OPEN
Industry Standard, Flexible Architecture

GREEN
Less Heat, Less Power Consumption

STABLE
Robust Design, Quality Parts

Stable and
Reliable Solution

Server/Workstation
Motherboard

D1848TERD4U-4Q
D1848TERD4U-4T4O

User Manual

English

Version 1.10
Published Dec. 2024

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CALIFORNIA, USA ONLY

The Lithium battery adopted on this motherboard contains Perchlorate, a toxic substance controlled in Perchlorate Best Management Practices (BMP) regulations passed by the California Legislature. When you discard the Lithium battery in California, USA, please follow the related regulations in advance.

"Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate"

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Licensee's specific rights may vary from country to country.

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

(1) this device may not cause harmful interference, and
(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.

ASRock Rack INC. hereby declares that this device is in compliance with the essential requirements and other relevant provisions of related Directives. Full text of EU declaration of conformity is available at: http://www.asrockrack.com

ASRock Rack follows the green design concept to design and manufacture our products, and makes sure that each stage of the product life cycle of ASRock Rack product is in line with global environmental regulations. In addition, ASRock Rack disclose the relevant information based on regulation requirements.

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DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

Contents

Chapter 1 Introduction

Thank you for purchasing ASRock Rack ***D1848TERD4U-4Q/D1848TERD4U-4T4O*** 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 software support.

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

About this motherboard technical support, please visit the website for specific information http://www.asrockrack.com/support/

1.1 Package Contents

- ASRock Rack D1848TERD4U-4Q/D1848TERD4U-4T4O motherboard (Micro-ATX form factor: 9.6-in x 9.6-in, 24.4cm x 24.4cm)
- Quick installation guide
- 1 SATA3 cable (60cm)
- 1 ATX 4P to 24P power cable
- 1 SATA power 6P to 15P cable
- 1 MINISAS cable(12G) (60cm)
- 1 I/O shield
- 1 screw for M.2 socket

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

English

1.2 Specifications

D1848TERD4U-4Q/D1848TERD4U-4T4O	
MB Physical Status	
Form Factor	mATX
Dimension	9.6" x 9.6" (24.4cm x24.4cm)
Processor System	
CPU	Intel® Xeon® D-1848TER processor
Socket	Single Socket (FCBGA2227)
Thermal Design Power	Up to 57W
Chipset	System on Chip
System Memory	
Quantity	4 DIMM slots (2DPC)
Type	288-pin DDR4 RDIMM, ECC/non-ECC UDIMM
Max. Capacity per DIMM	RDIMM: up to 64GB ECC/non-ECC UDIMM: up to 32GB
Max. DIMM Frequency	RDIMM: up to 2667MHz ECC/non-ECC UDIMM: up to 2667MHz
Voltage	1.2V
PCIe Expansion Slots (SLOT7 close to CPU)	
PCIe x 16	SLOT7*: PCIe4.0 x16 [CPU] **SLOT7 shares lanes with 2 SlimSAS.* *-Slimline1 and Slimline2 will disable when SLOT7 (PCIe4.0 x16) is populated* *-Slimline1 will disable when SLOT7 (PCIe4.0 x8) is populated.*
PCIe x 8	SLOT6*: PCIe3.0 x8 [CPU] **SLOT6 shares lanes with 2 Mini-SAS HD by BIOS setting*
Other PCIe Expansion Connectors	
M.2	M2_1 (PCIe3.0 x4 or SATA 6Gb/s); support 22110/2280 form factor [CPU] M2_2* (PCIe3.0 x4 or SATA 6Gb/s); support 22110/2280 form factor [CPU] **M2_2 shares lanes with 4 SATA 7-pin; 4 SATA 7-pin will disable when M2_2 is populated*
Others	2 SlimSAS* (PCIe4.0 x8) [CPU] **SLOT7 shares lanes with 2 SlimSAS.* *-Slimline1 and Slimline2 will disable when SLOT7 (PCIe4.0 x16) is populated* *-Slimline1 will disable when SLOT7 (PCIe4.0 x8) is populated*
SATA/SAS Storage	
PCH Built-in Storage	Intel® Xeon® D-1848TER (Up to 17 SATA 6Gb/s; RAID 0/1/5/10): 3 Mini-SAS HD*, 4 SATA 7-pin or 1 M2_2, 1 M2_1 **2 Mini-SAS HD shares lanes with SLOT6 by BIOS setting*
Server Management	
BMC Controller	ASPEED AST2500: IPMI2.0 with iKVM and vMedia support
IPMI Dedicated GLAN	1 RJ45 Dedicated IPMI LAN port by Realtek RTL8211E

Ethernet	
Additional GbE Controller	**D1848TERD4U-4Q:** 4 SFP28 (25GbE) **D1848TERD4U-4T4O:** 4 SFP28 (10GbE) 4 RJ45 (10GbE) by Intel® X557-AT4
Graphics	
Controller	ASPEED AST2500 : 1 DB15 (VGA), 1 header
Rear Panel I/O	
UID Button/LED	1 UID button w/ LED
VGA Port	1 DB15 (VGA)
Serial Port	1 DB9 (COM)
USB Port	2 Type-A (USB3.2 Gen1)
RJ45	**D1848TERD4U-4Q:** 1 dedicated IPMI **D1848TERD4U-4T4O:** 4 RJ45 (10GbE), 1 dedicated IPMI
Other Network Connector	**D1848TERD4U-4Q:** 4 SFP28 (25GbE) **D1848TERD4U-4T4O:** 4 SFP28 (10GbE)
Internal Connectors/Headers	
PSU Connector	1 Micro-Fit (4-pin, ATX PSU signal) w/ ATX 24-pin adapter cable, 2 (8-pin, ATX 12V) support 12V DC-in
Other Power Connector	1 (6-pin, SATA power)
Auxiliary Panel Header	1 (18-pin): chassis intrusion, LAN1/LAN2 activity LED, locate, SMBus
System Panel	1 (9-pin): power switch, reset switch, system power LED, HDD activity LED
VGA Header	1 (15-pin)
Fan Header	1 (4-pin, CPU fan), 5 (6-pin, SYS fans)
TPM Header	1 (13-pin, SPI)
VROC Heaser	1
SGPIO Header	1
HSBP	1
SMBus	1
PMBus	1
IPMB	1
ClearCMOS	1
USB 3.2 Gen1 Header	1 header (19-pin, 2 USB3.2 Gen1)
NMI Header	1
Others	1 external 17-pin 80 port debug header

LED Indicators	
Standby Power LED	1
80 Debug Port LED	1
Fan Fail LED	6
BMC Heartbeat LED	1
System BIOS	
BIOS Type	AMI UEFI BIOS; 512 Mb (64MB) SPI Flash ROM
BIOS Features	Plug and Play (PnP), ACPI 3.0 and above compliance wake up events, SMBIOS 3.2 and above, ASRock Rack Instant Flash
Hardware Monitor	
Temperature	CPU, MB Temperature sensing
Fan	Fan Tachometer CPU Quiet Fan (Allow Chassis Fan Speed Auto-Adjust by CPU Temperature) Fan Multi-Speed Control
Voltage	VCCIN_CPU, 1V8_AUX, VNN_PCH, VNN_NAC, 1V05_NAC, VDDQ_ABC_CPU, VPP_CPU_ABC, 3v/5v/12v, 1.05V, +BAT, 3VSB, 5VSB
Support OS	
OS	Microsoft® Windows®: - Server 2019 (64bit) - Server 2022 (64bit) Linux: - RedHat Enterprise Linux Server 8.5 (64bit) / 8.4 (64bit) - CentOs 8.4 (64bit) - UBuntu 20.04.4 (64bit) **Please refer to our website for the latest OS support list.*
Environment	
Temperature	Operation temperature: 10°C ~ 35°C / Non operation temperature: -40°C ~ 70°C

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

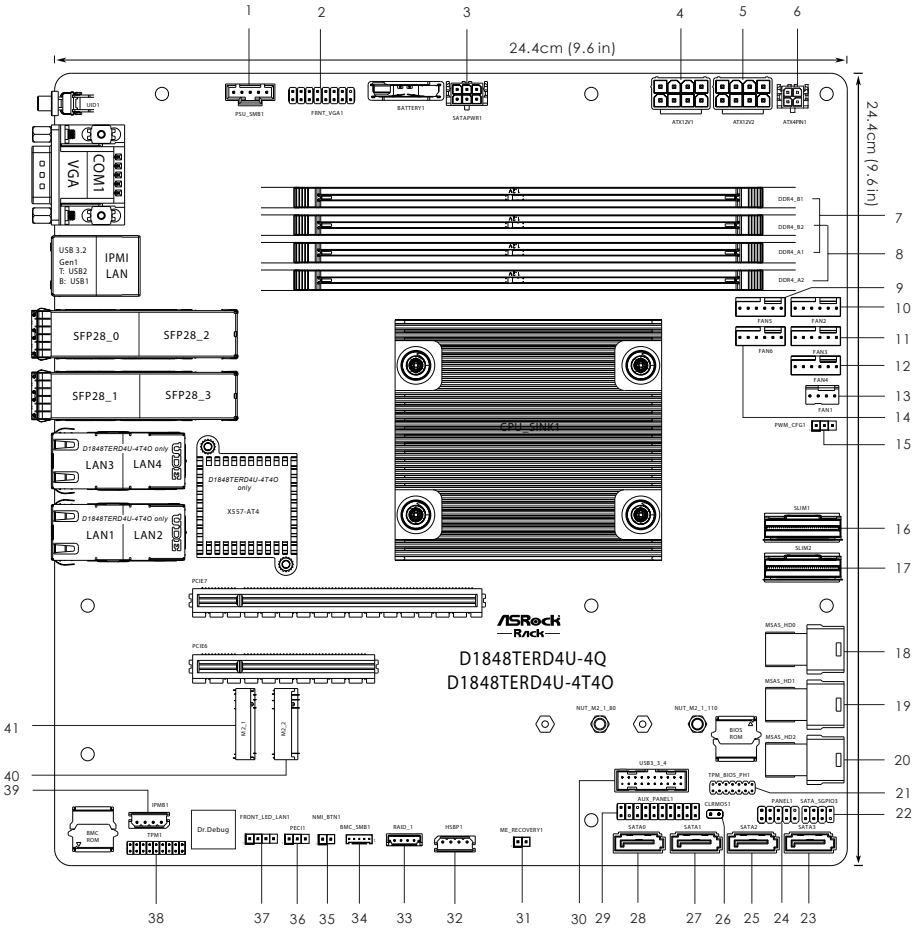
This motherboard supports Wake from on Board LAN. To use this function, please make sure that the "Wake on Magic Packet from power off state" is enabled in Device Manager > Intel® Ethernet Connection > Power Management. And the "PCI Devices Power On" is enabled in UEFI SETUP UTILITY > Advanced > ACPI 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 first like MS-DOS or Windows®. 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



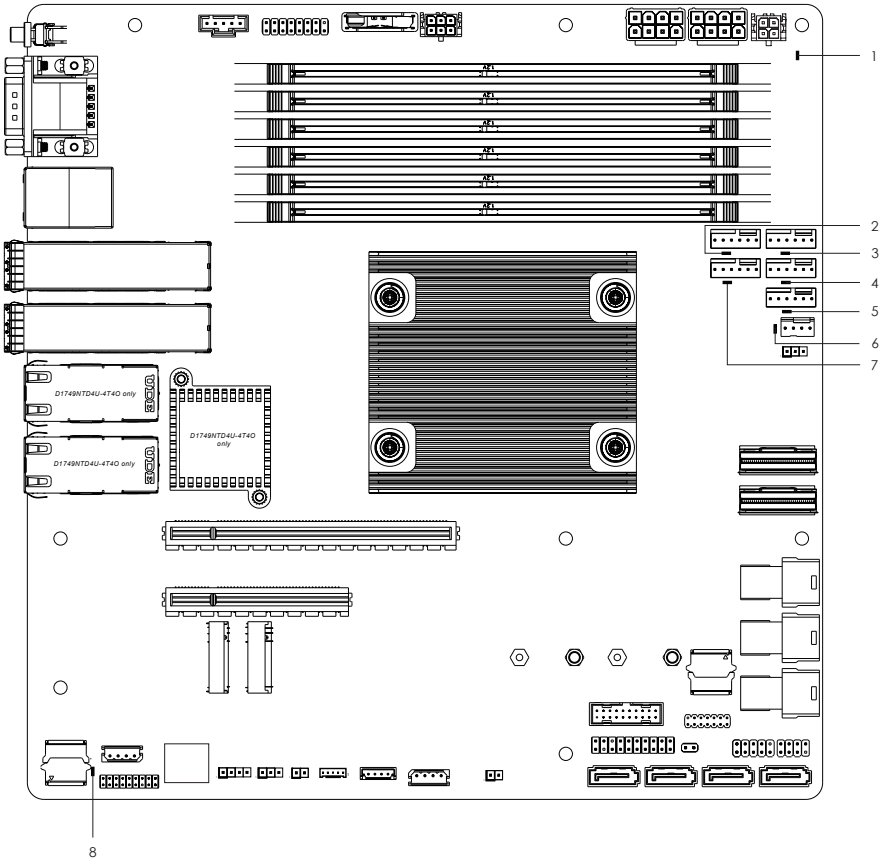
No.	Description
1	PSU SMBus (PSU_SMB1)
2	Front VGA Header (FRNT_VGA1)
3	SATA Power Connector (DC-IN Mode) (SATAPWR1)**
4	ATX 12V Power Connector (ATX12V1)
5	ATX 12V Power Connector (ATX12V2)
6	Micro-Fit Power Connector (ATX4PIN1)**
7	2 x 288-pin DDR4 DIMM Slots (DDR4_A1, DDR4_B1)*
8	2 x 288-pin DDR4 DIMM Slots (DDR4_A2, DDR4_B2)*
9	System Fan Connector (FAN5)
10	System Fan Connector (FAN2)
11	System Fan Connector (FAN3)
12	System Fan Connector (FAN4)
13	CPU Fan Connector (FAN1)
14	System Fan Connector (FAN6)
15	PWM Configuration Header (PWM_CFG1)
16	Slimline NVMe Connector (SLIM1)
17	Slimline NVMe Connector (SLIM2)
18	MINI-SAS HD Connector (MSAS_HD0)
19	MINI-SAS HD Connector (MSAS_HD1)
20	MINI-SAS HD Connector (MSAS_HD2)
21	TPM-SPI Header (TPM_BIOS_PH1)
22	SATA SGPIO Connector (SATA_SGPIO3)
23	SATA3 Connector (SATA3)
24	System Panel Header (PANEL1)
25	SATA3 Connector (SATA2)
26	Clear CMOS Jumper (CLRMOS1)
27	SATA3 Connector (SATA1)
28	SATA3 Connector (SATA0)
29	Auxiliary Panel Header (AUX_PANEL1)
30	USB 3.2 Gen1 Header (USB3_3_4)
31	ME Recovery Jumper (ME_RECOVERY1)
32	Backplane PCI Express Hot-Plug Connector (HSBP1)
33	Virtual RAID On CPU Header (RAID_1)

No.	Description
34	BMC SMB Header (BMC_SMB1)
35	Non Maskable Interrupt Button (NMI_BTN1)
36	CPU PECI Mode Jumper (PECI1)
37	Front LAN LED Connector (FRONT_LED_LAN1)
38	External 80 Port Debug Header (TPM1)
39	Intelligent Platform Management Bus Header (IPMB1)
40	M.2 Socket (M2_2) (Type 2280/22110)
41	M.2 Socket (M2_1) (Type 2280/22110)

**For DIMM installation and configuration instructions, please see p.16 (Installation of Memory Modules (DIMM)) for more details.*

***Use the bundled ATX 24pin-to-4pin converter cable to connect with the PSU. See Chaper 2.8 for more information.*

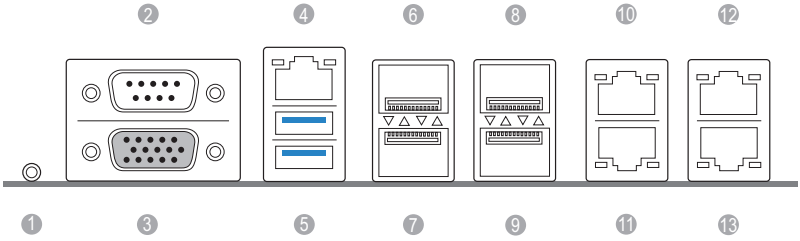
1.5 Onboard LED Indicators



English

No.	Item	Status	Description
1	SB_PWR1	Green	STB PWR ready
2	LED_FAN5	Red	SYS_FAN5 failed
3	LED_FAN2	Red	SYS_FAN2 failed
4	LED_FAN3	Red	SYS_FAN3 failed
5	LED_FAN4	Red	SYS_FAN4 failed
6	LED_FAN1	Red	CPU_FAN1 failed
7	LED_FAN6	Red	SYS_FAN6 failed
8	BMC_LED1	Green	BMC heartbeat LED

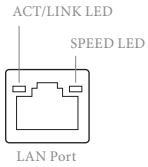
1.6 I/O Panel



No.	Description	No.	Description
1	UID Switch (UID1)	8	10/25G SFP28 (Fiber) (SFP28_3)***
2	COM Port (COM1)	9	10/25G SFP28 (Fiber) (SFP28_1)***
3	VGA Port (VGA)	10	10G LAN RJ-45 Port (LAN4)** *(D1848TERD4U-4T4O only)*
4	LAN RJ-45 Port (IPMI_LAN)*	11	10G LAN RJ-45 Port (LAN3)** *(D1848TERD4U-4T4O only)*
5	USB 3.2 Gen1 Ports (USB3_1_2)	12	10G LAN RJ-45 Port (LAN2)** *(D1848TERD4U-4T4O only)*
6	10/25G SFP28 (Fiber) (SFP28_2)***	13	10G LAN RJ-45 Port (LAN1, shared NIC)** *(D1848TERD4U-4T4O only)*
7	10/25G SFP28 (Fiber) (SFP28_0)***		

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.

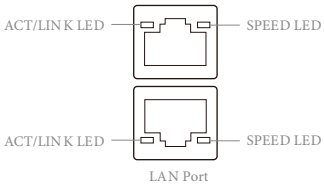


IPMI LAN Port LED Indications

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

English

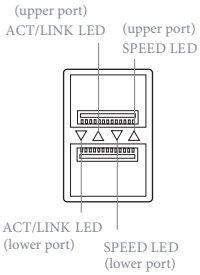
**There is an LED on each side of 10G LAN port. Please refer to the table below for the LAN port LED indications.



10G LAN Port (LAN1, LAN2, LAN3, LAN4) LED Indications *(D1848TERD4U-4T4O only)*

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

***There is an LED on each side of 10/25G LAN port. Please refer to the table below for the LAN port LED indications.

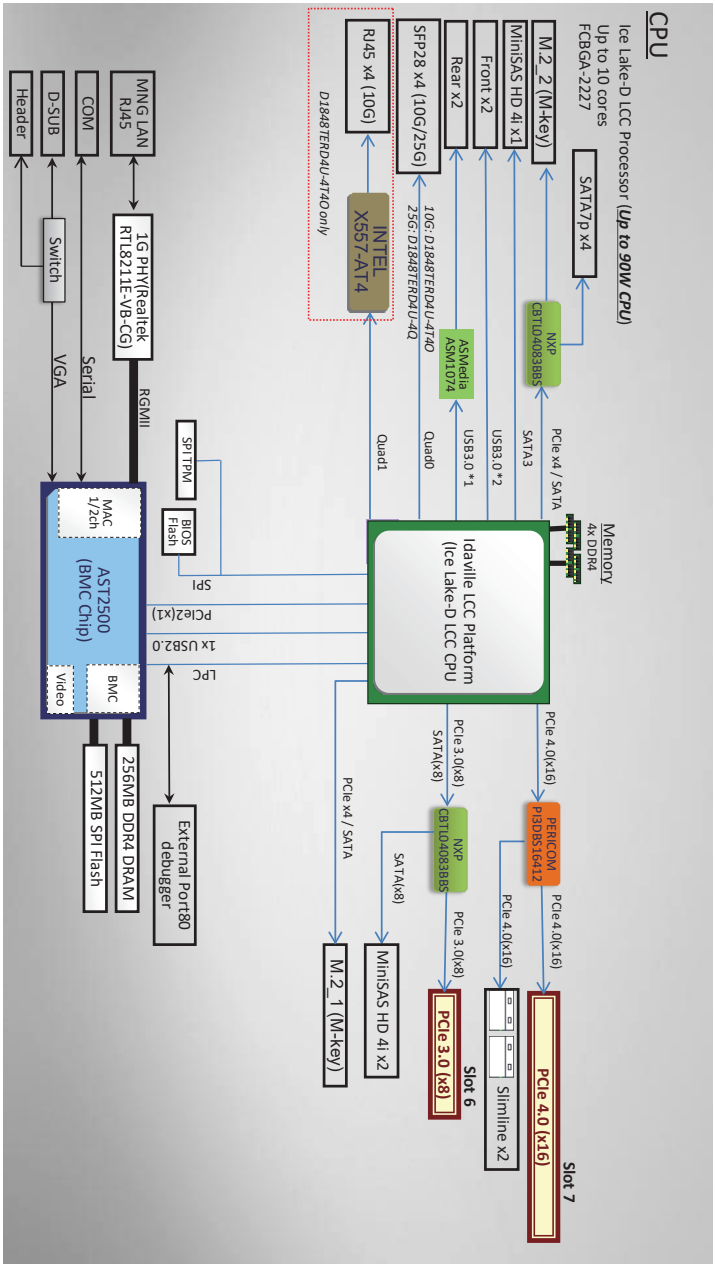


10/25G SFP28 Port (SFP28_0, SFP28_1, SFP28_2, SFP28_3) LED Indications

Activity / Link LED		Speed LED	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	100Mbps connection or no link
Blinking Green	Data Activity	Orange	1Gbps connection
On	Link	Green	**D1848TERD4U-4T4O:** 10Gbps connection **D1848TERD4U-4Q:** 25Gbps connection

English

1.7 Block Diagram



English

Chapter 2 Installation

This is a mATX form factor (9.6" x 9.6", 24.4 cm x 24.4 cm) 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 standoffs at the marked location, under the motherboard, from the chassis, in order to avoid electrical short circuit and damage to the motherboard.

