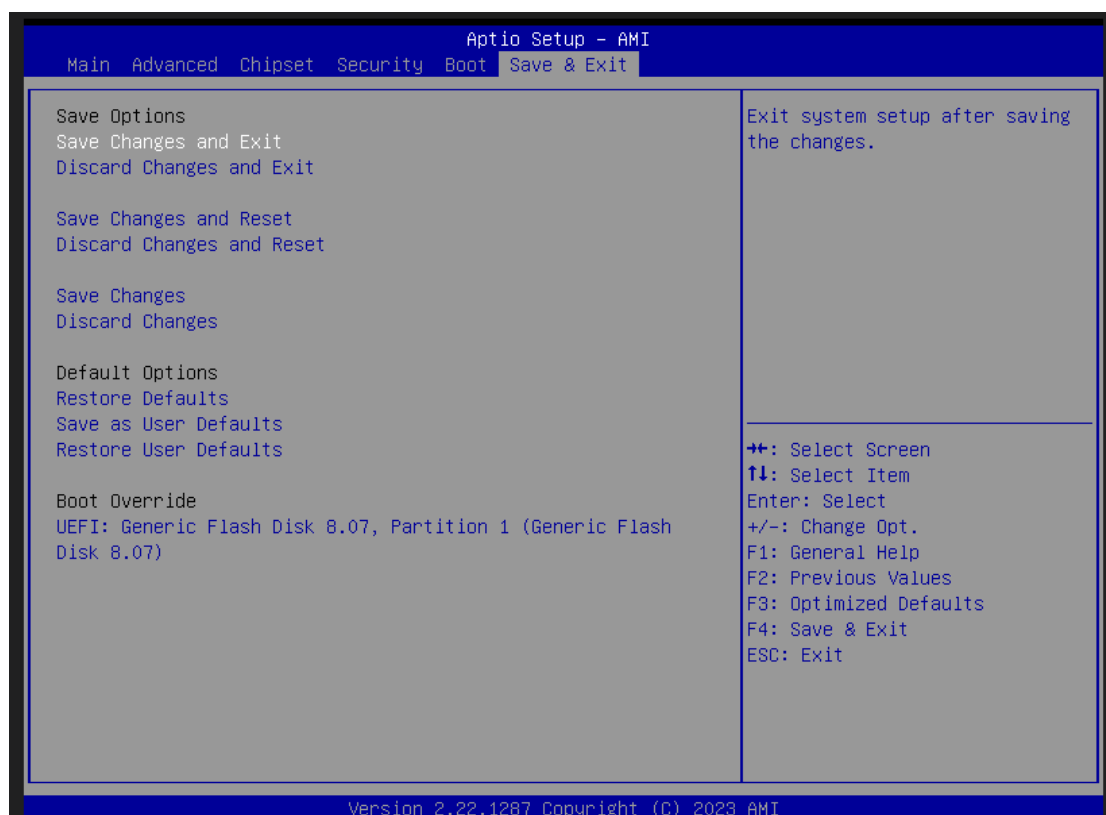
3.7   Boot Menu

The Boot menu allows users to change boot options of the system.

```
                              Aptio Setup - AMI
       Main  Advanced  Chipset  Security  Boot  Save & Exit

       Boot Configuration                                Number of seconds to wait for
       Setup Prompt Timeout            1                 setup activation key.
       Bootup NumLock State            [On]              65535(0xFFFF) means indefinite
       Quiet Boot                      [Disabled]        waiting.
       Network Stack                   [Disabled]

       Boot Option Priorities
       Boot Option #1                  [UEFI: Generic Flash
                                       Disk 8.07, Partition 1
                                       (Generic Flash Disk
                                       8.07)]

                                                         ↔: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit



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```

➢   Setup Prompt Timeout

Set the number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.

➢   Bootup NumLock State

Use this item to select the power-on state for the keyboard NumLock.

➢   Quiet Boot

Select to display either POST output messages or a splash screen during boot-up.

➢   Network stack

Use this item to enable or disable the boot ROM function of the onboard LAN chip when the system boots up.

➢   Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices.

3.8   Save & Exit Menu

The Save & Exit menu allows users to load your system configuration with optimal or fail-safe default values.

