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Server/Workstation
Motherboard

ALTRAD8UD-1L

ALTRAD8UD-1L2T

User Manual

English



Version 1.20

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- (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



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Chapter 1 Introduction

Thank you for purchasing ASRock Rack **ALTRAD8UD-1L / ALTRAD8UD-1L2T** motherboard, a reliable motherboard produced under ASRock Rack's consistently stringent quality control. It delivers excellent performance with robust design conforming to ASRock Rack's commitment to quality and endurance.

In this manual, chapter 1 and 2 contains introduction of the motherboard and step-by-step guide to the hardware installation. Chapter 3 and 4 contains the configuration guide to BIOS setup and information of the Support Software.



Because the motherboard specifications and the BIOS software might be updated, the content of this manual will be subject to change without notice. In case any modifications of this manual occur, the updated version will be available on ASRock Rack website without further notice. Find the latest memory and CPU support lists on ASRock Rack website as well. ASRock Rack's Website: www.ASRockRack.com

*Please visit the website for more specific information about the using model.
<http://www.asrockrack.com/support/>*

1.1 Package Contents

- ASRock Rack ALTRAD8UD-1L / ALTRAD8UD-1L2T motherboard
(Deep Micro-ATX form factor: 9.6" x 10.5", 24.4cm x 26.7cm)
- Quick installation guide
- 1 I/O shield
- 1 ATX 4P to 24P power cable (8cm)
- 1 CPU carrier
- 2 Screws for M.2 sockets



If any items are missing or appear damaged, contact the authorized dealer.

1.2 Specifications

ALTRAD8UD-1L / ALTRAD8UD-1L2T	
Physical Status	
Form Factor	Deep Micro-ATX
Dimension	9.6" x 10.5" (24.4cm x 26.7cm)
Processor System	
CPU	Supports Ampere® Altra® Max/Ampere® Altra® Processor
Socket	1 Socket (LGA4926)
Chipset	System on Chip
System Memory	
Supported DIMM Quantity	8 DIMM slots (1DPC)
Supported Type	Supports DDR4 288-pin RDIMM, LRDIMM
Max. Capacity per DIMM	256GB
Max. Frequency	3200MHz
Voltage	1.2V
<i>Note: Memory capacity, frequency, and voltage support is to be validated.</i>	
PCIe Expansion Slots (SLOT7 close to CPU)	
PCIe x16	SLOT7: PCIe4.0 x16* SLOT6: PCIe4.0 x16* SLOT5: PCIe4.0 x16 SLOT4: PCIe4.0 x16** *Supports PCIe4.0 x8 when using Ampere Altra processors **SLOT4 does not support full-length card
Other PCIe Expansion Connectors	
M.2	2 M-key (PCIe4.0 x4); support 2230/2280 form factor
Others	4 SlimSAS (PCIe4.0 x8) 2 OCuLink (PCIe4.0 x4)
Ethernet	
Additional GbE Controller	<u>ALTRAD8UD-1L:</u> Intel® i210: 1 RJ45 (1GbE) <u>ALTRAD8UD-1L2T:</u> Intel® X550: 2 RJ45 (10GbE) Intel® i210: 1 RJ45 (1GbE)
Server Management	
BMC Controller	ASPEED AST2500
IPMI Dedicated GLAN	1 Realtek RTL8211E for dedicated management GLAN
Graphics	
Controller	ASPEED AST2500
VRAM	DDR4 512MB

Rear I/O	
UID Button/LED	1 UID button w/ LED
VGA Port	1 DB15 (VGA)
USB	4 Type A (USB3.2 Gen1)
RJ45	<u>ALTRAD8UD-1L:</u> 1 RJ45 (1GbE), 1 dedicated IPMI
	<u>ALTRAD8UD-1L2T:</u> 2 RJ45 (10GbE), 1 RJ45 (1GbE), 1 dedicated IPMI
Internal Connectors/Headers	
Power Connector	1 (4-pin, ATX PSU signal) w/ ATX 24-pin adapter cable, 3 (8-pin, ATX 12V) support 12V DC-in
Auxiliary Panel Header	1 (18-pin): chassis intrusion, system fault LED, LAN1/LAN2 activity LED, locate, SMBus
System Panel	1 (9-pin): power switch, reset switch, system power LED, HDD activity LED
Front Lan LED Connector	1 (LAN3 LED)
COM Header	1
VGA Header	1
Speaker Header	1 (4-pin)
Fan Header	5 (6-pin)
Thermal Sensor Header	1
TPM Header	1 (13-pin, SPI)
HSBP	1
SMBus Header	1
PMbus Header	1
IPMB Header	1
Clear CMOS	1 (contact pads)
USB3.2 (Gen1) Header	1 (19-pin, 2 USB3.2 Gen1)
LED Indicators	
Standby Power LED	1 (5VSB)
Fan Fail LED	5
BMC Heartbeat LED	1
System BIOS	
Type	AMI UEFI BIOS; 256 Mb (32MB) SPI Flash ROM
Features	ASRock Rack Instant Flash, ACPI 6.2, SMBIOS 3.4.0 and above, Plug and Play(PnP)

Hardware Monitor	
Temperature	SOC, MB Temperature sensing
Fan	Fan Tachometer CPU Quiet Fan (Allow Chassis Fan Speed Auto-Adjust by CPU Temperature) Fan Multi-Speed Control
Voltage	12V, 5V, 3V3, 5VSB, 0V8_VDDC_SOC, BAT, 0V75_PCP_CPU, 1V8_PCP, 1V2_VDDQ0123, 1V2_VDDQ4567, 0V6_VTT0123, 0V6_VTT4567, 3V3_SOC, 1V8_VDDH, 1V5_VDDH, 0V85_VDDC_RCA
Supported OS	
OS	- RHEL 8.5 aarch64 - RHEL 9.2 aarch64 - CentOS-Stream 8 aarch64 - CentOS-Stream 9 aarch64 <i>*Please refer to the website for the latest OS support list.</i>
Environment	
Temperature	Operation temperature: 10°C ~ 35°C Non operation temperature: -40°C ~ 70°C

NOTE: Please refer to the website for the latest specifications.



This motherboard supports Wake from on Board LAN. To use this function, please make sure that the "Wake on Magic Packet from power off state" is enabled in Device Manager > Intel® Ethernet Connection > Power Management. And the "PCI Devices Power On" is enabled in UEFI SETUP UTILITY > Advanced > ACPI Configuration. After that, onboard LAN1&2 can wake up S5 under OS.

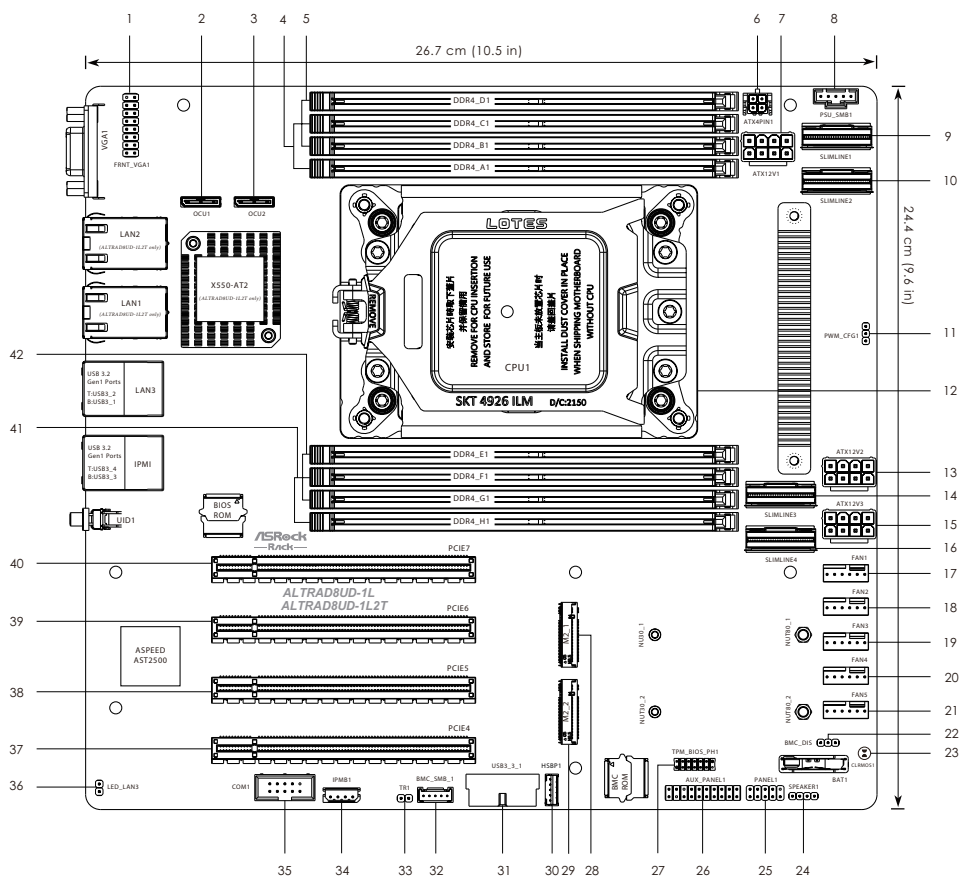


If installing Intel® LAN utility or Marvell SATA utility, this motherboard may fail Windows® Hardware Quality Lab (WHQL) certification tests. If installing the drivers only, it will pass the WHQL tests.

1.3 Unique Features

ASRock Rack Instant Flash is a BIOS flash utility embedded in Flash ROM. This convenient BIOS update tool allows user to update system BIOS without entering operating systems. With this utility, press the <F6> key during the POST or the <F2> key to enter into the BIOS setup menu to access ASRock Rack Instant Flash. Just launch this tool and save the new BIOS file to the USB flash drive, floppy disk or hard drive, then update the BIOS only in a few clicks without preparing an additional floppy diskette or other complicated flash utility. Please be noted that the USB flash drive or hard drive must use FAT32/16/12 file system.

1.4 Motherboard Layout



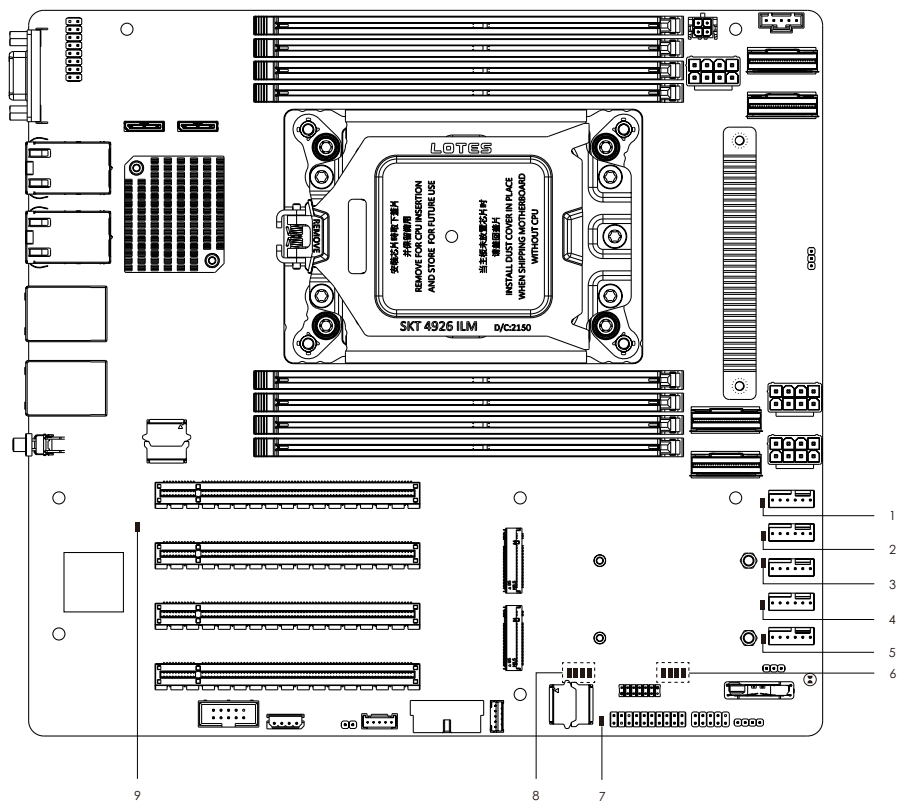
No.	Description
1	Front VGA Header (FRNT_VGA1)
2	OCuLink Connector (PCIe4.0 x4) (OCU1)
3	OCuLink Connector (PCIe4.0 x4) (OCU2)
4	2 x 288-pin DDR4 DIMM Slots (DDR4_A1, DDR4_C1)*
5	2 x 288-pin DDR4 DIMM Slots (DDR4_B1, DDR4_D1)*
6	Micro-Fit ATX 4Pin Power Connector (ATX4PIN1)
7	ATX 12V Power Connector (ATX12V1)
8	PSU SMBus Header (PSU_SMB1)
9	Slimline x8 Connector (SLIMLINE1)
10	Slimline x8 Connector (SLIMLINE2)
11	PWM Configuration Header (PWM_CFG1)
12	LGA 4926 CPU Socket (CPU1)
13	ATX 12V Power Connector (ATX12V2)
14	Slimline x8 Connector (SLIMLINE3)
15	ATX 12V Power Connector (ATX12V3)
16	Slimline x8 Connector (SLIMLINE4)
17	System Fan Connector (FAN1)
18	System Fan Connector (FAN2)
19	System Fan Connector (FAN3)
20	System Fan Connector (FAN4)
21	System Fan Connector (FAN5)
22	BMC Disabled Jumper (BMC_DIS)
23	Clear CMOS Pad (CLRMOS1)
24	Speaker Header (SPEAKER1)
25	System Panel Header (PANEL1)
26	Auxiliary Panel Header (AUX_PANEL1)
27	SPI TPM Header (TPM_BIOS_PH1)
28	M-key M.2 Socket (M2_1) (Type 2230/2280)
29	M-key M.2 Socket (M2_2) (Type 2230/2280)
30	Backplane PCI Express Hot-Plug Connector (HSBP1)
31	USB 3.2 Gen1 Header (USB3_3_1)
32	BMC SMBus Header (BMC_SMB_1)
33	Thermal Sensor Header (TR1)
34	Intelligent Platform Management Bus Header (IPMB1)
35	Serial Port Header (COM1)

No.	Description
36	Front LAN LED Connector (LED_LAN3)
37	PCI Express 4.0 x16 Slot (PCIE4)
38	PCI Express 4.0 x16 Slot (PCIE5)
39	PCI Express 4.0 x16 Slot (PCIE6)
40	PCI Express 4.0 x16 Slot (PCIE7)
41	2 x 288-pin DDR4 DIMM Slots (DDR4_F1, DDR4_H1)*
42	2 x 288-pin DDR4 DIMM Slots (DDR4_E1, DDR4_G1)*

**For DIMM installation and configuration instructions, please see p.24 (Installation of Memory Modules (DIMM)) for more details.*

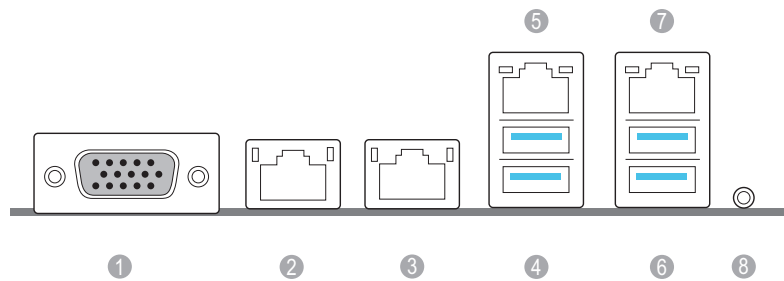
1.5 Onboard LED Indicators

The layout below is only for ALTRAD8UD-1L2T reference, both 1L2T and 1L LED locations are the same.