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.

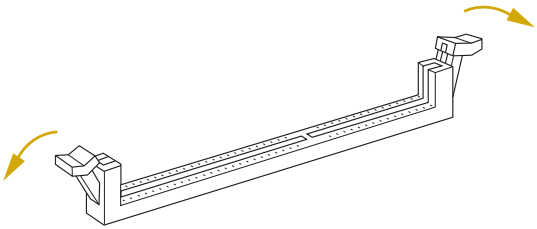
1. Unplug the power cord from the wall socket before touching any components.
2. To avoid damaging the motherboard's components due to static electricity, NEVER place the motherboard directly on the carpet or the like. Also remember to use a grounded wrist strap or touch a safety grounded object before 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.

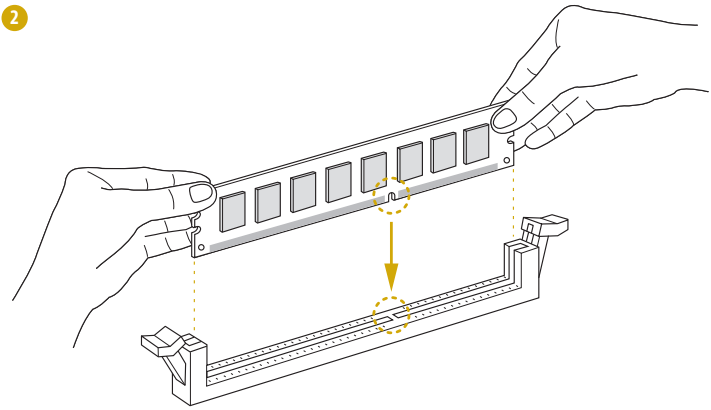
2.3 Installation of Memory Modules

This motherboard provides four 288-pin DDR4 (Double Data Rate 4) DIMM slots and supports Dual Channel Memory Technology.

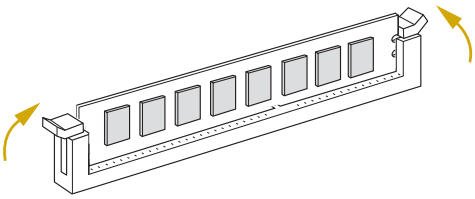
1



2



3



The DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the DIMM if forcing the DIMM into the slot at incorrect orientation.

2.4 Expansion Slot (PCI Express Slots)

There are 2 PCI Express slots on this motherboard.

PCIE slots:

PCIE6 (PCIE 3.0 x8 slot, from CPU1) is used for PCI Express x8 lane width cards.
PCIE7 (PCIE 4.0 x16 slot, from CPU1) is used for PCI Express x16 lane width cards.

Slot	Generation	Mechanical	Electrical	Source
PCIE6	3.0	x8	x8	CPU
PCIE7	4.0	x16	x16	CPU

PCIE7 shares lanes with SLIM1 and SLIM2. When PCIE7 is occupied by a PCI Express x8 lane width card, SLIM1 is disabled. When PCIE7 is occupied by a PCI Express x16 lane width card, both SLIM1 and SLIM2 are disabled.

PCIE7	SLIM1	SLIM2
PCIE x8 Card	Disabled	
PCIE x16 Card	Disabled	Disabled

PCIE6 shares lanes with MSAS_HD0 and MSAS_HD1. When PCIE6 is occupied by a PCI Express lane width card, both MSAS_HD0 and MSAS_HD1 are disabled.

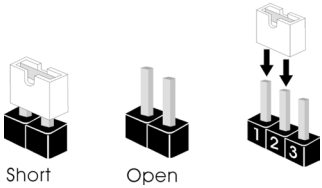
PCIE6	MSAS_HD0	MSAS_HD1
PCIE Card	Disabled	Disabled

Installing an expansion card

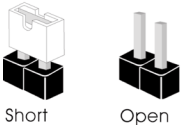
Step 1. Before installing an expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before starting the installation.
Step 2. Remove the system unit cover (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.

2.5 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.



NCSI Mode Jumper (3-pin PECI1) (see p.7, No. 36)	 CPU PECI connected to BMC (Default)	 CPU PECI connected to PCH (Default)



Clear CMOS Jumper (CLRMOS1) (see p.7, No. 26)	 2-pin Jumper

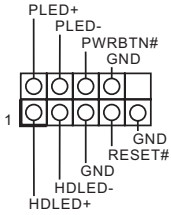
CLRMOS1 allows user to clear the data in CMOS. To clear and reset the system parameters to default setup, please turn off the computer and unplug the power cord from the power supply. After waiting for 15 seconds, use a jumper cap to short the pins on CLRMOS1 for 5 seconds. However, please do not clear the CMOS right after updating the BIOS. If user needs to clear the CMOS when finishing to update the BIOS, boot up the system first, and then shut it down before doing the clear-CMOS action. Please be noted that the password, date, time, and user default profile will be cleared only if the CMOS battery is removed. Please remember toremove the jumper cap after clearing the CMOS.

ME Recovery Jumper (ME_RECOVERY1) (see p.7, No. 31)	 2-pin Jumper

2.6 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.7, No. 24)



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.

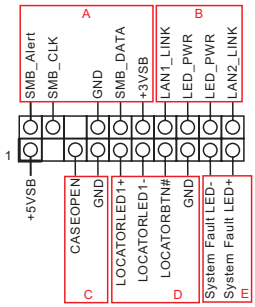
RESET (Reset Switch):
Connect to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.

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.7, No. 29)



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.

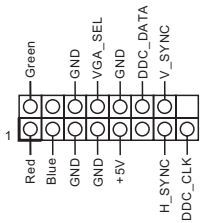
B. Internet status indicator (2-pin LAN1_LED, LAN2_LED)
These two 2-pin headers allow user to use the Gigabit internet indicator cable to connect to the LAN status indicator. When this indicator flickers, it means that the internet is properly connected.

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.

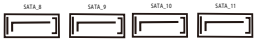
Front VGA Header
(15-pin FRNT_VGA1)
(see p.7, No. 2)



Please connect either end of VGA_2X8 cable to VGA header.

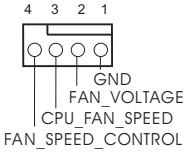
English

Serial ATA3 Connectors
(SATA0)
(see p.7, No. 28)
(SATA1)
(see p.7, No. 27)
(SATA2)
(see p.7, No. 25)
(SATA3)
(see p.7, No. 23)



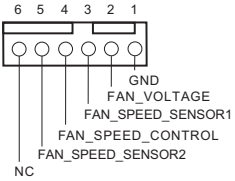
These SATA3 connectors support SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate.
*If M2_2 is occupied by a SATA-type M.2 device, SATA0, SATA1, SATA2 and SATA3 will be disabled.

CPU Fan Connector
(4-pin FAN1)
(see p.7, No. 13)



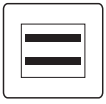
This motherboard provides one 4-Pin CPU fan (Quiet Fan) connector. Please connect this to Pin 1-3, when connecting a 3-Pin CPU fan .
For more details, please refer to the Cooler QVL list on the ASRock Rack website.

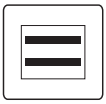
System Connectors
(6-pin FAN2)
(see p.7, No. 10)
(6-pin FAN3)
(see p.7, No. 11)
(6-pin FAN4)
(see p.7, No. 12)
(6-pin FAN5)
(see p.7, No. 9)
(6-pin FAN6)
(see p.7, No. 14)

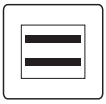


Please connect a fan cable to the fan connector and match the black wire to the ground pin. All fans support Fan Control.

Mini-SAS HD Connectors
Right-Angle:
(MSAS_HD0)
(see p.7, No. 18)
(MSAS_HD1)
(see p.7, No. 19)
(MSAS_HD2)
(see p.7, No. 20)

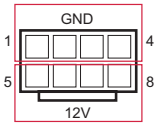

MSAS_HD0


MSAS_HD1


MSAS_HD2

The connector supports MiniSAS-to-SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate.

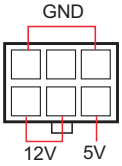
ATX 12V Power Connectors
(8-pin ATX12V1)
(see p.7, No. 4)
(8-pin ATX12V2)
(see p.7, No. 5)



The motherboard provides two 8-pin 12V power connector which is a required input for either DC-IN 12V or ATX +12V power source.

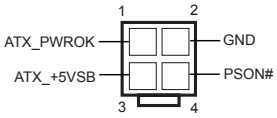
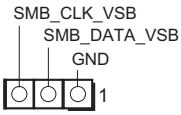
When using ATX power, it is necessary to use a 24pin-to-4pin power cable to connect between the 24pin power connector of PSU and the ATX4PIN1 connector on the motherboard for power supply and signal communication.

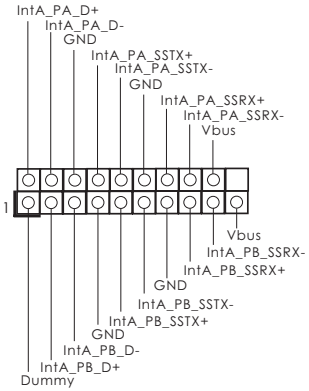
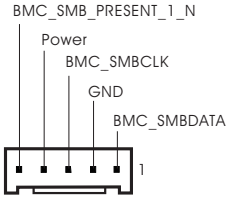
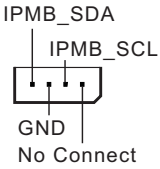
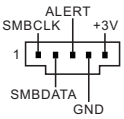
SATA Power Connector
(DC-IN Mode)
(6-pin SATAPWR1)
(see p.7, No. 3)



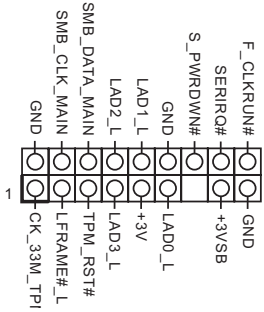
Please use a SATA power cable to connect this SATA Power Connector and the SATA HDD for supplying power from the motherboard, when using DC-IN mode without SATA power supply.

English

Micro-Fit Power Connector (4-pin ATX4PIN1 *(ATX 24pin-to-4pin)*) (see p.7, No. 6)		The motherboard provides one Micro-Fit 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 ATX4PIN1 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. Use the bundled ATX 24pin-to-4pin converter cable to connect with the PSU. See Chaper 2.8 for more information.
PWM Configuration Header (3-pin PWM_CFG1) (see p.7, No. 15)		The header is used for PWM configurations.
Non Maskable Interrupt Button Header (2-pin NMI_BTN1) (see p.7, No. 35)		Please connect a NMI device to this header.

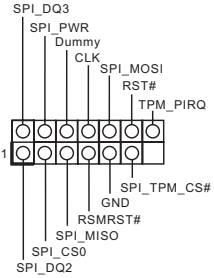
USB 3.2 Gen1 Header (19-pin USB3_3_4) (see p.7, No. 30)		Besides two default USB 3.2 Gen1 ports on the I/O panel, there is one USB 3.2 Gen1 header on this motherboard. This USB 3.2 Gen1 header can support two USB 3.2 Gen1 ports.
Baseboard Management Controller SMBus Header (5-pin BMC_SMB1) (see p.7, No. 34)		The header is used for the SM BUS devices.
Intelligent Platform Management Bus Header (4-pin IPMB1) (see p.7, No. 39)		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.
PSU SMBus Header (5-pin PSU_SMB1) (see p.7, No. 1)		PSU SMBus monitors the status of the power supply, fan and system temperature.