```
                              Aptio Setup - AMI
       Main   Advanced   Chipset   Security   Boot   Save & Exit

       Save Options                                  Exit system setup after saving
       Save Changes and Exit                         the changes.
       Discard Changes and Exit

       Save Changes and Reset
       Discard Changes and Reset

       Save Changes
       Discard Changes

       Default Options
       Restore Defaults
       Save as User Defaults                         →←: Select Screen
       Restore User Defaults                         ↑↓: Select Item
                                                     Enter: Select
       Boot Override                                 +/-: Change Opt.
       UEFI: Generic Flash Disk 8.07, Partition 1 (Generic Flash    F1: General Help
       Disk 8.07)                                    F2: Previous Values
                                                     F3: Optimized Defaults
                                                     F4: Save & Exit
                                                     ESC: Exit



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```

➢   Save Changes and Exit

When finishing the system configuration settings, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

➢   Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

➢   Save Changes and Reset

When finishing the system configuration settings, select this option to leave Setup and reboot the computer so the new system configuration parameters can take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

➢   Discard Changes and Reset

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

➢ Save Changes

When finishing the system configuration settings, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

➢ Discard Changes

Select this option to quit Setup without making any permanent changes to the system configuration. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

➢ Restore Defaults

After selecting this option, all the settings will be restored to defaults automatically. Select Restore Defaults from the Save & Exit menu and press <Enter>.

➢ Save as User Defaults

Select this option to save your current system configuration settings as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

➢ Restore User Defaults

After selecting this option, all the settings will be restored to user defaults automatically. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

➢ Boot Override

Select a drive to immediately boot that device regardless of the current boot order.

APPENDIX A
WATCHDOG TIMER

A.1 About Watchdog Timer

Software stability is a major issue in most applications. Some embedded systems are not watched by an operator for 24 hours. It is usually too late to wait for someone to reboot when computer hangs. The systems need to be able to reset automatically when things go wrong. The watchdog timer gives us a solution in this regard.

The watchdog timer is a counter that triggers a system reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

A.2 Sample Program

```
#include "stdafx.h"

#include <windows.h>
#include <stdio.h>
#include <tchar.h>
#include <stdlib.h>
#ifdef _DEBUG
#define new DEBUG_NEW
#endif
#pragma comment (lib, "User32.lib" )
#define IDT_TIMER WM_USER + 200
#define _CRT_SECURE_NO_WARNINGS 1
#define setbit(value,x) (value |=(1<<x))
#define clrbit(value,x) (value &=~(1<<x))
HINSTANCE hinstLibDLL = NULL;

LONG WDTDATA = 0;


typedef ULONG(*LPFNDLLGETIOSPACE)(ULONG);
LPFNDLLGETIOSPACE lpFnDll_Get_IO;
typedef void(*LPFNDLLSETIOSPACE)(ULONG, ULONG);
LPFNDLLSETIOSPACE lpFnDll_Set_IO;
int _tmain(int argc, _TCHAR* argv[])
```

```
{
int unit = 0;
int WDTtimer = 0;
if (hinstLibDLL == NULL)
{
hinstLibDLL = LoadLibrary(TEXT("diodll.dll"));
if (hinstLibDLL == NULL)
{
//MessageBox("Load diodll dll error", "", MB_OK);
}

}

if (hinstLibDLL)

{
lpFnDll_Get_IO = (LPFNDLLGETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"),
"GetIoSpaceByte");
lpFnDll_Set_IO = (LPFNDLLSETIOSPACE)GetProcAddress(GetModuleHandle("diodll.dll"),
"SetIoSpaceByte");
}
printf("Input Watch Dog Timer type, 1:Second ; 2:Minute :");
scanf("%d",&unit);
printf("\nInput Timer to countdown:");
scanf("%d", &WDTtimer);
printf("Start to countdown...");
//==Enter MB Pnp Mode==
lpFnDll_Set_IO(0x2e, 0x87);
lpFnDll_Set_IO(0x2e, 0x87);
lpFnDll_Set_IO(0x2e, 0x07);
lpFnDll_Set_IO(0x2f, 0x07); //SET LDN 07
//set LDN07 FA 10 to 11
lpFnDll_Set_IO(0x2e, 0xFA);
WDTDATA = lpFnDll_Get_IO(0x2f);
WDTDATA = setbit(WDTDATA, 0);
lpFnDll_Set_IO(0x2f, WDTDATA);
if (unit == 1)
{
lpFnDll_Set_IO(0x2e, 0xF6);
lpFnDll_Set_IO(0x2f, WDTtimer);
//start watchdog counting
lpFnDll_Set_IO(0x2e, 0xF5);
WDTDATA = lpFnDll_Get_IO(0x2f);
WDTDATA = setbit(WDTDATA, 5);
lpFnDll_Set_IO(0x2f, WDTDATA);
```

```
}
else if (unit == 2)
{

//set WDT Timer

lpFnDll_Set_IO(0x2e, 0xF6);

lpFnDll_Set_IO(0x2f, WDTtimer);
//set watchdog time unit to min
lpFnDll_Set_IO(0x2e, 0xF5);
WDTDATA = lpFnDll_Get_IO(0x2f);

WDTDATA = setbit(WDTDATA, 3);
lpFnDll_Set_IO(0x2f, WDTDATA);
//start watchdog counting
lpFnDll_Set_IO(0x2e, 0xF5);
WDTDATA = lpFnDll_Get_IO(0x2f);
WDTDATA = setbit(WDTDATA, 5);
lpFnDll_Set_IO(0x2f, WDTDATA);
}
system("pause");
return 0;

}
```