No.	Item	Status	Description
1	LED_FAN1	Red	FAN1 Fail
2	LED_FAN2	Red	FAN2 Fail
3	LED_FAN3	Red	FAN3 Fail
4	LED_FAN4	Red	FAN4 Fail
5	LED_FAN5	Red	FAN5 Fail
6	D52	Green	CPLD Ready
	D53	Red	OVERTEMP CPU
	D54	Red	Fail Alert
	D55	Red	HIGHTEMP CPU
7	SB_PWR1	Green	STB PWR Ready
LED6/LED5/LED4/LED3			
8	0 : 0 : 0 : 0 		Waiting for BMC Ready and Power Event.
	0 : 0 : 1 : 0 		BMC Ready. Waiting for Power Event.
	0 : 0 : 1 : 1 		Waiting for BMC Ready, Power Event occurred.
	1 : 0 : 1 : 0 		Initialize SMPro/PMPro.
	1 : 1 : 0 : 0 		PO sequence finished.
	1 : 1 : 1 : 0 		Shut down power.
9	BMC_LED1	Green	BMC heartbeat LED

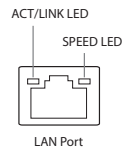
1.6 I/O Panel



No.	Description	No.	Description
1	VGA Port (VGA1)	5	1G LAN RJ-45 Port (LAN3)**
2	10G LAN RJ-45 Port (LAN2)*** (ALTRAD8UD-1L2T only)	6	USB 3.2 Gen1 Ports (USB3_3_4)
3	10G LAN RJ-45 Port (LAN1, shared NIC)*** (ALTRAD8UD-1L2T only)	7	LAN RJ-45 Port (IPMI)*
4	USB 3.2 Gen1 Ports (USB3_1_2)	8	UID Switch (UID1)

LAN Port LED Indications

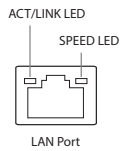
*There is an LED on each side of IPMI LAN port. Please refer to the table below for the LAN port LED indications.



IPMI LAN Port LED Indications

Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	10Mbps connection or no link
Blinking Yellow (Orange)	Data Activity	Yellow	100Mbps connection
On	Link	Green	1Gbps connection

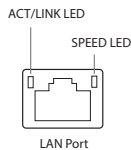
**There is an LED on each side of 1G LAN port. Please refer to the table below for the LAN port LED indications.



1G LAN Port LED Indications

Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	10Mbps connection or no link
Blinking Yellow	Data Activity	Orange	100Mbps connection
On	Link	Green	1Gbps connection

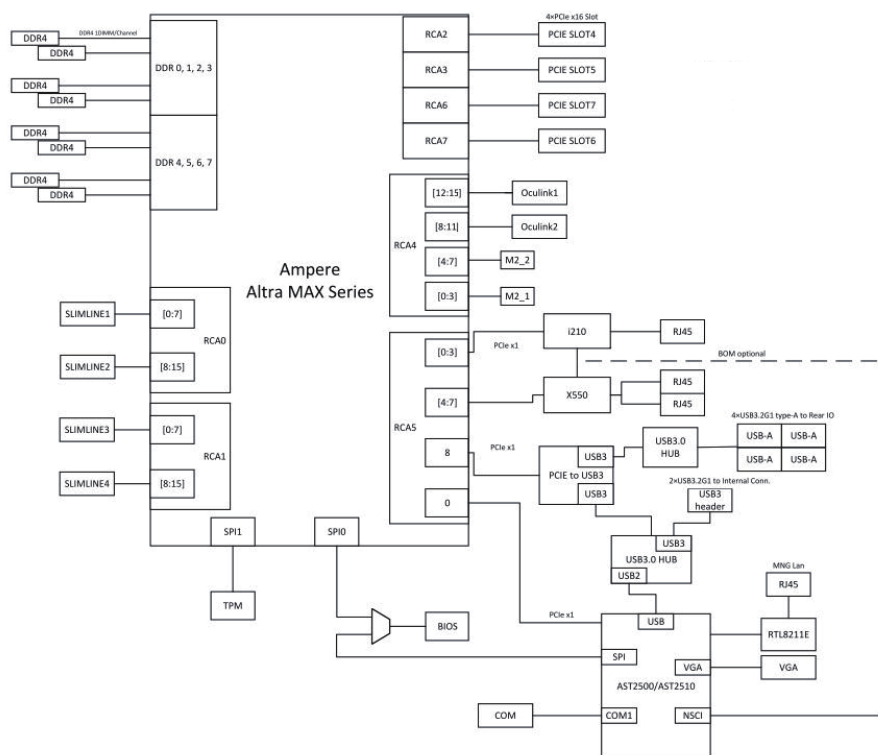
***There is an LED on each side of 10G LAN port. Please refer to the table below for the LAN port LED indications.



10G LAN Port LED Indications (*ALTRAD8UD-1L2T only*)

Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	100Mbps connection or no link
Blinking Yellow	Data Activity	Orange	1Gbps connection
On	Link	Green	10Gbps connection

1.7 Block Diagram



Chapter 2 Installation

This is a deep micro-ATX form factor (9.6" x 10.5") motherboard. Before installing the motherboard, study the configuration of the chassis to ensure that the motherboard fits into it.



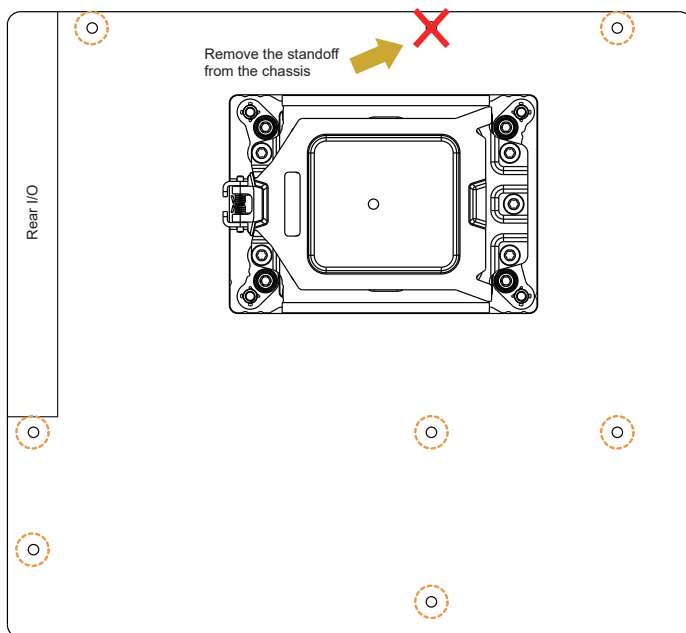
Make sure to unplug the power cord before installing or removing the motherboard. Failure to do so may cause physical injuries and motherboard damages.

2.1 Screw Holes

Place screws into the holes indicated by circles to secure the motherboard to the chassis.



Attention! Before installing this motherboard, be sure to unscrew and remove the standoff at the marked location, under the motherboard, from the chassis, in order to avoid electrical short circuit and motherboard damages.





Do not over-tighten the screws! Doing so may damage the motherboard.

2.2 Pre-installation Precautions

Take note of the following precautions before installing motherboard components or change any motherboard settings.

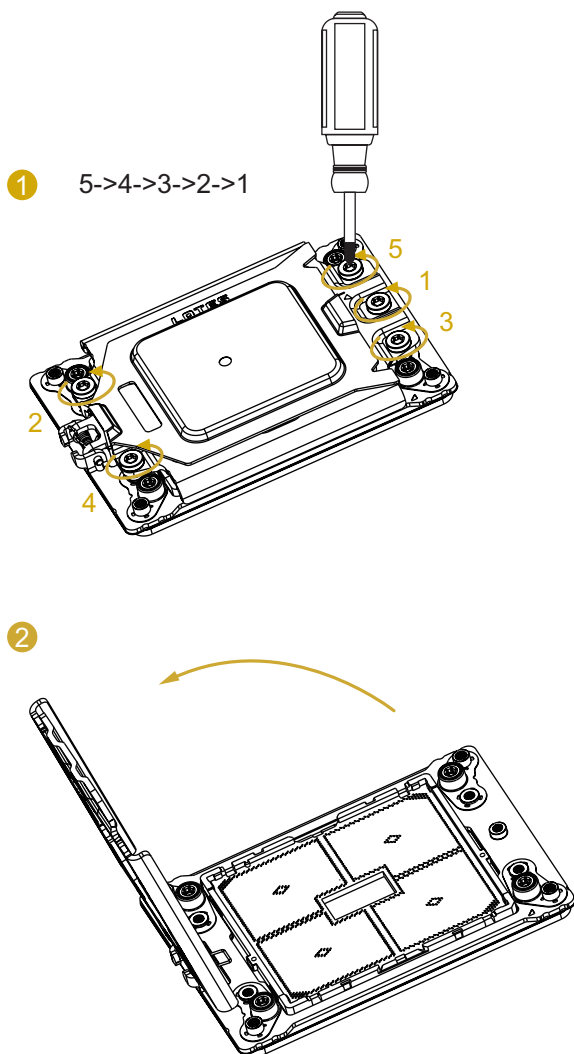
1. Unplug the power cord from the wall socket before touching any components.
2. To avoid damaging the motherboard's components due to static electricity, NEVER place the motherboard directly on the carpet or the like. Also remember to use a grounded wrist strap or touch a safety grounded object before handling the components.
3. Hold components by the edges and do not touch the ICs.
4. Whenever uninstall any component, place it on a grounded anti-static pad or in the bag that comes with the component.
5. When placing screws into the screw holes to secure the motherboard to the chassis, please do not over-tighten the screws! Doing so may damage the motherboard.



Before installing or removing any component, ensure that the power is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, and/or components.

