Stable and
Reliable Solution

**Server/Workstation**

Motherboard

# SP2C621D32TM3

## User Manual

English

**FC**

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.


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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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**UKCA**

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

**CE**

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.

Please refer to https://www.asrockrack.com/general/about.asp?cat=Responsibility for information disclosure based on regulation requirements ASRock Rack is complied with:

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 **SP2C621D32TM3** 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. You may find the latest memory and CPU support lists on ASRock Rack website as well. ASRock Rack's Website: www.ASRockRack.com*
>
> *If you require technical support related to this motherboard, please visit our website for specific information about the model you are using.*
> *http://www.asrockrack.com/support/*

## 1.1 Package Contents

- ASRock Rack SP2C621D32TM3 Motherboard
  (T-Shape Proprietary Form Factor: 17-in x 19-in, 43.18 cm x 48.26 cm)
- Quick Installation Guide
- 2 x Screws for M.2 Sockets

> ☆ *If any items are missing or appear damaged, contact your authorized dealer.*

English

## 1.2 Specifications

| SP2C621D32TM3 | |
|---|---|
| **Physical Status** | |
| Form Factor | Proprietary T-shape |
| Dimension | 16.8496" x 18.8724"  (427.98 x 479.36 mm) |
| **Processor System** | |
| CPU | Supports 3$^{rd}$ Gen Intel® Xeon® Scalable processors |
| Socket | Dual Socket P+ (LGA 4189) |
| Thermal Design Power (TDP) | 300W |
| Chipset | Intel® C621A |
| **System Memory** | |
| Supported DIMM Quantity | 16+16 DIMM slots (2DPC) |
| Supported Type | DDR4 288-pin RDIMM, LRDIMM, RDIMM/LRDIMM-3DS, Intel® Optane™ Persistent Memory 200 series |
| Max. Capacity per DIMM | RDIMM: up to 64GB |
| | RDIMM-3DS: up to 256GB |
| | LRDIMM: up to 128GB |
| | LRDIMM-3DS: up to 256GB |
| Max. Frequency | max. 3200MHz |
| Voltage | 1.2V |
| **PCIe Expansion Slots (SLOT7 close to CPU)** | |
| SLOT3 | Gen Z 4C+ (PCIe4.0 x16) [CPU2] |
| SLOT2 | Gen Z 8C (PCIe4.0 x32) [CPU2] |
| SLOT1 | Gen Z 8C (PCIe4.0 x32) [CPU1] |
| **Other PCIe Expansion Connectors** | |
| M.2 slot | 2 M-key (PCIe3.0 x4 or SATA 6Gb/s); supports 22110/2280 form factor [PCH] |
| SlimSAS | 2 Slimline (PCIe4.0x8) [CPU1] |
| | 2 Slimline (PCIe4.0x8) [CPU2] |
| *Note* | *SATA DOM will be disabled when M.2 is populated with a SATA device* |
| **SATA/SAS Storage** | |
| PCH Built-in Storage | Intel® C621A (10 SATA 6Gb/s, support RAID 0/1/5/10): |
| | 2 Mini-SAS HD, 2 SATA DOM or 2 M.2 |
| **Ethernet** | |
| Additional Ethernet Controller | 2 RJ45 (1GbE) by Intel® i350-AM2 |
| OCP slot | OCP NIC 3.0 (PCIe4.0 x16) [CPU1] |
| **USB** | |
| Connectors/headers | External: |
| | 2 Type-A (USB3.2 Gen1) |
| | Internal: |
| | 1 Type-A (USB3.2 Gen1) |

| | |
|---|---|
| | 1 header (26-pin, 1 USB3.2 Gen1 and 1 USB2.0) |
| | 1 header (19-pin, 2 USB3.2 Gen1) |
| | 1 header (9-pin, 2 USB2.0) |
| **Graphics** | |
| Controller | ASPEED AST2500: |
| | 1 DB15 (VGA), 1 (15-pin header) |
| **Security** | |
| TPM | 1 (13-pin, SPI) |
| **Rear I/O** | |
| UID button/LED | 1 UID button w/ LED |
| Video output | 1 DB15 (VGA) |
| Serial port | 1 RJ45 (COM) |
| USB | 2 Type-A (USB3.2 Gen1) |
| RJ45 | 2 RJ45(1GbE), 1 dedicated IPMI |
| **Hardware Monitor** | |
| Temperature | CPU, PCH, MB, Card side Temperature Sensing |
| Fan | CPU/Rear/Front Fan Tachometer |
| | CPU Quiet Fan (Allow Chassis Fan Speed Auto-Adjust by CPU Temperature) |
| | CPU/Rear/Front Fan Multi-Speed Control |
| Voltage | CPU1_PVCCIN, CPU2_PVCCIN, PVDDQ_ABCD,PVDDQ_EFGH,PVDDQ_IJKL,PVDDQ_MNOP, 1.05V_PCH,1.8V_PCH, +BAT,PVNN_PCH, 3.3V,5V,12V,3.3VSB, 5VSB |
| **Server Management** | |
| BMC Controller | ASPEED AST2500: iKVM, vMedia support |
| IPMI Dedicated GLAN | 1 RJ45 Dedicated IPMI LAN port by Realtek RTL8211E |
| **System BIOS** | |
| BIOS type | AMI 256Mb SPI Flash ROM |
| Features | Plug and Play, ACPI 4.0 and above compliance wake up events, SMBIOS 3.3 and above, ASRock Rack Instant Flash |
| **Internal Connectors/Headers** | |
| PSU connector | 2 (CRPS IN +12V/+12VSB, max. 2700W) |
| Other power connector | 3 (2x2 pin, 12V) for GPU cards, 1 (2x2 pin, 12V,5V) for HDD, 2 (3-pin) for SATA DOM, 1 (2x6 pin, 12V) + 1 (2x2 pin, 12V) for HSBP |
| System panel header | 1 (26-pin): System fault LED, locate, SMBus, power switch, reset switch, system power LED, HDD activity LED, LAN LED |
| NMI button | 1 |
| VGA header | 1 |
| Buzzer | 1 |
| Fan header | 6 (2x3-pin) for 2U system, 8 (2x4pin) for 1U system |

3

| TPM header | 1 (13-pin, SPI) |
|---|---|
| VROC header | 1 |
| SGPIO header | 1 |
| HSBP | 2 |
| SMbus header | 3 |
| PMbus header | 1 |
| IPMB header | 1 |
| Clear CMOS | 1 (contact pads) |
| ME manufacture mode header | 1 |
| **LED Indicators** | |
| Standby Power LED | 1 (3.3VSB) |
| 80 debug port LED | 1 |
| Fan Fail LED | 8 |
| BMC Heartbeat LED | 1 |
| CPU catter LED | 1 |
| HDD LED | 1 |
| **Support OS** | |
| OS | Microsoft® Windows® |
| | Server 2016 (64 bit) |
| | Server 2019 (64 bit) |
| | Server 2022 (64 bit) |
| | |
| | Linux |
| | Red Hat Enterprise Linux Server 7.9 (64 bit) / 8.5 (64 bit) |
| | CentOs 7.9 (64 bit) / 8.5 (64 bit) |
| | SUSE Enterprise Linux Server 15 SP2 (64 bit) / 15 SP3 (64 bit) |
| | Ubuntu 20.04.2 (64 bit) / 21.04 ( 64 bit) / 21.10 ( 64 bit) |
| | |
| | Hypervisor: |
| | VMWare® ESXi 6.7.0 U3 / vSphere 6.7.0 U3 |
| | VMWare® ESXi 7.0 U3d / vSphere 7.0 U3d |
| | Hyper-V Windows® Server 2016 |
| | Hyper-V Windows® Server 2019 |
| | |
| | *Please refer to our website for the latest OS support list.* |
| **Enviroment** | |
| Operating temperature | 10 - 35°C (50 - 95 degF) |
| Non-operating temperature | -40 - 70°C (-40 - 158degF) |