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APPENDIX B
WAKE ON LAN

How to Set up Wake on LAN

Please follow the following steps to set up Wake on LAN on Windows 11.

1. Press "⊞" w/ "S" or press "🔍" on Windows desktop.

2. Enter "proset" in red area.
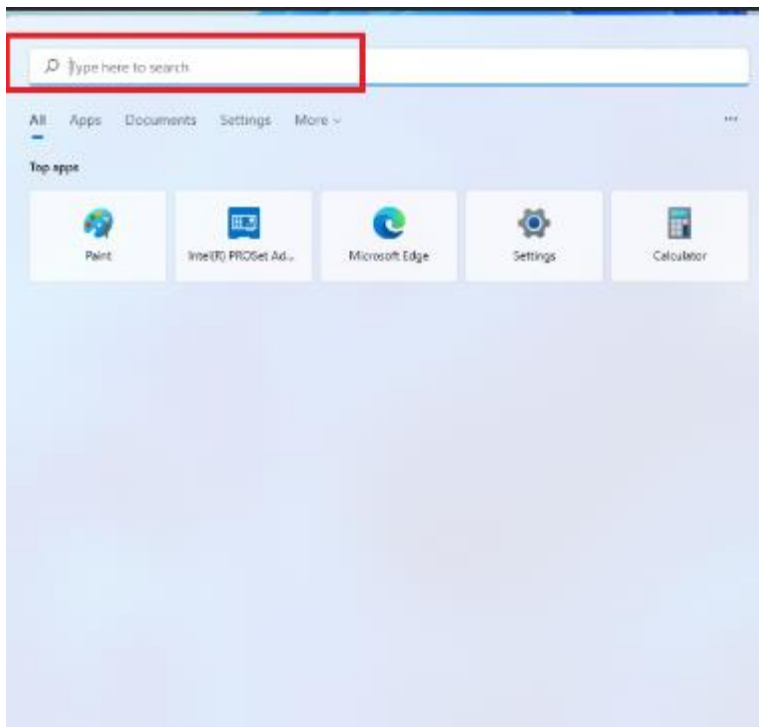
3. Select "Run as administrator"
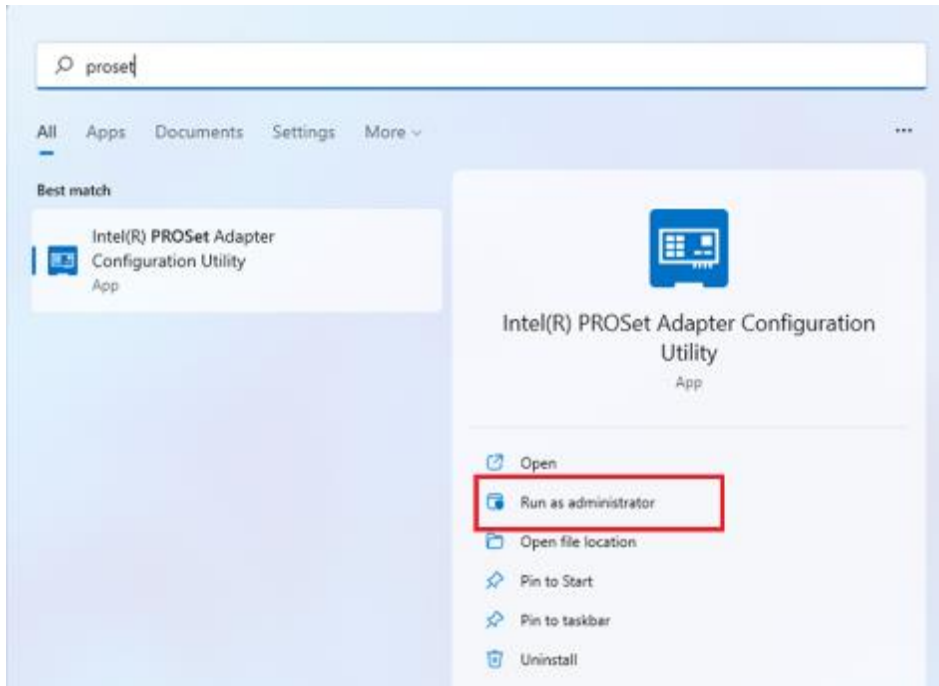