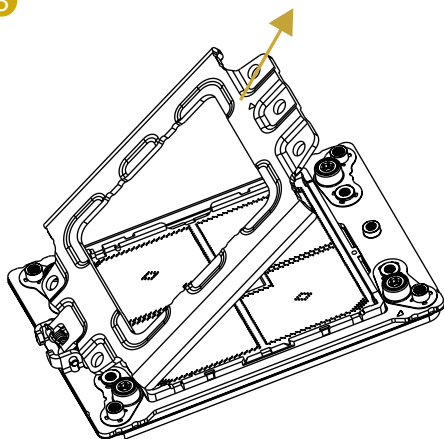
2.3 Installing the CPU

LOTES SKT4926



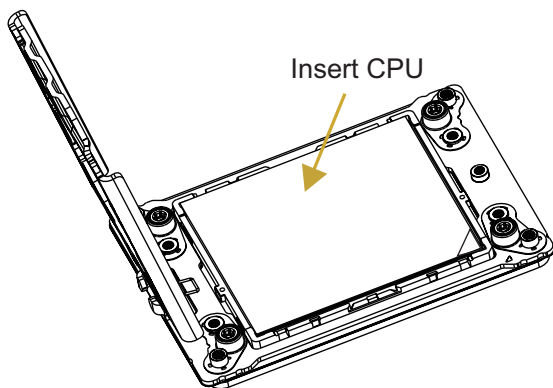
3

Remove Socket Cap

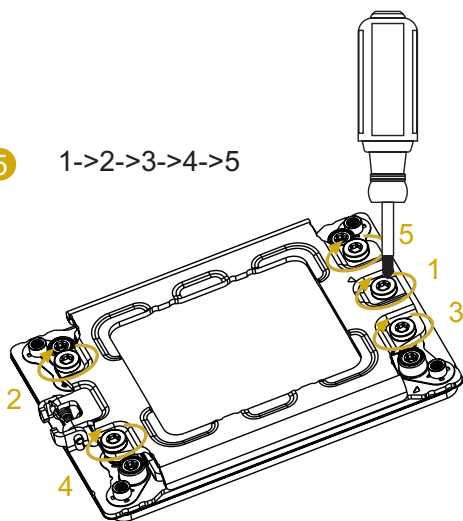


4

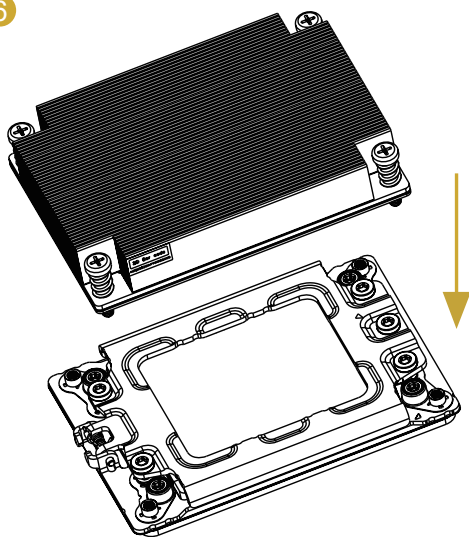
Insert CPU

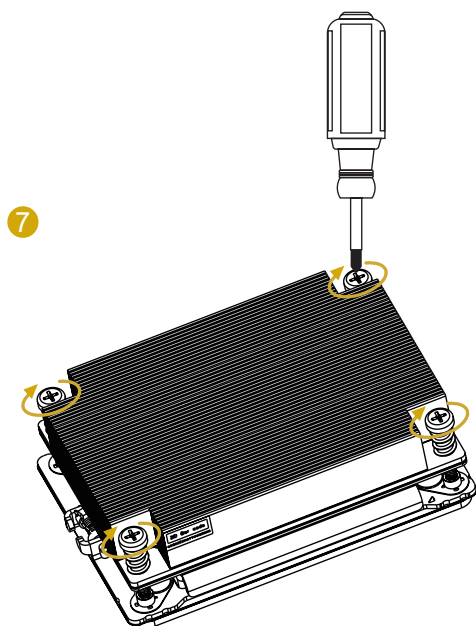


5 1->2->3->4->5



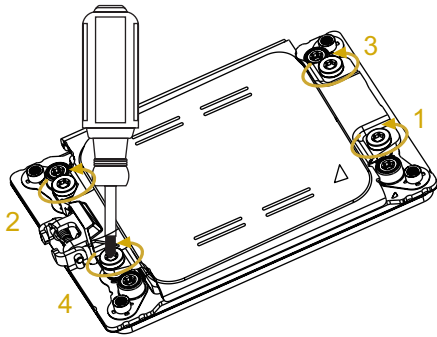
6



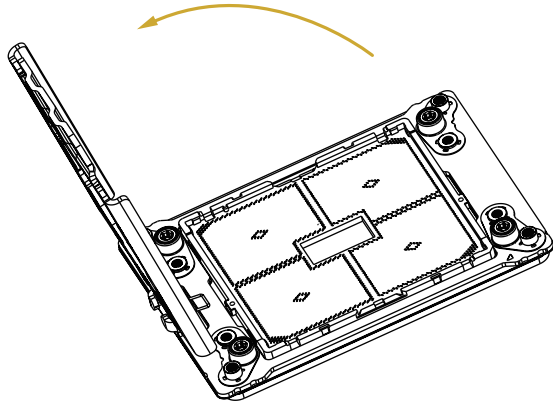


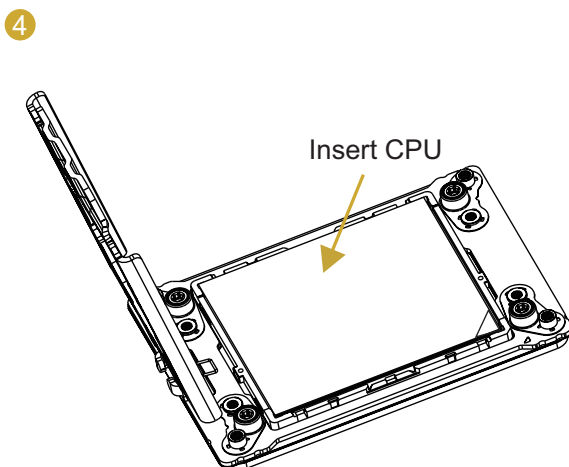
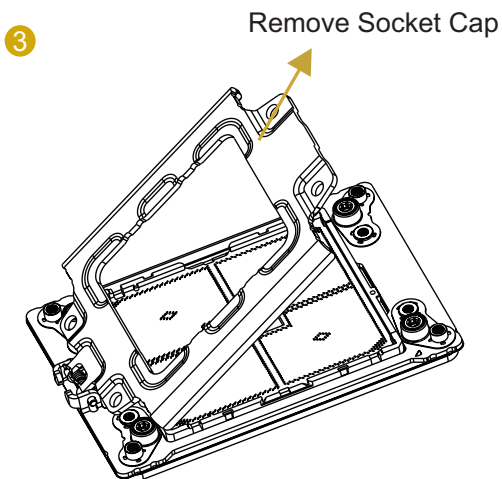
FOXCONN SKT4926

① 4->3->2->1



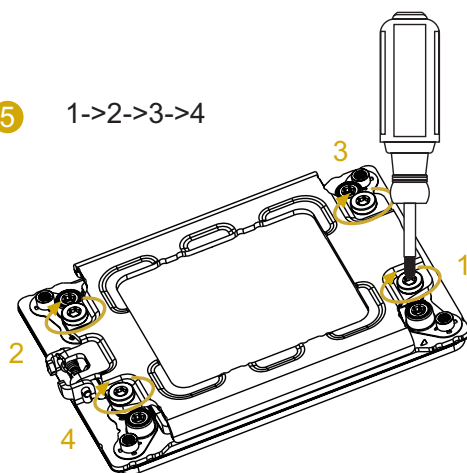
②



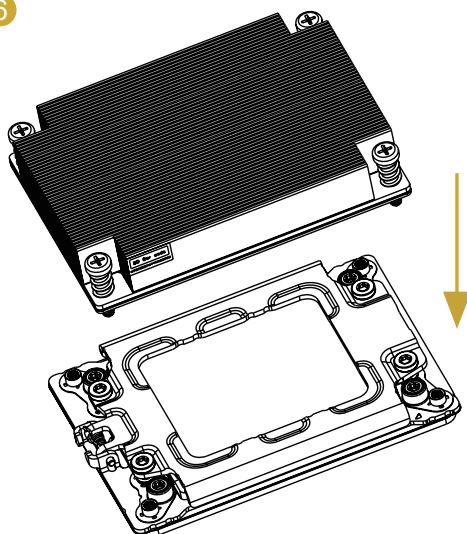


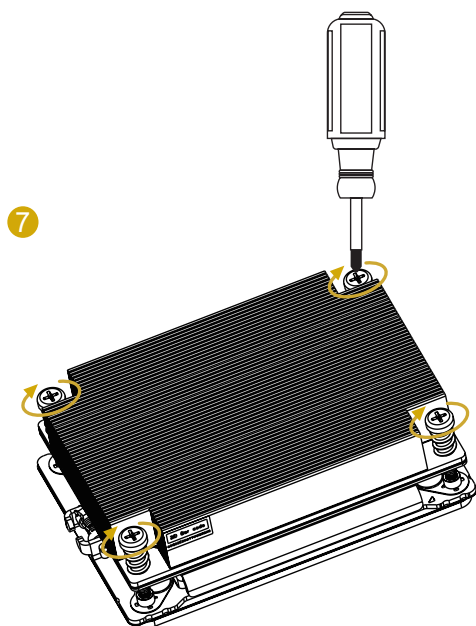
5

1->2->3->4



6





2.4 Installation of Memory Modules (DIMM)

This motherboard provides eight 288-pin DDR4 (Double Data Rate 4) DIMM slots in two groups, and supports Single Channel Memory Technology.

CPU1

DDR4_A1, B1, C1, D1

DDR4_E1, F1, G1 H1



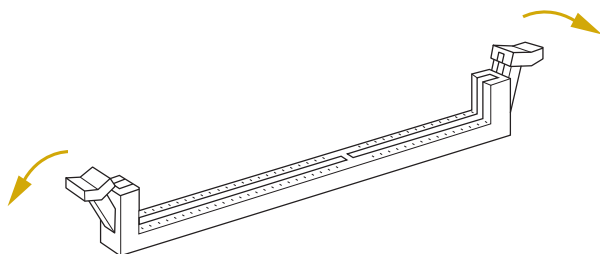
- 1. For Eight channel configuration, it always needs to install identical (the same brand, speed, size and chip-type) DDR4 DIMM groups.
- 2. Eight Channel Memory Technology is enabled only when 8 memory modules are installed.
- 3. It is not allowed to install a DDR, DDR2 or DDR3 memory module into a DDR4 slot; otherwise, this motherboard and DIMM may be damaged.

Recommended Memory Configurations

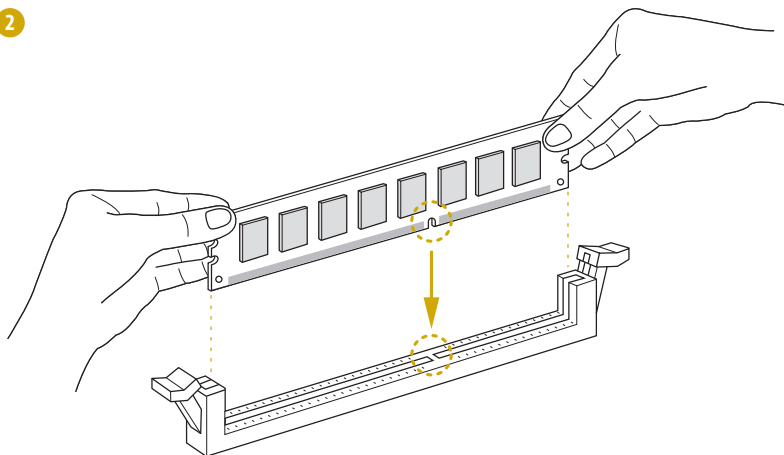
DIMM Slot		Number of DIMM Installed (RDIMM/LRDIMM only)			
		1	2	4	8
CPU1	A1	V	V	V	V
	B1			V	V
	C1				V
	D1				V
	E1		V	V	V
	F1			V	V
	G1				V
	H1				V

The symbol V indicates the slot is populated.

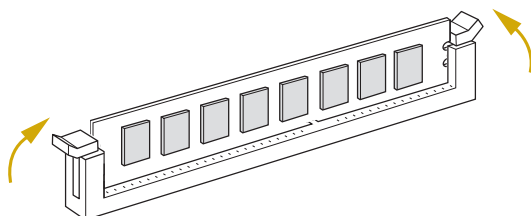
1



2



3



2.5 Expansion Slots (PCI Express Slots)

There are 4 PCI Express slots on this motherboard.

PCIe slots:

PCIe4 (PCIe 4.0 x16 slot, from CPU1) is used for PCI Express x16 lane width cards.

PCIe5 (PCIe 4.0 x16 slot, from CPU1) is used for PCI Express x16 lane width cards.

PCIe6 (PCIe 4.0 x16 slot, from CPU1) is used for PCI Express x8 or x16 lane width cards.

PCIe7 (PCIe 4.0 x16 slot, from CPU1) is used for PCI Express x8 or x16 lane width cards.

Slot	Generation	Mechanical	Electrical	Source
PCIe4	4.0	x16	x16	CPU1
PCIe5	4.0	x16	x16	CPU1
PCIe6	4.0	x16	x8 or x16	CPU1
PCIe7	4.0	x16	x8 or x16	CPU1

** Supports PCIe4.0 x8 when using Ampere Altra processors*

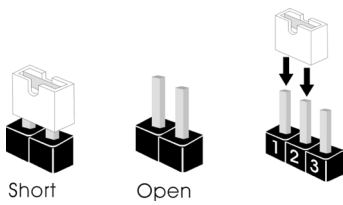
*** SLOT4 do not support full-length card*

Installing an expansion card

- Step 1. Before installing an expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before starting the installation.
- Step 2. Remove the system unit cover (if the motherboard is already installed in a chassis).
- Step 3. Remove the bracket facing the slot that intending to use. Keep the screws for later use.
- Step 4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
- Step 5. Fasten the card to the chassis with screws.
- Step 6. Replace the system cover.

2.6 Jumper Setup

The illustration shows how jumpers are setup. When the jumper cap is placed on the pins, the jumper is “Short”. If no jumper cap is placed on the pins, the jumper is “Open”. The illustration shows a 3-pin jumper whose pin1 and pin2 are “Short” when a jumper cap is placed on these 2 pins.



BMC Disabled Jumper
(3-pin BMC_DIS)
(see p.6, No. 22)



BMC Enabled (Default)



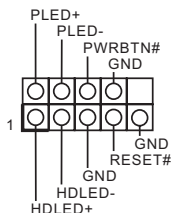
BMC Disabled

2.7 Onboard Headers and Connectors



Onboard headers and connectors are NOT jumpers. Do NOT place jumper caps over these headers and connectors. Placing jumper caps over the headers and connectors will cause permanent damage to the motherboard.

System Panel Header
(9-pin PANEL1)
(see p.6, No. 25)



Connect the power switch, reset switch and system status indicator on the chassis to this header according to the pin assignments. Particularly note the positive and negative pins before connecting the cables.



PWRBTN (Power Switch):

Connect to the power switch on the chassis front panel. Configure the way to turn off the system using the power switch.

RESET (Reset Switch):

Connect to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.

PLED (System Power LED):

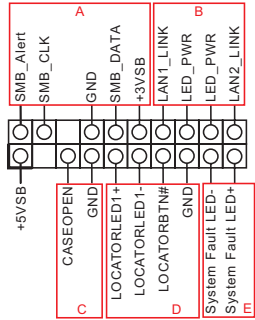
Connect to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED is off when the system is in S4 sleep state or powered off (S5).

HDLED (Hard Drive Activity LED):

Connect to the hard drive activity LED on the chassis front panel. The LED is on when the hard drive is reading or writing data.

The front panel design may differ by chassis. A front panel module mainly consists of power switch, reset switch, power LED, hard drive activity LED, speaker and etc. When connecting the chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.

Auxiliary Panel Header
(18-pin AUX_PANEL1)
(see p.6, No. 26)



This header supports multiple functions on the front panel, including the front panel SMB, internet status indicator and chassis intrusion pin.



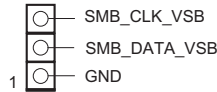
- A. Front panel SMBus connecting pin (6-1 pin FPSMB)**
This header allows user to connect SMBus (System Management Bus) equipment. It can be used for communication between peripheral equipment in the system, which has slower transmission rates, and power management equipment.
- B. Internet status indicator (2-pin LAN1_LED, LAN2_LED)**
These two 2-pin headers allow user to use the Gigabit internet indicator cable to connect to the LAN status indicator. When this indicator flickers, it means that the internet is properly connected.
- C. Chassis intrusion pin (2-pin CHASSIS)**
This header is provided for host computer chassis with chassis intrusion detection designs. In addition, it must also work with external detection equipment, such as a chassis intrusion detection sensor or a microswitch. When this function is activated, if any chassis component movement occurs, the sensor will immediately detect it and send a signal to this header, and the system will then record this chassis intrusion event. The default setting is set to the CASEOPEN and GND pin; this function is off.
- D. Locator LED (4-pin LOCATOR)**
This header is for the locator switch and LED on the front panel.
- E. System Fault LED (2-pin LOCATOR)**
This header is for the Fault LED on the system.

Thermal Sensor Header
(3-pin TR1)
(see p.6, No. 33)



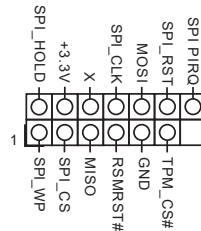
Please connect the thermal sensor cable to this header and the other end to the device which can monitor its temperature.

PWM Configuration Header
(3-pin PWM_CFG1)
(see p.6, No. 11)



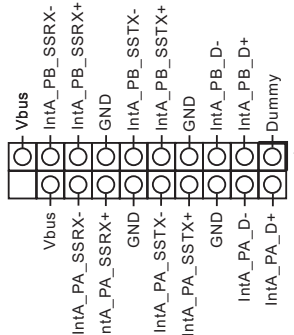
The header is used for PWM configurations.

SPI TPM Header
(13-pin TPM_BIOS_PH1)
(see p.6, No. 27)



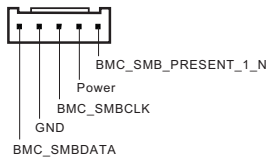
This connector supports SPI Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.

USB 3.2 Gen1 Header
Right Angle
(USB3_3_1)
(see p.6, No. 31)



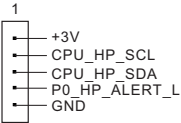
Besides two default USB 3.2 Gen1 ports on the I/O panel, there is one USB 3.2 Gen1 header on this motherboard. This USB 3.2 Gen1 header can support two USB 3.2 Gen1 ports.

BMC SMB Headers
(5-pin BMC_SMB_1)
(see p.6, No. 32)



These headers are used for the SM BUS devices.

Backplane PCI Express
Hot-Plug Connector
(5-pin HSBP1)
(see p.6, No. 30)



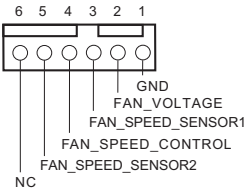
This connector is used for the hot plug feature of HDDs on the backplane.

Clear CMOS Pad
(CLRMOS1)
(see p.6, No. 23)



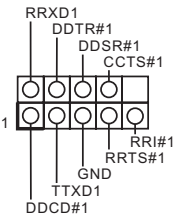
This allows user to clear the data in CMOS. To clear CMOS, take out the CMOS battery and short the Clear CMOS Pad.

System Fan Connectors
(6-pin FAN1)
(see p.6, No. 17)
(6-pin FAN2)
(see p.6, No. 18)
(6-pin FAN3)
(see p.6, No. 19)
(6-pin FAN4)
(see p.6, No. 20)
(6-pin FAN5)
(see p.6, No. 21)



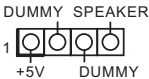
Please connect fan cables to the fan connectors and match the black wire to the ground pin. All fans support Fan Control.

Serial Port Header
(9-pin COM1)
(see p.6, No. 35)



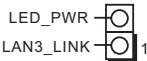
This COM1 header supports a serial port module.

Chassis Speaker Header
(4-pin SPEAKER1)
(see p.6, No. 24)



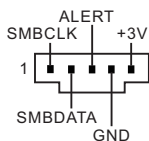
Please connect the chassis speaker to this header.

Front LAN LED Header
(2-pin LED_LAN3)
(see p.6, No. 36)



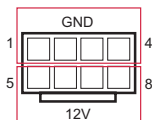
This 2-pin header is used for the front LAN status indicator.

PSU SMBus Header
(5-pin PSU_SMB1)
(see p.6, No. 8)



PSU SMBus monitors the status of the power supply, fan and system temperature.

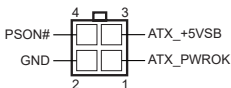
ATX 12V Power
Connectors
(8-pin ATX12V1)
(see p.6, No. 7)
(8-pin ATX12V2)
(see p.6, No. 13)
(8-pin ATX12V3)
(see p.6, No. 15)



This motherboard provides three 8-pin ATX 12V power connectors.

Under the lowest power supply, user can freely use ATX12V1, ATX12V2 or ATX12V3 connector.

Micro-Fit ATX 4Pin
Power Connector
(4-pin ATX4PIN1)
(ATX 24pin-to-4pin))
(see p.6, No. 6)

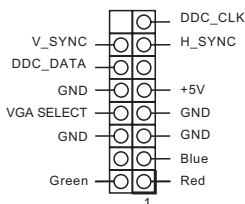


The motherboard provides one 4-pin power/signal connector which is a required input for ATX power source.

When using ATX power, it is necessary to use a 24pin-to-4pin power cable to connect between the 24pin power connector of PSU and the ATX12V connector on the motherboard for power supply and signal communication.

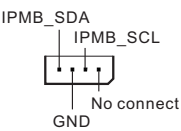
For DC-IN 12V application, it is not necessary to use this ATX 4-PIN power connector.

Front VGA Header
(15-pin FRNT_VGA1)
(see p.6, No. 1)



Please connect either end of VGA cable to VGA header.

Intelligent Platform
Management Bus Header
(4-pin IPMB1)
(see p.6, No. 34)



This 4-pin connector is used to provide a cabled base-board or front panel connection for value added features and 3rd-party add-in cards, such as Emergency Management cards, that provide management features using the IPMB.

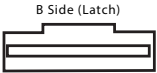
OCuLink Connectors
(OCU1)
(see p.6, No. 2)
(OCU2)
(see p.6, No. 3)



Please connect PCIE SSDs to the connector.

Pin	Defeinition	Pin	Defeinition
A21	-	B21	+3V
A20	GND	B20	GND
A19	RXN3	B19	TXN3
A18	RXP3	B18	TXP3
A17	GND	B17	GND
A16	RXN2	B16	TXN2
A15	RXP2	B15	TXP2
A14	GND	B14	GND
A13	100M_CLK_DN	B13	PRSNT_N
A12	100M_CLK_DP	B12	PERST_BUF_N
A11	GND	B11	GND
A10	WAKE#	B10	SMB_DATA
A9	-	B9	SMB_CLK
A8	GND	B8	GND
A7	RXN1	B7	TXN1
A6	RXP1	B6	TXP1
A5	GND	B5	GND
A4	RXN0	B4	TXN0
A3	RXP0	B3	TXP0
A2	GND	B2	GND
A1	+3V	B1	-
1	NP_NC1	3	P_GND1
2	NP_NC2	4	P_GND2

Slimline NVMe
Connectors
(SLIMLINE1)
(see p.6, No. 9)
(SLIMLINE2)
(see p.6, No. 10)
(SLIMLINE3)
(see p.6, No. 14)
(SLIMLINE4)
(see p.6, No. 16)



These connectors are used for
the NVME PCIE devices.

A1	77 79 75	B1
A2		B2
A3		B3
A4		B4
A5		B5
A6		B6
A7		B7
A8		B8
A9		B9
A10		B10
A11		B11
A12		B12
A13		B13
A14		B14
A15		B15
A16		B16
A17		B17
A18		B18
A19		B19
A20		B20
A21		B21
A22		B22
A23		B23
A24		B24
A25		B25
A26		B26
A27		B27
A28		B28
A29		B29
A30		B30
A31		B31
A32		B32
A33		B33
A34		B34
A35		B35
A36		B36
A37	78 80 76	B37

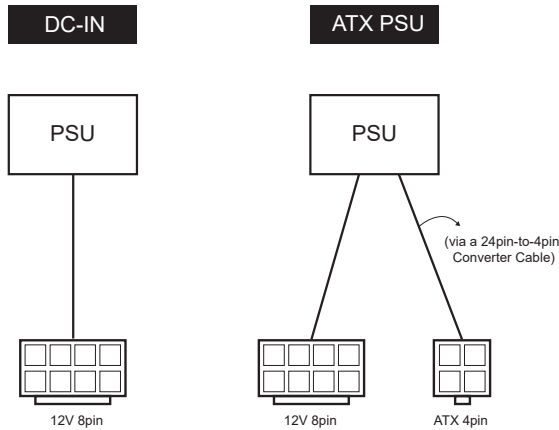
80-pin

Pin	Definition	Pin	Definition
A1	GND_1	B1	GDN12
A2	RX0_DP	B2	TX0_DP
A3	RX0_DN	B3	TX0_DN
A4	GDN2	B4	GDN13
A5	RX1_DP	B5	TX1_DP
A6	RX1_DN	B6	TX1_DN
A7	GDN3	B7	GDN14
A8	SIDEBAND1	B8	SMBCLK
A9	WAKE	B9	SMBDAT
A10	GND	B10	GND
A11	100M Clock DP	B11	PERST#
A12	100M Clock DN	B12	PRSNT#
A13	GDN4	B13	GDN15
A14	RX2_DP	B14	TX2_DP
A15	RX2_DN	B15	TX2_DN
A16	GDN5	B16	GDN16
A17	RX3_DP	B17	TX3_DP
A18	RX3_DN	B18	TX3_DN
A19	GDN6	B19	GDN17
A20	RX4_DP	B20	TX4_DP
A21	RX4_DN	B21	TX4_DN
A22	GDN7	B22	GDN18
A23	RX5_DP	B23	TX5_DP
A24	RX5_DN	B24	TX5_DN
A25	GDN8	B25	GND19
A26	SIDEBAND6	B26	SMBCLK
A27	WAKE	B27	SMBDAT
A28	GND	B28	GND
A29	100M Clock DP	B29	PERST#
A30	100M Clock DN	B30	PRSNT#
A31	GDN9	B31	GDN20
A32	RX6_DP	B32	TX6_DP
A33	RX6_DN	B33	TX6_DN
A34	GDN10	B34	GDN21
A35	RX7_DP	B35	TX7_DP
A36	RX7_DN	B36	TX7_DN
A37	GDN11	B37	GDN22
75	P_NC_2	78	P_NC_3
76	P_NC_4	79	NP_NC_1
77	P_NC_1	80	NP_NC_2

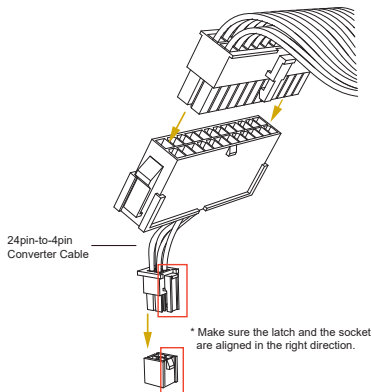
2.8 ATX PSU / DC-IN Power Connections

This motherboard supports both +12V DC and ATX power input. Please refer to the table below for the required connections between the motherboard and the power supply.

Connector	DC-IN	ATX PSU
12V 8pin	O	O
ATX 4pin	X	O (with the bundled ATX 24pin-to-4pin converter cable)



The following diagram illustrates how to connect the bundled ATX 24pin-to-4pin converter cable.



2.9 Unit Identification purpose LED/Switch

With the UID button, user can locate the server working on from behind a rack of servers.

Unit Identification
purpose LED/Switch
(UID1)



When the UID button on the front or rear panel is pressed, the front/rear UID blue LED indicator will be turned on. Press the UID button again to turn off the indicator.



Press and hold the UID button for 4 seconds, the BMC will trigger an external reset.

2.10 Dual LAN and Teaming Operation Guide

Dual LAN with Teaming enabled on the motherboard allows two single connections to act as one single connection for twice the transmission bandwidth, making data transmission more effective and improving the quality of transmission of distant images. Fault tolerance on the dual LAN network prevents network downtime by transferring the workload from a failed port to a working port.



The speed of transmission is subject to the actual network environment or status even with Teaming enabled.

Before setting up Teaming, please make sure whether the Switch (or Router) supports Teaming (IEEE 802.3ad Link Aggregation). Specify a preferred adapter in Intel PROSet. Under normal conditions, the Primary adapter handles all non-TCP/IP traffic. The Secondary adapter will receive fallback traffic if the primary fails. If the Preferred Primary adapter fails, but is later restored to an active status, control is automatically switched back to the Preferred Primary adapter.

Step 1

From **Device Manager**, open the properties of a team.

Step 2

Click the **Settings** tab.

Step 3

Click the **Modify Team** button.

Step 4

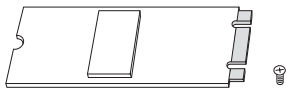
Select the adapter that want to be the primary adapter and click the **Set Primary** button.

The software will choose an adapter of the highest capability (model and speed) to act as the default primary upon not specify a preferred primary adapter. If a failover occurs, another adapter becomes the primary. The adapter will, however, rejoin the team as a non-primary.

2.11 M.2 SSD Module Installation Guide

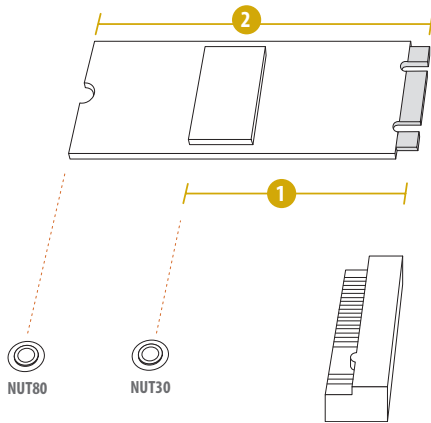
The M.2 Socket (M2_1/M2_2, Key M) supports type 2230/2280 SATA3 6.0 Gb/s module or a M.2 PCI Express module up to Gen4 x4 (16GT/s x4).

Installing the M.2 SSD Module



Step 1

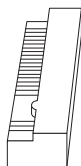
Prepare a M.2 SSD module and the screw.



Step 2

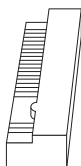
Depending on the PCB type and length of the M.2 SSD module, find the corresponding nut location to be used.

No.	1	2
Nut Location	NUT30	NUT80
PCB Length	3cm	8cm
Module Type	Type2230	Type 2280



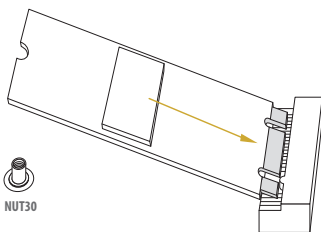
Step 3

Move the standoff based on the module type and length. Skip Step 3 and 4 and go straight to Step 5 when using the default nut. Otherwise, release the standoff by hand.



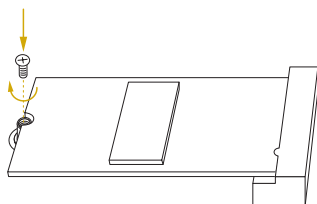
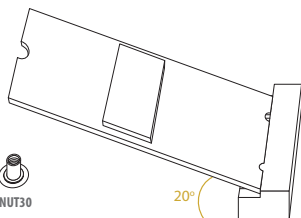
Step 4

Peel off the protective film on the nut to be used. Hand tighten the standoff into the desired nut location on the motherboard.



Step 5

Align and gently insert the M.2 SSD module into the M.2 slot. Please be aware that the M.2 SSD module only fits in one orientation.



Step 6

Tighten the screw with a screwdriver to secure the module into place. Please do not overtighten the screw as this might damage the module.

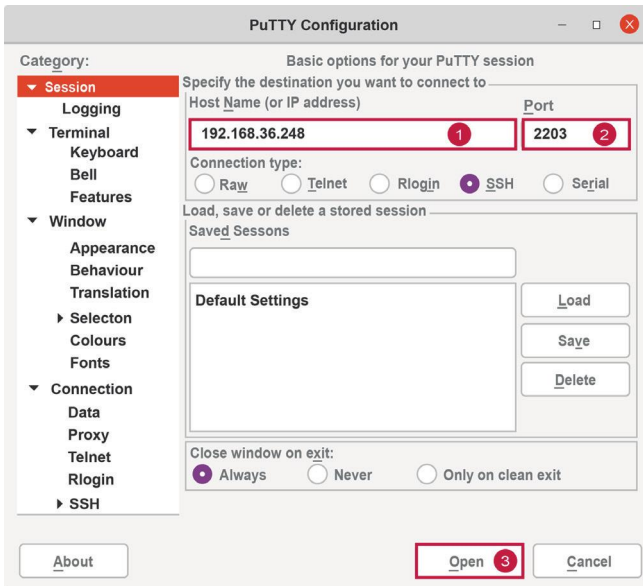
2.12 Host Console Debug Code

Using Putty Configuration to see the boot progress before UEFI loading, which makes troubleshooting even easier.



The screenshots in this user manual are examples and for references only. The actual images may slightly vary depending on the ip and port used.

1. Open Putty Configuration to enter the BMC IP address and Port number. Click "Open".



2. Enter the account/password: **root/OpenBmc** in the terminal window.



3. The terminal window will list the boot process as below.



```
192.168.36.248 - PuTTY
login as: root
root@192.168.36.248's password:
CP: 06001a0a
CP: 06001a0b
CP: 06001a0c
CP: 06001a0c
CP: 3 ff 00400
CP: 0 ff 01000
CP: 0 ff 01101
DRAM ECCD Initialization: [100] [=====]
CP: 0 ff 01200
CP: 3 ff 00800
DRAM memory regions:
Node[0] Region[0]: 0x000080000000 - 0x0000 ffffffff
Node[0] Region[1]: 0x080000000000 - 0x08007 ffffffff
Node[0] Region[0]: 0x000080000000 - 0x0803 ffffffff
DRAM: 16GB DDR4 2666 SYMBOL ECC
█
```

Command for Example:

>>

ssh root@<bmcip> -p 2200: host console

ssh root@<bmcip> -p 2201: ATF console

ssh root@<bmcip> -p 2202: SCP console

ssh root@<bmcip> -p 22 : BMC console

POST CODE Table:

Code	Description	PEI Progress
0x10	PEI_CORE_STARTED	
0x11	PEI_CAR_CPU_INIT	
0x15	PEI_CAR_NB_INIT	
0x19	PEI_CAR_SB_INIT	
0x2B	PEI_MEMORY_SPD_READ	
0x2C	PEI_MEMORY_PRESENCE_DETECT	
0x2D	PEI_MEMORY_TIMING	
0x2E	PEI_MEMORY_CONFIGURING	
0x2F	PEI_MEMORY_INIT	
0x31	PEI_MEMORY_INSTALLED	
0x32	PEI_CPU_INIT	
0x33	PEI_CACHE_INIT	
0x34	PEI_CPU_AP_INIT	
0x35	PEI_CPU_BSP_SELECT	
0x36	PEI_CPU_SMM_INIT	
0x37	PEI_MEM_NB_INIT	

0x3B PEI_MEM_SB_INIT

0x4F PEI_DXE_IPL_STARTED

PEI Errors

0x50 PEI_MEMORY_INVALID_TYPE,
PEI_MEMORY_INVALID_SPEED

0x51 PEI_MEMORY_SPD_FAIL

0x52 PEI_MEMORY_INVALID_SIZE,
PEI_MEMORY_MISMATCH

0x53 PEI_MEMORY_NOT_DETECTED,
PEI_MEMORY_NONE_USEFUL

0x54 PEI_MEMORY_ERROR

0x55 PEI_MEMORY_NOT_INSTALLED

0x56 PEI_CPU_INVALID_TYPE,
PEI_CPU_INVALID_SPEED

0x57 PEI_CPU_MISMATCH

0x58 PEI_CPU_SELF_TEST_FAILED,
PEI_CPU_CACHE_ERROR

0x59 PEI_CPU_MICROCODE_UPDATE_FAILED,
PEI_CPU_NO_MICROCODE

0x5A PEI_CPU_INTERNAL_ERROR,
PEI_CPU_ERROR

0x5B PEI_RESET_NOT_AVAILABLE

DXE Progress	
0x60	DXE_CORE_STARTED
0x61	DXE_NVRAM_INIT
0x62	DXE_SBRUN_INIT
0x63	DXE_CPU_INIT
0x68	DXE_NB_HB_INIT
0x69	DXE_NB_INIT
0x6A	DXE_NB_SMM_INIT
0x70	DXE_SB_INIT
0x71	DXE_SB_SMM_INIT
0x72	DXE_SB_DEVICES_INIT
0x78	DXE_ACPI_INIT
0x79	DXE_CSM_INIT
0x90	DXE_BDS_STARTED
0x91	DXE_BDS_CONNECT_DRIVERS
0x92	DXE_PCI_BUS_BEGIN
0x93	DXE_PCI_BUS_HPC_INIT
0x94	DXE_PCI_BUS_ENUM

0x95	DXE_PCI_BUS_REQUEST_RESOURCES
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0x96	DXE_PCI_BUS_ASSIGN_RESOURCES
------	------------------------------

0x97	DXE_CON_OUT_CONNECT
------	---------------------

0x98	DXE_CON_IN_CONNECT
------	--------------------

0x99	DXE_SIO_INIT
------	--------------

0x9A	DXE_USB_BEGIN
------	---------------

0x9B	DXE_USB_RESET
------	---------------

0x9C	DXE_USB_DETECT
------	----------------

0x9D	DXE_USB_ENABLE
------	----------------

0xA0	DXE_IDE_BEGIN
------	---------------

0xA1	DXE_IDE_RESET
------	---------------

0xA2	DXE_IDE_DETECT
------	----------------

0xA3	DXE_IDE_ENABLE
------	----------------

0xA4	DXE_SCSI_BEGIN
------	----------------

0xA5	DXE_SCSI_RESET
------	----------------

0xA6	DXE_SCSI_DETECT
------	-----------------

0xA7	DXE_SCSI_ENABLE
------	-----------------

0xA8	DXE_SETUP_VERIFYING_PASSWORD
------	------------------------------

0xA9	DXE_SETUP_START
0xAB	DXE_SETUP_INPUT_WAIT
0xAD	DXE_READY_TO_BOOT
0xAE	DXE_LEGACY_BOOT
0xAF	DXE_EXIT_BOOT_SERVICES
0xB0	RT_SET_VIRTUAL_ADDRESS_MAP_BEGIN
0xB1	RT_SET_VIRTUAL_ADDRESS_MAP_END
0xB2	DXE_LEGACY_OPROM_INIT
0xB3	DXE_RESET_SYSTEM
0xB4	DXE_USB_HOTPLUG
0xB5	DXE_PCI_BUS_HOTPLUG
0xB6	DXE_NVRAM_CLEANUP
0xB7	DXE_CONFIGURATION_RESET
DXE Errors	
0xD0	DXE_CPU_ERROR
0xD1	DXE_NB_ERROR
0xD2	DXE_SB_ERROR
0xD3	DXE_ARCH_PROTOCOL_NOT_AVAILABLE

0xD4	DXE_PCI_BUS_OUT_OF_RESOURCES
------	------------------------------

0xD5	DXE_LEGACY_OPROM_NO_SPACE
------	---------------------------

0xD6	DXE_NO_CON_OUT
------	----------------

0xD7	DXE_NO_CON_IN
------	---------------

0xD8	DXE_INVALID_PASSWORD
------	----------------------

0xD9	DXE_BOOT_OPTION_LOAD_ERROR
------	----------------------------

0xDA	DXE_BOOT_OPTION_FAILED
------	------------------------

0xDB	DXE_FLASH_UPDATE_FAILED
------	-------------------------

0xDC	DXE_RESET_NOT_AVAILABLE
------	-------------------------

Chapter 3 UEFI Setup Utility

3.1 Introduction

This section explains how to use the UEFI SETUP UTILITY to configure the system. The UEFI chip on the motherboard stores the UEFI SETUP UTILITY. Run the UEFI SETUP UTILITY when starting up the computer. Please press <F2> or during the Power-On-Self-Test (POST) to enter the UEFI SETUP UTILITY; otherwise, POST will continue with its test routines.

Restart the system by pressing <Ctrl> + <Alt> + <Delete> to enter the UEFI SETUP UTILITY after POST, or by pressing the reset button on the system chassis. This allows user to restart by turning the system off and then back on.



Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions are for reference purpose only, and they may not exactly match what seeing on the screen.

3.1.1 UEFI Menu Bar

The top of the screen has a menu bar with the following selections:

Item	Description
Main	To set up the system time/date information
Advanced	To set up the advanced UEFI features
Server Mgmt	To manage the server
Security	To set up the security features
Boot	To set up the default system device to locate and load the Operating System
Exit	To exit the current screen or the UEFI SETUP UTILITY

Use <←> key or <→> key to choose among the selections on the menu bar, and then press <Enter> to get into the sub screen.

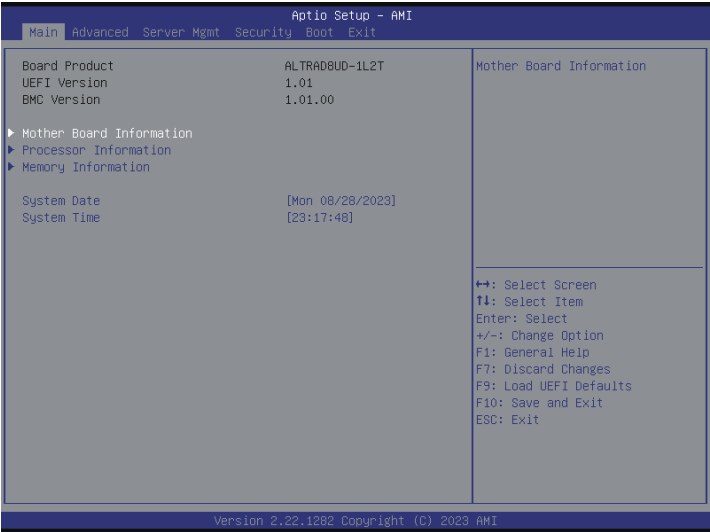
3.1.2 Navigation Keys

Please check the following table for the function description of each navigation key.

Navigation Key(s)	Function Description
← / →	Moves cursor left or right to select Screens
↑ / ↓	Moves cursor up or down to select items
+ / -	To change option for the selected items
<Tab>	Switch to next function
<Enter>	To bring up the selected screen
<PGUP>	Go to the previous page
<PGDN>	Go to the next page
<HOME>	Go to the top of the screen
<END>	Go to the bottom of the screen
<F1>	To display the General Help Screen
<F7>	Discard changes and exit the UEFI SETUP UTILITY
<F9>	Load optimal default values for all the settings
<F10>	Save changes and exit the UEFI SETUP UTILITY
<F12>	Print screen
<ESC>	Jump to the Exit Screen or exit the current screen

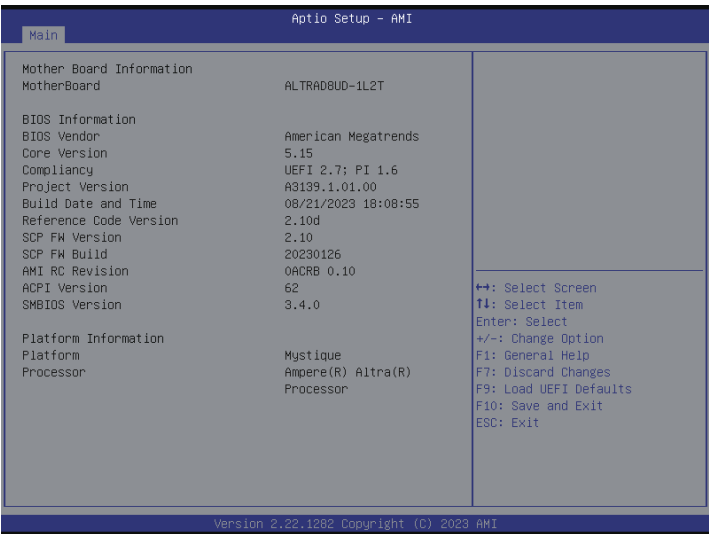
3.2 Main Screen

Once entering the UEFI SETUP UTILITY, the Main screen will appear and display the system overview. The Main screen provides system overview information and allows user to set the system time and date.



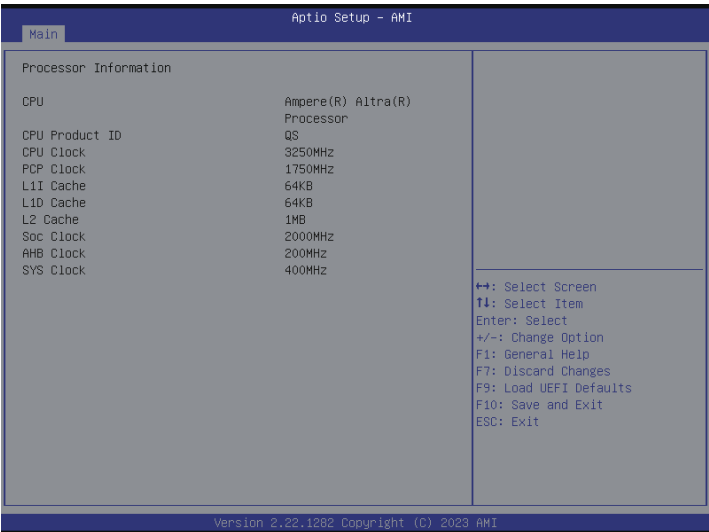
3.2.1 Mother Board Information

Press <Enter> to view the information of the motheboard.



3.2.2 Processor Information

Press <Enter> to view the information of the processor.



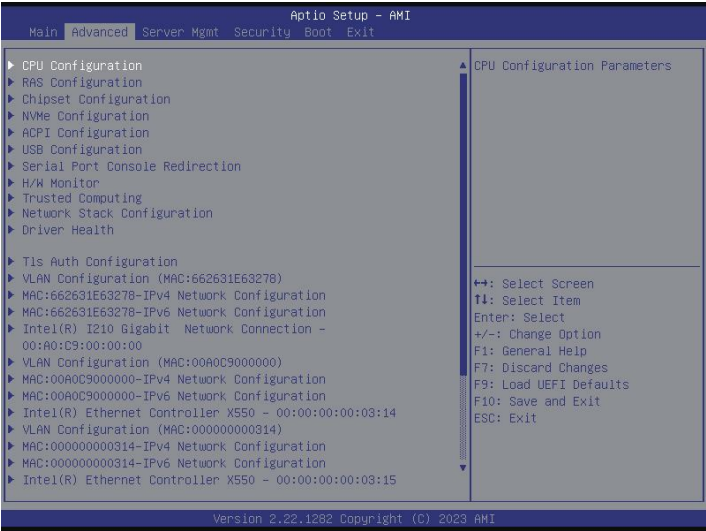
3.2.3 Memory Information

Press <Enter> to view the information of the memory.



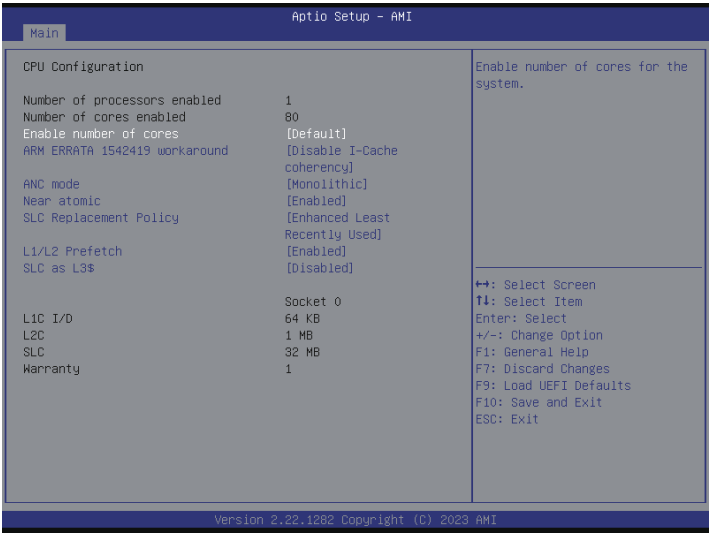
3.3 Advanced Screen

In this section, set the configurations for the following items: CPU Configuration, RAS Configuration, Chipset Configuration, NVME Configuration, ACPI Configuration, USB Configuration, Serial Port Console Redirection, H/W Monitor, Trusted Computing, Network Stack Configuration, Driver Health, Tls Auth Configuration and Instant Flash.



Setting wrong values in this section may cause the system to malfunction.

3.3.1 CPU Configuration



Enable number of cores

Use this item to enable the number of cores for the system.

ARM ERRATA 1542419 workaround

This item includes Disable, Workaround and Disable options used for trapping each IC IVAU to EL3.

ANC mode

- This item includes Monolithic, Hemisphere and Quadrant modes.
- Monolithic mode:** System has single NUMA partition for each socket.
- Hemisphere mode:** System has 2 NUMA partitions for each socket.
- Quadrant mode:** System has 4 NUMA partions for each socket.

Near atomic

Use this item to enable or disable the cacheable atomic instruction executed near CPU.

SLC Replacement Policy

This item allows user to select Replacement Policy for SLC.

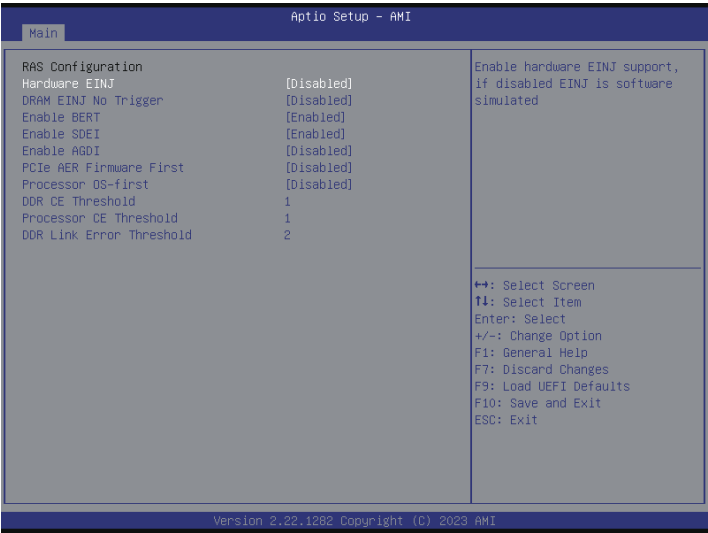
L1/L2 Prefetch

Use this item to enable or disable L1/L2 Prefetch for each core.

SLC as L3\$

Use this item to enable or disable PPTT to indicate SLC as L3\$ (Cache). This is limited to only 1P Monolithic mode.

3.3.2 RAS Configuration



Hardware EINJ

Use this item to enable or disable hardware EINJ support. If disabled, the EINJ is software simulated.

DRAM EINJ No Trigger

Avoid triggering DRAM errors with Hardware EINJ. If enabled, DRAM Hardware EINJ requests will only flip bits at the desired DRAM address and not force the hardware to immediately detect those bit flips.

Enable BERT

Use this item to enable Boot Error Record Table. If disabled, the BERT will not be populated.

Enable SDEI

Use this item to enable Software Delegated Exception Interface for NMI support.

Enable AGDI

Use this item to enable Arm Generic Diagnostic Dump and Reset Device Interface support. This also requires SDEI to be enabled.

PCIe AER Firmware First

Use this item to enable firmware to detect PCIe AER first. Otherwise OS detects AER.

Processor OS-first

Use this item to enable the operating system to prioritize processor errors through the AEST ACPU table.

DDR CE Threshold

This specifies the Number of DDR CEs to occur before using interrupt based notification to the OS rather than allowing the OS to poll for CEs.

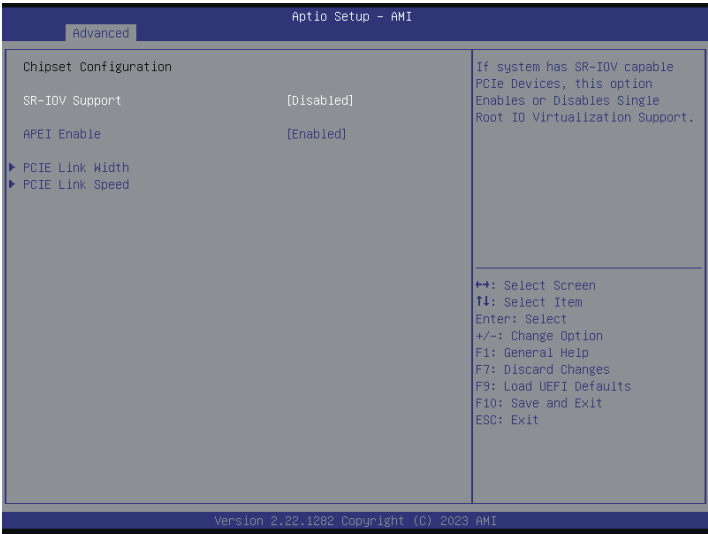
Processor CE Threshold

This specifies the Number of processor CEs to occur before using interrupt based notification to the OS rather than allowing the OS to poll for CEs.

DDR Link Error Threshold

This specifies the Number of DDR link errors before considering it fatal severity.

3.3.3 Chipset Configuration



SR-IOV Support

If system has SR-IOV capable PCIe Devices, this option Enables or Disables Single Root IO Virtualization Support.

APEI Enable

Use this item to enable or disable ACPI Platform Error Interface support.

PCIE Link Width

Select this item to configure PCIE Link Width.

SLIM2/SLIM1 Link Width

Use this item to select SLIM2/SLIM1 Link Width. The default value is [Auto].

SLIM4/SLIM3 Link Width

Use this item to select SLIM4/SLIM3 Link Width. The default value is [Auto].

PCIE4 Link Width

Use this item to select PCIE4 Link Width. The default value is [Auto].

PCIE5 Link Width

Use this item to select PCIE5 Link Width. The default value is [Auto].

PCIE7/6 Link Width

Use this item to select PCIE7/6 Link Width. The default value is [Auto].

PCIE Link Speed

Select this item to configure PCIE Link Speed.

SLIM1-1 Link Speed

Use this item to select SLIM1-1 Link Speed. The default value is [Auto].

SLIM1-2 Link Speed

Use this item to select SLIM1-2 Link Speed. The default value is [Auto].

SLIM2-1 Link Speed

Use this item to select SLIM2-1 Link Speed. The default value is [Auto].

SLIM2-2 Link Speed

Use this item to select SLIM2-2 Link Speed. The default value is [Auto].

SLIM3-1 Link Speed

Use this item to select SLIM3-1 Link Speed. The default value is [Auto].

SLIM3-2 Link Speed

Use this item to select SLIM3-2 Link Speed. The default value is [Auto].

SLIM4-1 Link Speed

Use this item to select SLIM4-1 Link Speed. The default value is [Auto].

SLIM4-2 Link Speed

Use this item to select SLIM4-2 Link Speed. The default value is [Auto].

OCU1 Link Speed

Use this item to select OCU1 Link Speed. The default value is [Auto].

OCU2 Link Speed

Use this item to select OCU2 Link Speed. The default value is [Auto].

M2_1 Link Speed

Use this item to select M2_1 Link Speed. The default value is [Auto].

M2_2 Link Speed

Use this item to select M2_2 Link Speed. The default value is [Auto].

PCIE4 Link Speed

Use this item to select PCIE4 Link Speed. The default value is [Auto].

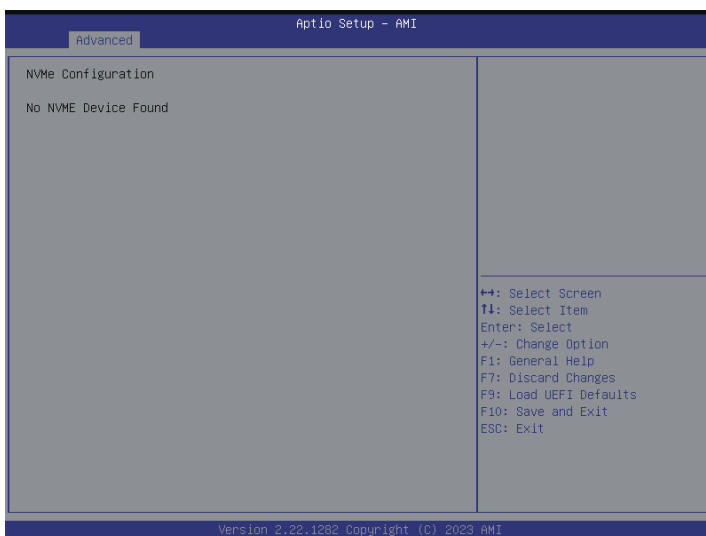
PCIE5 Link Speed

Use this item to select PCIE5 Link Speed. The default value is [Auto].

PCIE7/6 Link Speed

Use this item to select PCIE7/6 Link Speed. The default value is [Auto].

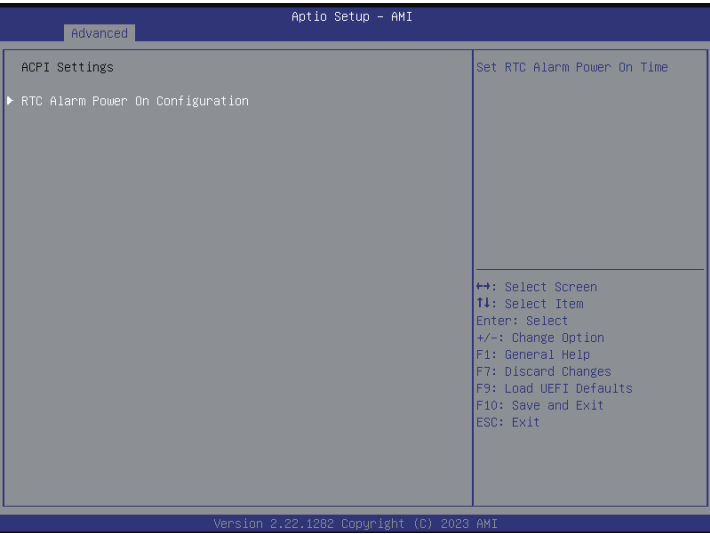
3.3.4 NVMe Configuration



NVMe Configuration

The NVMe Configuration displays the NVMe controller and Drive information.

3.3.5 ACPI Configuration



RTC Alarm Power On Configuration

Use this item to set RTC Alarm Power On Time.

RTC Alarm Power On

Use this item to enable or disable RTC (Real Time Clock) to power on the system.

RTC Alarm Date

Use this item to set Date of RTC power on feature.

RTC Alarm Hour

Use this item to set Hour of RTC power on feature.

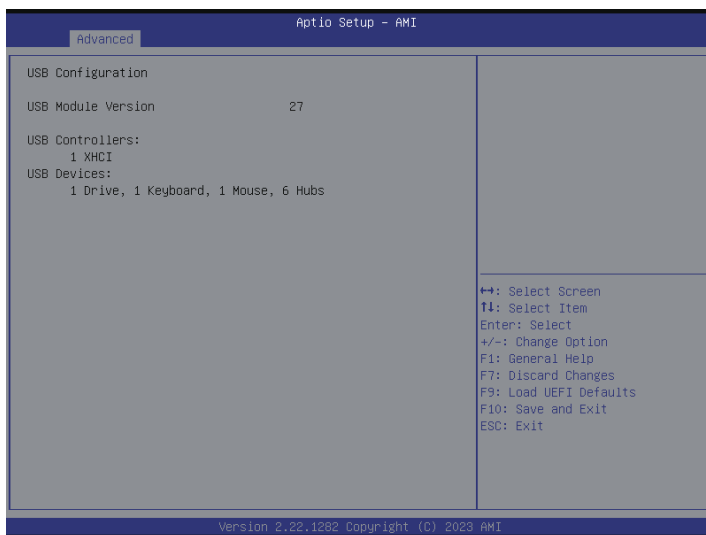
RTC Alarm Minute

Use this item to set Minute of RTC power on feature.

RTC Alarm Second

Use this item to set Second of RTC power on feature.

3.3.6 USB Configuration



USB Configuration

The USB Configuration displays the USB Module Version, USB Controllers and USB Device informations.

3.3.7 Serial Port Console Redirection



COM0

Console Redirection

Use this option to enable or disable Console Redirection. If this item is set to Enabled, user can select a COM Port to be used for Console Redirection.

Console Redirection Settings

Use this option to configure Console Redirection Settings, and specify how the computer and the host computer to which are connected exchange information. Both computers should have the same or compatible settings.

Terminal Type

Use this item to select the preferred terminal emulation type for out-of-band management. It is recommended to select [VT-UTF8].

Option	Description
VT100	ASCII character set
VT100+	Extended VT100 that supports color and function keys
VT-UTF8	UTF8 encoding is used to map Unicode chars onto 1 or more bytes
ANSI	Extended ASCII character set

Bits Per Second

Use this item to select the serial port transmission speed. The speed used in the host computer and the client computer must be the same. Long or noisy lines may require lower transmission speed. The options include [9600], [19200], [38400], [57600] and [115200].

Data Bits

Use this item to set the data transmission size. The options include [7] and [8] (Bits).

Parity

Use this item to select the parity bit. The options include [None], [Even], [Odd], [Mark] and [Space].

Stop Bits

The item indicates the end of a serial data packet. The standard setting is [1] Stop Bit. Select [2] Stop Bits for slower devices.

Flow Control

Use this item to set the flow control to prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to restart the flow. Hardware flow uses two wires to send start/stop signals. The options include [None] and [Hardware RTS/CTS].

VT-UTF8 Combo Key Support

Use this item to enable or disable the VT-UTF8 Combo Key Support for ANSI/VT100 terminals.

Recorder Mode

Use this item to enable or disable Recorder Mode to capture terminal data and send it as text messages.

Resolution 100x31

Use this item to enable or disable extended terminal resolution support.

Putty Keypad

Use this item to select Function Key and Keypad on Putty.

Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)**Console Redirection EMS**

Use this item to enable or disable Console Redirection. If this item is set to Enabled, user can select a COM Port to be used for Console Redirection.

Console Redirection Settings

Use this item to configure Console Redirection Settings, and specify how the computer and the host computer to which are connected exchange information.

Out-of-Band Mgmt Port

Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.

Terminal Type EMS

Use this item to select the preferred terminal emulation type for out-of-band management. It is recommended to select [VT-UTF8].

Option	Description
VT100	ASCII character set
VT100+	Extended VT100 that supports color and function keys
VT-UTF8	UTF8 encoding is used to map Unicode chars onto 1 or more bytes
ANSI	Extended ASCII character set

Bits Per Second EMS

Use this item to select the serial port transmission speed. The speed used in the host computer and the client computer must be the same. Long or noisy lines may require lower transmission speed. The options include [9600], [19200], [57600] and [115200].

Flow Control EMS

Use this item to set the flow control to prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to restart the flow. Hardware flow uses two wires to send start/stop signals. The options include [None], [Hardware RTS/CTS], and [Software Xon/Xoff].

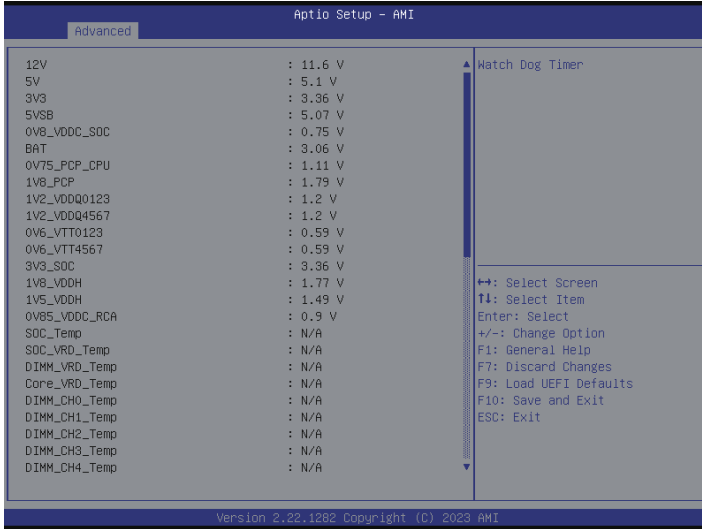
Data Bits EMS

Parity EMS

Stop Bits EMS

3.3.8 H/W Monitor

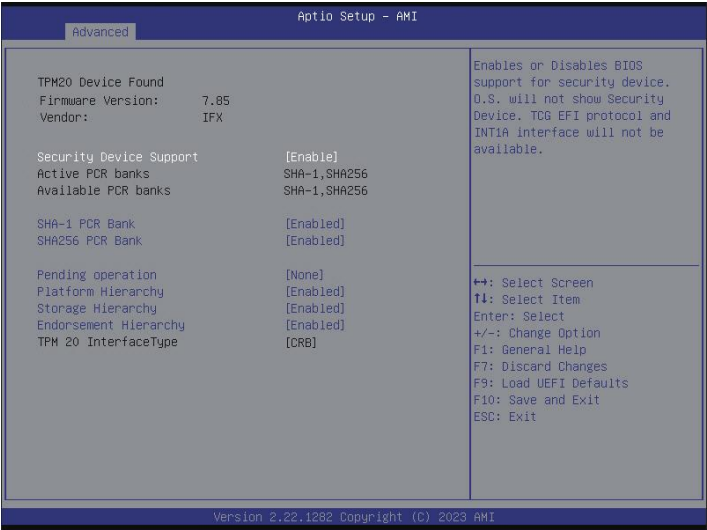
In this section, it allows user to monitor the status of the hardware on the system, including the parameters of the CPU temperature, motherboard temperature, CPU fan speed, chassis fan speed, and the critical voltage.



Watch Dog Timer

Use this item to enable or disable the Watch Dog Timer. The default value is [Auto].

3.3.9 Trusted Computing



NOTE: Options vary depending on the version of the connected TPM module.

Security Device Support

Use this item to enable or disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

SHA-1 PCR Bank

Use this item to enable or disable SHA-1 PCR Bank.

SHA256 PCR Bank

Use this item to enable or disable SHA256 PCR Bank.

Pending Operation

Schedule an Operation for the Security Device.

NOTE: The computer will reboot during restart in order to change State of the Device.

Platform Hierarchy

Use this item to enable or disable Platform Hierarchy.

Storage Hierarchy

Use this item to enable or disable Storage Hierarchy.

Endorsement Hierarchy

Use this item to enable or disable Endorsement Hierarchy.

3.3.10 Network Stack Configuration



Network Stack

Enable UEFI network stack can prevents user from performing single-user network boots and network installation. If disabled, the host does not use the network interface.

IPv4 PXE Support

Enable IPv4 PXE Boot support. If disabled, IPv4 PXE Boot Option is not supported.

IPv4 HTTP Support

Enable IPv4 HTTP Boot support. If disabled, IPv4 HTTP Boot Option is not supported.

IPv6 PXE Support

Enable IPv6 PXE Boot support. If disabled, IPv6 PXE Boot Option is not supported.

IPv6 HTTP Support

Enable IPv6 HTTP Boot support. If disabled, IPv6 HTTP Boot Option is not supported.

PXE Boot Wait Time

Specifies the wait time and press the ESC key to abort the PXE boot.

Media Detect Count

Specifies the number of times the presence of physical storage device are verified on a system reset or power cycle.

3.3.11 Driver Health



Interl (R) PRO/1000 Open Source 9.2.06 PCI-E Healthy

This provides Health Status for the drivers and controllers.

Interl (R) 10GbE Open Source 8.2.06 AArch64 Healthy

This provides Health Status for the drivers and controllers.

3.3.12 Tls Auth Configuration



Server CA Configuration

Press <Enter> to configure Server CA.

Client Cert Configuration

Enroll Cert

Press <Enter> to enroll cert.

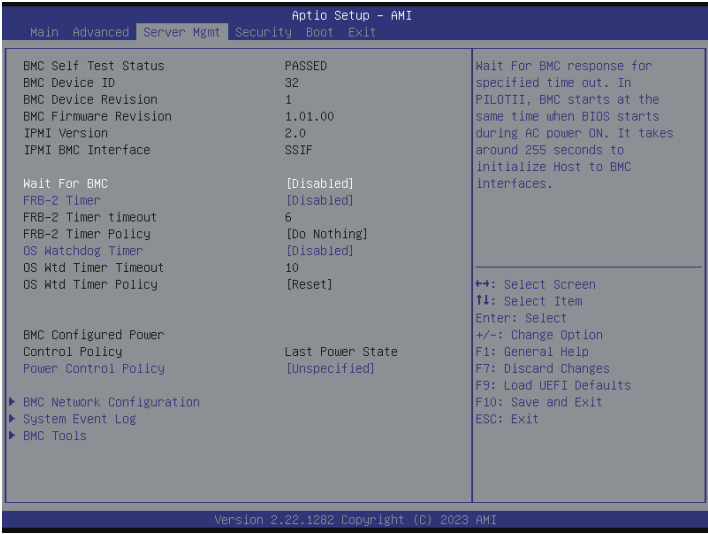
Delete Cert

Press <Enter> to delete cert.

3.3.13 Instant Flash

Instant Flash is a UEFI flash utility embedded in Flash ROM. This convenient UEFI update tool allows you to update system UEFI without entering operating systems. Just save the new UEFI file to the USB flash drive, floppy disk or hard drive and launch this tool, then updating the UEFI only in a few clicks without preparing an additional floppy diskette or other complicated flash utility. Please be noted that the USB flash drive or hard drive must use FAT32/16/12 file system. If executing Instant Flash utility, the utility will show the UEFI files and their respective information. Select the proper UEFI file to update your UEFI, and reboot the system after the UEFI update process is completed.

3.4 Server Mgmt



Wait For BMC

Wait For BMC response for specified time out. BMC starts at the same time when BIOS starts during AC power ON. It takes around 90 seconds to initialize Host to BMC interfaces.

FRB-2 Timer

Use this item to enable or disable FRB-2 timer (POST timer)

FRB-2 Timer Timeout

Use this item to define the FRB-2 Time Expiration between 1 to 30 value.

FRB-2 Timer Policy

Configure how the system should respond. If the FRB-2 Timer expires is disabled, this item is not available.

OS Watchdog Timer

Use this item to enable or disable OS Watchdog Timer. If enabled, starts a BIOS timer which can only be shut off by Management Software after the OS loads.

OS Wtd Timer Timeout

Configure the OS Boot Watchdog Timer Expiration between 1 to 30 min value. If the OS Boot Watchdog Timer is disabled, this item is not available.

OS Wtd Timer Policy

Configure how the system should respond if the OS Boot Watchdog Timer expires. If the OS Boot Watchdog Timer is disabled, this item is not available.

Power Control Policy

Configure how the system should respond if AC Power is lost. Reset is not required when the selected Power policy is set and saved in BMC.

BMC Network Configuration

Use this item to configure BMC network parameters.

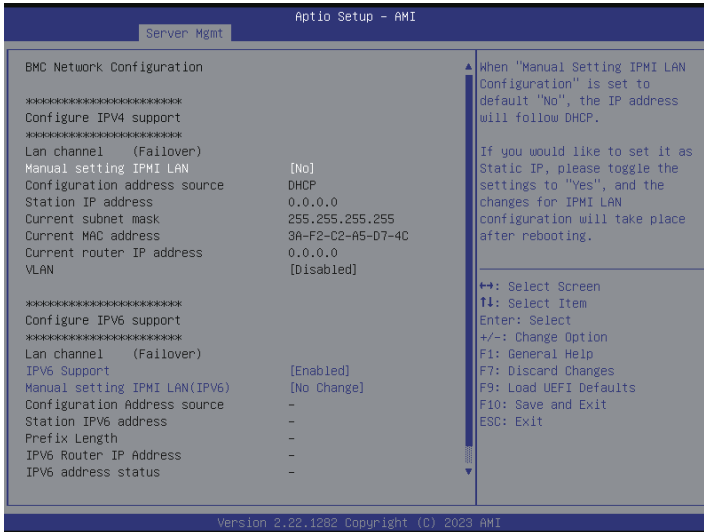
System Event Log

Press <Enter> to change the SEL event log configuration.

BMC Tools

Use this item to configure about KCS control, restore AC power loss and load BMC default settings.

3.4.1 BMC Network Configuration



Lan Channel (Failover)

Manual Setting IPMI LAN

If [No] is selected, the IP address is assigned by DHCP. If you prefer using a static IP address, toggle to [Yes], and the changes take effect after the system reboots. The default value is [No].

Configuration Address Source

Select to configure BMC network parameters statically or dynamically (by BIOS or BMC). Configuration options: [Static] and [DHCP].

Static: Manually enter the IP Address, Subnet Mask and Gateway Address in the BIOS for BMC LAN channel configuration.

DHCP: IP address, Subnet Mask and Gateway Address are automatically assigned by the network's DHCP server.



When [DHCP] or [Static] is selected, do NOT modify the BMC network settings on the IPMI web page.



The default login information for the IPMI web interface is:

Username: root

Password: OpenBmc

For more instructions on how to set up remote control environment and use the IPMI management platform, please refer to the IPMI Configuration User Guide or go to the Support website at: <https://www.asrockrack.com/support/faq.asp>

VLAN

Enable or disable Virtual Local Area Network.

If [Enabled] is selected, configure the items below.

VLAN ID: Select this item to configure the VLAN ID setting, the Maximum value is 4094 and the Minimum value is 1.

VLAN Priority: Select this item to configure the VLAN Priority setting, the Maximum value is 7 and the Minimum value is 0.

IPv6 Support

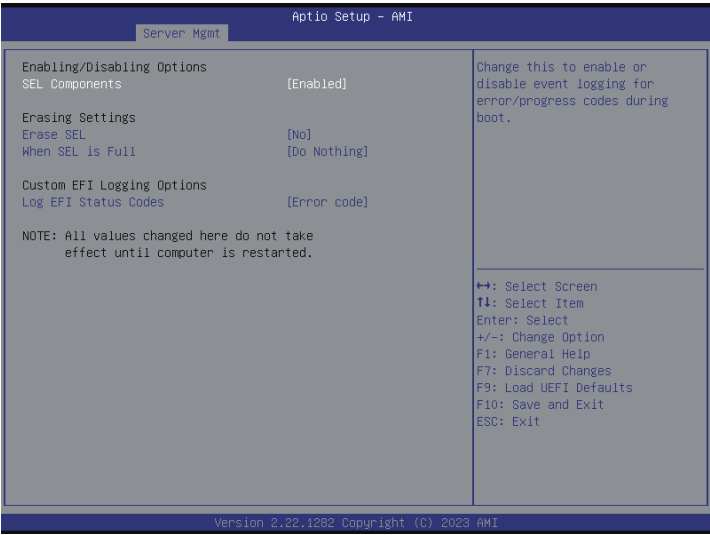
Enable or Disable LAN1 IPv6 Support.

Manual Setting IPMI LAN (IPv6)

Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC).

Unspecified option will not modify any BMC network parameters during BIOS phase.

3.4.2 System Event Log



SEL Components

Change this item to enable or disable event logging for error/progress codes during boot.

Erasing SEL

Use this item to choose options for erasing SEL.

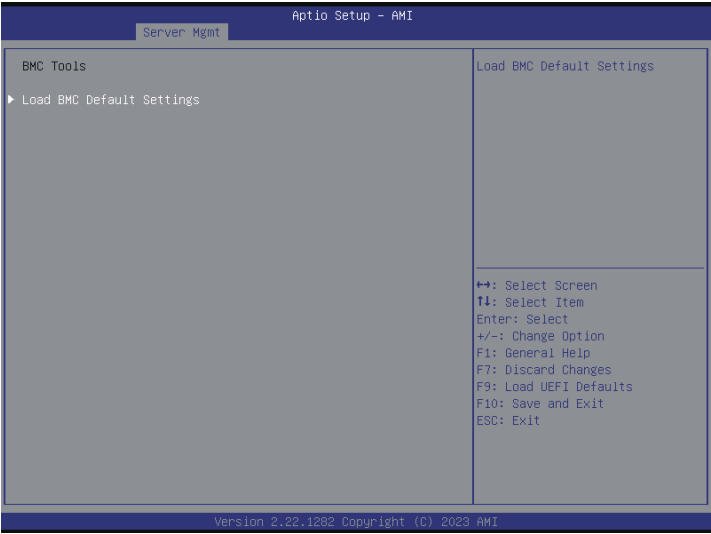
When SEL is Full

Use this to choose options for reactions to a full SEL.

Log EFI Status Codes

Use this item to disable the logging of EFI Status Codes or log only error code or only progress code or both.

3.4.3 BMC Tools

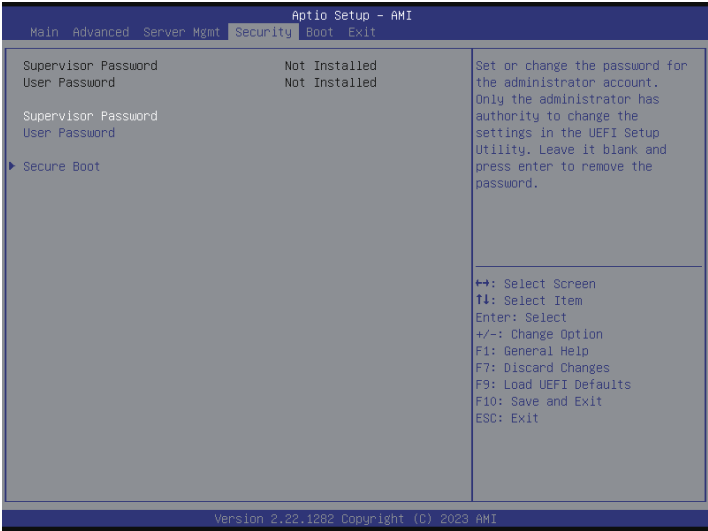


Load BMC Default Settings

Use this item to load BMC default settings.

3.5 Security

This section allows user to set or change the supervisor/user password for the system. For the user password also can clear it.



Supervisor Password

Set or change the password for the administrator account. Only the administrator has authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

User Password

Set or change the password for the user account. Users are unable to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

Secure Boot

Use this to enable or disable Secure Boot Control. The default value is [Disabled]. Enable to support Windows Server 2012 R2 or later versions Secure Boot.

Secure Boot Mode

Secure Boot mode selector: Standard/Custom. In Custom mode Secure Boot Variables can be configured without authentication.

Install Default Secure Boot Keys

Please install default secure boot keys if it's the first time using secure boot.

Clear Secure Boot Keys

Use this to clear the secure boot keys.

3.5.1 Key Management

In this section, expert users can modify Secure Boot Policy variables without full authentication.



3.6 Boot

In this section, it will display the available devices on your system for you to configure the boot settings and the boot priority.



Boot Option #1

Use this item to set the system boot order.

Boot Option #2

Use this item to set the system boot order.

Boot Option #3

Use this item to set the system boot order.

Boot Option #4

Use this item to set the system boot order.

Boot Option #5

Use this item to set the system boot order.

Boot Option #6

Use this item to set the system boot order.

UEFI USB Drive BBS Priorities

Specifies the Boot Device Priority sequence from available UEFI USB Drives.

UEFI Application Boot Priorities

Specifies the Boot Device Priority sequence from available UEFI Application.

Setup Prompt Timeout

Configure the number of seconds to wait for the UEFI setup utility.

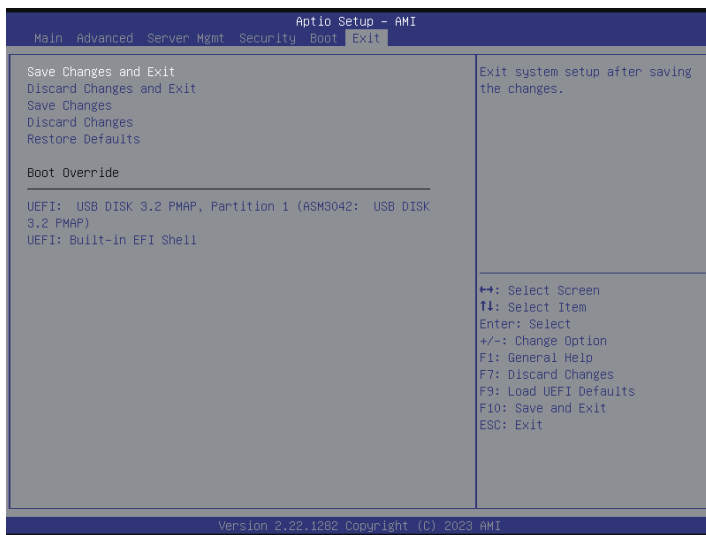
Bootup NumLock State

If this item is set to [On], it will automatically activate the Numeric Lock function after boot-up.

Full Screen Logo

Use this item to enable or disable OEM Logo. The default value is [Enabled].

3.7 Exit Screen



Save Changes and Exit

When selecting this item, the following message “Save configuration changes and exit setup?” will pop-out. Press <F10> key or select [Yes] to save the changes and exit the UEFI SETUP UTILITY.

Discard Changes and Exit

When selecting this item, the following message “Discard changes and exit setup?” will pop-out. Press <ESC> key or select [Yes] to exit the UEFI SETUP UTILITY without saving any changes.

Save Changes

When selecting this item, the following message “Save changes?” will pop-out. Press <F7> key or select [Yes] to save all changes.

Discard Changes

When selecting this item, the following message “Discard changes?” will pop-out. Press <F7> key or select [Yes] to discard all changes.

Restore Defaults

Use this item to restore or load default values for all the setup options.

Chapter 4 Software Support

After all the hardware has been installed, we suggest you go to our official website at <http://www.ASRockRack.com> and make sure if there are any new updates of the BIOS / BMC firmware for your motherboard.

4.1 Download and Install Operating System

This motherboard supports various Linux compliant operating systems. Please download the operating system from your OS manufacturer. Please refer to your OS documentation for more instructions.

4.2 Download and Install Software Drivers

Please download the required drivers from our website at <http://www.ASRockRack.com>.

To download necessary drivers, go to the product page, click on the "Download" tab, choose the operating system you use, and select the driver you need to be downloaded.

4.3 Contact Information

If you need to contact ASRock Rack or want to know more about ASRock Rack, welcome to visit ASRock Rack's website at <http://www.ASRockRack.com>; or you may contact your dealer for further information.

Chapter 5 Troubleshooting

5.1 Troubleshooting Procedures

Follow the procedures below to troubleshoot the system.



Always unplug the power cord before adding, removing or changing any hardware components. Failure to do so may cause physical injuries to you and damages to motherboard components.

1. Disconnect the power cable and check whether the PWR LED is off.
2. Unplug all cables, connectors and remove all add-on cards from the motherboard.
Make sure that the jumpers are set to default settings.
3. Confirm that there are no short circuits between the motherboard and the chassis.
4. Install a CPU and fan on the motherboard, then connect the chassis speaker and power LED.

If there is no power...

1. Confirm that there are no short circuits between the motherboard and the chassis.
2. Make sure that the jumpers are set to default settings.
3. Check the settings of the 115V/230V switch on the power supply.
4. Verify if the battery on the motherboard provides ~3VDC. Install a new battery if it does not.

If there is no video...

1. Try replugging the monitor cables and power cord.
2. Check for memory errors.

If there are memory errors...

1. Verify that the DIMM modules are properly seated in the slots.
2. Use recommended DDR4 RDIMM/LRDIMM.
3. If having installed more than one DIMM modules, they should be identical with the same brand, speed, size and chip-type.
4. Try inserting different DIMM modules into different slots to identify faulty ones.
5. Check the settings of the 115V/230V switch on the power supply.

Unable to save system setup configurations...

1. Verify if the battery on the motherboard provides ~3VDC. Install a new battery if it does not.
2. Confirm whether your power supply provides adequate and stable power.

Other problems...

1. Try searching keywords related to your problem on ASRock Rack's FAQ page:
<http://www.asrockrack.com/support>

5.2 Technical Support Procedures

If the problems are still unsolved, please contact ASRock Rack's technical support with the following information:

1. Contact information
2. Model name, BIOS version and problem type.
3. System configuration.
4. Problem description.

Contact ASRock Rack's technical support at:
<http://www.asrockrack.com/support/tsd.asp>

5.3 Returning Merchandise for Service

For warranty service, the receipt or a copy of your invoice marked with the date of purchase is required. By calling your vendor or going to our RMA website (<http://event.asrockrack.com/tsd.asp>) you may obtain a Returned Merchandise Authorization (RMA) number.

The RMA number should be displayed on the outside of the shipping carton which is mailed prepaid or hand-carried when returning the motherboard to the manufacturer. Shipping and handling charges will be applied for all orders that must be mailed when service is complete.

This warranty does not cover damages incurred in shipping or from failure due to alteration, misuse, abuse or improper maintenance of products.

Contact the distributor first for any product related problems during the warranty period.

Contact Information

If it needs to contact ASRock Rack or want to know more about ASRock Rack, you're welcome to visit ASRock Rack's website at <http://www.asrockrack.com>; or contact the dealer for further information. For technical questions, please submit a support request form at <https://event.asrockrack.com/tsd.asp>

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