External 80 Port Debug Header
(17-pin TPM1)
(see p.7, No. 38)



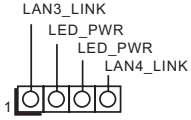
This header is used to connect to a debug display for showing the motherboard debug information.

SPI TPM Header
(13-pin TPM_BIOS_PH1)
(see p.7, No. 21)



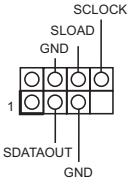
This connector supports SPI Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.

Front LAN LED Header
(FRONT_LED_LAN1)
(see p.7, No. 37)



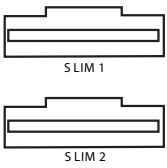
This 4-pin connector is used for the front LAN status indicator.

Serial General Purpose Input/Output Header
(7-pin SATA_SGPIO3)
(see p.7, No. 22)



This header supports Serial Link interface for onboard SATA connections.

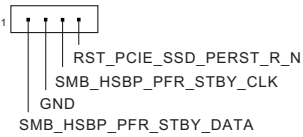
SLIMLINE NVMe x8 Connectors
(SLIM1)
(see p.7, No. 16)
(SLIM2)
(see p.7, No. 17)



These connectors are used for the NVME PCIE devices.

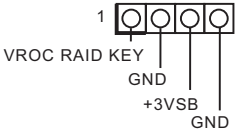
English

Backplane PCI Express Hot-Plug Connector (4-pin HSBP1) (see p.7, No. 32)



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

Virtual RAID On CPU Header (4-pin RAID_1) (see p.7, No. 33)



This connector supports Intel® Virtual RAID on CPU and NVME/AHCI RAID on CPU PCIE.

With the introduction of the Intel VROC product, there are three modes of operation:

SKU	HW key required	Key features
Pass-thru	Not needed	• Pass-thru only (no RAID) • LED Management • Hot Plug Support • RAID 0 support for Intel Fultondale NVMe SSDs
Standard	VROCSTANMOD	• Pass-thru SKU features • RAID 0, 1, 10
Premium	VROCPREMMOD	• Standard SKU features • RAID 5 • RAID 5 Write Hole Closure
ISS	VROCISSDMOD	

*Only Intel SSDs are supported.

*For further details on VROC, please refer to the official information released by Intel.

English

2.7 Dr. Debug

Dr. Debug is used to provide code information, which makes troubleshooting even easier. Please see the diagrams below for reading the Dr. Debug codes.

Code	Description
0x10	PEI_CORE_STARTED
0x11	PEI_CAR_CPU_INIT
0x15	PEI_CAR_NB_INIT
0x19	PEI_CAR_SB_INIT
0x31	PEI_MEMORY_INSTALLED
0x32	PEI_CPU_INIT
0x33	PEI_CPU_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
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
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
0xF0	PEI_RECOVERY_AUTO
0xF1	PEI_RECOVERY_USER
0xF2	PEI_RECOVERY_STARTED
0xF3	PEI_RECOVERY_CAPSULE_FOUND
0xF4	PEI_RECOVERY_CAPSULE_LOADED
0xE0	PEI_S3_STARTED
0xE1	PEI_S3_BOOT_SCRIPT
0xE2	PEI_S3_VIDEO_REPOST

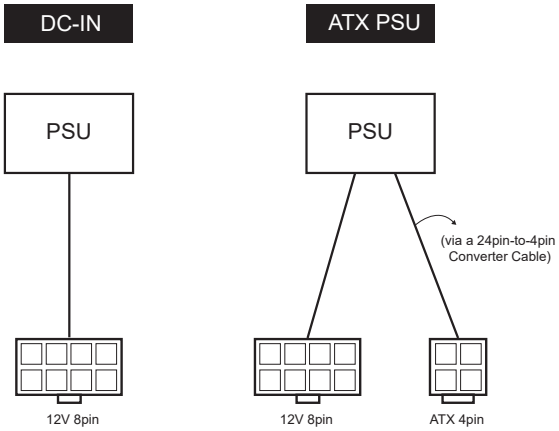
0xE3	PEI_S3_OS_WAKE
0x50	PEI_MEMORY_INVALID_TYPE
0x53	PEI_MEMORY_NOT_DETECTED
0x55	PEI_MEMORY_NOT_INSTALLED
0x57	PEI_CPU_MISMATCH
0x58	PEI_CPU_SELF_TEST_FAILED
0x59	PEI_CPU_NO_MICROCODE
0x5A	PEI_CPU_ERROR
0x5B	PEI_RESET_NOT_AVAILABLE
0xD0	DXE_CPU_ERROR
0xD1	DXE_NB_ERROR
0xD2	DXE_SB_ERROR
0xD3	DXE_ARCH_PROTOCOL_NOT_AVAILABLE
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
0xE8	PEI_MEMORY_S3_RESUME_FAILED
0xE9	PEI_S3_RESUME_PPI_NOT_FOUND
0xEA	PEI_S3_BOOT_SCRIPT_ERROR
0xEB	PEI_S3_OS_WAKE_ERROR

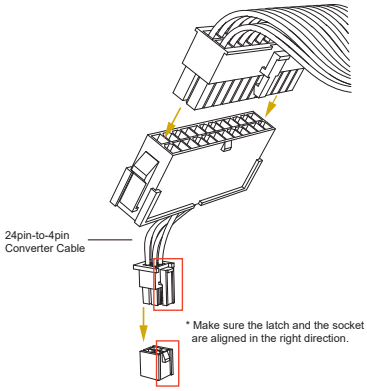
2.8 ATX PSU / DC-IN Power Connections

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.



English

2.9 LED/Switches

User can use the UID button to locate the server working on behind a rack of servers.

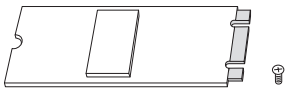
Unit Identification purpose LED/Switch (UID1)		When the UID button on the front or rear panel is pressed, the front/rear UID blue LED indicator will be truned on. Press the UID button again to turn off the indicator.

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

2.10 M.2 SSD Module Installation Guide (M2_1/M2_2)

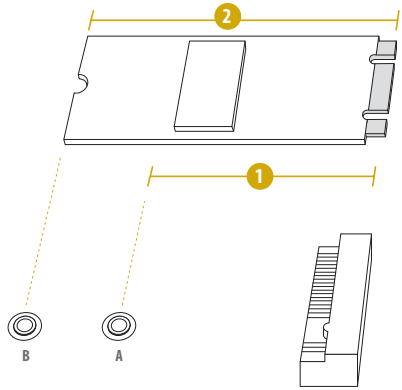
The M.2 Socket (M2_1/M2_2, Key M) supports type 2280/22110 M.2 PCI Express module up to Gen3 x4 (8GT/s x4).
*If M2_2 is occupied by a SATA-type M.2 device, SATA0, SATA1, SATA2 and SATA3 will be disabled.

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.

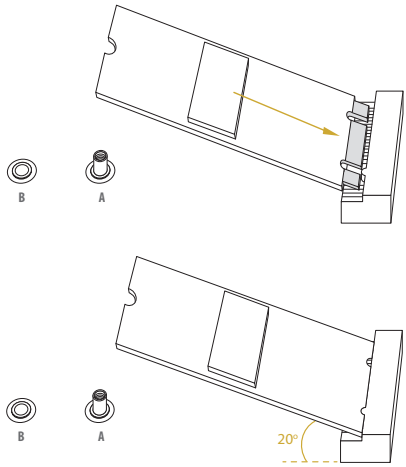
No.	1	2
Nut Location	A	B
PCB Length	8cm	11cm
Module Type	Type2280	Type22110

Step 3

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

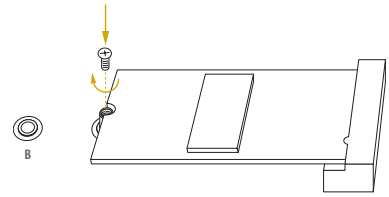
Step 4

Peel off the yellow 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.

2.11 Dual LAN and Teaming Operation Guide

Dual LAN with Teaming enabled on this 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.

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 <Del> 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
Security	To set up the security features
Boot	To set up the default system device to locate and load the Operating System
Server Mgmt	To manage the server
Event Logs	For event log configuration
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.

English

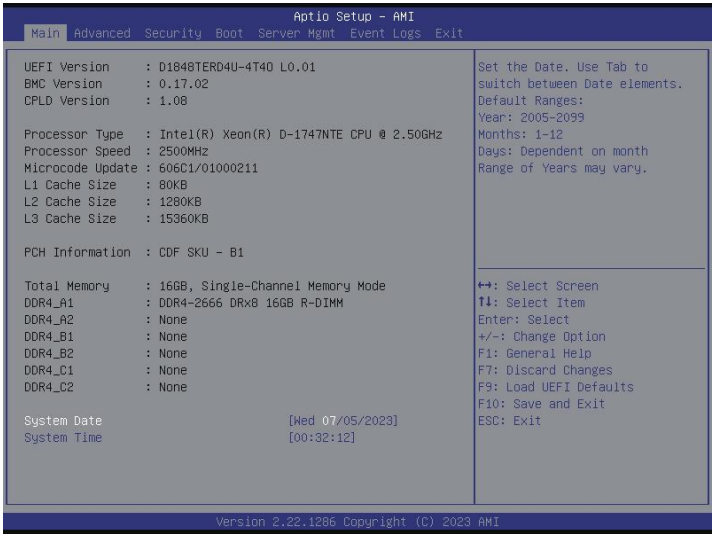
3.1.2 Navigation Keys

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

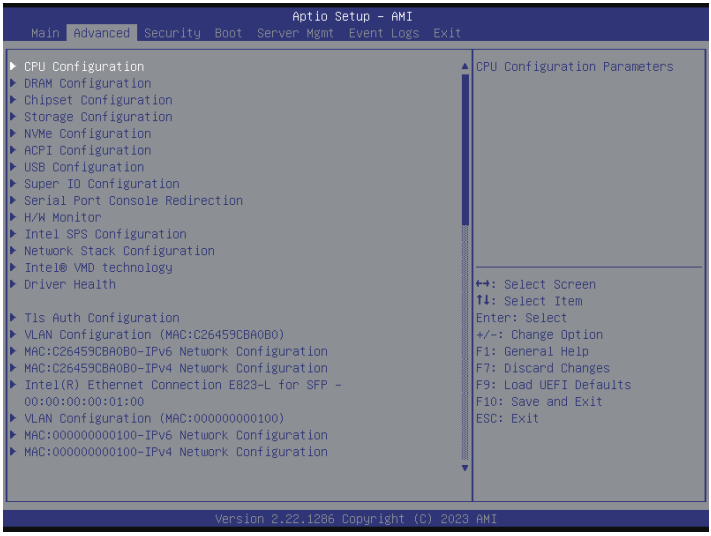
3.2 Main Screen

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.



3.3 Advanced Screen

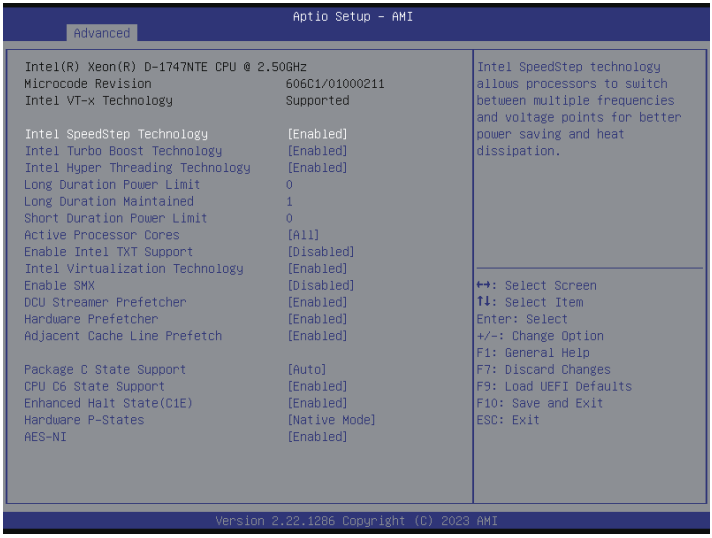
In this section, set the configurations for the following items: CPU Configuration, DRAM Configuration, Chipset Configuration, Storage Configuration, NVMe Configuration, ACPI Configuration, USB Configuration, Super IO Configuration, Serial Port Console Redirection, H/W Monitor, Intel SPS Configuration, Network Stack Configuration, Intel(R) VMD Technology, Driver Health, Tls Configuration and Instant Flash.



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

English

3.3.1 CPU Configuration



Intel SpeedStep Technology

Intel SpeedStep technology allows processors to switch between multiple frequencies and voltage points for better power saving and heat dissipation. CPU turbo ratio can be fixed when Intel SpeedStep Technology set Disabled and Intel Turbo Boost Technology set Enabled.

Please note that enabling this function may reduce CPU voltage and lead to system stability or compatibility issues with some power supplies. Please set this item to [Disabled] if above issues occur.

Intel Turbo Boost Technology

Intel Turbo Boost Technology enables the processor to run above its base operating frequency when the operating system requests the highest performance state.

Intel Hyper Threading Technology

Intel Hyper Threading Technology allows multiple threads to run on each core, so that the overall performance on threaded software is improved.

Long Duration Power Limit

Configure Package Power Limit 1 in watts. When the limit is exceeded, the CPU ratio will be lowered after a period of time. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

Long Duration Maintained

Configure the period of time until the CPU ratio is lowered when the Long Duration Power Limit is exceeded.

Short Duration Power Limit

Configure Package Power Limit 2 in watts. When the limit is exceeded, the CPU ratio will be lowered immediately. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

Active Processor Cores

Select the number of cores to enable in each processor package.

Enable Intel TXT Support

Enables Intel Trusted Execution Technology Configuration.

Intel Virtualization Technology

Intel Virtualization Technology allows a platform to run multiple operating systems and applications in independent partitions, so that one computer system can function as multiple virtual systems.

Enable SMX

Use this item to enable Safer Mode Extensions.

DCU Streamer Prefetcher

DCU streamer prefetcher is an L1 data cache prefetcher (MSR 1A4h [2]).

Hardware Prefetcher

Automatically prefetch data and code for the processor. Enable for better performance.

Adjacent Cache Line Prefetch

Automatically prefetch the subsequent cache line while retrieving the currently requested cache line. Enable for better performance.

Package C State Support

Enable CPU, PCIe, Memory, Graphics C State Support for power saving.

CPU C6 State Support

Enable C6 deep sleep state for lower power consumption.

Enhanced Halt State(C1E)

Enable Enhanced Halt State (C1E) for lower power consumption.

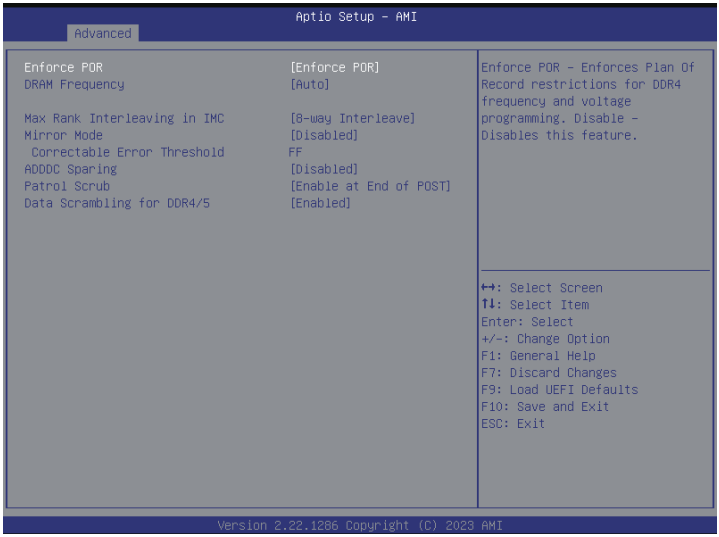
Hardware P-States

Disable: Hardware chooses a P-state based on OS Request (Legacy P-States)
Native Mode: Hardware chooses a P-state based on OS guidance
Out of Band Mode: Hardware autonomously chooses a P-state (no OS guidance)

AES-NI

Use this item to enable or disable AES-NI support.

3.3.2 DRAM Configuration



Enforce POR

Enforce POR - Enforces Plan Of Record restrictions for DDR4 frequency and voltage programming. Disable - Disables this feature.

DRAM Frequency

If [Auto] is selected, the motherboard will detect the memory module(s) inserted and assign the appropriate frequency automatically.

Max Rank Interleaving in IMC

Use this item to select Rank Interleaving setting.

Mirror Mode

Mirror Mode will set entire 1LM memory in system to be mirrored, consequently reducing the memory capacity by half. Mirror Enable will disable XPT Prefetch.

Correctable Error Threshold

Correctable Error Threshold (0 - 0x7FFF) used for sparing, tagging, and leaky bucket.

ADDDC Sparing

Enable or disable ADDDC Sparing.

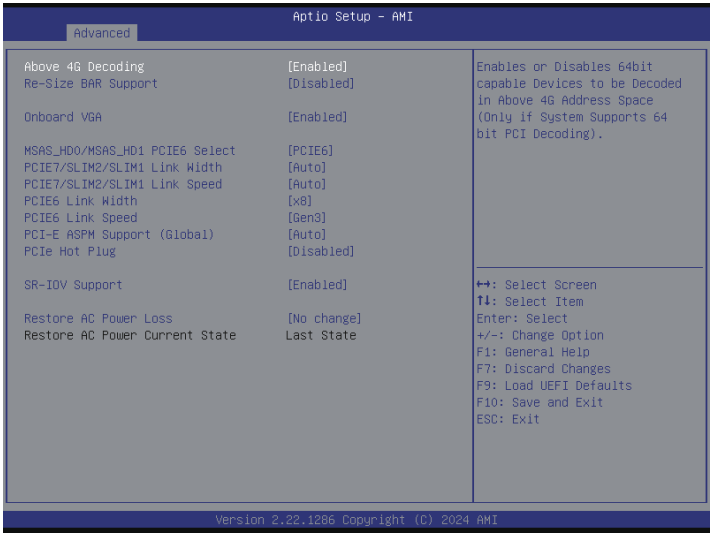
Patrol Scrub

Patrol Scrub is a background activity initiated by the processor to seek out and fix memory errors. The default value is [Enabled at End of POST].

Data Scrambling for DDR4/5

Enable - Enables data scrambling for DDR4 and DDR5.
Disable - Disables this feature.
Auto - Sets it to the MRC default setting; current default is Enable.

3.3.3 Chipset Configuration



Above 4G Decoding

Enables or Disables 64bit capable Devices to be Decoded in Above 4G Address Space (Only if System Supports 64 bit PCI Decoding).

Re-Sized BAR Support

If system has Resizable BAR capable PCIe Devices, this option Enables or Disables Resizable BAR Support.

Onboard VGA

Use this to enable or disable the Onboard VGA function.

MSAS_HD0/MSAS_HD1 PCIE6 Select

This allows user to switch signal among MSAS_HD0/MSAS_HD1 or PCIE6.

PCIE7/SLIM2/SLIM1 Link Width

This allows user to configure PCIE7/SLIM2/SLIM1 slot Link Width. The default value is [Auto].

PCIE7/SLIM2/SLIM1 Link Speed

This allows user to configure PCIE7/SLIM2/SLIM1 slot Link Speed. The default value is [Auto].

PCIE6 Link Width

This presents PCIE6 slot Link Width. The default value is [x8].

PCIE6 Link Speed

This allows user to configure PCIE6 slot Link Speed. The default value is [Gen3].

PCI-E ASPM Support (Global)

This option enables or disables the ASPM support for all CPU downstream devices.

PCIE Hot Plug

Use this item to configure PCIE Hot Plug.

SR-IOV Support

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

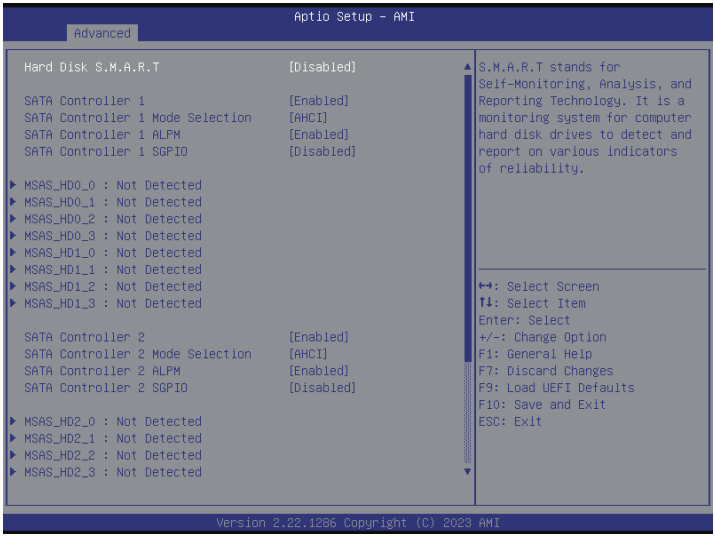
Restore AC Power Loss

This allows user to set the power state after a power failure. If [Power Off] is selected, the power will remain off when the power recovers. If [Power On] is selected, the system will start to boot up when the power recovers.

Restore AC Power Current State

This displays the current state of restore AC power.

3.3.4 Storage Configuration



Hard Disk S.M.A.R.T.

S.M.A.R.T stands for Self-Monitoring, Analysis, and Reporting Technology. It is a monitoring system for computer hard disk drives to detect and report on various indicators of reliability.

SATA Controller 1/2/3

Use this item to enable or disable SATA Controllers.

SATA Controller 1/2 Mode Selection

Determines how SATA controller(s) operate.

SATA Controller 1/2/3 ALPM

Use this item to enable or disable Support Aggressive Link Power Management.

SATA Controller 1/2/3 SGPIO Enable

Use this item to enable or disable Serial GPIO for SATA controller.

MSAS_HD0_0/1/2/3, MSAS_HD1_0/1/2/3, MSAS_HD2_0/1/2/3, M2_1(SATA), SATA0/M2_2(SATA), SATA1/2/3

Depending on how many MSAS_HD/SATA/M2 ports to list on the screen, with its status indicated as SATA device [(Model Name)] or [Not Detected].

External SATA
Enable or disable SATA safe removal notifications.

Hot Plug
Enable or disable Hot Plug for specified port.

Spin Up Device
If enabled for any of ports Staggerred Spin Up will be performed and only the drives which have this option enabled will spin up at boot. Otherwise all drives spin up at boot.

SATA Device Type
Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

3.3.5 NVMe Configuration

NVMe Configuration

The NVMe Configuration displays the NVMe controller and Drive information.

Launch NVMe driver

Select this item to enable or disable launch NVMe driver.

3.3.6 ACPI Configuration

PCIE Devices Power On

Allow the system to be waked up by a PCIE device and enable wake on LAN.

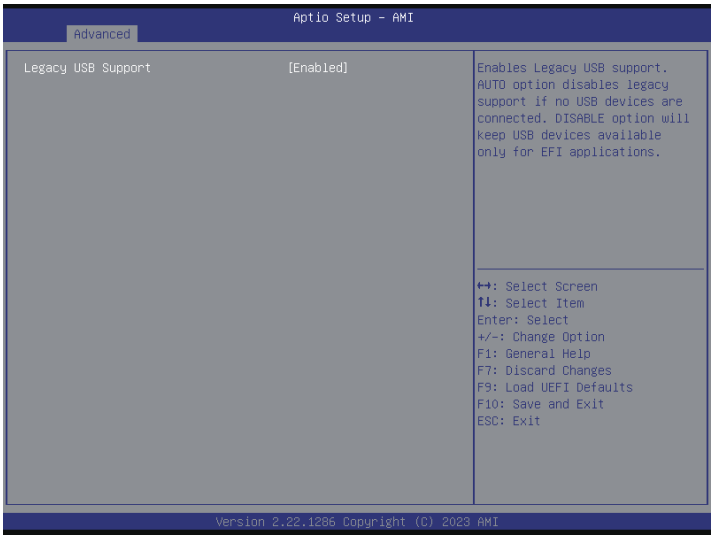
Ring-In Power On

Allow the system to be waked up by onboard COM port modem Ring-In signals.

RTC Alarm Power On

Allow the system to be waked up by the real time clock alarm. Set it to By OS to let it be handled by operating system.

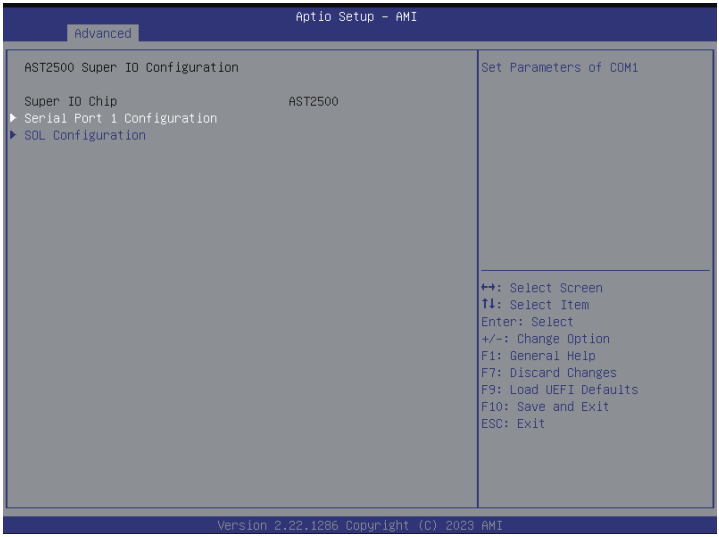
3.3.7 USB Configuration



Legacy USB Support

Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications. This is only available upon the CSM is enabled.

3.3.8 Super IO Configuration



Serial Port 1 Configuration

Use this item to set parameters of COM1.

Serial Port

Use this item to enable or disable the serial port (COM).

Change Settings

Use this item to select an optimal setting for Super IO device.

SOL Configuration

Use this item to set parameters of SOL.

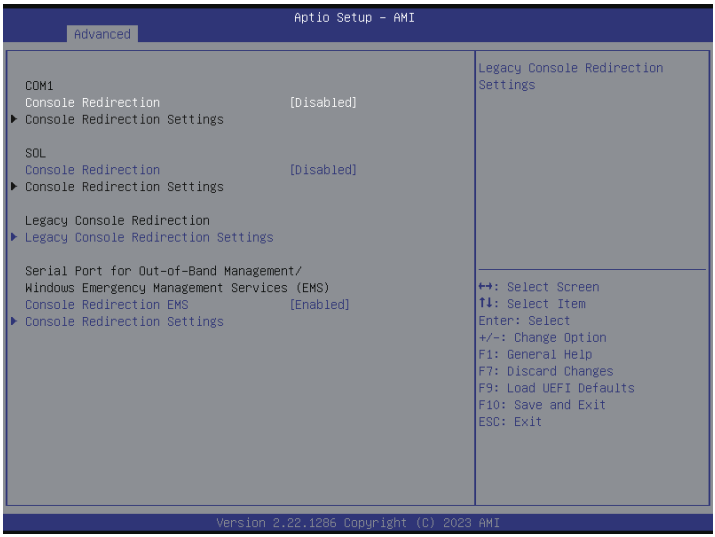
SOL Port

Use this item to enable or disable SOL port.

Change Settings

Use this item to select an optimal setting for Super IO device.

3.3.9 Serial Port Console Redirection



COM1/SOL

Console Redirection

Use this option to enable or disable Console Redirection. If this item is set to Enabled, 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.

Option	Description
VT100	ASCII character set
VT100Plus	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]. A parity bit can be sent with the data bits to detect some transmission errors.Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.
Even: parity bit is 0 if the num of 1's in the data bits is even.
Odd: parity bit is 0 if num of 1's in the data bits is odd.
Mark: parity bit is always 1.
Space: Parity bit is always 0.

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.

The item as below is only available upon the CSM is enabled.

Legacy Console Redirection

Legacy Console Redirection Settings

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

Redirection COM Port

Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.

Resolution

On Legacy OS, the Number of Rows and Columns supported redirection.

Redirect After POST

When Bootloader is selected, then Legacy Console Redirection is disabled before booting to legacy OS. When Always Enable is selected, then Legacy Console Redirection is enabled for legacy OS. Default setting for this option is set to Always Enable.

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

Console Redirection EMS

Use this option to enable or disable Console Redirection. If this item is set to Enabled, 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 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

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], [57600] and [115200].

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], [Hardware RTS/CTS], and [Software Xon/Xoff].

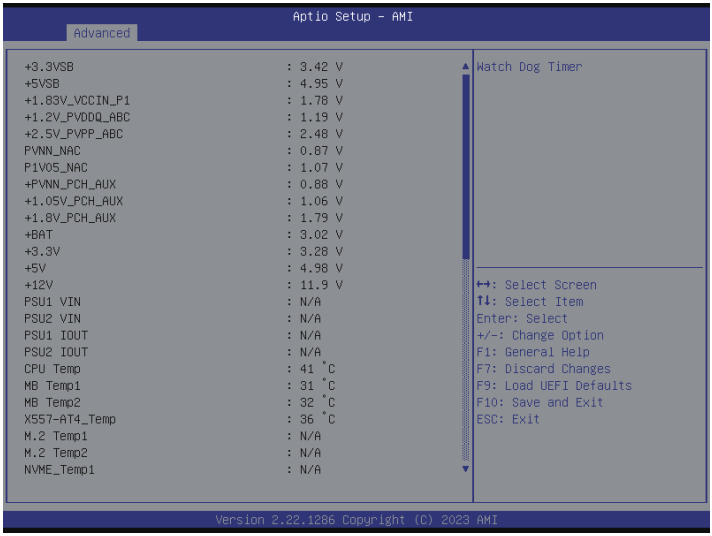
Data Bits

Parity

Stop Bits

3.3.10 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.

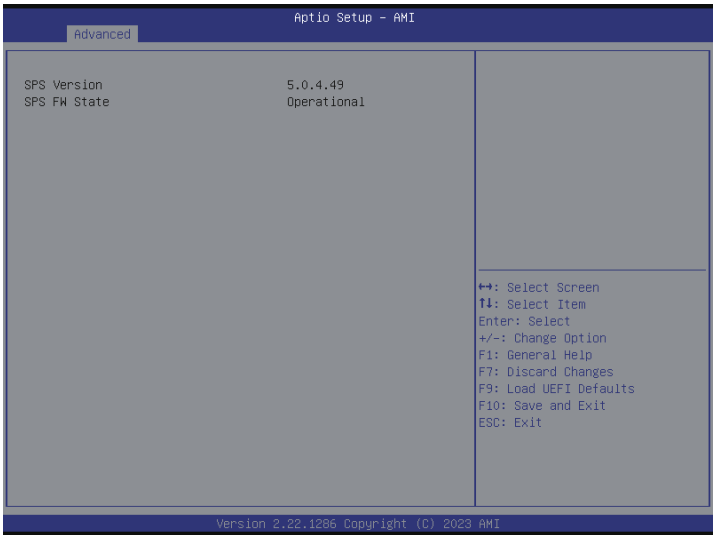


Watch Dog Timer

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

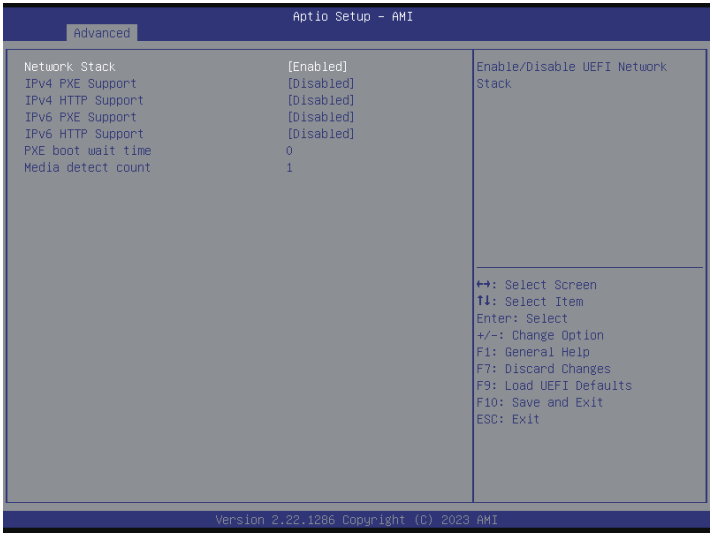
English

3.3.11 Intel SPS Configuration



SPS screen displays the Intel SPS Configuration information, such as Operational Firmware Version and Firmware State.

3.3.12 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.

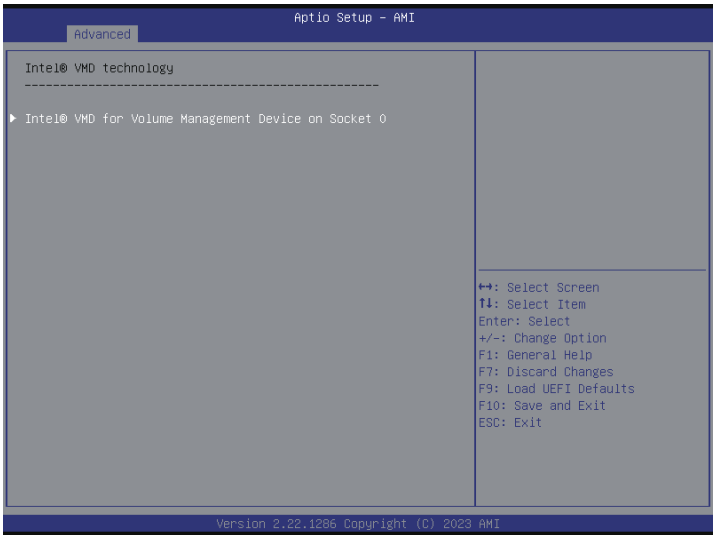
PXE Boot Wait Time

Wait time in seconds to press ESC key to abort the PXE boot.

Media Detect Count

Number of times the presence of media will be checked. Use either +/- or numeric keys to set the value.

3.3.13 Intel(R) VMD Technology



VMD Config for IOU 0 (PCIE7/SLIM2/SLIM1)

Enable/Disable VMD

Use this item to enable or disable VMD Controller. When enabled, the options below appear.

VMD port A

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port B

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

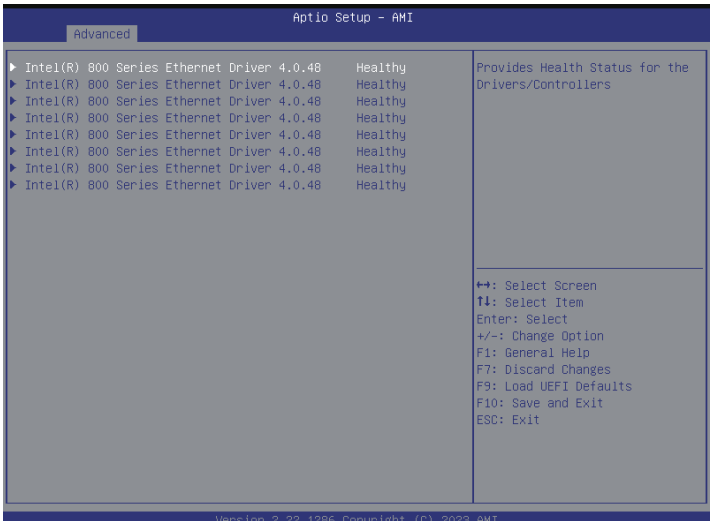
VMD port C

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

VMD port D

Use this item to enable or disable Intel(R) Volume Management Device Technology on specific root port.

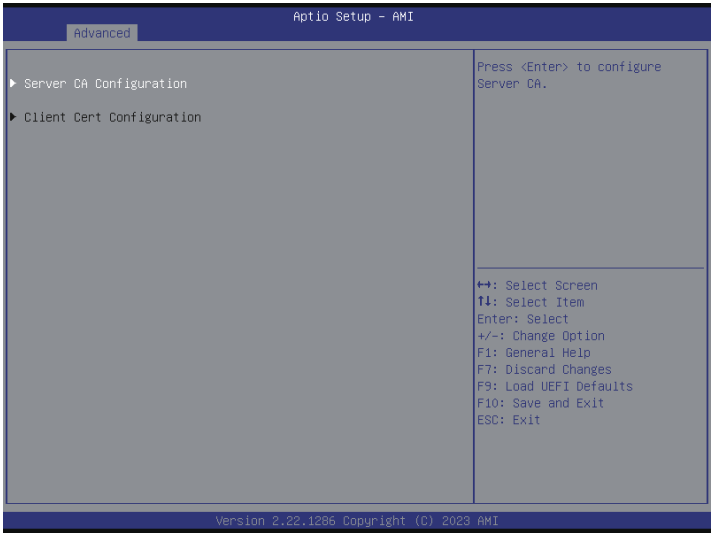
3.3.14 Driver Health



Inter (R) 800 Series Ethernet Driver 4.0.48 Healthy

Provides Health Status for the Drivers/Controllers

3.3.15 Tls Auth Configuration



Server CA Configuration

Press <Enter> to configure Server CA.

Client Cert Configuration

Enroll Cert

Press <Enter> to enroll cert.

Delete Cert

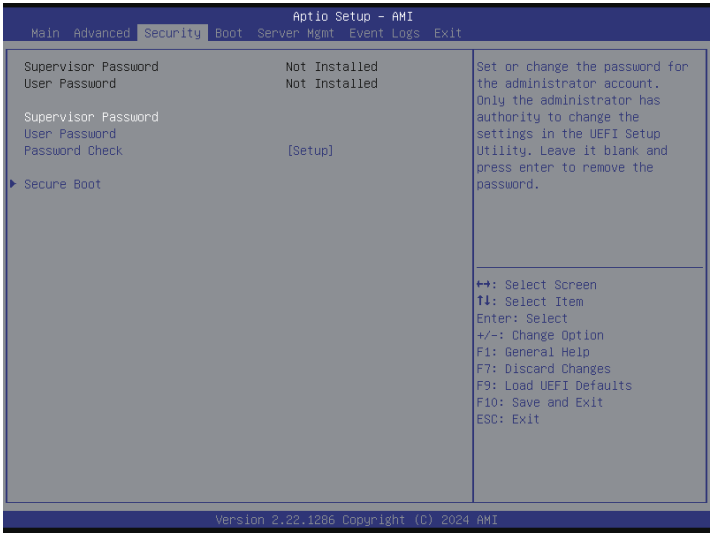
Press <Enter> to delete cert.

3.3.16 Instant Flash

Instant Flash is a UEFI flash utility embedded in Flash ROM. This convenient UEFI update tool allows user to update system UEFI without entering operating systems first like MS-DOS or Windows®. Just save the new UEFI file to the USB flash drive, floppy disk or hard drive and launch this tool, then update 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 the UEFI, and reboot the system after the UEFI update process is completed.

3.4 Security

In this section, set or change the supervisor/user password for the system. User can also clear the user password.



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.

Password Check

Setup: Check password when entering the UEFI Setup Utility.
Always: Check password on every boot.

Secure Boot

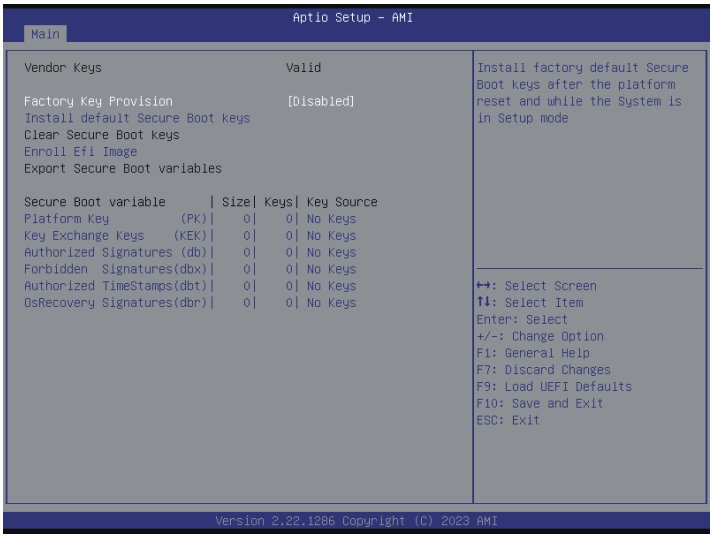
Use this to enable or disable Secure Boot Control. The default value is [Disabled]. Enable to support Windows Server 8 Secure Boot.

Secure Boot Mode

Secure Boot mode selector: Standard/Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

3.4.1 Key Management

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



Factory Key Provision

Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.

Install Default Secure Boot Keys

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

Clear Secure Boot keys

Force System to Setup Mode - clear all Secure Boot Variables. Change takes effect after reboot.

Enroll Efi Image

Allow the image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db).

Export Secure Boot variables

Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device.

Platform Key (PK)

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST

b) EFI_CERT_X509 (DER)

c) EFI_CERT_RSA2048 (bin)

d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Factory, Modified, Mixed

Key Exchange Keys (KEK)

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST

b) EFI_CERT_X509 (DER encoded)

c) EFI_CERT_RSA2048 (bin)

d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Factory, Modified, Mixed

Authorized Signatures (db)

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST

b) EFI_CERT_X509 (DER encoded)

c) EFI_CERT_RSA2048 (bin)

d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Factory, Modified, Mixed

Forbidden Signatures (dbx)

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST

b) EFI_CERT_X509 (DER encoded)

c) EFI_CERT_RSA2048 (bin)

d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Factory, Modified, Mixed

Authorized TimeStamps (dbt)

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST

b) EFI_CERT_X509 (DER encoded)

c) EFI_CERT_RSA2048 (bin)

d) EFI_CERT_SHA256, 384, 512

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Factory, Modified, Mixedt

OsRecovery Signatures (dbr)

Enroll Factory Defaults or load certificates from a file:

1. Public Key Certificate in:

a) EFI_SIGNATURE_LIST

b) EFI_CERT_X509 (DER encoded)

c) EFI_CERT_RSA2048 (bin)

d) EFI_CERT_SHA256, 384, 512

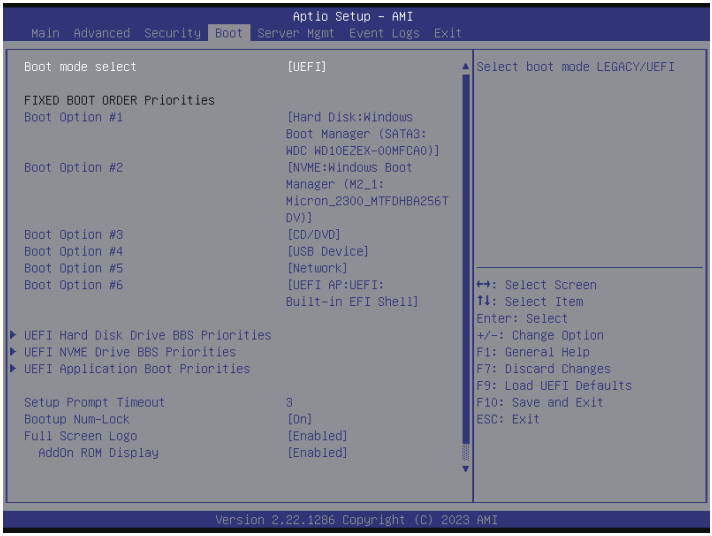
2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, Modified, Mixed, Test

3.5 Boot Screen

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



Boot mode select

This item is only available upon the CSM is enabled. Use this item to select boot mode LEGACY/UEFI.

Boot Option #1/#2/#3/#4/#5/#6

Use this item to set the system boot order.

UEFI Hard Disk Drive BBS Priorities

Specifies the Boot Device Priority sequence from available UEFI Hard Disk Drives.

UEFI CDROM/DVD Drive BBS Priorities

Specifies the Boot Device Priority sequence from available UEFI CDROM/DVD Drives.

UEFI USB Drive BBS Priorities

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

UEFI NETWORK Drive BBS Priorities

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

UEFI NVME Drive BBS Priorities

Specifies the Boot Device Priority sequence from available UEFI NVME 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 Num-Lock

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

Full Screen Logo

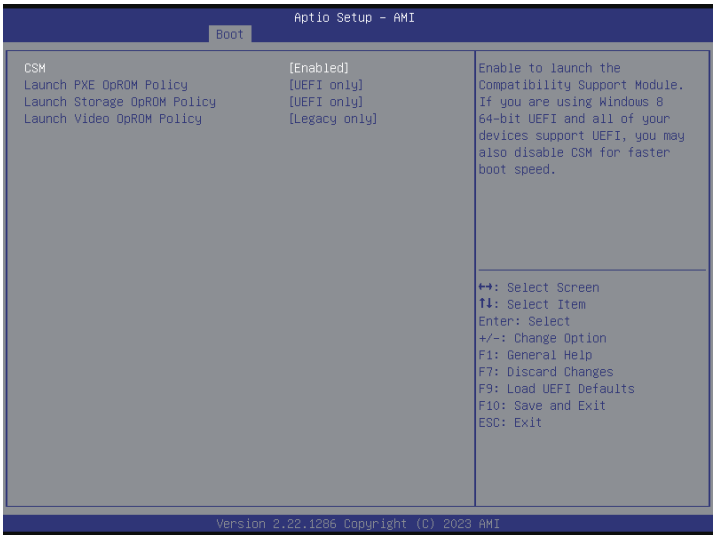
Enable to display the boot logo or disable to show normal POST messages

This item as below is only available upon the CSM is enabled.

AddOn ROM Display

Use this item to set display mode for Option ROM. The default value is [Enabled].

3.5.1 CSM (Compatibility Support Module)



CSM

Enable to launch the Compatibility Support Module. If using Windows 8 64-bit UEFI and all of devices support UEFI, disabling CSM for faster boot speed.

Launch PXE OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

Launch Storage OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

Launch Video OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

3.6 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 255 seconds to initialize Host to BMC interfaces.

3.6.1 BMC Network Configuration

BMC Out of Band Access

Enabled or disabled BMC Out of band Access.

Lan Channel (Failover)

Manual Setting IPMI LAN

If [No] is selected, the IP address is assigned by DHCP. If 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.*

English

The default login information for the IPMI web interface is:
Username: admin
Password: admin

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: http://www.asrockrack.com/support/ipmi.asp

VLAN

Enabled or disabled 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 Priotity setting. the Maximum value is 7 and the Minimum value is 0.

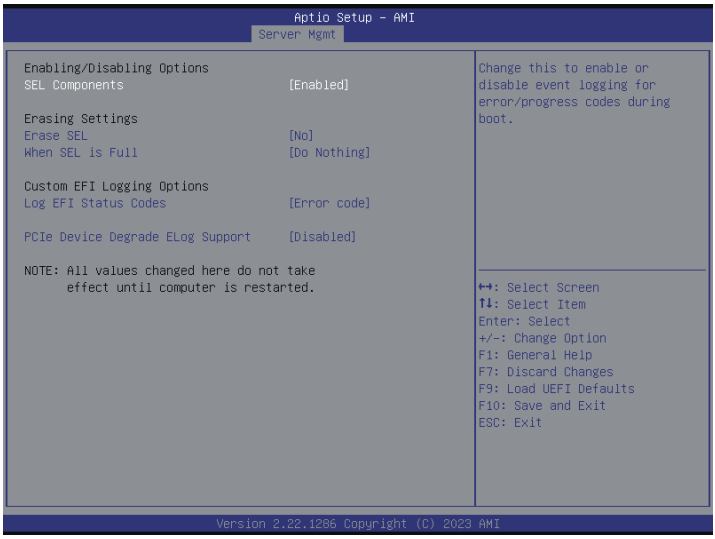
IPV6 Support

Enabled 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.

3.6.2 System Event Log



SEL Components

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

Erase SEL

Use this to choose options for earsing SEL.

When SEL is Full

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

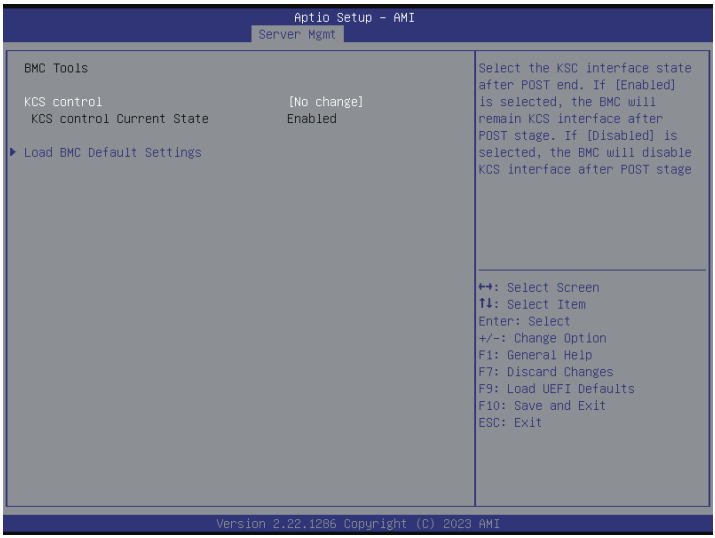
Log EFI Status Codes

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

PCIe Device Degrade ELog Support

Use this item to enable or disable PCIe Device Degrade Error Logging Support.

3.6.3 BMC Tools



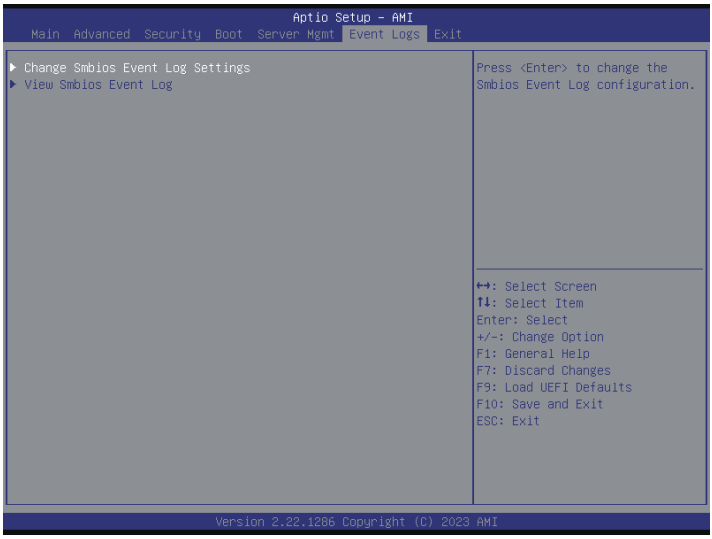
KCS Control

Select this KCS interface state after POST end. If [Enabled] us selected, the BMC will remain KCS interface after POST stage. If [Disabled] is selected, the BMC will disable KCS interface after POST stage

Load BMC Default Settings

Use this item to load BMC default settings.

3.7 Event Logs



Change Smbios Event Log Settings

This allows user to configure the Smbios Event Log Settings.

When entering, the items as below are displayed.

Smbios Event Log
Use this item to enable or disable all features of the SMBIOS Event Logging during system boot.

Erase Event Log
The options include [No], [Yes, Next reset] and [Yes, Every reset]. If Yes is selected, all logged events will be erased.

When Log is Full
Use this item to choose options for reactions to a full Smbios Event Log. The options include [Do Nothing] and [Erase Immediately].

Log System Boot Event
Choose option to enable or disable logging of System boot event.

MECI
MECI (Mutiple Event Count Increment). The number of occurrences of a duplicate event that must pass before the multiple-event counter of log entry is updated. The value renges from 1 to 255.

METW

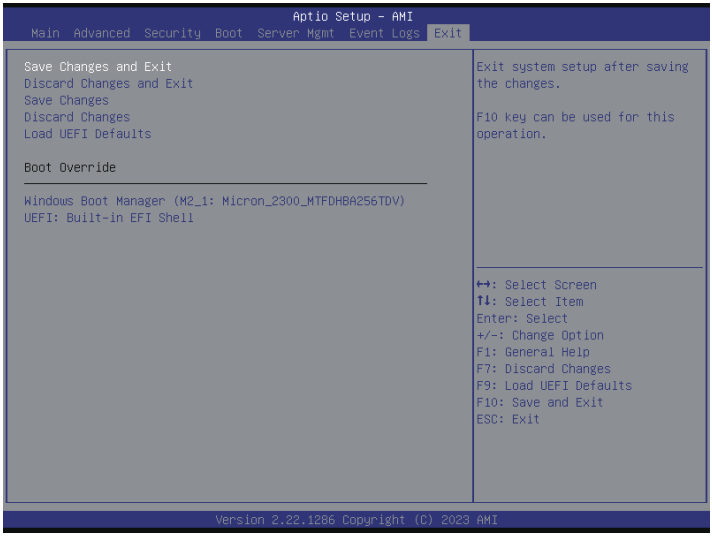
METW (Mutiple Event Time Window). The number of minutes which must pass between duplicate log entries which utilize a multiple-event counter. The value renges from 0 to 99 minutes.

View Smbios Event Log

Press <Enter> to view the Smbios Event Log records.

All values changed here do not take effect until computer is restarted.

3.8 Exit Screen



Save Changes and Exit

When selecting this option, 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 option, 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 option, the following message “Save changes?” will pop-out. Select [Yes] to save all changes.

Discard Changes

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

Load UEFI Defaults

Load UEFI default values for all the setup questions. F9 key can be used for this operation.

Boot Override

These items displays the available devices. Select an item to start booting from the selected device.

Chapter 4 Software Support

After all the hardware has been installed, it suggests to go to the offical website at http://www.ASRockRack.com and make sure if there are any new updates of the BIOS / BMC firmware for the motherboard.

4.1 Download and Install Operating System

This motherboard supports various Microsoft® Windows® Server / Linux compliant operating systems. Please download the operating system from the OS manufacturer. Please refer to the OS documentation for more instructions.

** Please download the Intel® SATA Floppy Image driver from the ASRock Rack's website (www.asrockrack.com) to the USB drive while installing OS in SATA RAID mode.*

4.2 Download and Install Software Drivers

This motherboard supports various Microsoft® Windows® compliant drivers. Please download the required drivers from the website at http://www.ASRockRack.com.

To download necessary drivers, go the product page, click on the "Download" tab, choose the operating system that is used, and then download the using driver.

4.3 Contact Information

Contact ASRock Rack or want to know more about ASRock Rack, welcome to visit ASRock Rack's website at http://www.ASRockRack.com; or contact the 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 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, ECC/non-ECC UDIMM
3. Install more than one DIMM modules that 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 the power supply provides adaquate and stable power.

Other problems...

1. Try searching keywords related to the related 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 the invoice marked with the date of purchase is required. By calling the vendor or going to RMA website (http://event. asrockrack.com/tsd.asp) to 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

ASRock Rack Incorporation

e-mail: ASRockRack_sales@asrockrack.com

ASRock Rack EUROPE B.V.

Bijsterhuizen 11-11
6546 AR Nijmegen
The Netherlands
Phone: +31-24-345-44-33

ASRock Rack America, Inc.

13848 Magnolia Ave, Chino, CA91710 U.S.A.
Phone: +1-909-590-8308
Fax: +1-909-590-1026