4. Select a LAN port (1) which will support "Wake on LAN", then enable functionality you need under "Adapter Settings" (2)
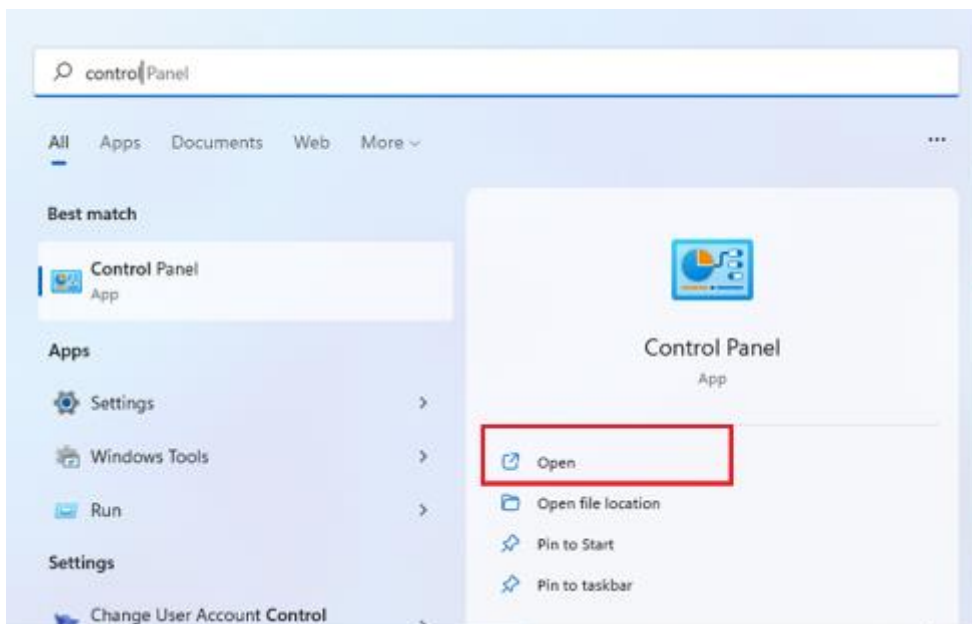
5. Press "Apply Changes" (3).
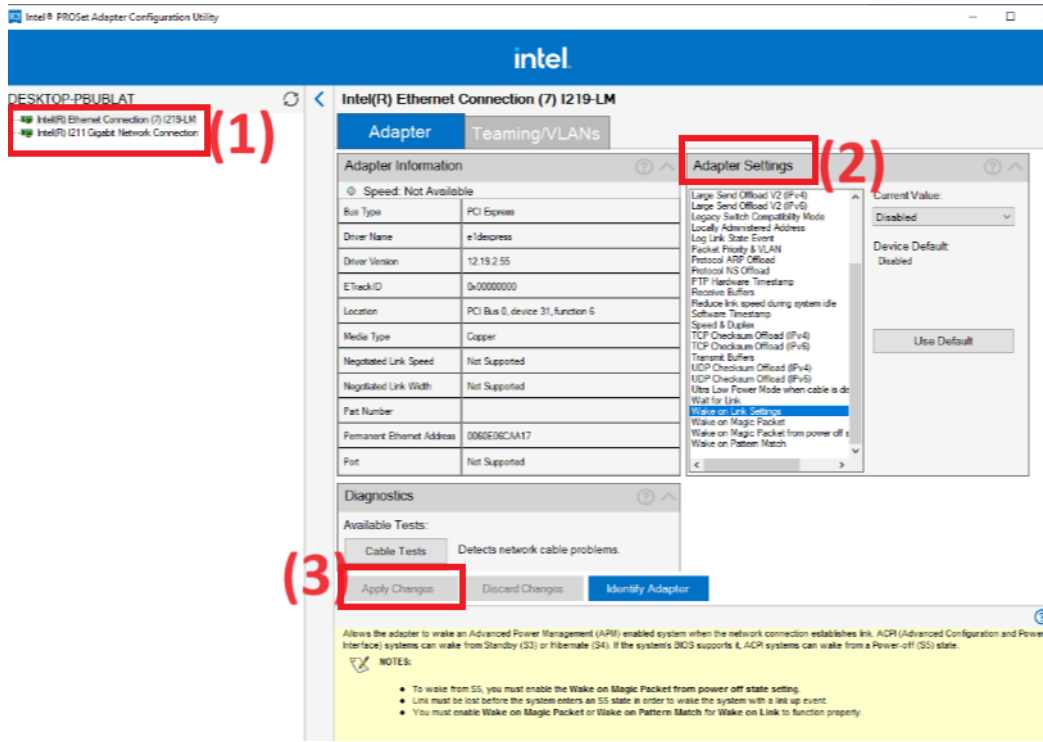
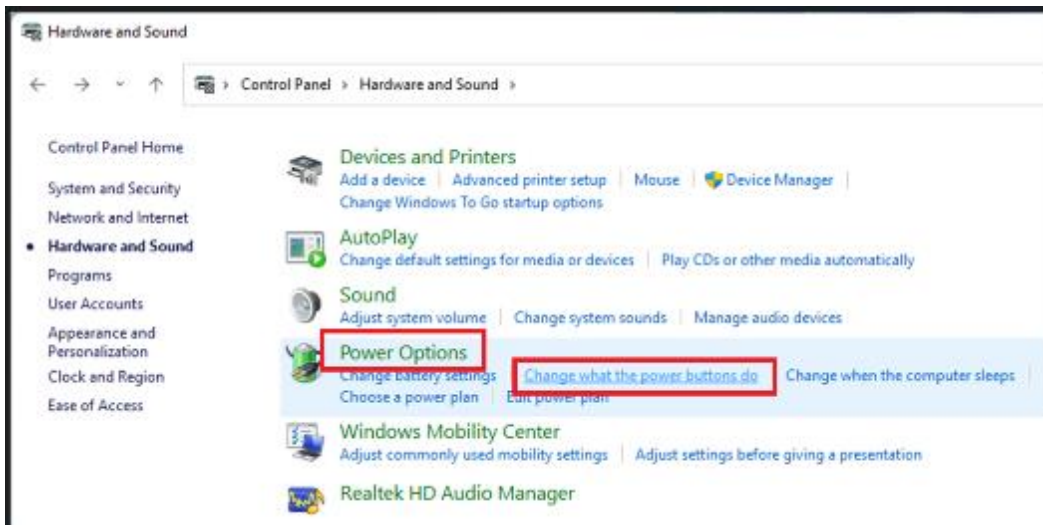**Please follow step 4 and step 5 to set the other LAN ports for "Wake on LAN"

6. Press " ⊞ " w/ "S" or press " 🔍 " on Windows desktop.
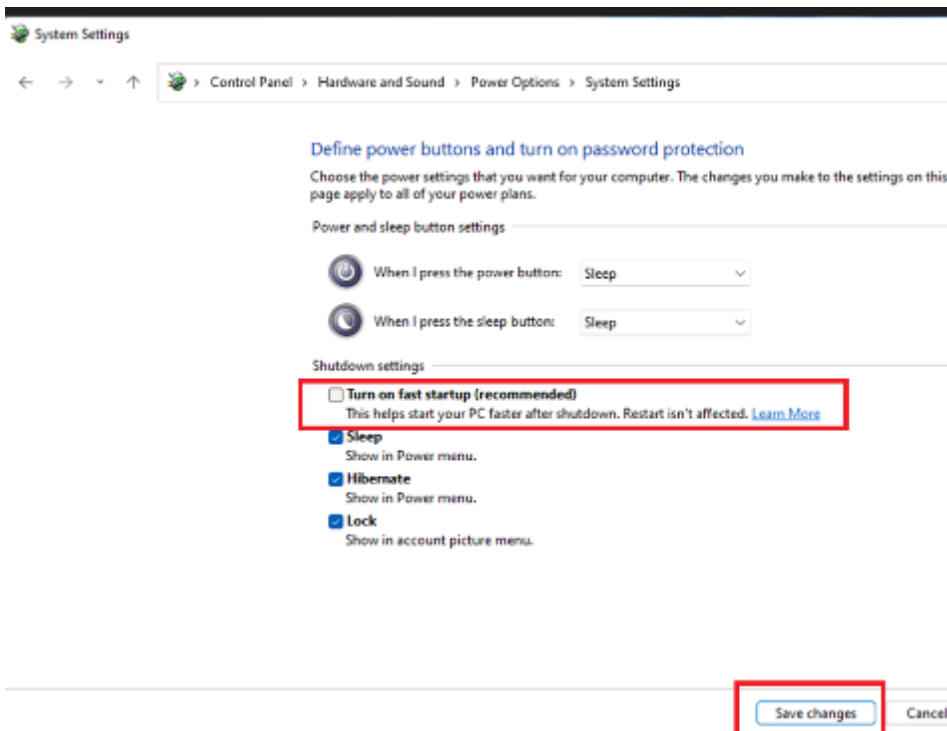
7. Enter "control panel" in red area.
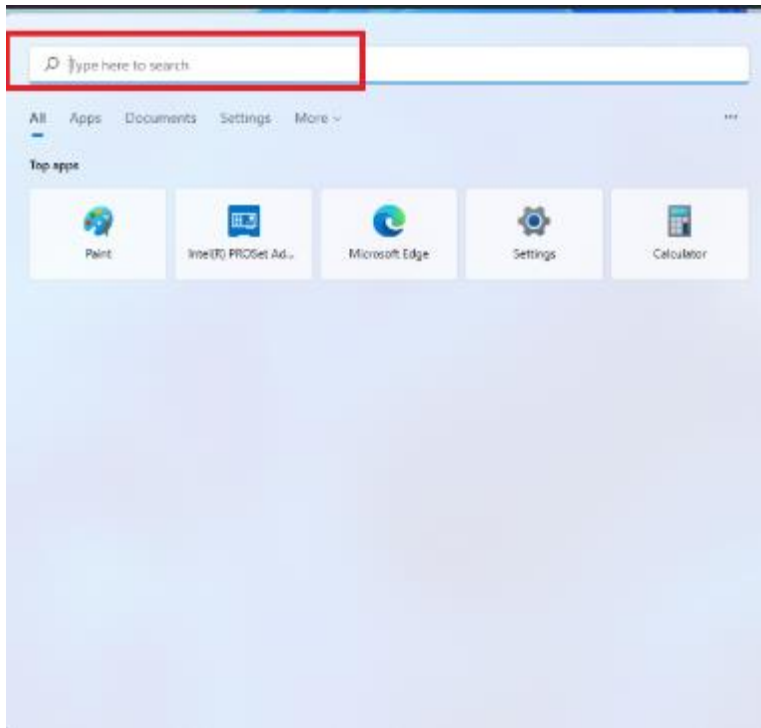
8.   Select "Open".

9. Press Power options →Change what the power button do

10. Remove " " from "Turn on fast startup", the press "Save changes".

11. Reboot the system to enable the above settings. Installation is completed.

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APPENDIX C
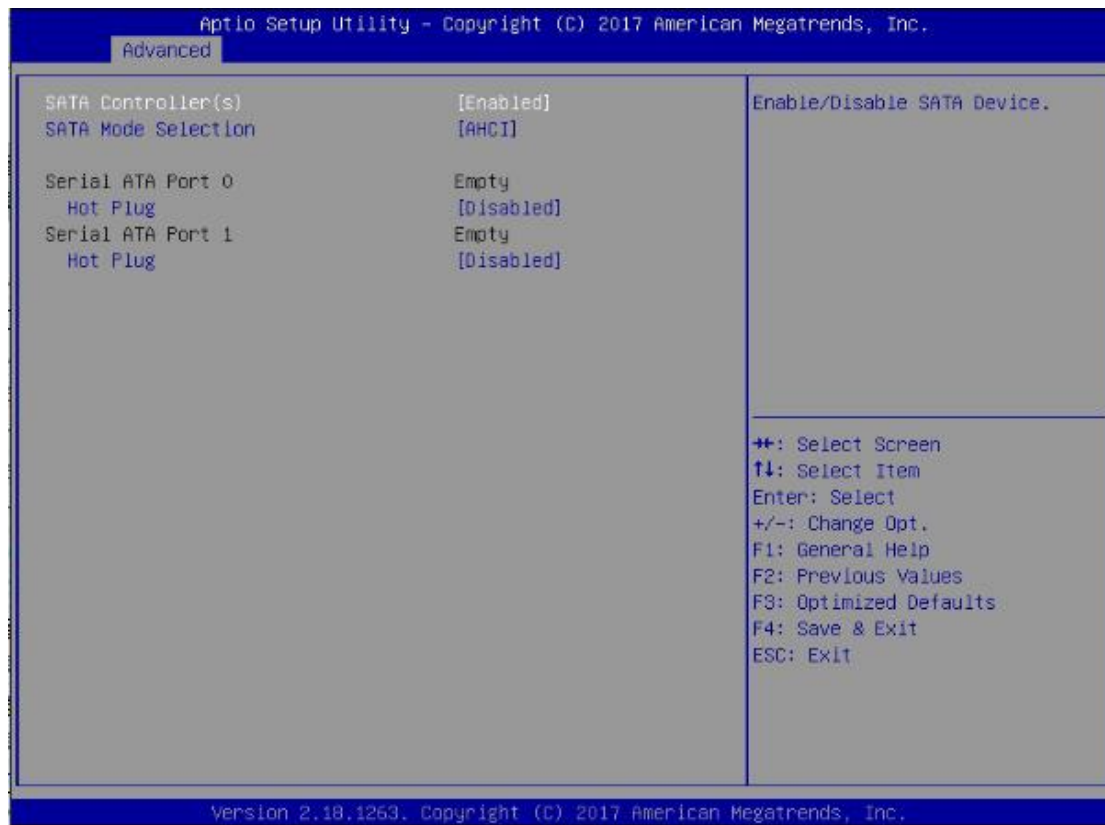# HDD HOT-SWAPPABLE

HDD HOT-SWAPPABLE

IPC920 offers two hot-swap 2.5" HDD or SSD, people can easy install and replace the storages by following steps.

Using HDD hot-swappable function

Step 1   Please press "Delete" after turn on the system, then following the path to enable the Hot Plug function.

BIOS setup→Advamced→SATA Controller(s)→SATA Mode Selection→

Serial ATA Port→Hot Plug enable

```
         Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Advanced

  SATA Controller(s)              [Enabled]              Enable/Disable SATA Device.
  SATA Mode Selection             [AHCI]

  Serial ATA Port 0               Empty
    Hot Plug                      [Disabled]
  Serial ATA Port 1               Empty
    Hot Plug                      [Disabled]




                                                         ++: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Opt.
                                                         F1: General Help
                                                         F2: Previous Values
                                                         F3: Optimized Defaults
                                                         F4: Save & Exit
                                                         ESC: Exit


         Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Step 2   System auto reboot, installation completed.

Removing Hot-Swappable storage

Step 1   Click " "

Step 2   Select "Eject xxxx".

Step 3   Remove the HDD devic after "Safe To Remove Hardware" shown.
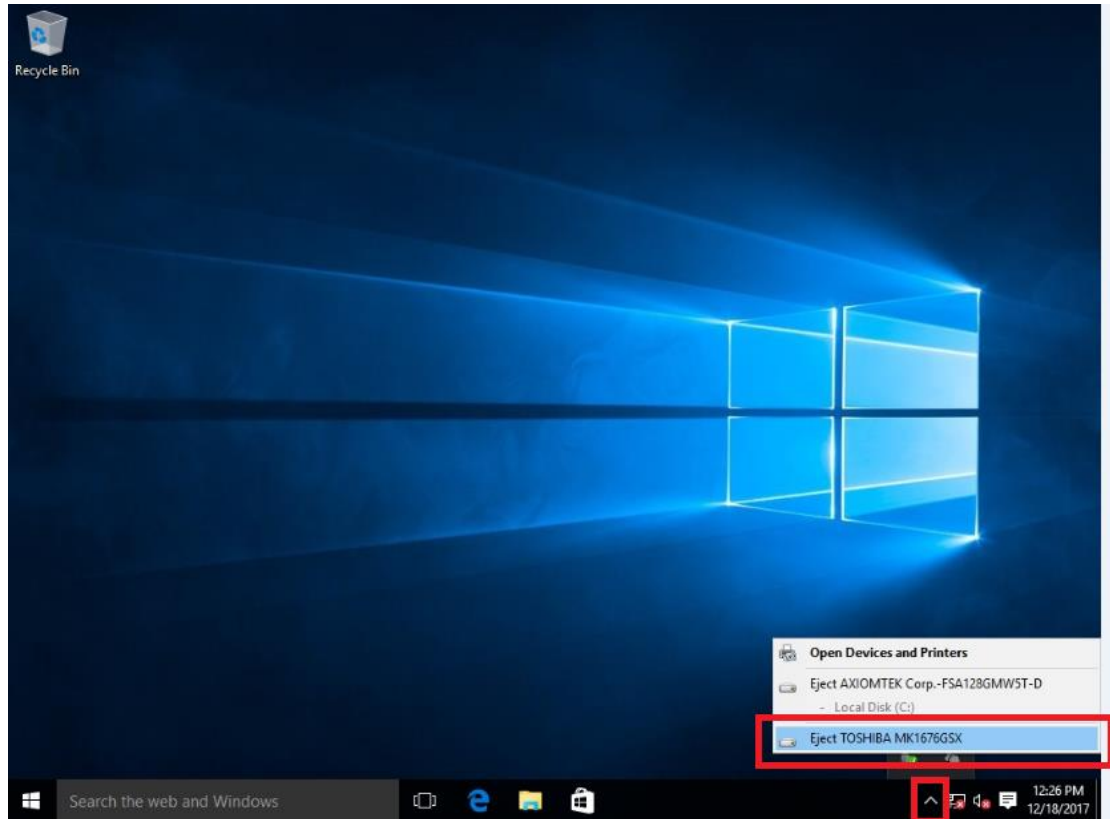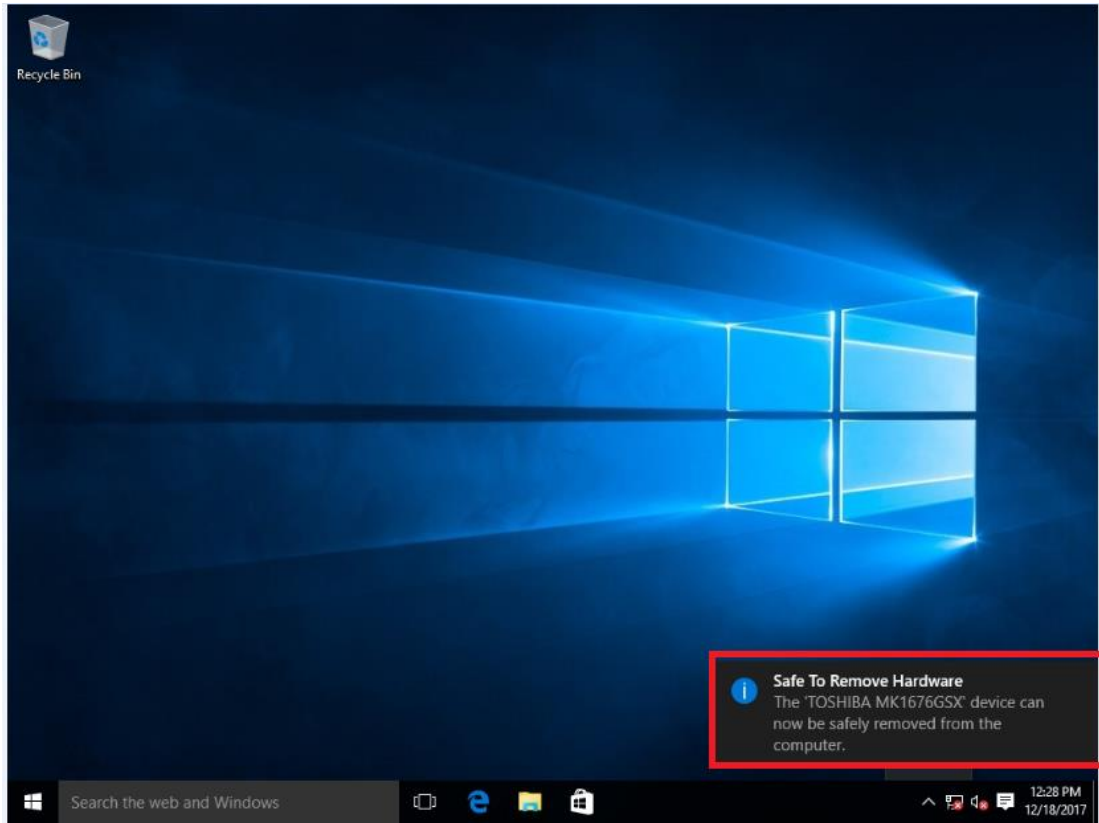
Note: Please close the programs which are in using before removing the devices.