*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 you install Intel® LAN utility or Marvell SATA utility, this motherboard may fail Windows® Hardware Quality Lab (WHQL) certification tests. If you install 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 you to update system BIOS without entering operating systems first like MS-DOS or Windows*. With this utility, you can 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 your USB flash drive, floppy disk or hard drive, then you can update your 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 Motionerboard Layout
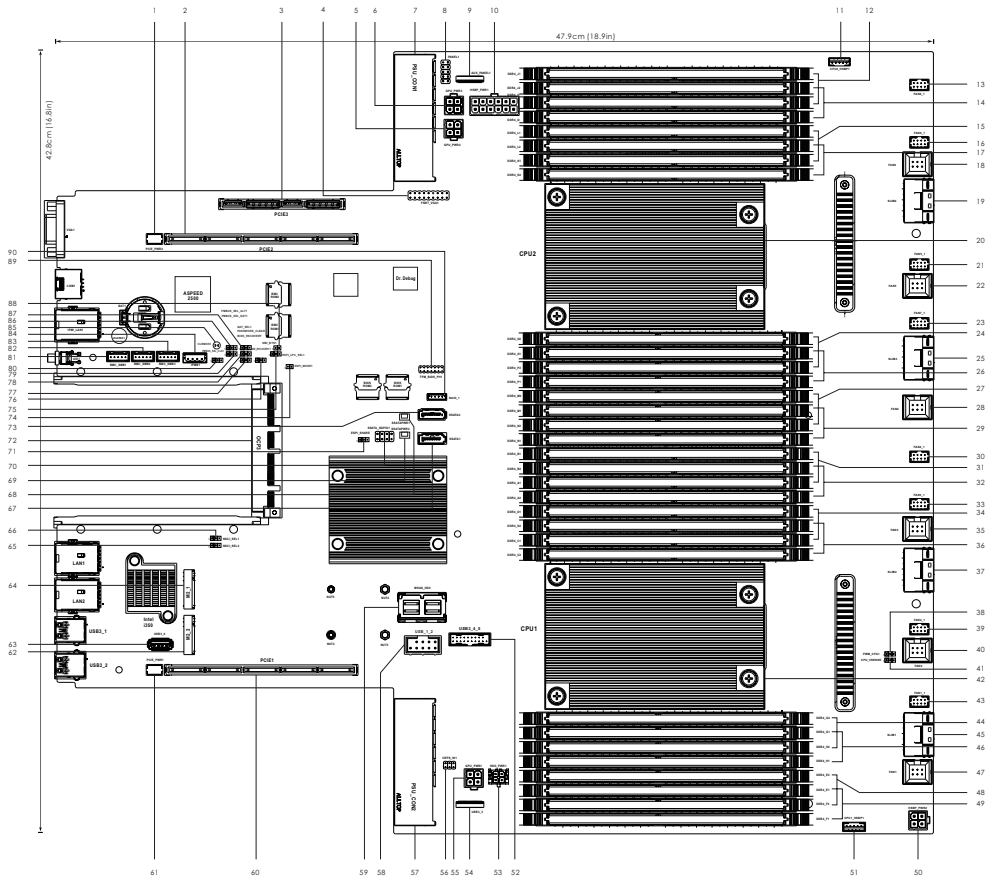
| No. | Description |
|-----|-------------|
| 1 | PCIE Power Connector  (PCIE_PWR2) |
| 2 | PCIE 4.0 x32 Slot  (PCIE2) |
| 3 | PCIE 4.0 x16 Slot  (PCIE3) |
| 4 | Front VGA Header  (FRONT_VGA1) |
| 5 | GPU Power Connector  (GPU_PWR2) |
| 6 | GPU Power Connector  (GPU_PWR3) |
| 7 | Power Supply Unit Connector  (PSU_CON1) |
| 8 | System Panel Header  (PANEL1) |
| 9 | Auxiliary Panel Header  (AUX_PANEL1) |
| 10 | HDD Backplane Power Connector (HSBP_PWR1) |
| 11 | Backplane PCI Express Hot-Plug Connector  (CPU2_HSBP1) |
| 12 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_I1, DDR4_J1)* |
| 13 | System Fan Connector  (FAN8_1) *(for 1U system)* |
| 14 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_I2, DDR4_J2)* |
| 15 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_K1, DDR4_L1)* |
| 16 | System Fan Connector  (FAN6_1) *(for 1U system)* |
| 17 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_K2, DDR4_L2)* |
| 18 | System Fan Connector  (FAN6) *(for 2U system)* |
| 19 | Slimline x8 Connector (SLIM4) |
| 20 | LGA 4189 CPU Socket (CPU2) |
| 21 | System Fan Connector  (FAN5_1) *(for 1U system)* |
| 22 | System Fan Connector  (FAN5) *(for 2U system)* |
| 23 | System Fan Connector  (FAN7_1) *(for 1U system)* |
| 24 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_O2, DDR4_P2)* |
| 25 | Slimline x8 Connector (SLIM3) |
| 26 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_O1, DDR4_P1)* |
| 27 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_M2, DDR4_N2)* |
| 28 | System Fan Connector (FAN4) *(for 2U system)* |
| 29 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_M1, DDR4_N1)* |
| 30 | System Fan Connector  (FAN4_1) *(for 1U system)* |
| 31 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_A1, DDR4_B1)* |
| 32 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_A2, DDR4_B2)* |
| 33 | System Fan Connector  (FAN3_1) *(for 1U system)* |
| 34 | 2 x 288-pin  DDR4  DIMM  Slots (DDR4_C1, DDR4_D1)* |
| 35 | System Fan Connector  (FAN3) *(for 2U system)* |

| No. | Description |
|-----|-------------|
| 36 | 2 x 288-pin DDR4 DIMM Slots (DDR4_E2, DDR4_F2)* |
| 37 | Slimline x8 Connector (SLIM2) |
| 38 | PWM Configuration Header (PWM_CFG1) |
| 39 | System Fan Connector (FAN2_1) *(for 1U system)* |
| 40 | System Fan Connector (FAN2) *(for 2U system)* |
| 41 | CPU VSENSE Header (CPU_VSENSE) |
| 42 | LGA 4189 CPU Socket (CPU1) |
| 43 | System Fan Connector (FAN1_1) *(for 1U system)* |
| 44 | 2 x 288-pin DDR4 DIMM Slots (DDR4_G2, DDR4_H2)* |
| 45 | Slimline x8 Connector (SLIM1) |
| 46 | 2 x 288-pin DDR4 DIMM Slots (DDR4_G1, DDR4_H1)* |
| 47 | System Fan Connector (FAN1) *(for 2U system)* |
| 48 | 2 x 288-pin DDR4 DIMM Slots (DDR4_E2, DDR4_F2)* |
| 49 | 2 x 288-pin DDR4 DIMM Slots (DDR4_E1, DDR4_F1)* |
| 50 | HDD Backplane Power Connector (HSBP_PWR2) |
| 51 | Backplane PCI Express Hot-Plug Connector (CPU1_HSBP1) |
| 52 | USB 3.2 Gen1 Header (USB3_5_6) |
| 53 | HDD Power Connector (HDD_PWR1) |
| 54 | Front USB 3.2 Gen1 Header (USB3_3) |
| 55 | GPU Power Connector (GPU_PWR1) |
| 56 | PDB Power Connector (CRPS_IN1) |
| 57 | Power Supply Unit Connector (PSU_CON2) |
| 58 | USB 2.0 Header (USB_1_2) |
| 59 | MiniSAS HD Connector (MSAS_HD0) |
| 60 | PCIE 4.0 x32 Slot (PCIE1) |
| 61 | PCIE Power Connector (PCIE_PWR1) |
| 62 | M.2 Socket (M2_2) (Type 2280/22110) |
| 63 | Vertical Type A USB 3.2 Gen1 Connector (USB3_6) |
| 64 | M.2 Socket (M2_1) (Type 2280/22110) |
| 65 | NCSI Mode Jumper (NCSI_SEL2) |
| 66 | NCSI Mode Jumper (NCSI_SEL1) |
| 67 | SATA DOM Connector (SSATA1) |
| 68 | SATA DOM Power Connector (SSATAPWR1) |
| 69 | SATA DOM Power Connector (SSATAPWR2) |

English

| No. | Description |
|-----|-------------|
| 70 | SATA SGPIO Connector (SSATA_SGPIO1) |
| 71 | ESPI Flash Sharing Jumper (ESPI_SHARE) |
| 72 | OCP 3.0 Gen4 x16 Mezzanine Card Slot (OCP3) |
| 73 | SATA DOM Connector (SSATA0) |
| 74 | BIOS Swap Override Header (ESPI_MODE1) |
| 75 | ESPI/LPC Selection Jumper (ESPI_LPC_SEL1) |
| 76 | ME Recovery Jumper (ME_RECOVERY1) |
| 77 | BIOS Recovery Jumper (BIOS_RECOVERY1) |
| 78 | Password Reset Jumper (PASSWORD_CLEAR) |
| 79 | PMBUS Mode Jumper (PMBUS_SEL_DAT1) |
| 80 | PMBUS Mode Jumper (PMBUS_SEL_CLK1) |
| 81 | BMC SMBus Header (BMC_SMB1) |
| 82 | BMC SMBus Header (BMC_SMB2) |
| 83 | BMC SMBus Header (BMC_SMB3) |
| 84 | Intelligent Platform Management Bus Header (IPMB1) |
| 85 | Clear CMOS Pad (CLRMOS1) |
| 86 | PMBUS Mode Jumper (PMBUS_SEL_ALT1) |
| 87 | QAT Mode Jumper (QAT_SEL) |
| 88 | Non Maskable Interrupt Button (NMI_BTN1) |
| 89 | TPM-SPI Header (TPM_BIOS_PH1) |
| 90 | Virtual RAID On CPU Header (RAID_1) |

\* *For DIMM installation and configuration instructions, please see p.20 (Installation of Memory Modules (DIMM)) for more details.*

## 1.5 Onboard LED Indicators
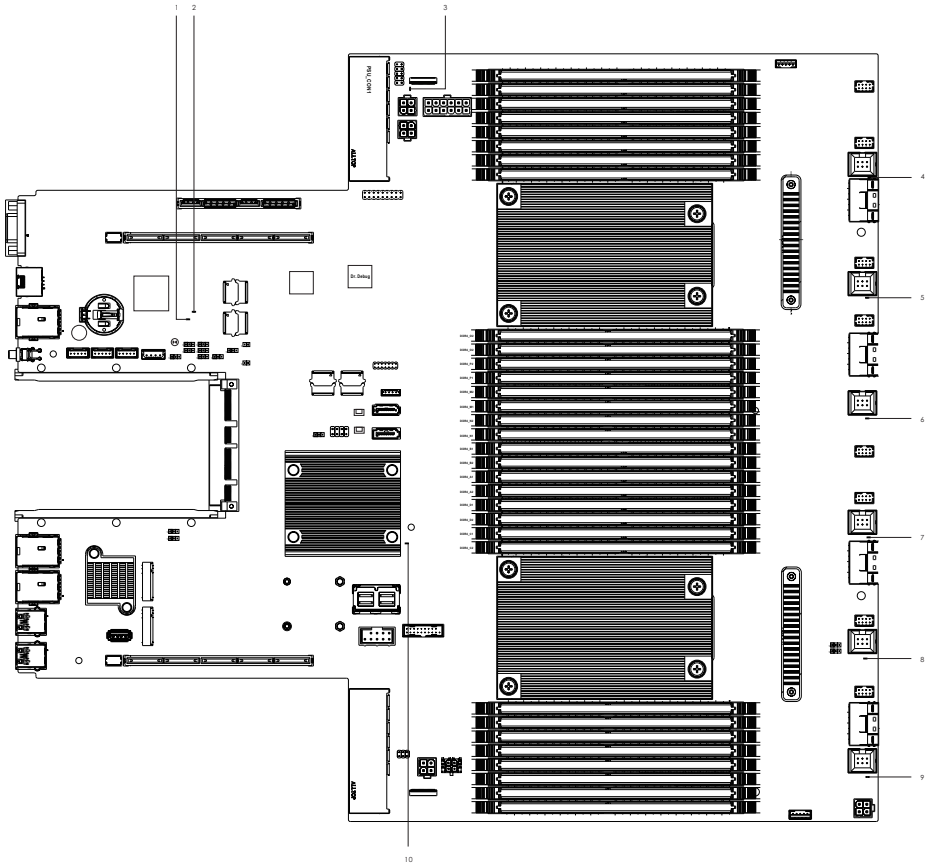
| No. | Item | Status | Description |
|-----|------|--------|-------------|
| 1 | BLED | Green | BMC heartbeat LED |
| 2 | LED_CATERR1 | Red | CPU CATERR error |
| 3 | HDD_LED | Green | HDD activity LED |
| 4 | SYS_FAN_LED6 | Red | FAN6_1 failed |
| 5 | SYS_FAN_LED5 | Red | FAN5_1failed |
| 6 | SYS_FAN_LED4 | Red | FAN4_1 failed |
| 7 | SYS_FAN_LED3 | Red | FAN3_1 failed |
| 8 | SYS_FAN_LED2 | Red | FAN2_1 failed |
| 9 | SYS_FAN_LED1 | Red | FAN1_1 failed |
| 10 | SB_PWR1 | Green | STB PWR ready |

## 1.6 I/O Panel
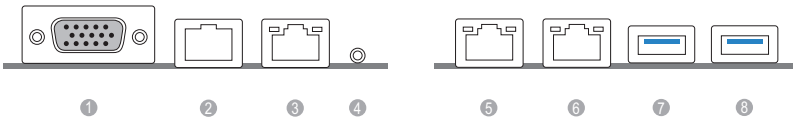
| No. | Description | No. | Description |
|-----|-------------|-----|-------------|
| 1 | VGA Header (VGA1) | 5 | 1G LAN RJ-45 Port (LAN1)** |
| 2 | Serial Port (RJ45) (COM1) | 6 | 1G LAN RJ-45 Port (LAN2)** |
| 3 | IPMI LAN Header (IPMI_LAN1)* | 7 | USB 3.2 Gen1 Port  (USB3_2) |
| 4 | UID Switch (UID) | 8 | USB 3.2 Gen1 Port  (USB3_1) |

**LAN Port LED Indications**

*There are two LED next to the LAN port. Please refer to the table below for the LAN port LED indications.

ACT/LINK LED
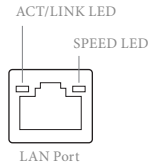
SPEED LED

LAN Port

**Dedicated IPMI LAN Port LED Indications**

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

\*There are two LED next to the LAN port. Please refer to the table below for the LAN port LED indications.

ACT/LINK LED
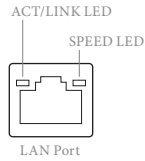
SPEED LED

LAN Port

**1G LAN Port (LAN1, LAN2) LED Indications**

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

## 1.7  Block Diagram
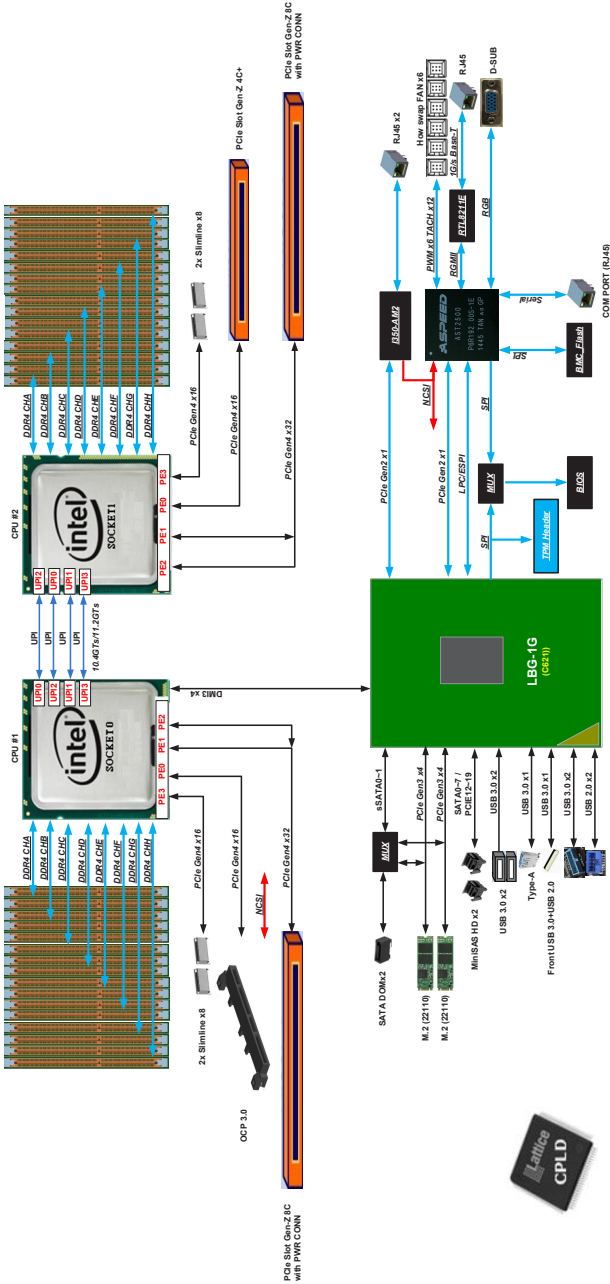
# Chapter 2 Installation

This is a T-Shape Proprietary form factor (17" x 19", 43.18 cm x 48.26 cm) motherboard. Before you install the motherboard, study the configuration of your 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 to you and damages to motherboard components.*

## 2.1 Screw Holes

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

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

## 2.2 Pre-installation Precautions

Take note of the following precautions before you install 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 your motherboard directly on the carpet or the like. Also remember to use a grounded wrist strap or touch a safety grounded object before you handle the components.
3. Hold components by the edges and do not touch the ICs.
4. Whenever you 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 you install or remove 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 and Heatsink

☆ 1. *Before you insert the CPU into the socket, please check if the PnP cap is on the socket, if the CPU surface is unclean, or if there are any bent pins in the socket. Do not force to insert the CPU into the socket if above situation is found. Otherwise, the CPU will be seriously damaged.*
2. *Unplug all power cables before installing the CPU.*

**①**
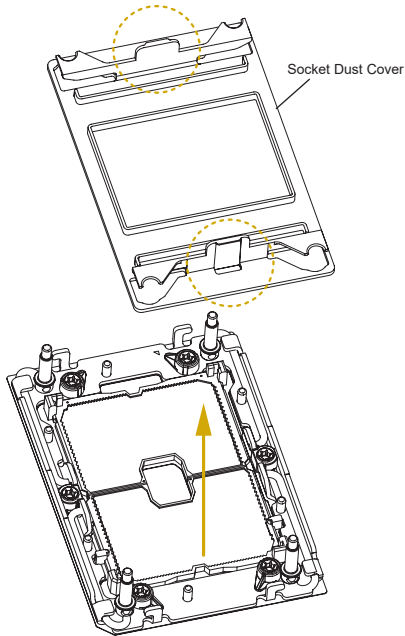
Socket Dust Cover

**2**



CPU Carrier

**3**

4

5

**180º**

**6**



**7**

CPU Carrier

8



Heatsink

CPU Carrier

Socket
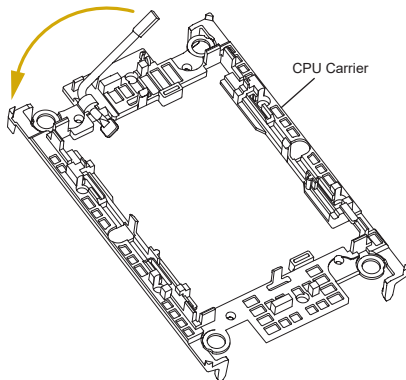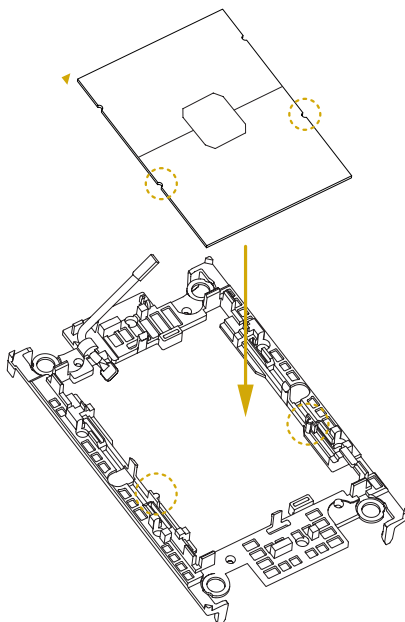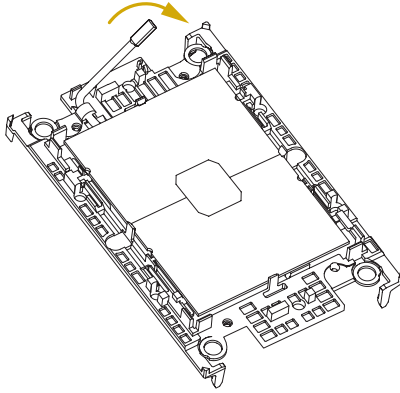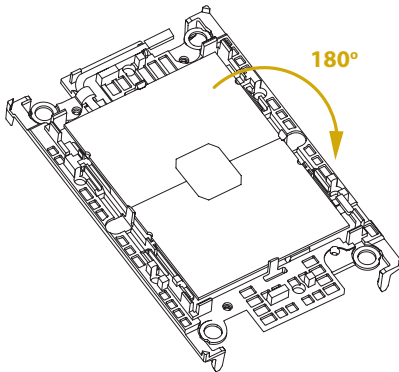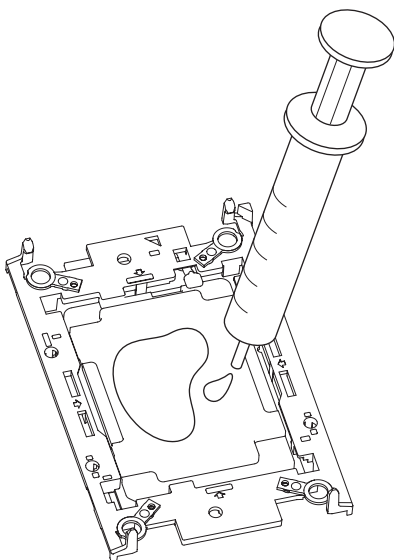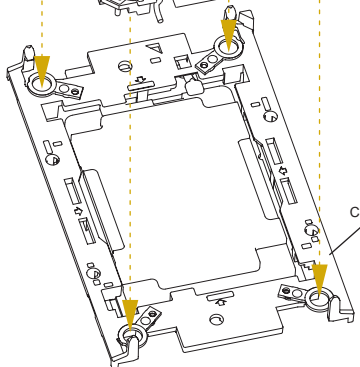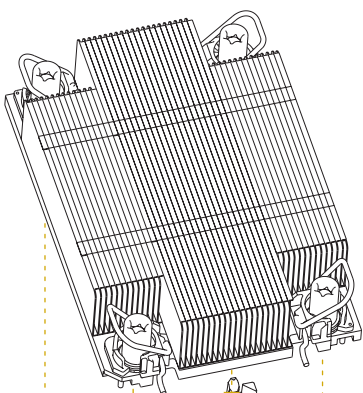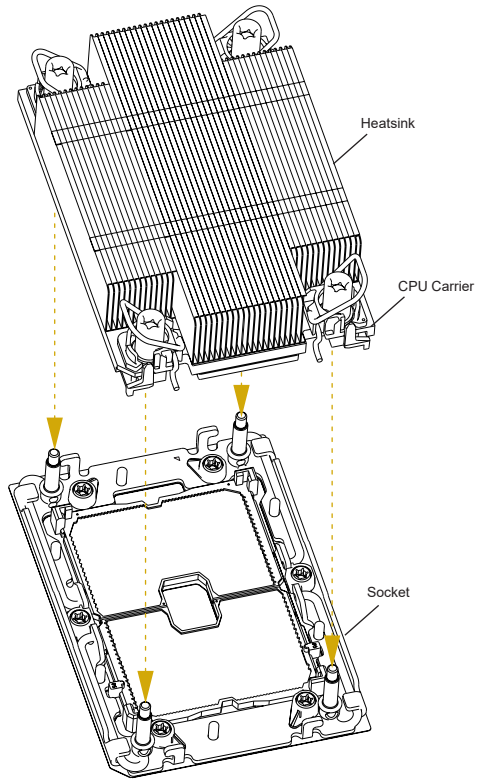
**9**
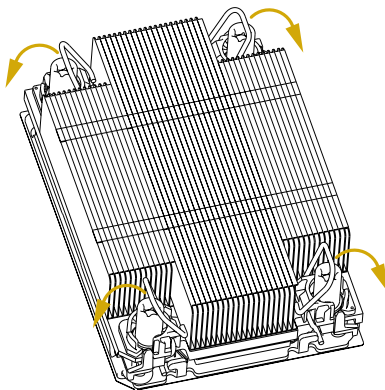
**10**
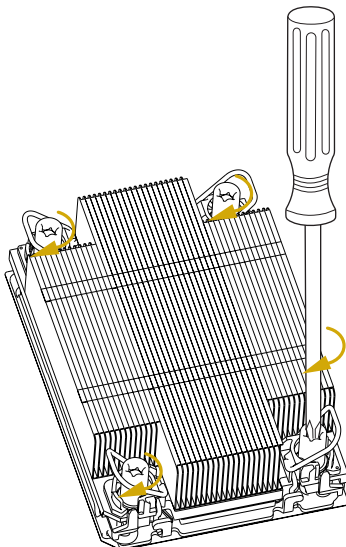
## 2.4 Installation of Memory Modules (DIMM)

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

| CPU1 | CPU2 |
| --- | --- |
| DDR4_A1, B1, C1, D1, E1, F1, G1 H1 (Blue) | DDR4_I2, J2, K2, L2, M1, N1, O1, P1 (Blue) |
| DDR4_A2, B2, C2, D2, E2, F2, G2, H2 (White) | DDR4_I1, J1, K1, L1, M2, N2, O2, P2 (White) |

☆
1. *For Eight channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR4 DIMM groups.*
2. *Eight Channel Memory Technology is enabled only when 8 or 16 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.*

English

### 2.4.1 DIMM Population for DDR4

The following is the recommended memory population for installing all volatile DDR4 memory modules, without mixing any Intel Persistent Memory 200 series (BPS).

### Recommended Memory Configurations

**1 CPU Configurations (DDR4)**

| | | DIMM(S) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 4 | 6 | 8 | 12 | 16 |
| CPU1 | A1 | | # | # | # | # | # | # |
| | B1 | # | | | # | # | # | # |
| | C1 | | | # | # | # | # | # |
| | D1 | | | | | # | | # |
| | E1 | | # | # | # | # | # | # |
| | F1 | | | | # | # | # | # |
| | G1 | | | # | # | # | # | # |
| | H1 | | | | | # | | # |
| | A2 | | | | | | # | # |
| | B2 | | | | | | # | # |
| | C2 | | | | | | # | # |
| | D2 | | | | | | | # |
| | E2 | | | | | | # | # |
| | F2 | | | | | | # | # |
| | G2 | | | | | | # | # |
| | H2 | | | | | | | # |

The symbol # indicates the slot is populated.

**2 CPU Configurations (DDR4)**

|       |     | DIMM(S) | | | | | | |
| ----- | --- | --- | --- | --- | --- | --- | --- | --- |
|       |     | 1 | 2 | 4 | 6 | 8 | 12 | 16 |
| CPU1  | A1  |   | # | # | # | # | # | # |
|       | B1  | # |   |   | # | # | # | # |
|       | C1  |   |   | # | # | # | # | # |
|       | D1  |   |   |   |   | # |   | # |
|       | E1  |   | # | # | # | # | # | # |
|       | F1  |   |   |   | # | # | # | # |
|       | G1  |   |   | # | # | # | # | # |
|       | H1  |   |   |   |   | # |   | # |
|       | A2  |   |   |   |   |   | # | # |
|       | B2  |   |   |   |   |   | # | # |
|       | C2  |   |   |   |   |   | # | # |
|       | D2  |   |   |   |   |   |   | # |
|       | E2  |   |   |   |   |   | # | # |
|       | F2  |   |   |   |   |   | # | # |
|       | G2  |   |   |   |   |   | # | # |
|       | H2  |   |   |   |   |   |   | # |

| | | DIMM(S) | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 4 | 6 | 8 | 12 | 16 |
| CPU2 | I1 | | # | # | # | # | # | # |
| | J1 | # | | | # | # | # | # |
| | K1 | | | # | # | # | # | # |
| | L1 | | | | | # | | # |
| | M1 | | # | # | # | # | # | # |
| | N1 | | | | # | # | # | # |
| | O1 | | | # | # | # | # | # |
| | P1 | | | | | # | | # |
| | I2 | | | | | | # | # |
| | J2 | | | | | | # | # |
| | K2 | | | | | | # | # |
| | L2 | | | | | | | # |
| | M2 | | | | | | # | # |
| | N2 | | | | | | # | # |
| | O2 | | | | | | # | # |
| | P2 | | | | | | | # |

## 2.4.2 DIMM Population for DDR4 and BPS

The following is the recommended memory population for installing Intel Persistent Memory 200 series (BPS) memory modules with DDR4 DIMMs:

**1 CPU Configuration (DDR4+BPS)**

| DDR4 + BPS | CPU1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 |
| 4 DDR4 + 4 BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS |
| 6 DDR4 + 1 BPS | DDR4 | DDR4 | DDR4 | BPS | DDR4 | DDR4 | DDR4 | N/A |

**2 CPU Configuration (DDR4+BPS)**

| CPU1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DDR4 + BPS | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 |
| 8 DDR4 + 8 BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS |
| 12 DDR4 + 2 BPS | DDR4 | DDR4 | DDR4 | BPS | DDR4 | DDR4 | DDR4 | N/A |

| CPU2 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DDR4 + BPS | I1 | J1 | K1 | L1 | M1 | N1 | O1 | P1 |
| 8 DDR4 + 8 BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS |
| 12 DDR4 + 2 BPS | DDR4 | DDR4 | DDR4 | BPS | DDR4 | DDR4 | DDR4 | N/A |
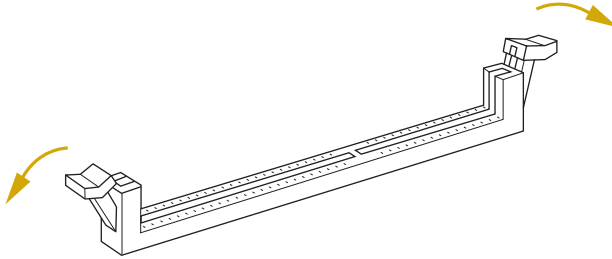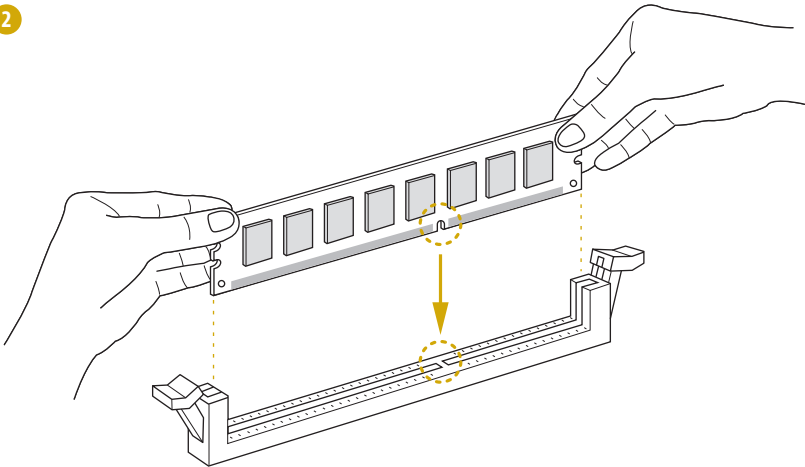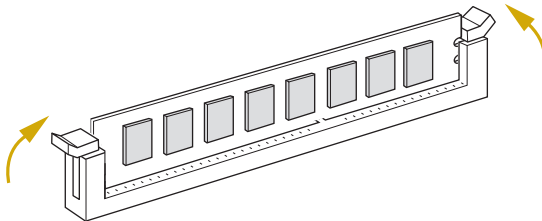
## 2.5 Expansion Slots (PCI and PCI Express Slots)

There are 3 PCI Express slots on this motherboard.

### PCIE slot:

PCIE1 (PCIE 4.0 x32 slot, from CPU1) is used for PCI Express x32 lane width cards.
PCIE2 (PCIE 4.0 x32 slot, from CPU2) is used for PCI Express x32 lane width cards.
PCIE3 (PCIE 4.0 x16 slot, from CPU2) is used for PCI Express x16 lane width cards.

| Slot | Generation | Mechanical | Electrical | Source |
|------|-----------|-----------|-----------|--------|
| PCIE 3 | 4.0 | x16 | x16 | CPU2 |
| PCIE 2 | 4.0 | x32 | x32 | CPU2 |
| PCIE 1 | 4.0 | x32 | x32 | CPU1 |

### 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 you start the installation.

Step 2.     Remove the system unit cover (if your motherboard is already installed in a chassis).

Step 3.     Remove the bracket facing the slot that you intend 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.

Short          Open
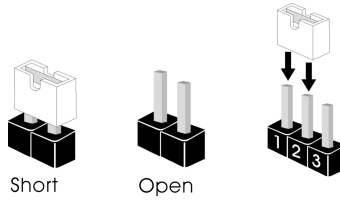
| | | |
|---|---|---|
| ME Recovery Jumper<br>(3-pin ME_RECOVERY1)<br>(see p.7,  No. 76) | **1_2**<br>Normal Mode (Default) | **2_3**<br>ME Recovery Mode |
| PMBUS Mode Jumper<br>(3-pin  PMBUS_SEL_CLK1)<br>(see p.7, No. 80)<br>(3-pin  PMBUS_SEL_DAT1)<br>(see p.7, No. 79)<br>(3-pin PMBUS_SEL_ALT1)<br>(see p.7, No. 86) | **1_2**<br>PMBus connected to BMC<br>(Default) | **2_3**<br>PMBus connected to PCH |
| Password Reset Jumper<br>(3-pin  PASSWORD_<br>CLEAR)<br>(see p.7,  No. 78) | **1_2**<br>Normal Mode (Default) | **2_3**<br>Password Clear |
| BIOS Recovery Jumper<br>(3-pin BIOS_RECOVERY1)<br>(see p.7,  No. 77) | **1_2**<br>Normal Mode (Default) | **2_3**<br>Recover BIOS |

English

| | | |
|---|---|---|
| ESPI/LPC Selection Jumper (3-pin ESPI_LPC_SEL1) (see p.7, No. 75) | **1_2** ESPI | **2_3** LPC (Default) |

| | | |
|---|---|---|
| ESPI Flash Sharing Jumper (3-pin ESPI_SHARE) (see p.7, No. 71) | **1_2** Master ESPI Flash Sharing (Default) | **2_3** Slave ESPI Flash Sharing |

| | | |
|---|---|---|
| QAT Mode Jumper (3-pin QAT_SEL) (see p.7, No. 87) | **1_2** QAT Asymmetric (Default) | **2_3** QAT Symmetric |

| | | |
|---|---|---|
| NCSI Mode Jumper (3-pin NCSI_SEL1) (see p.7, No. 66) | **2_3** | NCSI is set to onboard LAN (Default) |
| | + | |
| NCSI Mode Jumper (3-pin NCSI_SEL2) (see p.7, No. 65) | **2_3** | |

| | | |
|---|---|---|
| NCSI Mode Jumper (3-pin NCSI_SEL1) (see p.7, No. 66) | **1_2** | NCSI is set to OCP3.0 |
| | + | |
| NCSI Mode Jumper (3-pin NCSI_SEL2) (see p.7, No. 65) | **2_3** | |
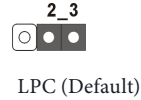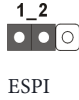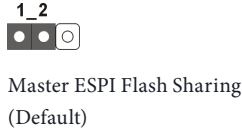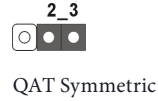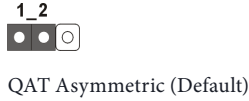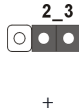
The illustration shows how jumpers are setup. When the jumper cap is placed on the pins, the jumper is "Short". If no jumper cap is placed on the pins, the jumper is "Open".
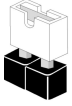
Short          Open

| BIOS Swap Override Jumper (ESPI_MODE1) (see p.7, No. 74) | 1_2  2-pin Jumper | Open: Disable  Override (Default) Short: Enable Override |
| --- | --- | --- |
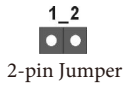
English

## 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.7, No. 8)

```
           ┌──┬──┐
           │  │O │ GND
      GND ─┤O │O ├ RESET#
  PWRBTN# ─┤O │O ├ GND
    PLED- ─┤O │O ├ HDLED-
    PLED+ ─┤O │O ├ HDLED+
           └──┴──┘
              1
```
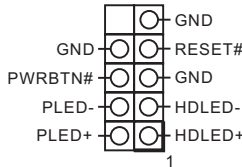
Connect the power switch, reset switch and system status indicator on the chassis to this header according to the pin assignments. Particularly note the positive and negative pins before connecting the cables.

⊕ **PWRBTN (Power Switch):**
Connect to the power switch on the chassis front panel. You may configure the way to turn off your 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 your 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. 9)

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

| AUX_PANEL1 | |
|---|---|
| PIN | NET |
| 1 | +3VSB |
| 2 | +3VSB |
| 3 | N/A |
| 4 | LOCATORLED+ |
| 5 | PLED- |
| 6 | LOCATORLED- |
| 7 | +3V |
| 8 | N/A |
| 9 | System Fault LED- |
| 10 | HDLED- |
| 11 | PWRBTN# |
| 12 | LAN1_LED+ |
| 13 | GND |
| 14 | LAN1_LED- |
| 15 | RESET# |
| 16 | SMB_DATA |
| 17 | SMB_CLK |
| 18 | GND |
| 19 | LOCATORBTN# |
| 20 | N/A |
| 21 | N/A |
| 22 | N/A |
| 23 | LAN2_LED+ |
| 24 | LAN2_LED- |
| 25 | GND |
| 26 | GND |

Non Maskable Interrupt
Button Header
(2-pin NMI_BTN1)
(see p.7, No. 88)

GND

CONTROL

Please connect a NMI device to this header.

Backplane PCI Express
Hot-Plug Connectors
(5-pin CPU1_ HSBP1)
(see p.7, No. 51)
(5-pin CPU2_ HSBP1)
(see p.7, No. 11)

GND
P0_HP_ALERT_L
CPU_HP_SDA
CPU_HP_SCL
+3V
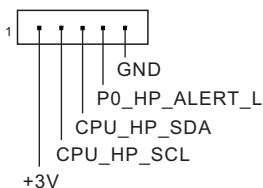
These headers are used for the hot plug feature of HDDs on the backplane.

English

35

Front USB 3.2 Gen1
Header
(19-pin USB3_3)
(see p.7, No. 54)

Besides four default USB 3.2 Gen1 ports on the I/O panel, there are two USB 3.2 Gen1 headers on this motherboard. Each USB 3.2 Gen1 header can support two USB 3.2 Gen1 ports.

| USB3_3 | |
|---|---|
| PIN | NET |
| 1 | Vbus |
| 2 | Vbus |
| 3 | Vbus |
| 4 | Vbus |
| 5 | Vbus |
| 6 | Vbus |
| 7 | GND |
| 8 | GND |
| 9 | GND |
| 10 | GND |
| 11 | GND |
| 12 | GND |
| 13 | GND |
| 14 | GND |
| 15 | INTA_PA_SSRX- |
| 16 | INTA_PA_SSRX+ |
| 17 | GND |
| 18 | INTA_PA_SSTX- |
| 19 | INTA_PA_SSTX+ |
| 20 | GND |
| 21 | IntA_PA_D- |
| 22 | IntA_PA_D+ |
| 23 | GND |
| 24 | IntA_PB_D- |
| 25 | IntA_PB_D+ |
| 26 | GND |

Front VGA Header
(17-pin FRNT_VGA1)
(see p.7, No. 4)
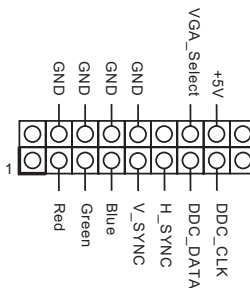
Please connect either end of VGA cable to VGA header.

BMC SMB Headers
(5-pin BMC_SMB1)
(see p.7, No. 81)
(5-pin BMC_SMB2)
(see p.7, No. 82)
(5-pin BMC_SMB3)
(see p.7, No. 83)

BMC_SMB_PRESENT_1_N
Power
BMC_SMBCLK
GND
BMC_SMBDATA
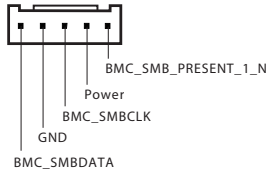
These headers are used for the SM BUS devices.

SPI TPM Header
(13-pin SPI_TPM_J1)
(see p.7,  No. 89)

SPI_DQ2 — SPI_DQ3
SPI_CS0 — SPI_PWR
SPI_MISO — Dummy
RSMRST# — CLK
GND — SPI_MOSI
SPI_TPM_CS# — RST#
— TPM_PIRQ
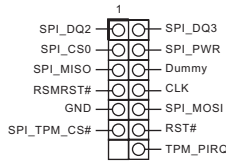
This connector supports SPI Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital  identities, and ensures platform integrity.

System Fan Connectors
*(for 2U system)*
(6-pin FAN1)
(see p.7,  No. 47)
(6-pin FAN2)
(see p.7,  No. 40)
(6-pin FAN3)
(see p.7,  No. 35)
(6-pin FAN4)
(see p.7,  No. 28)
(6-pin FAN5)
(see p.7,  No. 22)
(6-pin FAN6)
(see p.7,  No. 18)
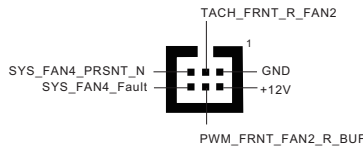
TACH_FRNT_R_FAN2
SYS_FAN4_PRSNT_N — GND
SYS_FAN4_Fault — +12V
PWM_FRNT_FAN2_R_BUF

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

English

System  Fan Connectors
*(for 1U system)*
(6-pin FAN1_1)
(see p.7,  No. 43)
(6-pin FAN2_1)
(see p.7,  No. 39)
(6-pin FAN3_1)
(see p.7,  No. 33)
(6-pin FAN4_1)
(see p.7,  No. 30)
(6-pin FAN5_1)
(see p.7,  No. 21)
(6-pin FAN6_1)
(see p.7,  No. 18)
(6-pin FAN7_1)
(see p.7,  No. 23)
(6-pin FAN8_1)
(see p.7,  No. 13)
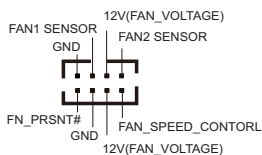
12V(FAN_VOLTAGE)
FAN1 SENSOR        FAN2 SENSOR
GND
FN_PRSNT#          FAN_SPEED_CONTORL
GND
12V(FAN_VOLTAGE)

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

GPU Power Connectors
(4-pin GPU_PWR1)
(see p.7, No. 55)
(4-pin GPU_PWR2)
(see p.7, No. 5)
(4-pin GPU_PWR3)
(see p.7, No. 6)

GND
1      2
3      4
12V
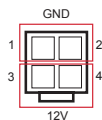
This motherboard provides three GPU power connectors.

SATA Power Connector
(4-pin HDD_PWR1)
(see p.7, No. 53)

1        2
GND            GND
+12V            +5V
3        4
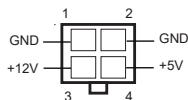
Please use a SATA power cable to connect this SATA Power Connector and your SATA HDD for supplying power from the motherboard, when using DC-IN mode without SATA power supply.

Backplane Power
Connector
(12-pin HSBP_PWR1)
(see p.7, No. 10)

+12V

12        8

7        1

GND
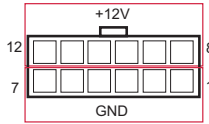
Please connect a 12-pin power
cable to this connector to
connect a HDD.

(4-pin HSBP_PWR2)
(see p.7, No. 50)

GND

1   2

3   4

12V
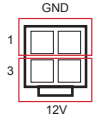
Intelligent Platform
Management Bus header
(4-pin IPMB1)
(see p.7, No. 84)

IPMB_SDA
IPMB_SCL

GND
No Connect
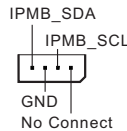
This 4-pin connector is used
to provide a cabled baseboard
or front panel connection for
value added features and 3rd-
party add-in cards, such as
Emergency Management cards,
that provide management
features using the IPMB.

Serial General Purpose
Input/Output Header
(7-pin SATA_SGPIO1)
(see p.7, No. 69)

SCLOCK
SLOAD
GND

1

SDATAOUT
GND
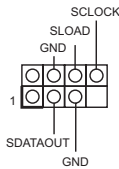
This header supports Serial
Link interface for onboard
SATA connections.

PWM Configuration
Header
(3-pin PWM_CFG1)
(see p.7, No. 38)

1
GND
SMB_DATA_VSB
SMB_CLK_VSB
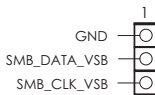
This header is used for PWM
configurations.

USB 2.0 Header
(9-pin USB_1_2)
(see p.6, No. 58)

USB_PWR
P-
P+
GND

1

DUMMY
GND
P+
P-
USB_PWR
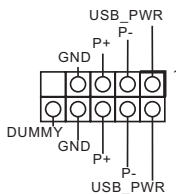
There is one USB
2.0 header on this
motherboard. This USB
2.0 header can support
two ports.

USB 3.2 Gen1 Connector
(USB3_6)
(see p.7, No. 63)

USB 3.2 Gen1 Header
(19-pin USB3_5_6)
(see p.7, No. 78)

IntA_PA_D+
IntA_PA_D-
GND
IntA_PA_SSTX+
IntA_PA_SSTX-
GND
IntA_PA_SSRX+
IntA_PA_SSRX-
Vbus

Vbus
IntA_PB_SSRX-
IntA_PB_SSRX+
GND
IntA_PB_SSTX-
IntA_PBA_SSTX+
GND
IntA_PB_D-
IntA_PB_D+
Dummy
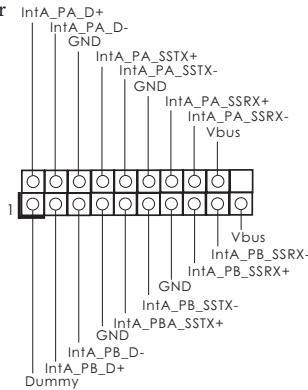
Besides four default USB 3.2 Gen1 ports on the I/O panel, there is one USB 3.2 Gen1 header on this motherboard. This USB 3.2 Gen1 header can support two USB 3.2 Gen1 ports.

Mini SAS HD Connector
(MSAS_HD0)
(see p.7, No.59)

MSAS_HD0
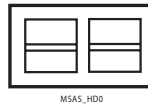
The Mini SAS HD connector supports SAS/SATA data cables for internal storage devices. The current SAS3/SATA3 interface allows up to 12.0 Gb/s data transfer rate. For connecting SAS HDDs, please contact SAS data cable dealers.

SATA DOM Power
Connectors
(3-pin SSATAPWR1)
(see p.7, No. 68)
(3-pin SSATAPWR2)
(see p.7, No. 69)

N/A
GND
+5V
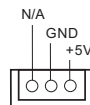
Please connect the power cables on the SATA DOM to the connectors.

| | | |
|---|---|---|
| Serial ATA3 Connectors<br>(SSATA0)<br>(see p.7, No. 73)<br>(SSATA1)<br>(see p.7, No. 67) | SSATA0<br>SSATA1 | These two SATA3 connectors support SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate. |
| Serial ATA3 DOM Connectors<br>(SSATA0)<br>(see p.7, No. 73)<br>(SSATA1)<br>(see p.7, No. 67) | SSATA0<br>SSATA1 | The SATA3 DOM connectors support both a SATA DOM (Disk-On-Module) and a SATA data cable for internal storage devices.<br>*SATADOM will be disabled when M.2 is populated with a SATA device.* |
| PDB Power Connector<br>(5-pin CRPS_IN1)<br>(see p.7, No. 56) | PSU1_PWROK<br>N/A<br>GND<br>1<br>PS_ON#<br>+12VSB | When a power distribution board is needed, use a power cable to connect this connector and the PDB for power supply. |
| Clear CMOS Pad<br>(CLRCMOS1)<br>(see p.7, No. 85) | | This allows you to clear the data in CMOS. To clear CMOS, take out the CMOS battery and short the Clear CMOS Pad. |
| CPU VSENSE Header<br>(3-pin CPU_VSENSE)<br>(see p.7, No. 41) | H_VSENSEINPMAX_CPU1<br>GND<br>H_VSENSEINPMAX_CPU2<br>1 | This header is used to detect CPU1 & CPU2 vsense. |
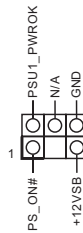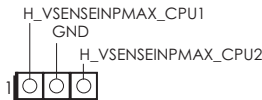
Virtual RAID On CPU
Header
(4-pin RAID_1)
(see p.7, No. 90)

GND
+3VSB
GND
VROC RAID KEY
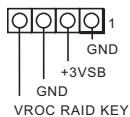
This connector supports Intel®
Virtual RAID on CPU and
NVME/AHCI RAID on CPU
PCIE.

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) <br> • LED Management <br> • Hot Plug Support <br> • RAID 0 support for Intel Fultondale NVMe SSDs |
| Standard | VROCSTANMOD | • Pass-thru SKU features <br> • RAID 0, 1, 10 |
| Premium <br><br> ISS | VROCPREMMOD <br><br> VROCISSDMOD | • Standard SKU features <br> • RAID 5 <br> • RAID 5 Write Hole Closure |

*Only Intel SSDs are supported.

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

Slimline SAS Connectors
Right-Angle:
(SLIM1)
(see p.7, No. 45)
(SLIM2)
(see p.7, No. 37)
(SLIM3)
(see p.7, No. 25)
(SLIM4)
(see p.7, No. 19)

These connectors are used for the NVME PCIE devices.
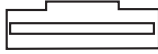
| A1 | 77 79 75 | B1 |
|----|----------|----|
| A2 | | B2 |
| A3 | | B3 |
| A4 | | B4 |
| A5 | | B5 |
| A6 | | B6 |
| A7 | | B7 |
| A8 | | B8 |
| A9 | | B9 |
| A10 | | B10 |
| A11 | | B11 |
| A12 | | B12 |
| A13 | | B13 |
| A14 | | B14 |
| A15 | | B15 |
| A16 | | B16 |
| A17 | | B17 |
| A18 | | B18 |
| 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 | Defeinition | Pin | Defeinition |
|-----|-------------|-----|-------------|
| A1 | GND_1 | B1 | GND_12 |
| A2 | RX_0+ | B2 | TX_0+ |
| A3 | RX_0- | B3 | TX_0- |
| A4 | GND_2 | B4 | GND_13 |
| A5 | RX_1+ | B5 | TX_1+ |
| A6 | RX_1- | B6 | TX_1- |
| A7 | GND_3 | B7 | GND_14 |
| A8 | SIDEBAND_7A | B8 | SIDEBAND_0A |
| A9 | SIDEBAND_4A | B9 | SIDEBAND_1A |
| A10 | GND | B10 | GND |
| A11 | SIDEBAND_A+ | B11 | SIDEBAND_5A |
| A12 | SIDEBAND_A- | B12 | SIDEBAND_6A |
| A13 | GND_4 | B13 | GND_15 |
| A14 | RX_2+ | B14 | TX_2+ |
| A15 | RX_2- | B15 | TX_2- |
| A16 | GND_5 | B16 | GND_16 |
| A17 | RX_3+ | B17 | TX_3+ |
| A18 | RX_3- | B18 | TX_3- |
| A19 | GND_6 | B19 | GND_17 |
| A20 | RX_4+ | B20 | TX_4+ |
| A21 | RX_4- | B21 | TX_4- |
| A22 | GND_7 | B22 | GND_18 |
| A23 | RX_5+ | B23 | TX_5+ |
| A24 | RX_5- | B24 | TX_5- |
| A25 | GND_8 | B25 | GND_19 |
| A26 | SIDEBAND_7B | B26 | SIDEBAND_0B |
| A27 | SIDEBAND_4B | B27 | SIDEBAND_1B |
| A28 | GND | B28 | GND |
| A29 | SIDEBAND_B+ | B29 | SIDEBAND_5B |
| A30 | SIDEBAND_B- | B30 | SIDEBAND_6B |
| A31 | GND_9 | B31 | GND_20 |
| A32 | RX_6+ | B32 | TX_6+ |
| A33 | RX_6- | B33 | TX_6- |
| A34 | GND_10 | B34 | GND_21 |
| A35 | RX_7+ | B35 | TX_7+ |
| A36 | RX_7- | B36 | TX_7- |
| A37 | GND_11 | B37 | GND_32 |
| | | | |
| 75 | NP_NC_1 | 78 | P_GND_3 |
| 76 | NP_NC_2 | 79 | P_GND_2 |
| 77 | P_GND_1 | 80 | P_GND_4 |

## 2.8  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 |

English

| | |
|---|---|
| 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 |

**English**

| | |
|---|---|
| 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 |

**English**

| | |
|---|---|
| 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 |

## 2.9 Identification purpose LED/Switch

With the UID button, You are able to locate the server you're 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 truned on. Press the UID button again to turn off the indicator.

## 2.10  M.2 SSD Module Installation Guide

The Ultra M.2 Socket (M2_1, Key M) supports either a M.2 SATA3 6.0 Gb/s module or a M.2 PCI Express module up to Gen3 x4 (32Gb/s). The Ultra M.2 Socket (M2_2, Key M) supports either a M.2 SATA3 6.0 Gb/s module or a M.2 PCI Express module up to Gen3 x4 (32Gb/s).

### Installing the M.2 SSD Module
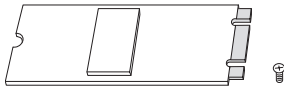
***Step 1***

Prepare a M.2 SSD module and the screw.
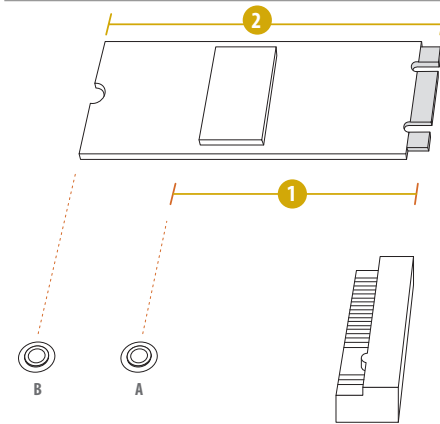
***Step 2***

Depending on the PCB type and length of your 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 |
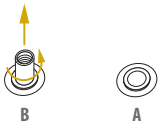
**Step 3**

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

**B    A**
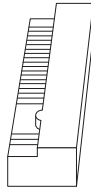
**Step 4**

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

**B    A**
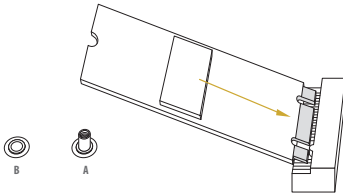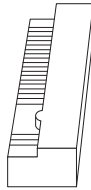
**Step 5**

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.

**B    A**

**B    A**

20°
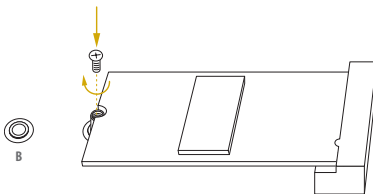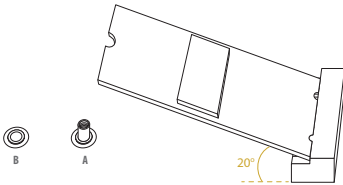
**Step 6**

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

**B**

**English**

53

# Chapter 3 UEFI Setup Utility

## 3.1 Introduction

This section explains how to use the UEFI SETUP UTILITY to configure your system. The UEFI chip on the motherboard stores the UEFI SETUP UTILITY. You may run the UEFI SETUP UTILITY when you start 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.

If you wish to enter the UEFI SETUP UTILITY after POST, restart the system by pressing <Ctrl> + <Alt> + <Delete>, or by pressing the reset button on the system chassis. You may also 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 you see on your 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.

## 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 |

English

## 3.2 Main Screen

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

```
                          Aptio Setup - AMI
      Main  Advanced  Security  Boot   Server Mgmt  Event Logs  Exit

   UEFI Version     : SP2C621D32TM3 L0.12                  ▲
   BMC Version      : 1.06.00
   CPLD Version     : 0.01

   Processor Type   : Intel(R) Xeon(R) Platinum 8368Q CPU @
   2.60GHz
   Processor Speed  : 2600MHz
   Microcode Update : 606A6/0D000363
   L1 Cache Size    : 80KB
   L2 Cache Size    : 1280KB
   L3 Cache Size    : 58368KB

   PCH Information  : LBG QS/PRQ - C621A - S2
                                                  ←→: Select Screen
   Total Memory     : 16GB,    Single-Channel Memory Mode    ↑↓: Select Item
                                                  Enter: Select
   DDR4_A1          : None                        +/-: Change Option
   DDR4_A2          : None                        F1: General Help
   DDR4_B1          : None                        F7: Discard Changes
   DDR4_B2          : None                        F9: Load UEFI Defaults
   DDR4_C1          : None                        F10: Save and Exit
   DDR4_C2          : None                        ESC: Exit
   DDR4_D1          : None
   DDR4_D2          : None
   DDR4_E1          : None                        ▼

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```

## 3.3  Advanced Screen

In this section, you may 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, Runtime Error Logging, Intel SPS Configuration, Intel VMD Technology, Tls Auth Configuration and Instant Flash.

```
                            Aptio Setup - AMI
        Main  Advanced  Security  Boot  Server Mgmt  Event Logs  Exit

   ▶ CPU Configuration                         CPU Configuration Parameters
   ▶ DRAM Configuration
   ▶ Chipset Configuration
   ▶ Storage Configuration
   ▶ NVMe Configuration
   ▶ ACPI Configuration
   ▶ USB Configuration
   ▶ Super IO Configuration
   ▶ Serial Port Console Redirection
   ▶ H/W Monitor
   ▶ Runtime Error Logging
   ▶ Intel SPS Configuration
   ▶ Intel® VMD technology                     ←→: Select Screen
   ▶ Tls Auth Configuration                    ↑↓: Select Item
                                               Enter: Select
     UEFI Update Utility                       +/-: Change Option
   ▶ Instant Flash                             F1: General Help
                                               F7: Discard Changes
                                               F9: Load UEFI Defaults
                                               F10: Save and Exit
                                               ESC: Exit


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```

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

### 3.3.1 CPU Configuration

```
                              Aptio Setup - AMI
        Advanced

 Intel(R) Xeon(R) Platinum 8368Q CPU @ 2.60GHz     │ Intel SpeedStep technology
 Microcode Revision                 606A6/0D000363 │ allows processors to switch
 Intel VT-x Technology               Supported     │ between multiple frequencies
                                                   │ and voltage points for better
 Intel SpeedStep Technology          [Enabled]     │ power saving and heat
 Intel Turbo Boost Technology        [Enabled]     │ dissipation.
 Intel Hyper Threading Technology    [Enabled]     │ CPU turbo ratio can be fixed
 Long Duration Maintained            [1s]          │ when Intel SpeedStep
 Short Duration Power Limit          Auto          │ Technology set Disabled and
 Long Duration Power Limit           Auto          │ Intel Turbo Boost Technology
 Active Processor 1 Cores            [All]         │ set Enabled.
 Active Processor 2 Cores            [All]         │
                                                   │
 Enable Intel TXT Support            [Disabled]    │ ↔: Select Screen
 Intel Virtualization Technology     [Enabled]     │ ↑↓: Select Item
 Enable SMX                          [Disabled]    │ Enter: Select
 DCU Streamer Prefetcher             [Enabled]     │ +/-: Change Option
 Hardware Prefetcher                 [Enabled]     │ F1: General Help
 Adjacent Cache Line Prefetch        [Enabled]     │ F7: Discard Changes
                                                   │ F9: Load UEFI Defaults
 Package C State Support             [Auto]        │ F10: Save and Exit
 CPU C6 State Support                [Enabled]     │ ESC: Exit
 Enhanced Halt State(C1E)            [Enabled]     │
 Hardware P-States                   [Native Mode] │
 AES-NI                              [Enabled]   ▼ │

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```

### 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 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.

### 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.

### Active Processor 1 Cores

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

### Active Processor 2 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.

English

### 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.

### CPU Thermal Throttling

Enable CPU internal thermal control mechanisms to keep the CPU from overheating.

### SNC (Sub NUMA)

SNC Disable will support 1-cluster (XPT/KTI prefetch eanble) 4-IMC way interleave. SNC2 Enable supports 2-clusters SNC and 2-way IMC interleave. SNC4 Enable supports 4-clusters SNC and 1-way IMC interleave. Enable SNC2 or SNC4 will gray out iMC_Interleave knob and UmaBasedClustering knob.

### Delayed Authentication Mode (DAM) Override

Use this item to enable or disable overriding the state of the Delayed Authentication Mode (DAM).

### UMA-Based Clustering

UMA Based Clustering options include Disable (ALL2ALL), Hemisphere (2 cluster), and Quadrant (4 cluster, not supported on ICX). These options are only valid when SNC is disabled. If SNC is enabled, UMA-Based Clustering is automatically disabled by BIOS.

### Total Memory Encryption (TME)

Use this item to enable or disable Total Memory Encryption (TME).

### SW Guard Extensions (SGX)

Use this item to enable or disable Software Guard Extensions (SGX).

### Enable/Disable SGX Auto MP Registration Agent

The MP registration agent is responsible for register the platform.

### SGX Registration Server

Use this item to choose which server should be used for SGX registration.

## 3.3.2 DRAM Configuration

```
                              Aptio Setup - AMI
      Advanced

  Enforce POR                    [Disabled]          Enforce POR - Enforces Plan Of
  DRAM Frequency                 [Auto]              Record restrictions for DDR4
  Numa                           [Enabled]           frequency and voltage
                                                     programming. Disable -
  IMC Interleaving               [1-way Interleave]  Disables this feature.
  Mirror Mode                    [Disabled]
  Memory Rank Sparing            [Disabled]
  ADDDC Sparing                  [Disabled]
  Multi Rank Sparing             [Two Rank]
  Patrol Scrub                   [Enable at End of POST]
  Data Scrambling for DDR4       [Enabled]

                                                     ↔: Select Screen
                                                     ↑↓: Select Item
                                                     Enter: Select
                                                     +/-: Change Option
                                                     F1: General Help
                                                     F7: Discard Changes
                                                     F9: Load UEFI Defaults
                                                     F10: Save and Exit
                                                     ESC: Exit

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```

### 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.

### Numa

Use this item to enable or disable Non Uniform Memory Access (NUMA).

### IMC Interleaving

Select to configure IMC Interleaving settings.

### Mirror Mode

Mirror Mode will set entire 1LM/2LM memory in system to be mirrored, consequently reducing the memory capacity by half. Mirror Enable will disable XPT Prefetch.

### Memory Rank Sparing

Enable or disable Memory Rank Sparing.

### ADDDC Sparing

Enable or disable ADDDC Sparing.

### Multi Rank Sparing

Set Multi Rank Sparing number. Default and the maximum is 2 ranks per channel.

### Patrol Scrub

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

### Data Scrambling for DDR4

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

## 3.3.3 Chipset Configuration

```
                              Aptio Setup – AMI
          Advanced

  MMCFG Base                       [Auto]              ▲  Select MMCFG Base
  MMIO High Base                   [32T]
  MMIO High Granularity Size       [64G]
  Above 4G Decoding                [Enabled]
  Primary Graphics Adapter         [PCI Express]
  Onboard VGA                      [Auto]
  VT-d                             [Enabled]
  PCIe Hot Plug                    [Enabled]
  Onboard LAN                      [Enabled]

  OCP3  Link Speed                 [Gen3]
  PCIE1 Link Width                 [x8x8x8x8]
  PCIE1 Link Speed                 [Gen3]
  PCIE2 Link Width                 [x8x8x8x8]        ↔: Select Screen
  PCIE2 Link Speed                 [Gen3]            ↑↓: Select Item
  PCIE3 Link Width                 [x16]             Enter: Select
  PCIE3 Link Speed                 [Gen3]            +/-: Change Option
  SLIM2/SLIM1 Link Width           [x4x4x4x4]        F1: General Help
  SLIMLIN2/SLIMLIN1 Link Speed     [Gen3]            F7: Discard Changes
  SLIM4/SLIM3 Link Width           [x4x4x4x4]        F9: Load UEFI Defaults
  SLIMLIN4/SLIMLIN3 Link Speed     [Gen3]            F10: Save and Exit
  PCI-E ASPM Support (Global)      [Disabled]        ESC: Exit

  SR-IOV Support                   [Enabled]
  Restore AC Power Loss            [No change]      ▼

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```

### MMCFG Base

Use this item to select MMCFG Base.

### MMIO High Base

Use this item to select MMIO High Base.

### MMIO High Granularity Size

Use this item to select the allocation size used to assign mmioh resources. Total mmioh space can be up to 32x granularity. Per stack mmioh resource assignments are multiples of the granularity where 1 unit per stack is the default allocation.

### Above 4G Decoding

Enable or disable 64bit capable Devices to be decoded in Above 4G Address Space (only if the system supports 64 bit PCI decoding).

### Primary Graphics Adapter

If PCI Express graphics card is installed on the motherboard, you may use this option to select PCI Express or Onboard VGA as the primary graphics adapter.

*If no PCI Express graphics card is installed, [Onboard VGA] is the default graphics adapter. There is no screen on monitor even if a HDMI display is connected. Select [Onboard Hdmi] instead to use HDMI as output source.*

### Onboard VGA

Use this to enable or disable the Onboard VGA function. The default value is [Auto].

*This item is not available when the Primary Graphic Adapter is set to [Onboard VGA].*

### VT-d

Intel(R) Virtualization Technology for Directed I/O helps your virtual machine monitor better utilize hardware by improving application compatibility and reliability, and providing additional levels of manageability, security, isolation, and I/O performance.

### PCIe Hot Plug

Use this item to enable or disable PCIe Hot Plug globally.

### Onboard LAN

This allows you to enable or disable the Onboard LAN feature.

### OCP3 Link Speed

This allows you to select PCIE Link Speed. The default value is [Gen3].

### PCIE1 Link Width

This allows you to select PCIE1 Link Width. The default value is [x8x8x8x8].

### PCIE1 Link Speed

This allows you to select PCIE Link Speed. The default value is [Gen3].

### PCIE2 Link Width

This allows you to select PCIE2 Link Width. The default value is [x8x8x8x8].

### PCIE2 Link Speed

This allows you to select PCIE Link Speed. The default value is [Gen3].

### PCIE3 Link Width

This allows you to select PCIE3 Link Width. The default value is [x16].

### PCIE3 Link Speed

This allows you to select PCIE Link Speed. The default value is [Gen3].

### SLIM2/SLIM1 Link Width

This allows you to select SLIM2/SLIM1 Link Width. The default value is [x4x4x4x4].

### SLIMLIN2/SLIMLIN1 Link Speed

This allows you to select PCIE Link Speed. The default value is [Gen3].

### SLIM4/SLIM3 Link Width

This allows you to select SLIM4/SLIM3 Link Width. The default value is [x4x4x4x4].

### SLIMLIN4/SLIMLIN3 Link Speed

This allows you to select PCIE 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.

### 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 you 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.

### 3.3.4 Storage Configuration

```
                              Aptio Setup - AMI
         Advanced

      SATA Controller              [Enabled]         Enable or Disable SATA
      SATA Mode Selection          [AHCI]            Controller
      SATA ALPM                    [Enabled]

   ▶ SATA_0 : Not Detected
   ▶ SATA_1 : Not Detected
   ▶ SATA_2 : Not Detected
   ▶ SATA_3 : