USER'S MANUAL

IMB701

ATX Motherboard with LGA4677 Socket 5th/4th Gen Intel® Xeon® Scalable Processors, Intel® C741, 5 PCIe x16, NVMe and OpenBMC

AXIOMTEK

www.axiomtek.com

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CAUTION

Wrong type of batteries may cause explosion. It is recommended that users only replace with the same or equivalent type of batteries as suggested by the manufacturer once properly disposing of any used ones.

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ESD Precautions

Computer boards have integrated circuits sensitive to static electricity. To prevent chipsets from electrostatic discharge damage, please take care of the following jobs with precautions:

- Do not remove boards or integrated circuits from their anti-static packaging until you are ready to install them.
- Before holding the board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds to discharge static electricity from your body.
- Wear a grounding wrist strap, available from most electronic component stores, when handling boards and components.

Trademarks Acknowledgments

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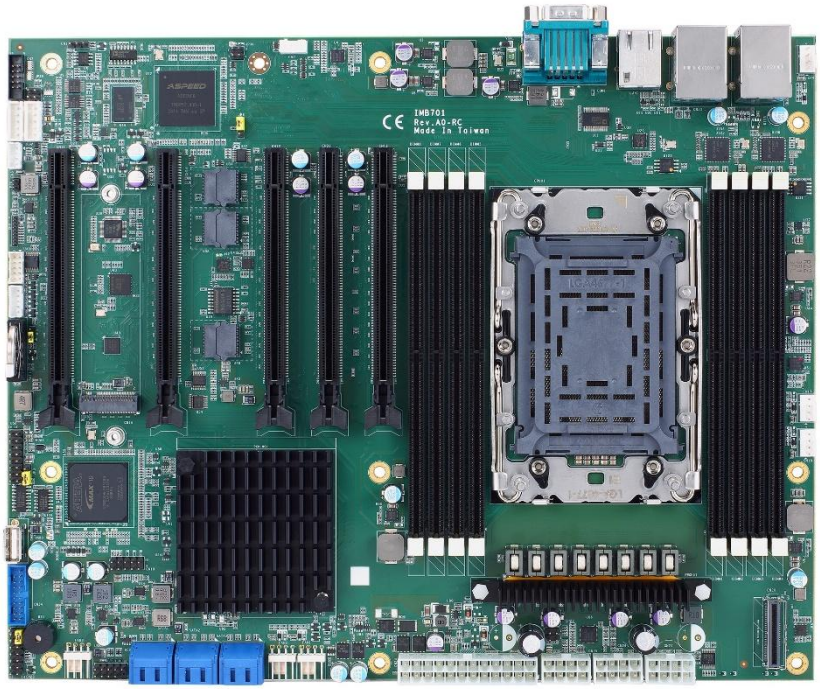
Section 1
Introduction



The IMB701 is an advanced ATX industrial sever board based on the 4th/5th gen Intel® Xeon® Scalable processors in an LGA4677 socket, and comes with an Intel® C741 chipset. Featuring enhanced computing power to deliver optimal computing and visual performance, the IMB701 motherboard is an ideal solution for developing major industry applications ranging from deep learning AI, high-end inspection with AI and video surveillance.

To maximize expandability, the mother board comes with five PCIe x16 slots for multiple AI acceleration cards to deliver superior graphics performance, two Gigabit LANs with Intel® Ethernet controller I210-AT, one dedicated OpenBMC LAN port, M.2 M key 2280 and MCIO for storage. It also supports Trusted Platform Module 2.0 (TPM 2.0) is available to ensure critical information security. Furthermore, the IMB701 can operate under a wide temperature range from 0°C to +60°C for use in harsh environments.

1.1 Features

- 5th/4th gen Intel® Xeon® Scalable processors (Platinum, Gold, Silver, and Bronze), up to 350W TDP
- 8 DDR5-5200 R-DIMM ECC, up to 512GB memory
- 5 PCIe x16
- Supports M.2 Key M and MCIO
- TPM 2.0 supported
- Supports OpenBMC
- Supports multiple graphic cards
- Supports internal USB dongle

1.2 Specifications

- **CPU**
  - LGA4677 socket (socket E) 5th/4th gen Intel® Xeon® Scalable processors (Platinum, Gold, Silver, and Bronze), up to 350W TDP

- **Chipset**
  - Intel® C741

- **BIOS**
  - AMI BIOS

- **System Memory**
  - 8 x R-DIMM sockets
  - Maximum 512GB DDR5 memory (max. 64GB per slot)
  - Supports 5200MHz
  - Supports the memory with ECC function

- **Onboard Multi I/O**
  - 1 x PS/2 keyboard and mouse (box header)
  - 1 x RS-232 (rear I/O)
  - 1 x PMBus
  - 1 x 8-channel TTL

- **USB Interface**
  - 4 x USB 3.2 Gen1
  - 2 x internal USB 3.2 Gen1
  - 2 x internal USB 2.0
  - 1 x Internal USB 2.0 Type-A (for license dongle)

- **Ethernet**
  - 2 x 10/100/1000 Mbps Ethernet (Intel® I210-AT)
  - 1 x Dedicated IPMI LAN port (Realtek RTL8211F)

- **Storage**
  - 6 x SATAIII with RAID 0/1/5/10
  - 1 x M.2 M-Key 2280 with PCIe Gen5 x4 signal for NVMe SSD
  - 1 x MCIO (PCIe Gen4 x8) for 2 x NVMe SSD

- **Audio**
  - Supports HD audio interface as a 2x8 pin header

- **Display**
  - 1 x 15-pin D-Sub as VGA connector. Resolution max. up to 1920x1200 @60Hz
  - AST2600

- **Expansion Interface**
  - Slot 1 & 2: PCIe x16 (1 x Gen5 x16 or 2 x Gen5 x8 via jumper setting)
  - Slots 3, 4, & 5: PCIe x16 (Gen5 x16 link)
  - Slot 6: NVMe M.2 Key M 2280 (PCIe Gen5 x4)

Note

Default: slot 1 has PCIe x16 signal, and slot2 has no signal.
If you want to switch slot 1 and slot 2 signal to PCIe x8 signal, please refer to section 2.4.3 & BIOS page42

- **Power Input**
  - 1 x 24-pinATX power input connector
  - 2 x 12V ATX power input connector for CPU Power

- **Operating Temperature**
  - 0°C ~ 60°C, depends on cooler solution
  - CPU TDP 270W 0°C ~ 60°C / CPU TDP 350W 0°C ~ 50°C

- **Storage Temperature**
  - -20°C ~ 85°C

- **Operating Humidity**
  - 10% to 95% relative humidity, non-condensing

- **Dimensions**
  - 305 x 244mm (12” x 9.6”)

Note

All specifications and images are subject to change without notice.

1.3 Packing list

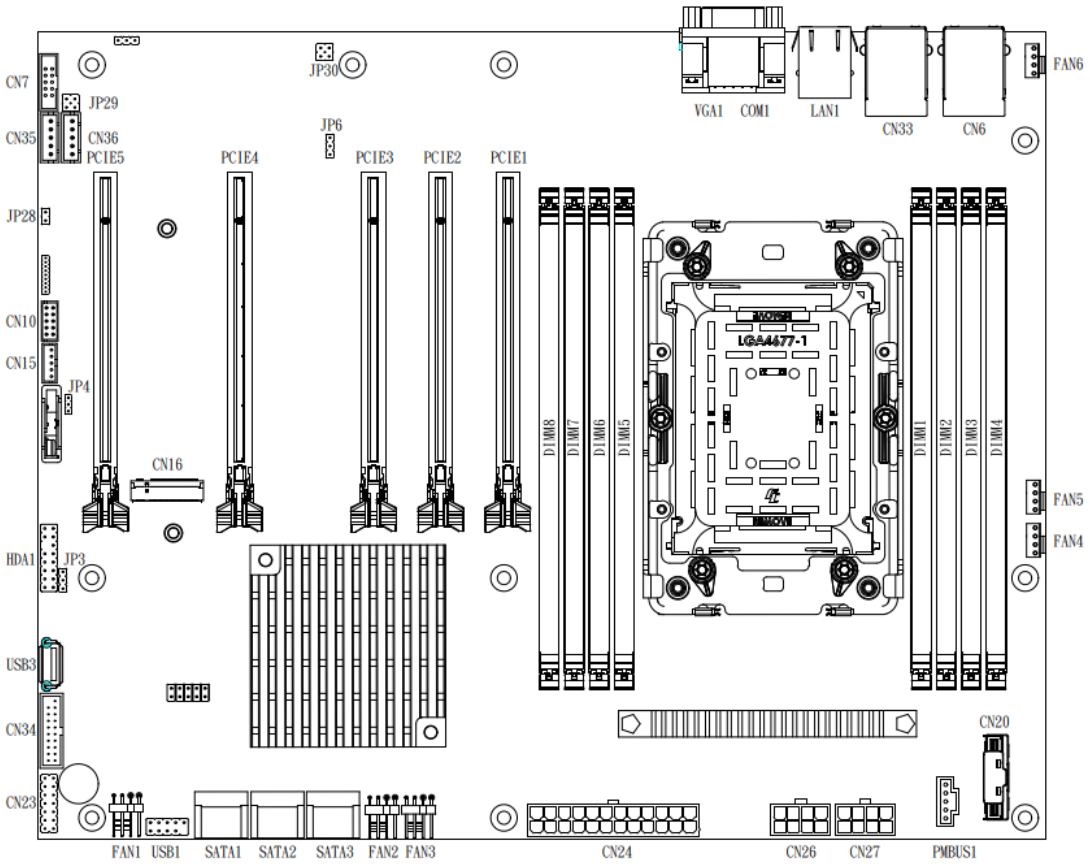
- **Bulk packing**
  - 1 x Motherboard
  - 1 x I/O bracket
  - 1 x LGA4677 CPU carrier - E1A
  - 1 x LGA4677 CPU carrier - E1B

- **Gift box**
  - 1 x Motherboard
  - 1 x I/O bracket
  - 1 x LGA4677 CPU carrier - E1A
  - 1 x LGA4677 CPU carrier - E1B

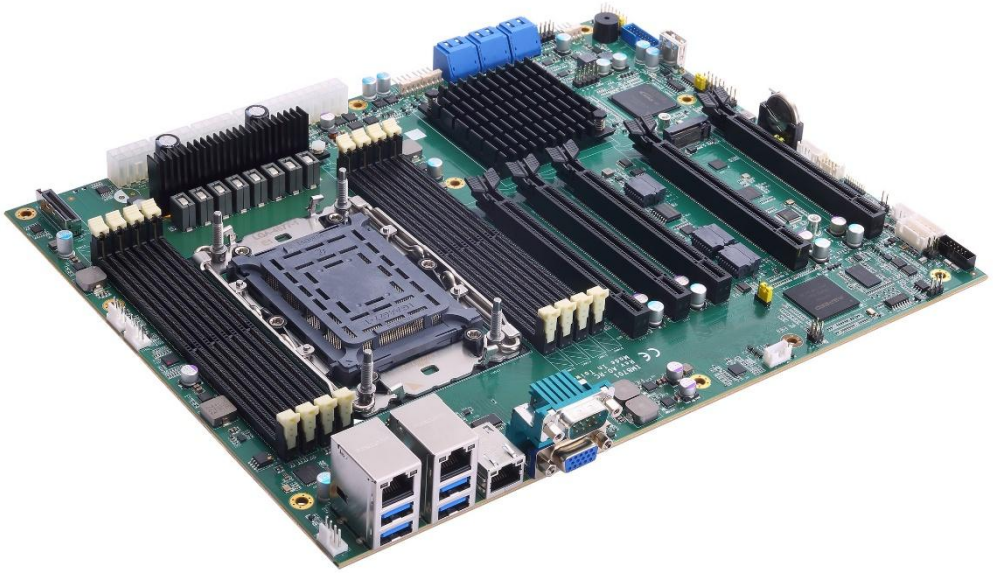
Section 2
Board and Pin Assignments

2.1 Board Layout

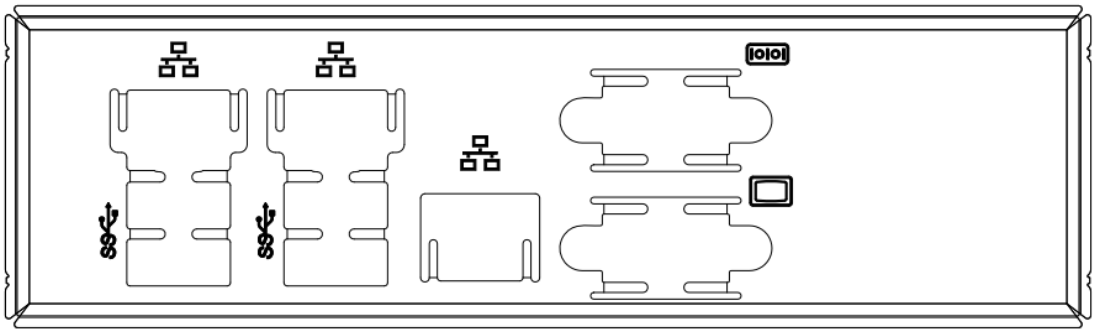
Top side



2.2 Rear I/O

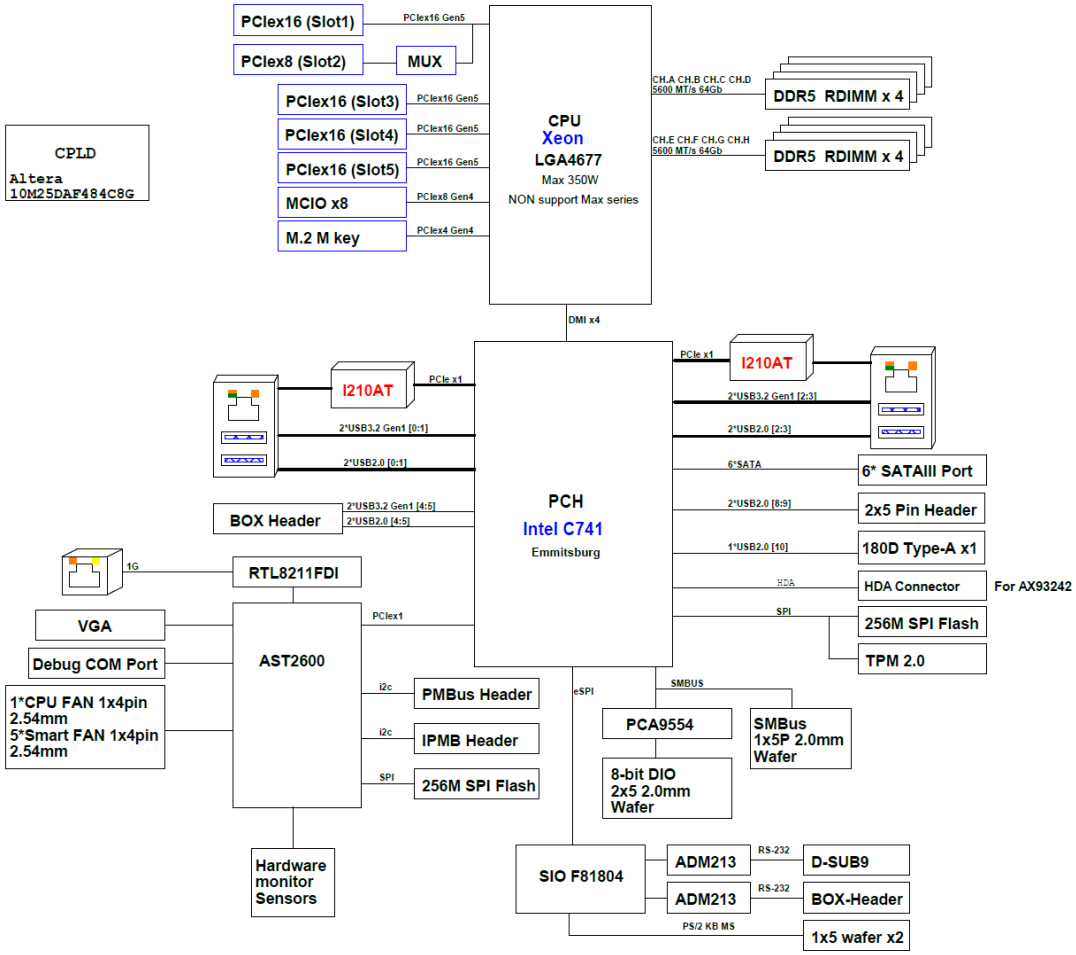


I/O side



I/O bracket

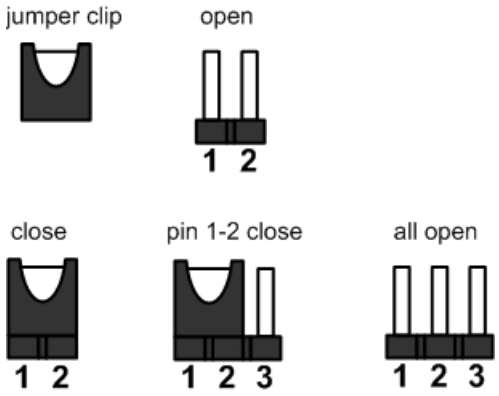
2.3 Block Diagram



2.4 Jumper Settings

Pin description

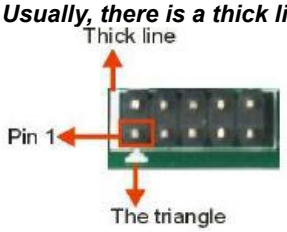
A jumper is a small component consisting of a jumper clip and jumper pins. Install a jumper clip on two jumper pins to close the jumper pins. Remove the jumper clip from two jumper pins to open the jumper pins. The following illustration shows how to set up a jumper.



Note

To identify the first pin of a header or jumper, please refer to the following information:

- ***Usually, there is a thick line or a triangle near the header or jumper pin 1.***



- ***A square pad, which you can find on the back of the motherboard, is usually used for pin 1.***

Before applying power to the IMB701, make sure all of the jumpers are in factory default position. Below you can find a summary table of all jumpers and onboard default settings.

Note

Turn off power before changing any default jumper settings.

Jumper	Descriptions	Default Setting
JP3	AT/ATX power mode select Default: AT mode	1-2 Close
JP4	Clear CMOS Default: Normal operation	1-2 Close
JP6	PCIe x16 slot using location slot PCIe1 & 2 Default: x16	1-2 Close

2.4.1 ATX/AT mode (JP3)

This 3x1-pin p=2.54mm jumper allows you to select AT or ATX power mode.

Function	Setting
AT mode (Default)	1-2 close
ATX mode	2-3 close

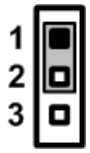
2.4.2 Clear CMOS (JP4)

This jumper (3x1-pin p=2.54mm) allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which includes system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Remove the onboard battery.
3. Move the jumper clip from pins 1-2 (default) to pins 2-3. Keep the clip on pins 2-3 for about 5~10 seconds, then move the clip back to pins 1-2.
4. Re-install the battery.
5. Plug the power cord and turn ON the computer.
6. Hold down the <Del> key during the boot process and enter BIOS setup to re-enter data.

Function	Setting
Normal operation (Default)	1-2 close
Clear CMOS	2-3 close



2.4.3 PCIe x16 slot bifurcation (JP13)

Use these jumpers (3x1-pin p=2.54mm) to set signal for slot location PCIe1 and 2 used.

Function	Setting
X16 and no signal (Default)	1-2 close
X8 and X8	2-3 close

Note

If the setting is 1-2 close, slot location 1 is for PCIe x16 signal and slot location 2 has no signal.
BIOS setting page 42: IIO configuration → IOU2 (IIO PCIe Port3) set x16

If the setting is 2-3 close, slot location 1 is PCIe x8 signal and slot location 2 is PCIe x8.
BIOS setting page 42: IIO configuration → IOU2 (IIO PCIe Port3) set x8 & x8

2.5 Connectors

Signals go to other parts of the system through connectors. Loose or improper connection might cause problems, Make sure all connectors are properly and firmly connected. Here is a summary table showing the connectors on the hardware.

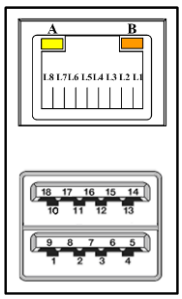
Connector	Description
CN6	LAN I210 + USB3.2 Gen1*2 Connector
CN33	LAN I210 + USB3.2 Gen1 *2 Connector
LAN1	OpenBMC LAN
VGA1	VGA Connector
COM1	COM Connector
CN7	COM Box Header
CN35	PS/2 connector KB
CN36	PS2 connector MS
CN10	GPIO connector
CN15	SMBus
CN16	M.2 Connector
HDA1	Audio connector for AX93242
CN34	Internal USB 3.2 Gen1 Connector (box header)
USB3	USB2.0 (180° type-A for USB dongle)
USB1	USB2.0*2 (pin header)
CN23	Front Panel
PMBUS1	PMBus
CN20	MCIO Connector
SATA1~SATA3	SATA III*6 Connector
DIMM1~DIMM8	DDR5 RDIMM Connector
PCIE1,PCIE2	PCI-Express x16 (Gen5) or 2*PCI-Express x8 (Gen5)
PCIE3~PCIE5	PCI-Express x16 (Gen5)
CN24	ATX Power Connector
CN26	ATX CPU 12V Power Connector
CN27	ATX CPU 12V Power Connector
FAN1~4, FAN6	System FAN
FAN5	CPU FAN
JP3	AT/ATX Mode Select Connector
JP4	Clear RTC Connector
JP6	PCIe1/PCIe2 x16 slot bifurcation Connector
JP28	Case Open Connector
JP29	LAN Active LED Connector
JP30	BMC ID LED / BMC RST BTN Connector

2.5.1 LAN & USB3.2 Connector (CN6、CN33)

The motherboard comes with two high performance plug and play Ethernet interfaces (RJ-45) which are fully compliant with the IEEE 802.3 standard. Connection can be established by plugging one end of the Ethernet cable into this RJ-45 connector and the other end to a 1000/100/10 Base-T hub.

The Universal Serial Bus (compliant with USB 3.2 Gen1 (CN6) or USB3.2 Gen1 (CN33) connectors on the rear I/O are used for installing USB peripherals such as a keyboard, mouse, scanner, etc.

Pin	LAN Signal	Pin	LAN Signal
L1	Tx+ (Data transmission positive)	L2	Tx- (Data transmission negative)
L3	Rx+ (Data reception positive)	L4	RJ-1 (For 1000 Base-T only)
L5	RJ-1 (For 1000 Base-T only)	L6	Rx- (Data reception negative)
L7	RJ-1 (For 1000 Base-T only)	L8	RJ-1 (For 1000 Base-T only)
A	100 LAN LED (Green) / 1000 LAN LED (Orange)	B	Active LED



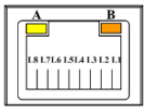
LAN

USB

Pin	USB Signal	Pin	USB Signal
1	USB3_POWER	2	USB1 -
3	USB1 +	4	GND
5	USB3_SSRX1-	6	USB3_SSRX1+
7	GND	8	USB3_SSTX1-
9	USB3_SSTX1+	10	USB3_POWER
11	USB2 -	12	USB2 +
13	GND	14	USB3_SSRX2-
15	USB3_SSRX2+	16	GND
17	USB3_SSTX2-	18	USB3_SSTX2+

2.5.2 Dedicated IPMI LAN (LAN1)

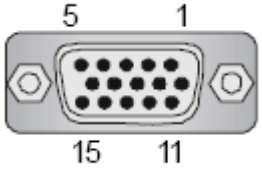
Pin	LAN Signal	Pin	LAN Signal
L1	Tx+ (Data transmission positive)	L2	Tx- (Data transmission negative)
L3	Rx+ (Data reception positive)	L4	RJ-1 (For 1000 Base-T only)
L5	RJ-1 (For 1000 Base-T only)	L6	Rx- (Data reception negative)
L7	RJ-1 (For 1000 Base-T only)	L8	RJ-1 (For 1000 Base-T only)
A	100 LAN LED (Green) / 1000 LAN LED (Orange)	B	Active LED



2.5.3 VGA (VGA1)

The 15-pin D-Sub connector is commonly used for VGA display.

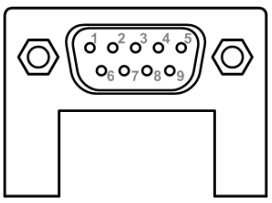
Pin	Signal	Pin	Signal
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	VCC	10	GND
11	NC	12	DDC DATA
13	Horizontal Sync	14	Vertical Sync
15	DDC CLK		



2.5.4 COM Connector (COM1)

This is a high rise 9-pin D-Sub connector for COM1 serial port interface. The pin assignments of RS-232 is listed in the table below.

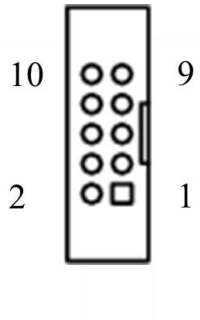
Pin	RS-232
1	DCD#
2	RXD
3	TXD
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#



2.5.5 COM Box header (CN7)

The motherboard comes with 5x2-pin headers for COM serial port interfaces.

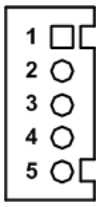
Pin	Signal	Pin	Signal
1	DCD#	2	DSR#
3	RXD#	4	RTS#
5	TXD#	6	CTS#
7	DTR#	8	N/C
9	GND	10	N/C



2.5.6 Internal Keyboard Connector (CN35)

The internal keyboard (PS/2 type) interface is available through a 5-pin connector.

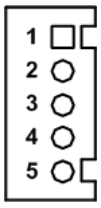
Pin	Signal
1	Keyboard Clock
2	Keyboard Data
3	NC
4	GND
5	+5V level



2.5.7 Internal Mouse Connector (CN36)

The internal mouse (PS/2 type) interface is available through a 5-pin connector.

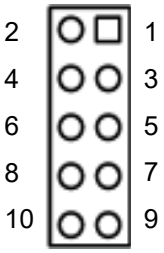
Pin	Signal
1	Mouse Clock
2	Mouse Data
3	NC
4	GND
5	+5V level



2.5.8 GPIO Header (CN10)

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

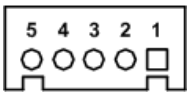
Pin	Signal	Pin	Signal
1	DIO1	2	DIO8
3	DIO2	4	DIO7
5	DIO3	6	DIO6
7	DIO4	8	DIO5
9	NA	10	GND



2.5.9 SMBus Header (CN15)

The CN15 (5x1-pin p=2.00mm) is for SMBus (System Management Bus) interface.

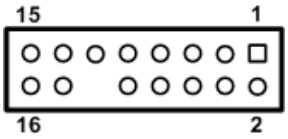
Pin	Signal	Pin	Signal
1	SMB_SCL	2	N/C
3	GND	4	SMB_SDA
5	+5V		



2.5.10 Audio header (HDA1)

This is a 2x8-pin header for connecting an external HD Audio board (AX93242).

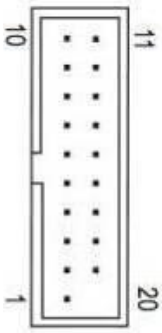
Pin	Signal	Pin	Signal
1	BCLK	2	GND
3	RST#	4	N.C
5	SYNC	6	GND
7	SDO	8	+3.3S
9	SDIO	10	+12VS
11	N.C	12	
13	N.C	14	N.C
15	N.C	16	GND



2.5.11 Internal USB 3.1 Gen1 Connector (CN34)

The CN34 is a 19-pin internal connector for installing versatile USB 3.1 compliant peripherals.

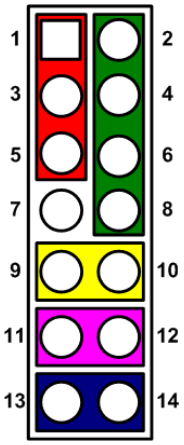
Pin	Signal	Pin	Signal
1	VBUS0		
2	SSRX5-	19	VBUS1
3	SSRX5+	18	SSRX6-
4	GND	17	SSRX6+
5	SSTX5-	16	GND
6	SSTX5+	15	SSTX6-
7	GND	14	SSTX6+
8	USB10-	13	GND
9	USB10+	12	USB11-
10	ID	11	USB11+



2.5.12 Front Panel Header (CN23)

This is a front panel header (7x2-pin p=2.54mm).

Pin	Signal
1	Power LED+
2	SPK- [*]
3	GND
4	BUZZER
5	Power LED-
6	N/C
7	N/C
8	SPK+ [*]
9	PWR-
10	PWR+
11	RESET-
12	RESET+
13	HD LED-
14	HD LED+



Note

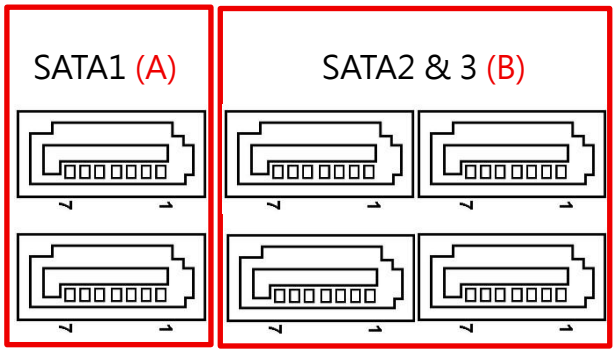
[*]: The buzzer on the motherboard will be active when pin 2 and pin 4 are connected; the external speaker on the chassis will be active when pin 2 and pin 4 are open.

2.5.13 SATA Connector (SATA1~SATA3)

These Serial Advanced Technology Attachment (Serial ATA or SATA) connectors are for SATA 3.0 interface allowing up to 6.0Gb/s data transfer rate. It is a computer bus interface for connecting to devices such as hard disk drive.

Each SATA group includes 2 ports (SATA1 and SATA2 & 3 group).
The upper and lower SATA1 connectors are group A supporting RAID 0/1 configurations.
The upper and lower SATA2/3 connectors are group B supporting RAID 0/1/5/10 configurations.

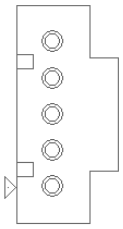
Pin	Signal
1	GND
2	SATA_TX+
3	SATA_TX-
4	GND
5	SATA_RX-
6	SATA_RX+
7	GND



2.5.14 PMBus (PMBUS1)

The Power System Management Bus connector monitors the power supply, system temperatures and fan.

Pin	Signal
1	Clock
2	Data
3	PMBus Alert
4	GND
5	+3.3V



PMBUS1

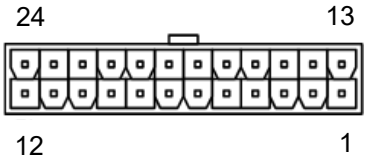
2.5.15 Power Input Connector (CN24, CN26 and CN27)

Steady and sufficient power can be supplied to all components on the motherboard by connecting the power connector. Please make sure all components and devices are properly installed before connecting the power connector.

An external power supply plug fits into CN24/26/27 in only one orientation. Properly press down the power supply plug until it completely and firmly fits into the connector. Loose connection may cause system instability.

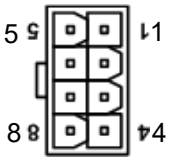
CN24 24-pin ATX power input connector:

Pin	CN26 Signal	Pin	CN26 Signal
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	PWR OK	20	-5V
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	3.3V	24	GND



CN26/CN27 CPU power input connector

Pin	ATX2 Signal	Pin	ATX2 Signal
1	GND	5	+12V
2	GND	6	+12V
3	GND	7	+12V
4	GND	8	+12V



2.5.16 Fan Connectors (Fan1~6)

This motherboard has six fan connectors. Find fan speed option(s) at OpenBMC website.

FAN1~4 and FAN6 (4x1-pin p=2.54mm) is for the system fan connectors.

FAN 5 (4x1-pin p=2.54mm) is for the CPU fan connector.

Pin	Signal
1	GND
2	+12V
3	FAN Speed Detection
4	FAN Speed Control

2.5.17 Case Open (JP28)

Function	Setting
Case Open	Connect to Case Open switch

2.5.18 LAN LED (JP29)

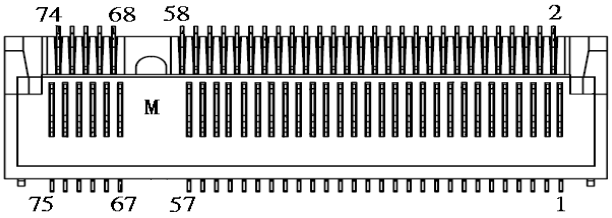
Function	Setting
LAN1 Active LED	1 LAN1 LED+ 2 LAN1 LED-
LAN2 Active LED	3 LAN2 LED+ 4 LAN2 LED-

2.5.19 BMC ID LED / BMC RST BTN (JP30)

Function	Setting
BMC ID LED (BMC can set LED ON/Off)	1 BMC LED+ 2 BMC LED-
BMC RST BTN Press BTN to turn off ID LED	3-4 BTN

2.5.20 M.2 2280 Key M PCIe x4 SSD slot (CN16)

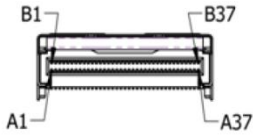
The IMB701 comes with one M.2 2280 Key M slot with PCIe x4 signal for NVMe SSD storage.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
1	GND	2	+3.3V	3	GND	4	+3.3V
5	PEX3_RX-	6	NC	7	PEX3_RX+	8	NC
9	GND	10	LED_1#	11	PEX3_TX-	12	+3.3V
13	PEX3_TX+	14	+3.3V	15	GND	16	+3.3V
17	PEX2_RX-	18	+3.3V	19	PEX2_RX+	20	NC
21	GND	22	NC	23	PEX2_TX-	24	NC
25	PEX2_TX+	26	NC	27	GND	28	NC
29	PEX1_RX-	30	NC	31	PEX1_RX+	32	NC
33	GND	34	NC	35	PEX1_TX-	36	NC
37	PEX1_TX+	38	M.2_DEVSLP	39	GND	40	NC
41	PEX0_RX-	42	NC	43	PEX0_RX+	44	NC
45	GND	46	NC	47	PEX0_TX-	48	NC
49	PEX0_TX+	50	PERST#	51	GND	52	CLKREQ#
53	PEX0_REFCLKn	54	PEWAKE#	55	PEX0_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		

2.5.21 MCIO Connector (CN20)

The IMB701 comes with one MCIO connector for 2 x NVMe SSD storage with PCIe x4 signal.



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND	A20	RX4P	B1	GND	B20	TX4P
A2	RX0P	A21	RX4N	B2	TX0P	B21	TX4N
A3	RX0N	A22	GND	B3	TX0N	B22	GND
A4	GND	A23	RX5P	B4	GND	B23	TX5P
A5	RX1P	A24	RX5N	B5	TX1P	B24	TX5N
A6	RX1N	A25	GND	B6	TX1N	B25	GND
A7	GND	A26	GND	B7	GND	B26	SMB2_CLK
A8	GND	A27	WAKE#	B8	SMB1_CLK	B27	SMB2_DATA
A9	WAKE#	A28	GND	B9	SMB1_DATA	B28	GND
A10	GND	A29	CLK2_P	B10	GND	B29	PERST2
A11	CLK1_P	A30	CLK2_N	B11	PERST1	B30	GND
A12	CLK1_N	A31	GND	B12	GND	B31	GND
A13	GND	A32	RX6P	B13	GND	B32	TX6P
A14	RX2P	A33	RX6N	B14	TX2P	B33	TX6N
A15	RX2N	A34	GND	B15	TX2N	B34	GND
A16	GND	A35	RX7P	B16	GND	B35	TX7P
A17	RX3P	A36	RX7N	B17	TX3P	B36	TX7N
A18	RX3N	A37	GND	B18	TX3N	B37	GND
A19	GND			B19	GND		

2.6 Hardware Installation

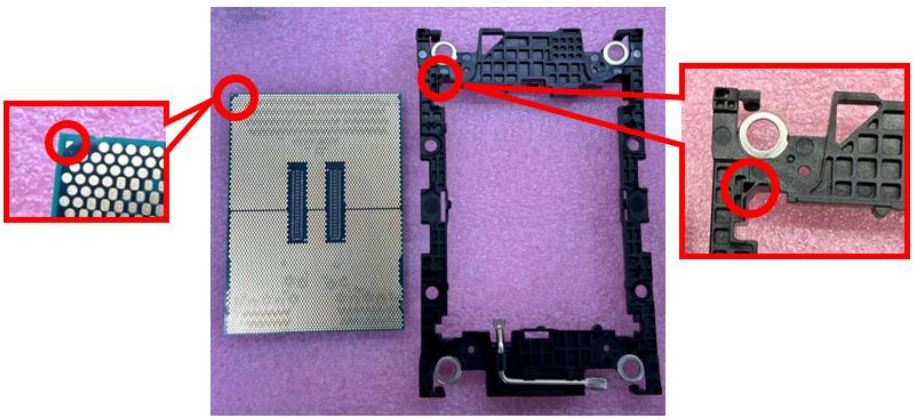
This section provides information on how to install the IMB701 Series.

2.6.1 Installing the CPU

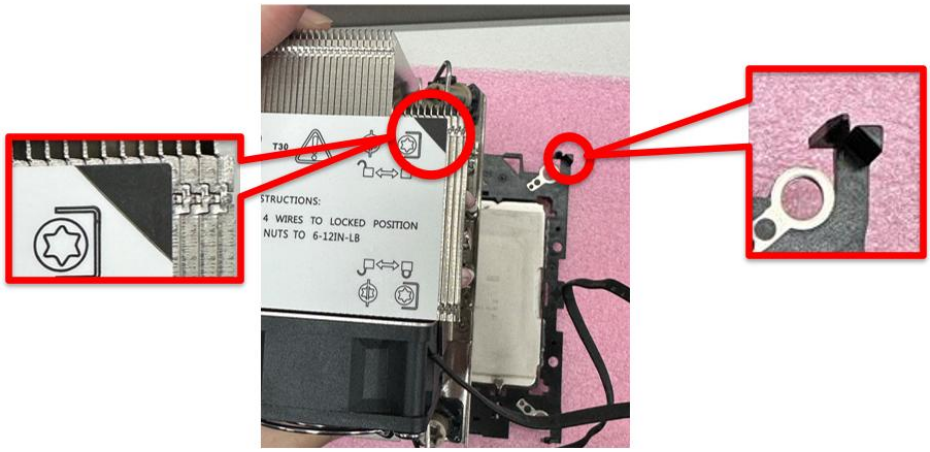
The LGA4677 processor socket comes with a cover to protect the processor. Please install the processor into the CPU socket step by step as illustrated below.

Step 1 Remove the socket protective covers. Press the load lever and release it from the retention tab.

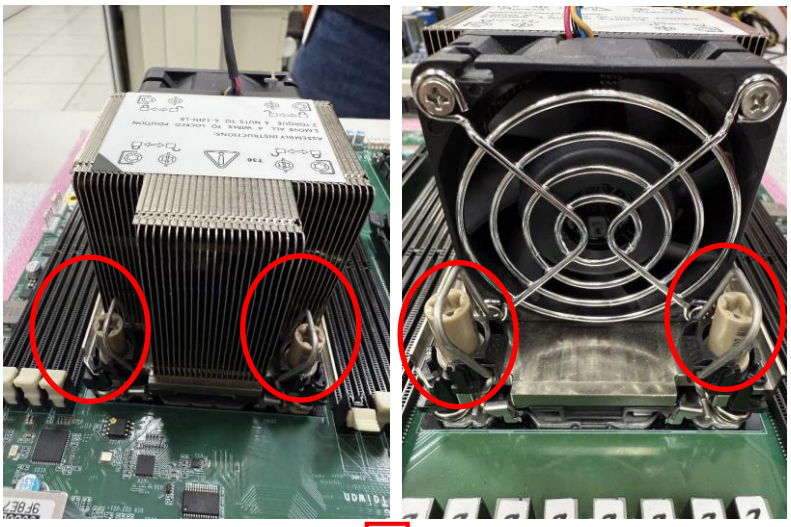
Step 2 Insert the CPU onto the CPU clip and align upper left pin mark on the CPU clip.



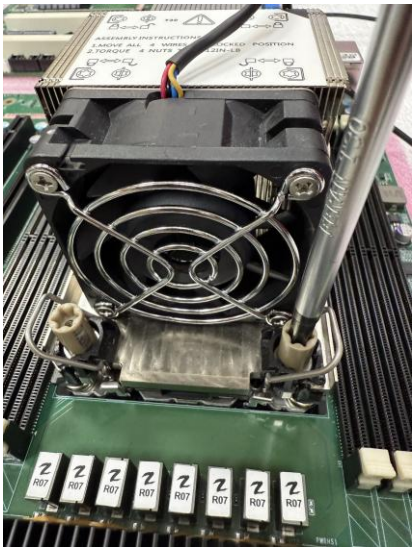
Step 3 Check the pin mark on the cooler and CPU clip and CPU.



Step 4 Latch four levers on the cooler.



Step 5 Use a T30 Torx screwdriver (8in-LBF) to tighten the screws on the cooler.



2.7 Memory Installation

The following table shows the recommended memory configuration, with installed quantity of memory, and the different DIMM configuration affect memory performance.

Channel		DIMM1	DIMM2	DIMM3	DIMM4	DIMM5	DIMM6	DIMM7	DIMM8
Quantity of Memory installed	1	V							
						V			
			V						
							V		
	2	V						V	
				V		V			
	4	V		V		V		V	
	6	V		V	V	V	V	V	
		V	V	V		V		V	V
			V	V	V	V	V		V
		V	V		V		V	V	V
	8	V	V	V	V	V	V	V	V

Section 3
Hardware Description

3.1 Microprocessors

The IMB701 series supports 4th/5th Gen Intel® Xeon® Scalable processors, which enable your system to operate under Windows® server 2022 and Linux environments. The system performance depends on the microprocessor. Make sure all correct settings are arranged for your microprocessor to prevent the CPU from damage.

Note

Caution: Make sure to turn off power supply before you install the processor into the CPU socket.

3.2 BIOS

The IMB701 series uses AMI Plug and Play BIOS.

3.3 System Memory

The IMB701 supports eight DDR5 RDIMM sockets for maximum memory capacity up to 512GB of DDR5 RAMs. The memory module comes in sizes of 16GB, 32GB, and 64GB.

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Section 4
AMI BIOS Setup 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 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.

4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press <Del> during the Power On Self Test (POST) to enter BIOS setup, otherwise, POST will continue with its test routines.
2. Once you enter the BIOS, 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 BIOS setup, you can restore BIOS optimal defaults by setting JP4 (see section 2.4.2).

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.

4.2 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.
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.
+– Plus/Minus	The Plus and Minus <Arrow> keys allow you to change the field value of a particular setup item.
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.

4.3 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.

BIOS Information
Display the BIOS information.

Access Level
Display the access level of current user.

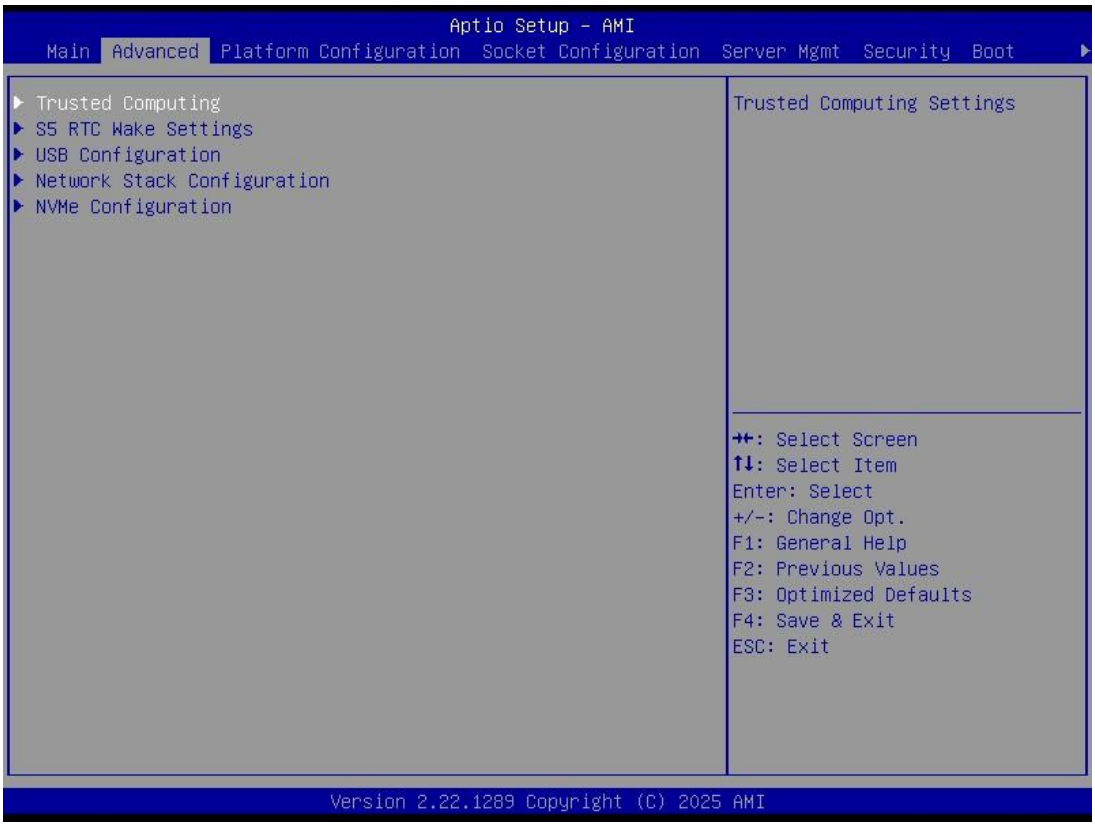
System Date/Time
Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time is entered in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

4.4 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:

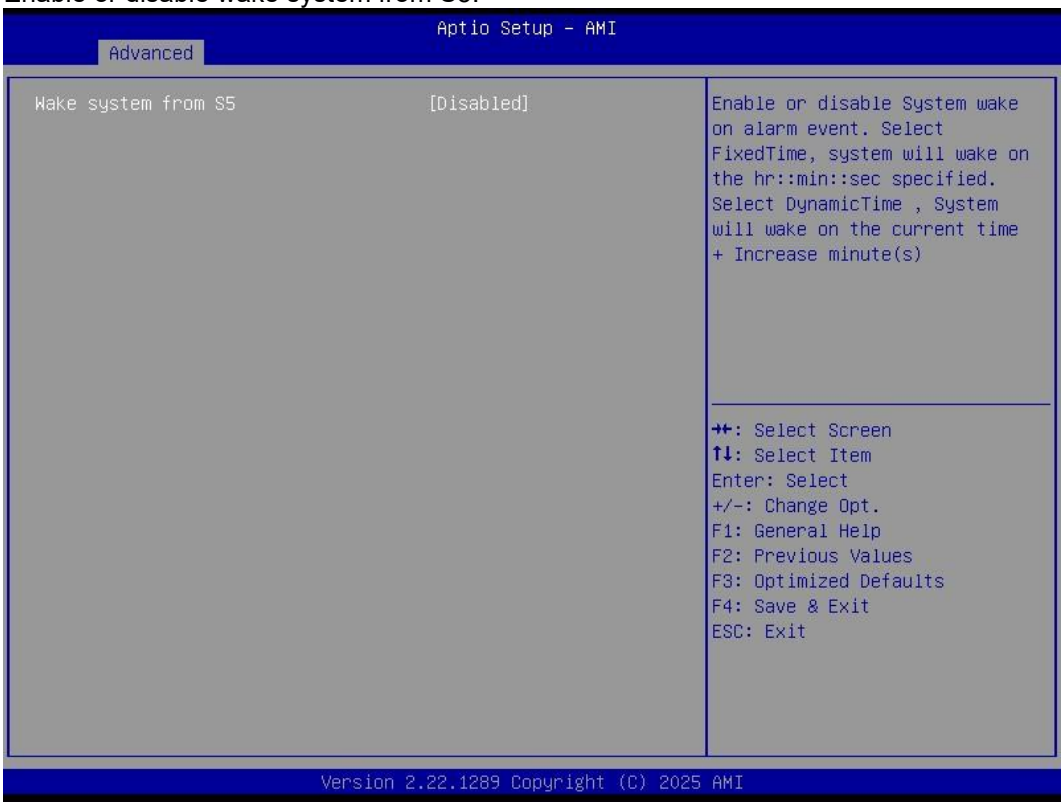
- ► Trusted Computing
- ► S5 RTC Wake Settings
- ► USB Configuration
- ► Network Stack Configuration
- ► NVMe Configuration

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



- **Trusted Computing**
  Enable or disable security device support.

- **S5 RTC Wake Settings**
  Enable or disable wake system from S5.



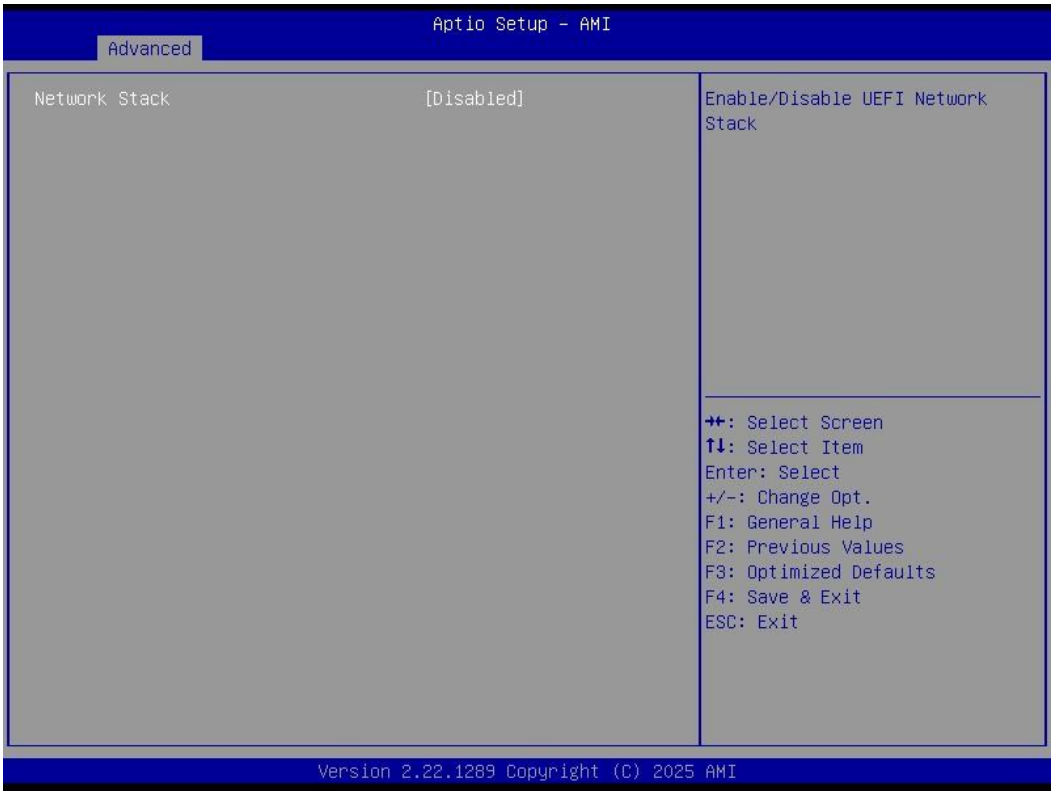
- **USB Configuration**
  This screen shows USB configuration.

USB Devices
Displays all detected USB devices.

Legacy USB Support
Enables Legacy USB support. The AUTO option disables legacy support if no USB devices are connected.

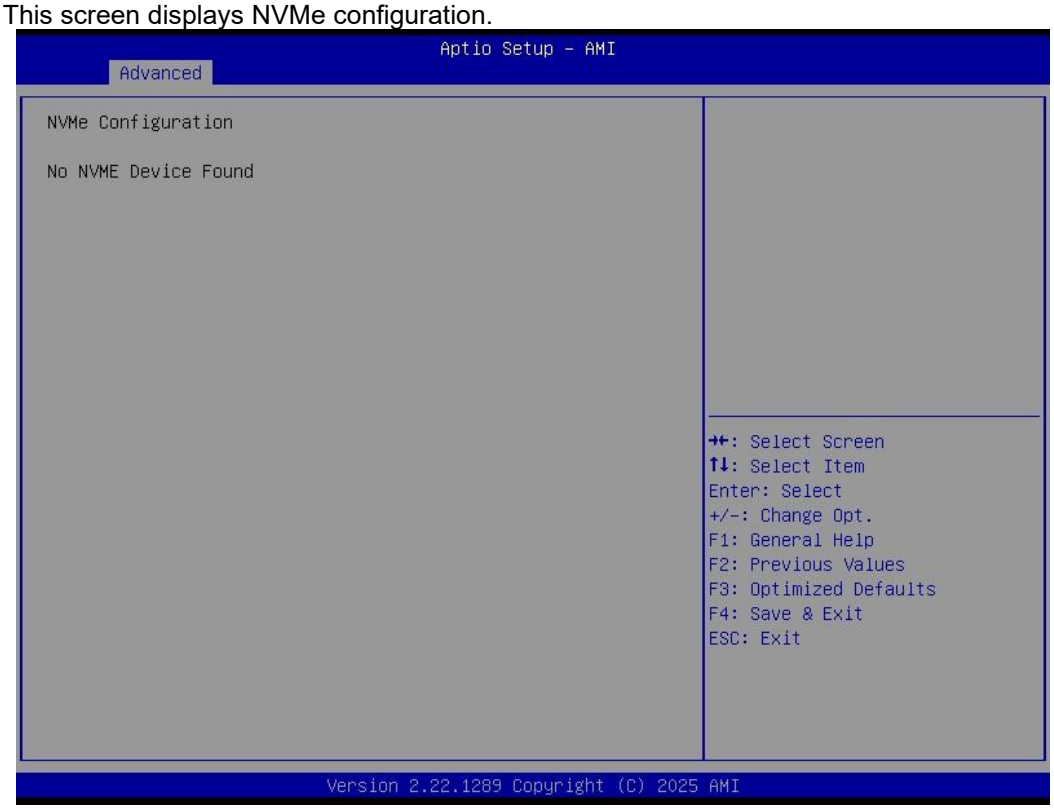
USB Mass Storage Driver Support
Enable/Disable USB Mass Storage Driver Support.

- **Network Stack Configuration**
  Enable or disable network stack on this page.



- **NVMe Configuration**

  This screen displays NVMe configuration.

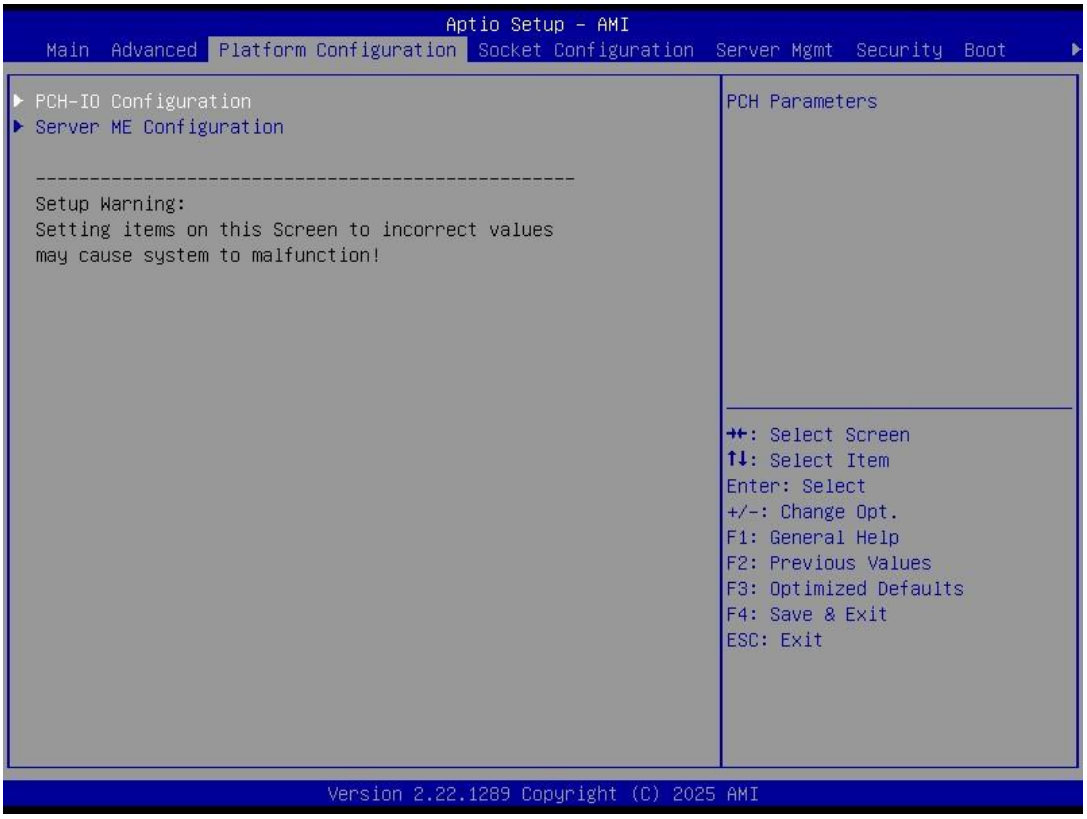


4.5 Platform Configuration

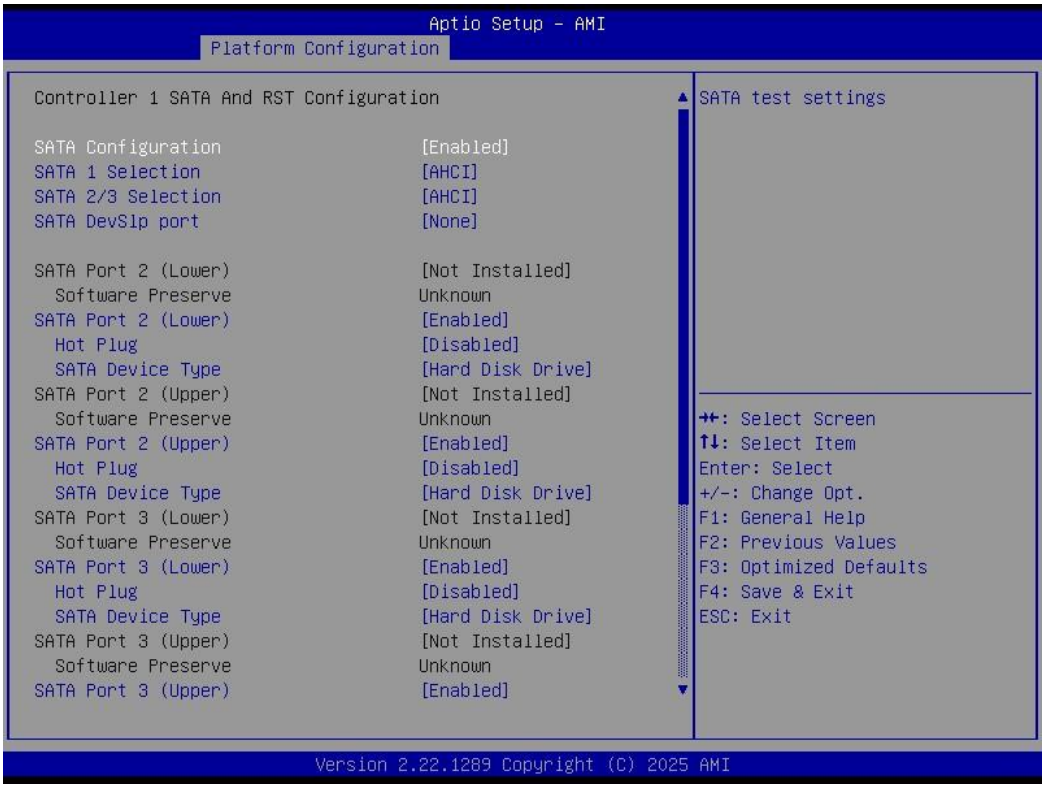
The Chipset menu allows users to change the advanced chipset settings. You can select any of the items in the left frame of the screen to go to the sub menus:

- ► PCH-IO Configuration
- ► Server ME Configuration

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



- **PCH-IO 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.



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

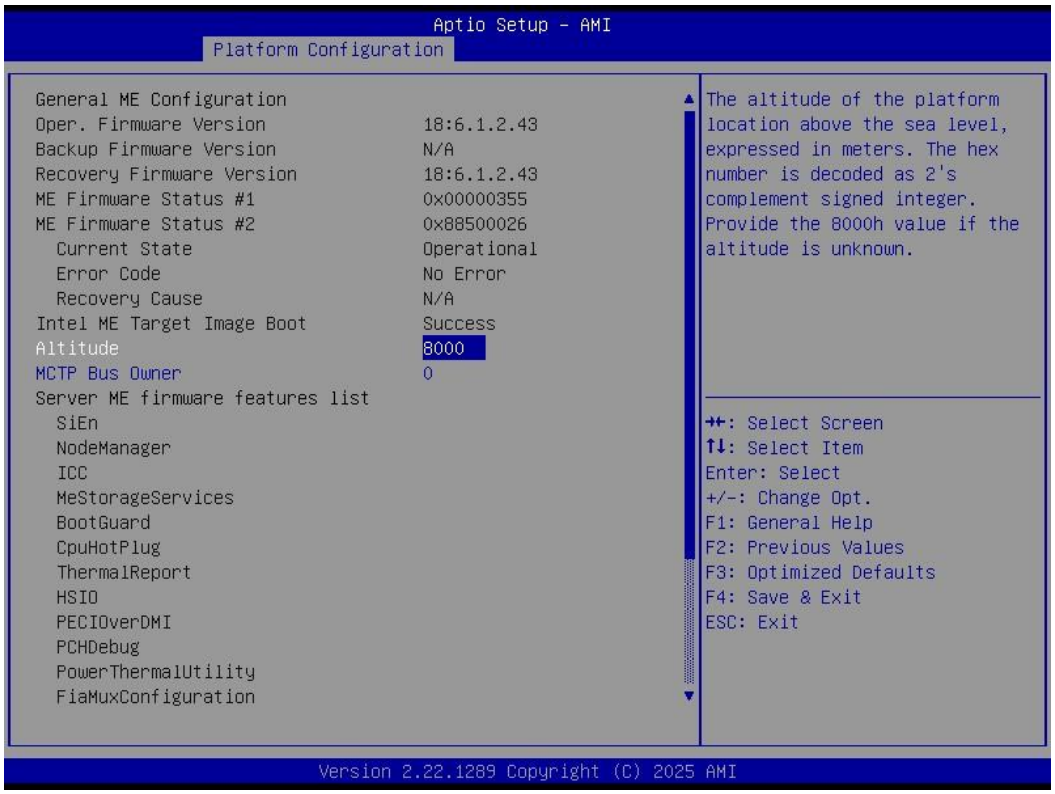
Configuration SATA as
Determine how SATA controller(s) operate. Operation mode options are RAID and AHCI (Advanced Host Controller Interface). The default is the AHCI mode.

Port
Enable or disable the SATA port.

Hot Plug
Designates this port as Hot Pluggable.

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

- **Server ME Configuration**
  This screen displays ME configuration information.

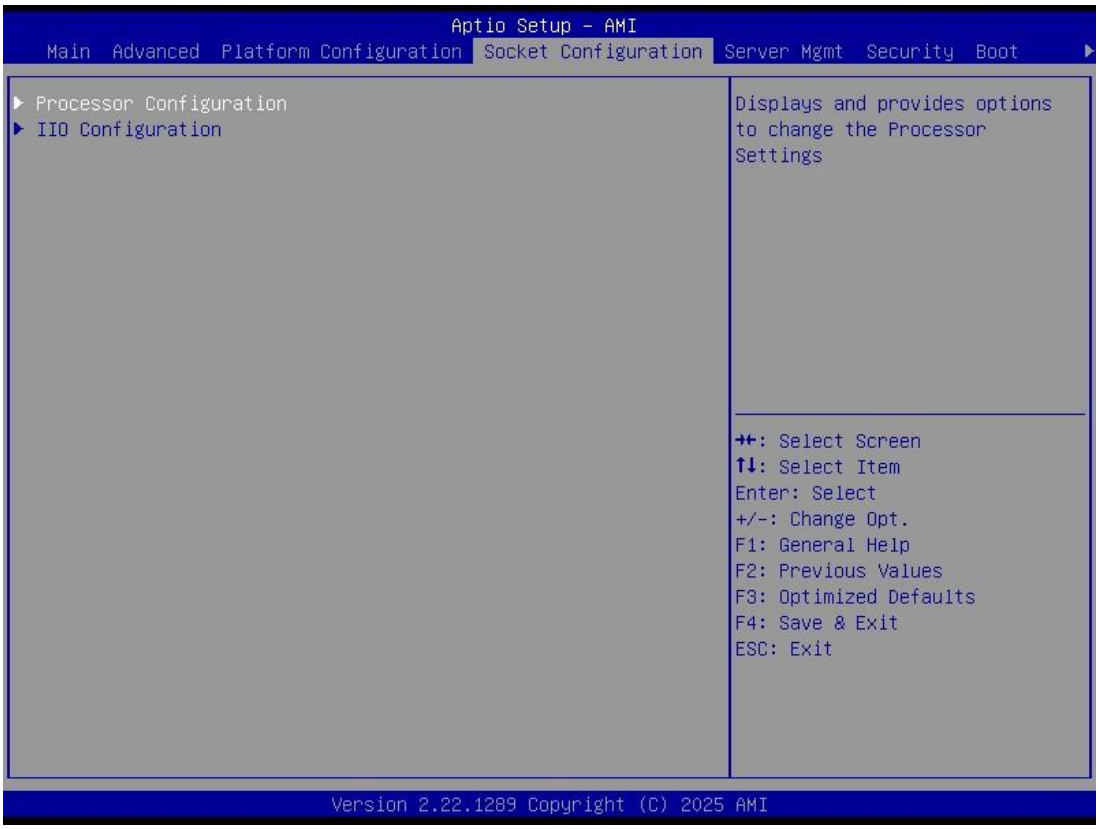


4.6 Socket Configuration

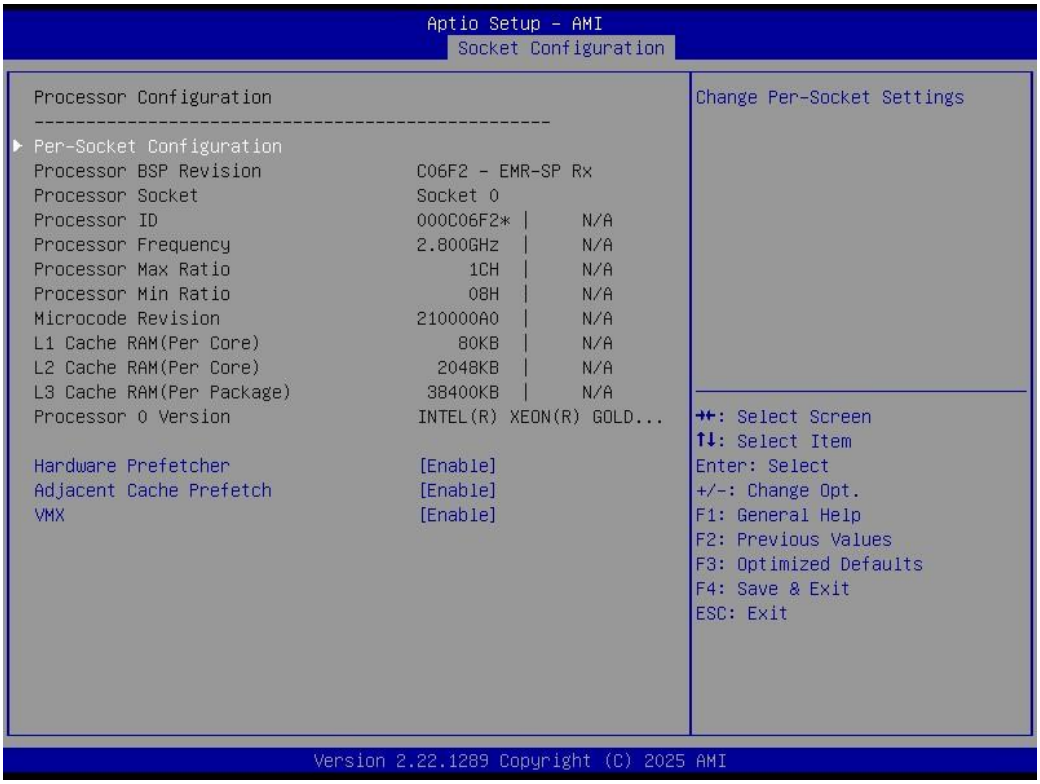
The socket configuration menu allows users to change the advanced socket settings.

- ► Processor Configuration
- ► IIO Configuration

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



- **Processor Configuration**
  This screen shows processor information and set Hardware Prefetcher, Adjacent Cache Prefetch and VMX functions.

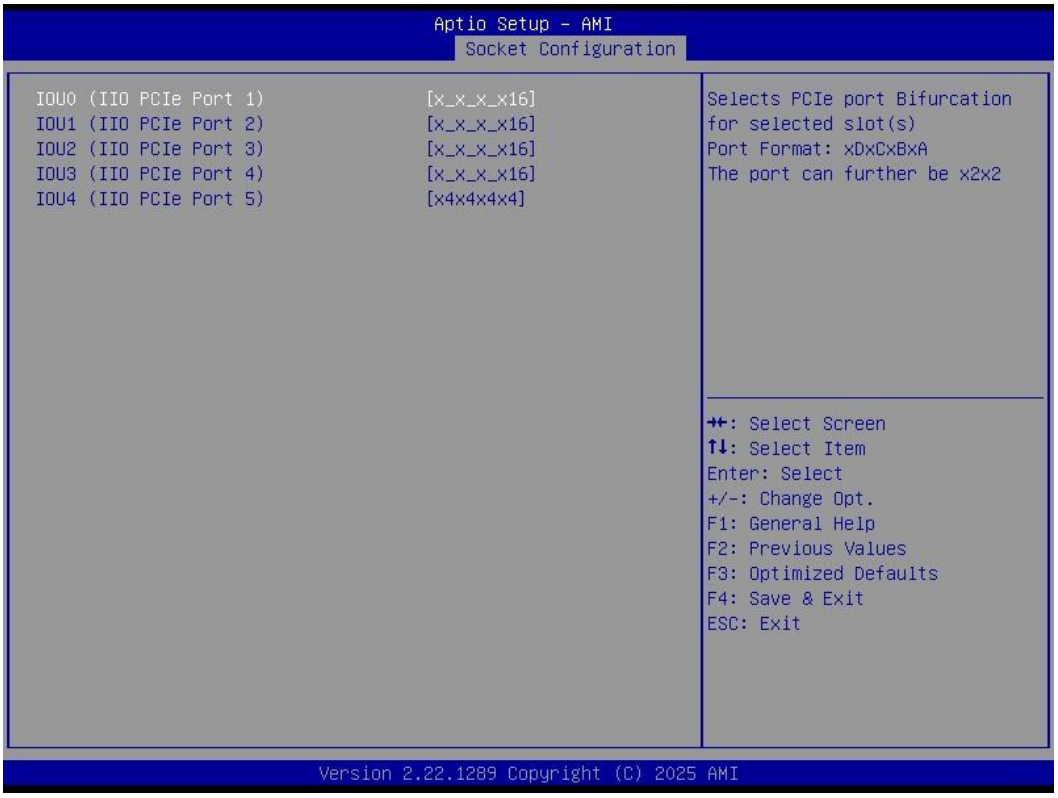


Hardware Prefetcher
The Hardware Prefetcher is a CPU feature that predicts and preloads memory into cache to reduce latency. Leave it enabled by default unless you're doing very specialized workloads where prefetching interferes with performance.

Adjacent Cache Prefetch
The setting is like automatic hardware prefetch, to speed up sequential memory access.

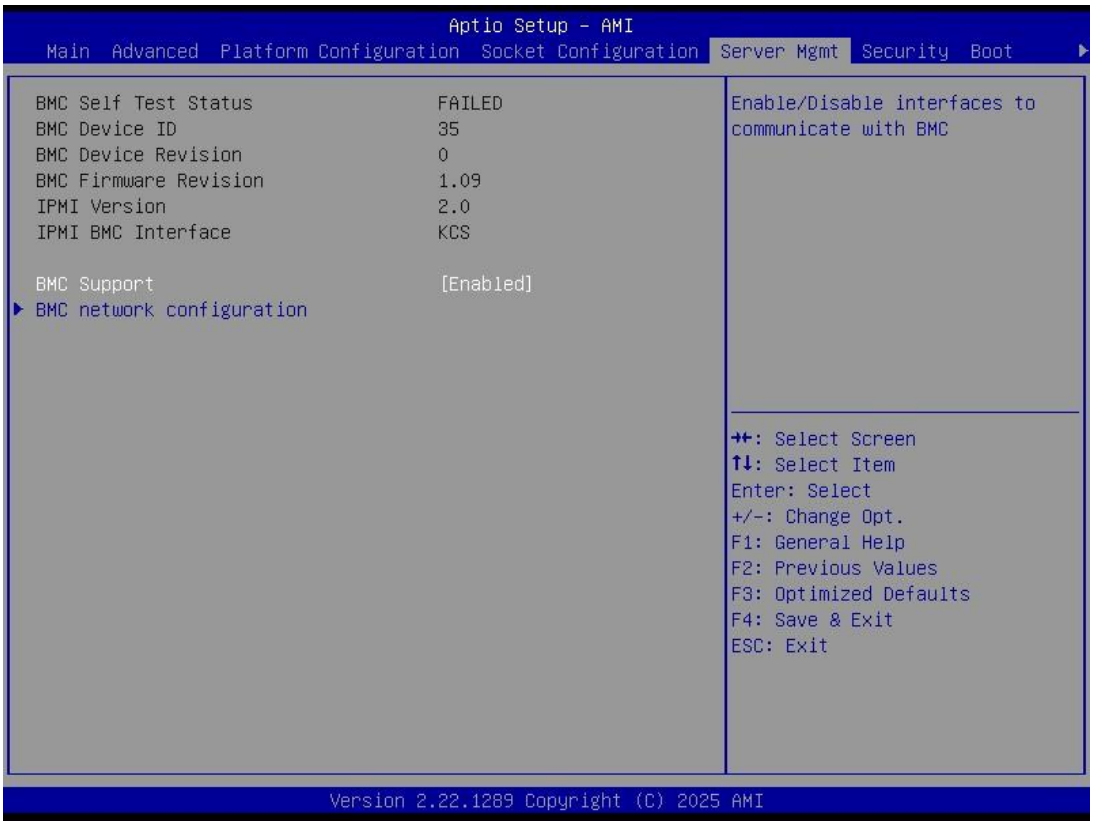
VMX
Enable or disable Intel® VMX for IA-32 processors that support Intel® Vanderpool Technology.

- **IIO Configuration**
  This screen shows the IO configuration information.

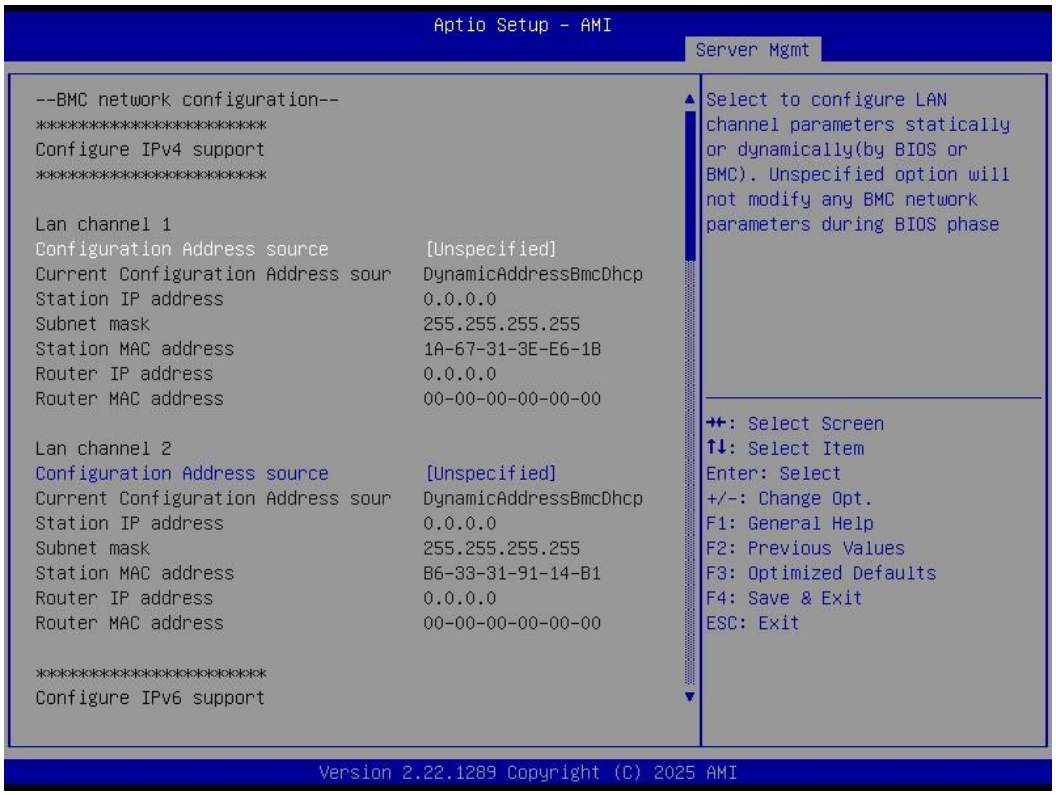


4.7 Server Management

The screen allows users to change the settings for the BMC.

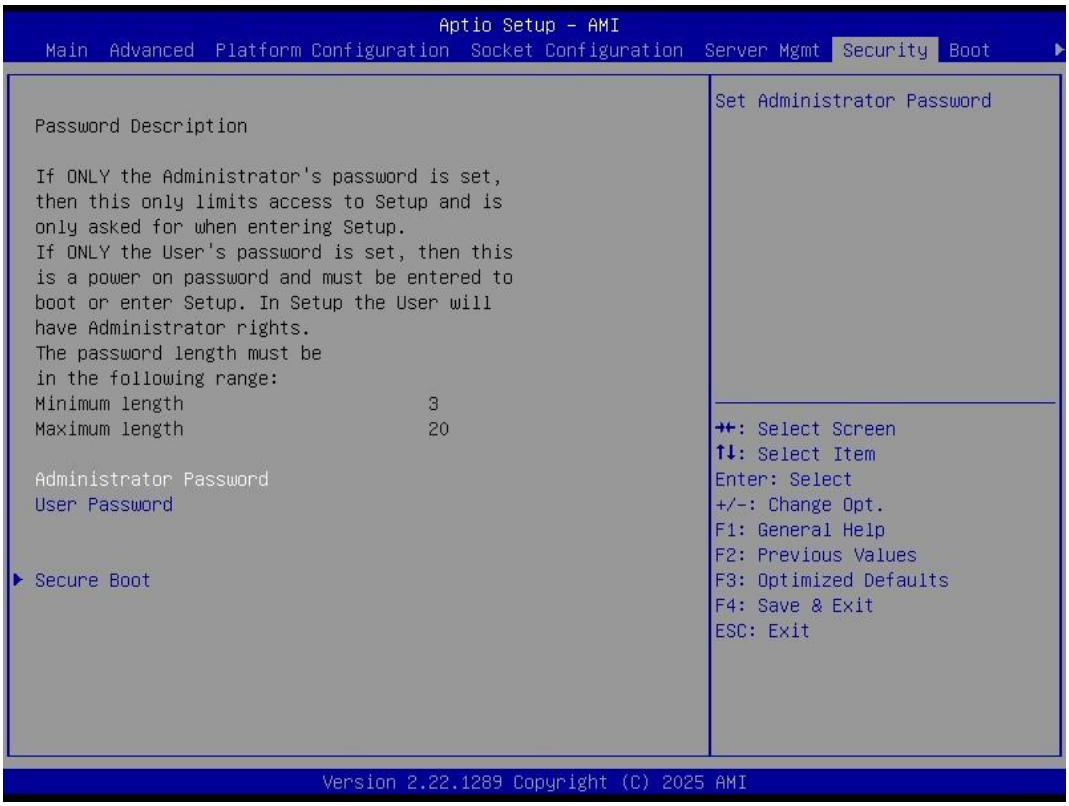


- **BMC Network Configuration**
  Select to configure LAN channel parameters statically or dynamically (by BMC).



4.8 Security Menu

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

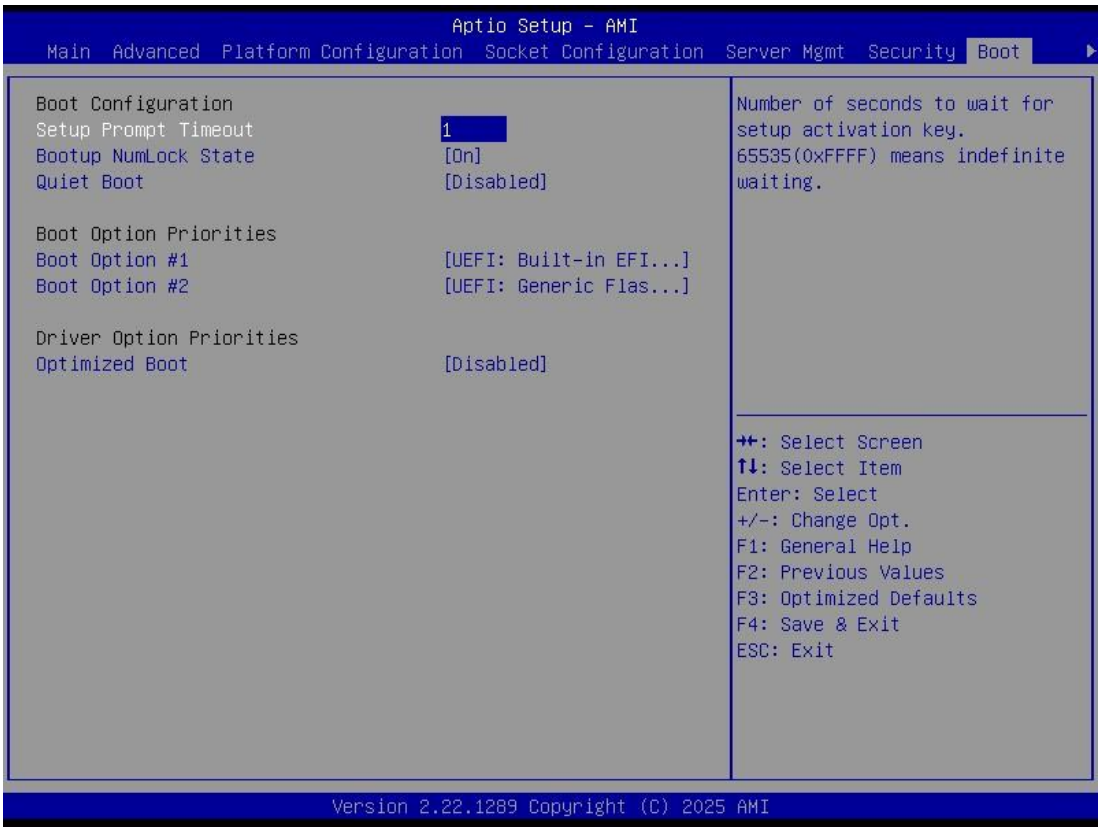


Administrator Password
This item indicates whether an administrator password has been set (installed or uninstalled).

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

4.9 Boot Menu

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



Setup Prompt Timeout
Enter the number of seconds to wait for the setup activation key. 65535(0xFFFF) means indefinite waiting.

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

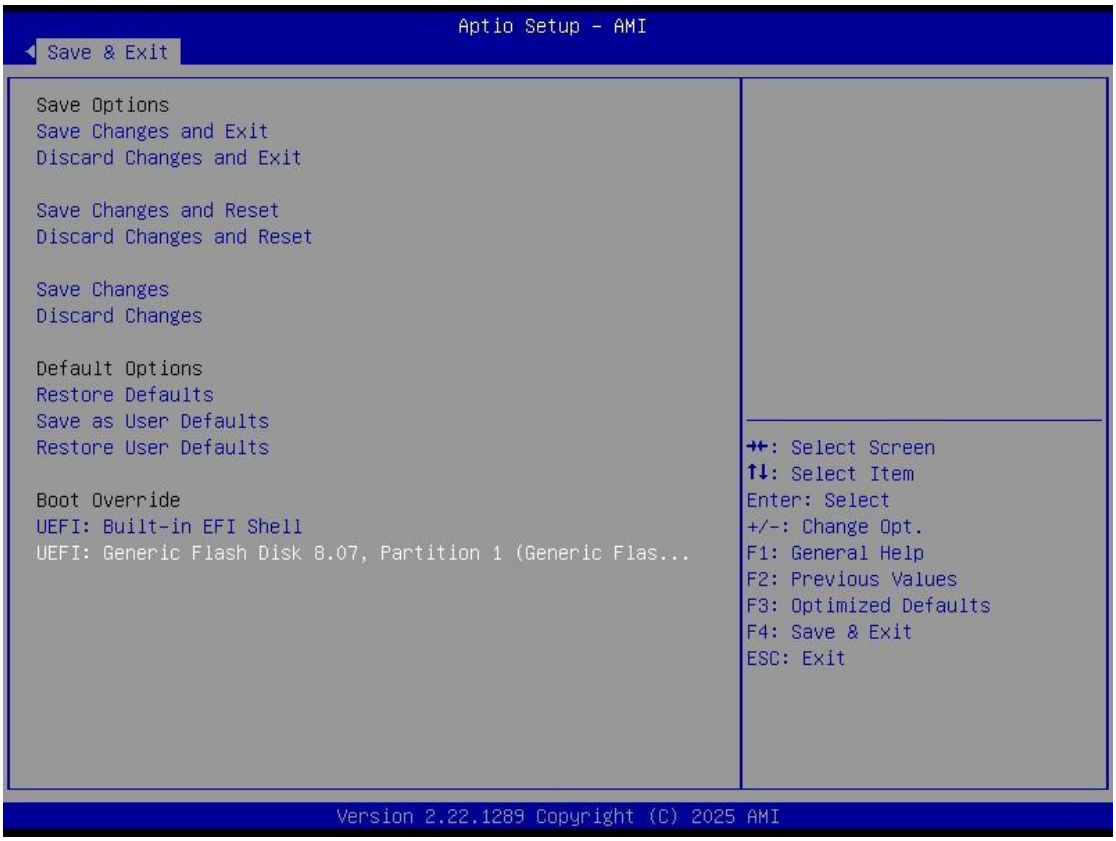
Quiet Boot
Select to display either POST output messages or a splash screen during boot-up.

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

Optimized Boot
When the system BIOS boots using native UEFI graphic drivers, use this function to control and enable for compatibility with VMware ESXi on a system configured for UEFI Boot Mode, and to enable and use Secure Boot Mode

4.10 Save & Exit Menu

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



Save Changes and Exit
When you have completed the system configuration changes, 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 you have completed the system configuration changes, 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 you have completed the system configuration changes, 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
It automatically sets all Setup options to a complete set of default settings when you select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

Save as User Defaults
Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

Restore User Defaults
It automatically sets all Setup options to a complete set of User Defaults when you select this option. 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.

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Appendix A
Watchdog Timer

About Watchdog Timer

Software stability is a major issue in most applications. Some embedded systems are not watched by humans for 24 hours. It is usually too slow 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 that solution.

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.

How to Use Watchdog Timer

Start
↓
1. Enable configuration:
-O 2E 87
-O 2E 87
↓
2. Select logic device:
-O 2E 07
-O 2F 07
↓
3. Enable WDT:
-O 2E 30
-O 2F 01
↓
4. Activate WDT:
-O 2E F0
-O 2F 80
↓
5. Set base timer:
-O 2E F6
-O 2F 0A ; Set reset time. Ex: A->reset time=10sec
↓
6. Set timer unit (second or minute):
-O 2E F5
-O 2F 71 ; Set timer unit.
; Ex: 1->timer unit=second, 9->timer unit=minute

- Timeout Value Range
  - 1 to 255
  - Minute / Second

Note:

*If **N**=00h, the time base is set to second.*
***M** = time value*
00h: Time-out Disable
01h: Time-out occurs after 1 second
02h: Time-out occurs after 2 seconds
03h: Time-out occurs after 3 seconds
.
.
FFh: Time-out occurs after 255 seconds

*If **N**=08h, the time base is set to minute.*
***M** = time value*
00h: Time-out Disable
01h: Time-out occurs after 1 minute
02h: Time-out occurs after 2 minutes
03h: Time-out occurs after 3 minutes
.
.
FFh: Time-out occurs after 255 minutes

Appendix B
Configuring SATA for RAID

Configuring SATA Hard Drive(s) for RAID Function

Before you begin the SATA configuration, please prepare:

- Two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID with the SATA controller, you may prepare only one hard drive.

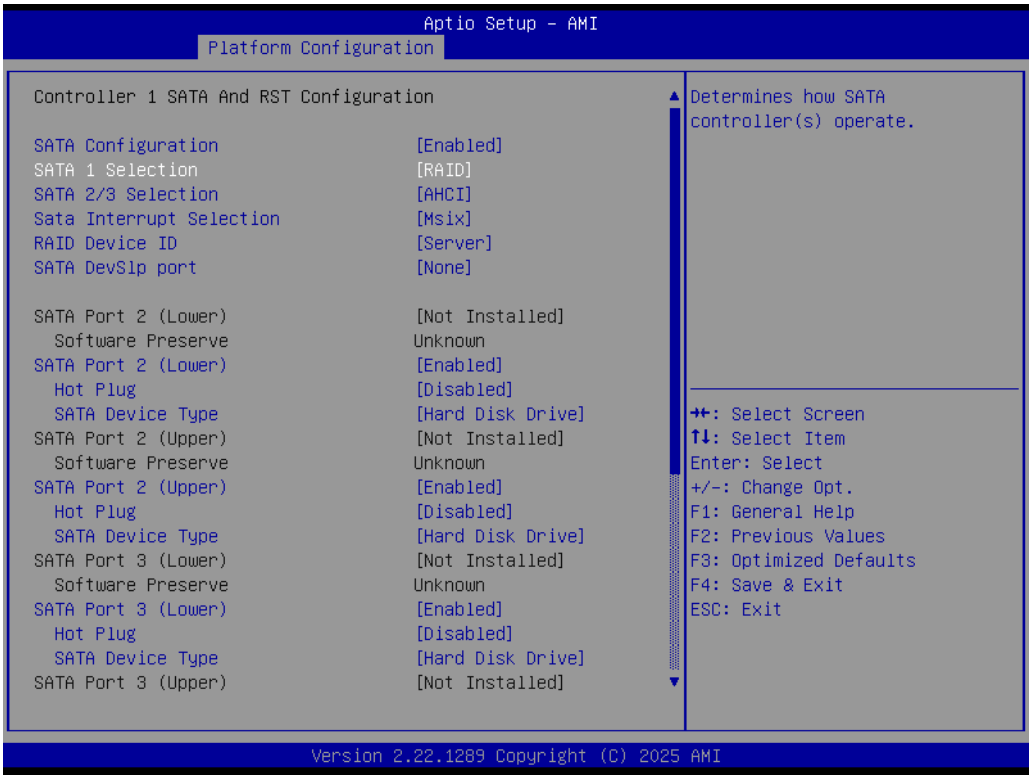
Please follow up the steps below to configure SATA hard drive(s):

1. Install SATA hard drive(s) in your system.
2. Enter the BIOS Setup to configure SATA controller mode and boot sequence.
3. Configure RAID by the RAID BIOS.

1. Installing SATA hard drive(s) in your system.
Connect one end of the SATA signal cable to the rear of the SATA hard drive, and the other end to available SATA port(s) on the board. Then, connect the power connector of power supply to the hard drive.

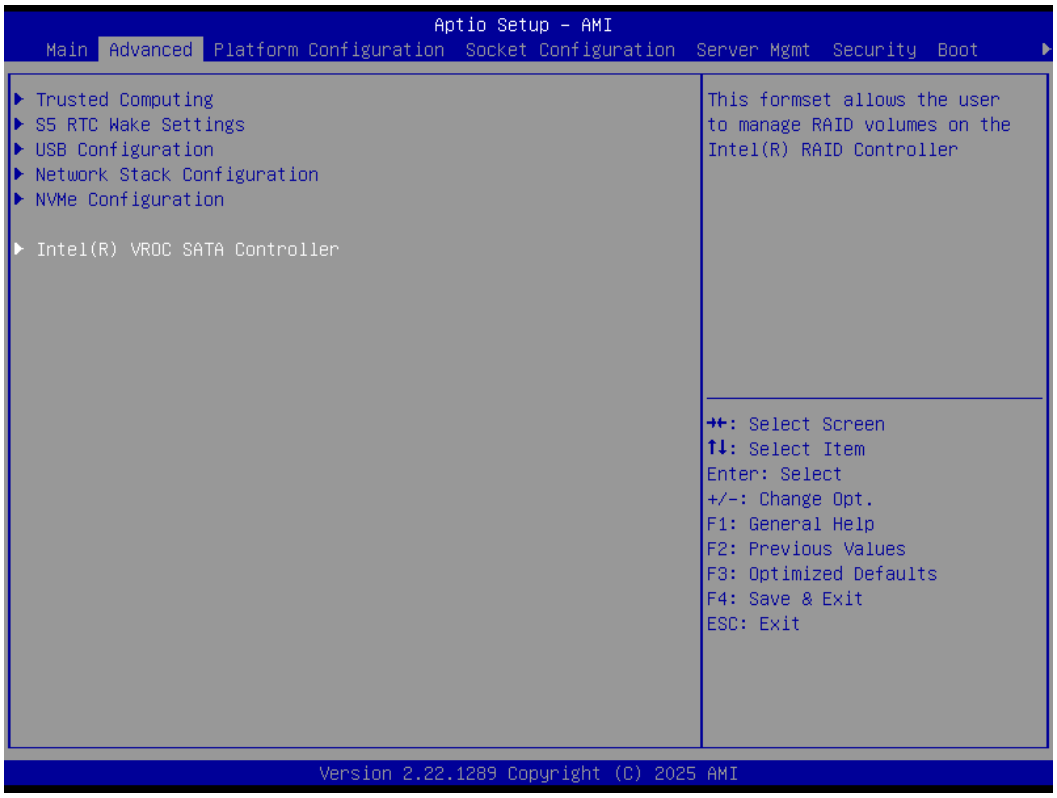
2. Configuring SATA controller mode and boot sequence by the BIOS Setup.
You have to make sure whether the SATA controller is configured correctly by system BIOS Setup and set up BIOS boot sequence for the SATA hard drive(s).

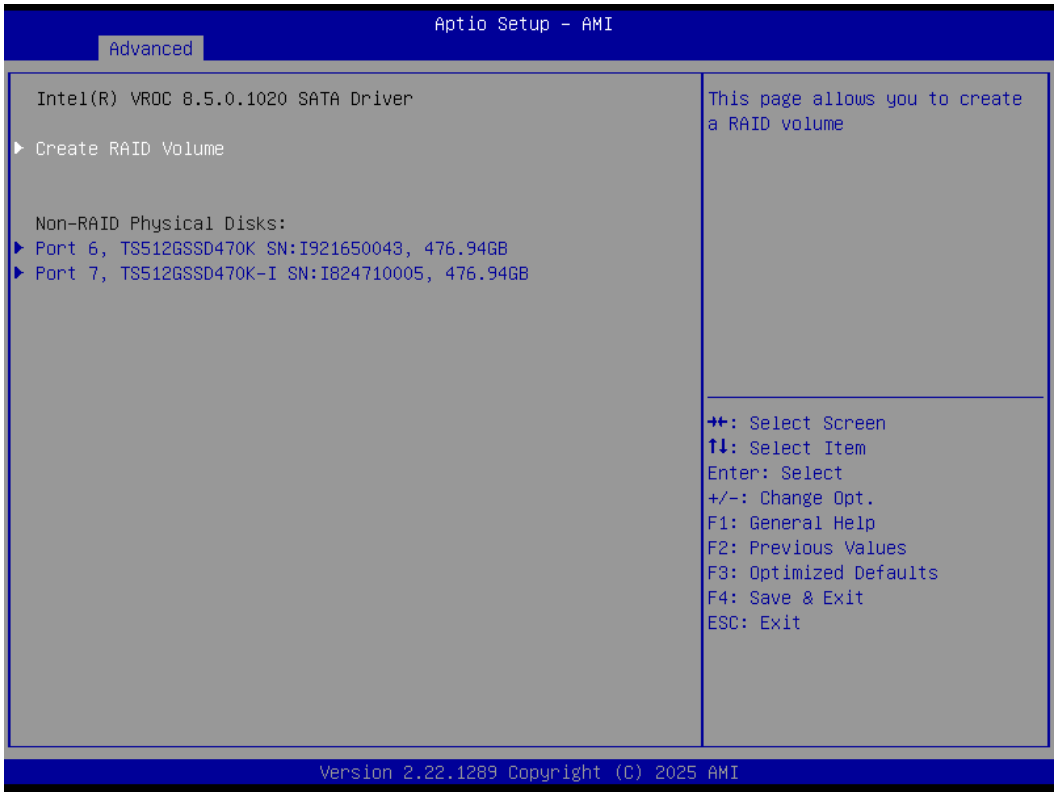
2.1. Turn on your system, and then press the <Del> button to enter BIOS Setup during running POST (Power-On Self Test). If you want to create RAID, just go to the Platform configuration/PCH SATA Configuration, select the “Configuration SATA as”, and press <Enter> for more options. A list of options appears, please select “RAID”.



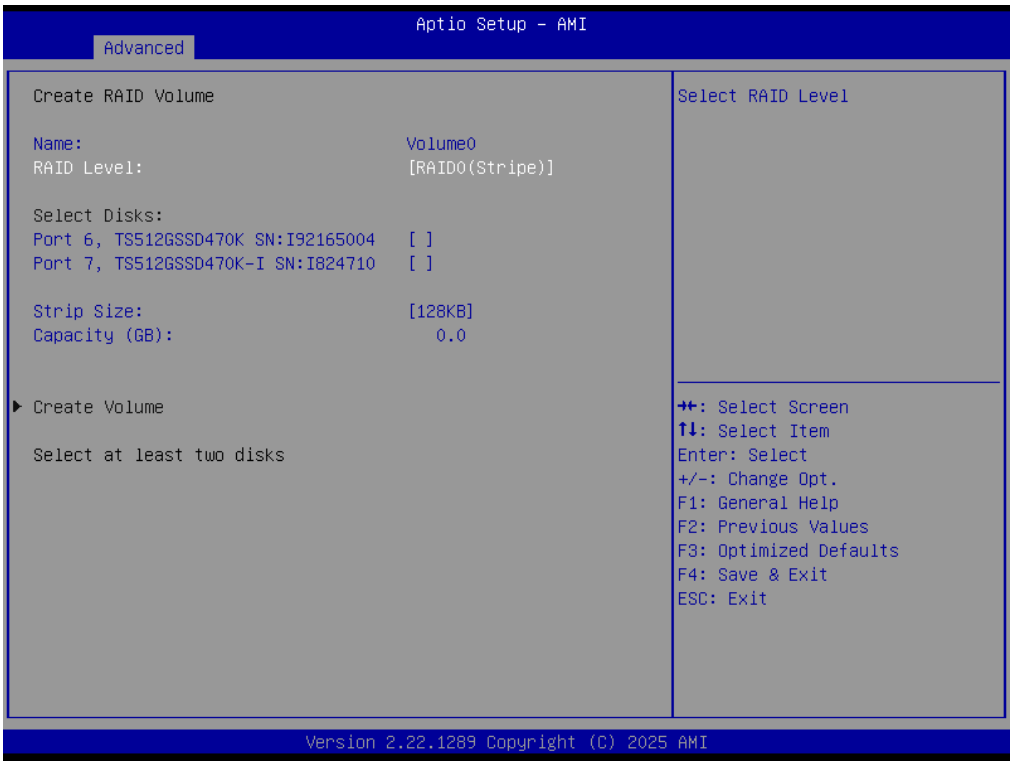
2.2. Save and exit the BIOS Setup.

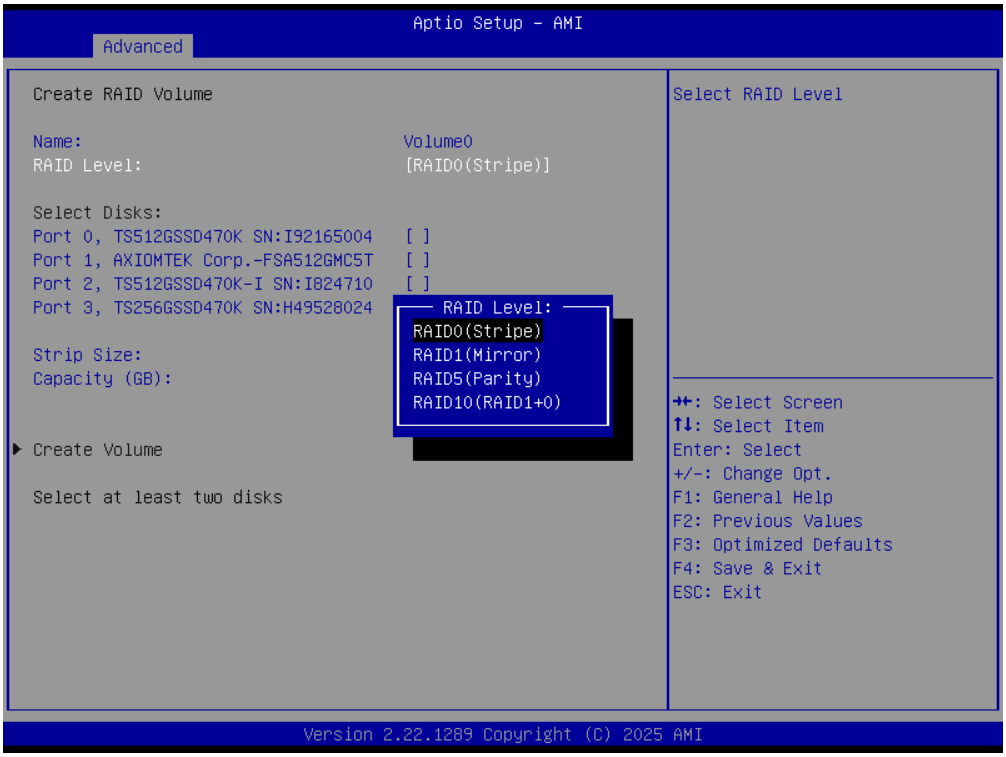
2.3. Go to the Advanced screen, select the “Intel(R) VROC SATA Controller”; furtherly, select the ”Cerate RAID Volume” and press <Enter> for more options.





2.4. Select the “RAID Level”, and choose RAID0, 1, 5 or 10 for your needs.





2.5. Save and exit the BIOS Setup.

Appendix C
Digital I/O

Digital I/O Software Programming

- I2C to GPIO PCA9554PW GPIO[3:0] is Output, GPIO[7:4] is Input.
- I2C address: 0b0100100x.
- IOBASE: 0xF040
- Registers:

Command byte

Command	Protocol	Function
0	Read byte	Input port register
1	Read/write byte	Output port register
2	Read/write byte	Polarity inversion register
3	Read/write byte	Configuration register

The command byte is the first byte to follow the address byte during a write transmission. It is used as a pointer to determine which of the following registers will be written or read.

Register 0: Input port register.
This register is a read-only port. It reflects the incoming logic levels of the pins, regardless of whether the pin is defined as an input or an output by Register 3. Writes to this register have no effect.

The default 'X' is determined by the externally applied logic level, normally '1' when no external signal is externally applied because of the internal pull-up resistors.

Bit	Symbol	Access	Value	Description
7	I7	Read only	X	Determined by externally applied logic level.
6	I6	Read only	X	
5	I5	Read only	X	
4	I4	Read only	X	
3	I3	Read only	X	
2	I2	Read only	X	
1	I1	Read only	X	
0	I0	Read only	X	

Register 1: Output port register.
This register reflects the outgoing logic levels of the pins defined as outputs by Register 3. Bit values in this register have no effect on pins defined as inputs. Reads from this register return the value that is in the flip-flop controlling the output selection, not the actual pin value.

Bit	Symbol	Access	Value	Description
7	O7	R	1*	Reflects outgoing logic levels of pins defined as outputs by Register 3.
6	O6	R	1*	
5	O5	R	1*	
4	O4	R	1*	
3	O3	R	1*	
2	O2	R	1*	
1	O1	R	1*	
0	O0	R	1*	

* : Default value

Register 2: Configuration register.
This register configures the directions of the I/O pins. If a bit in this register is set, the corresponding port pin is enabled as an input with high-impedance output driver. If a bit in this register is cleared, the corresponding port pin is enabled as an output. At reset, the I/Os are configured as inputs with a weak pull-up to VDD.

Bit	Symbol	Access	Value	Description
7	C7	R/W	1*	Configure the directions of the I/O pins. 0 = Corresponding port pin enabled as an output. 1 = Corresponding port pin configured as input (default value).
6	C6	R/W	1*	
5	C5	R/W	1*	
4	C4	R/W	1*	
3	C3	R/W	1*	
2	C2	R/W	1*	
1	C1	R/W	1*	
0	C0	R/W	1*	

* : Default value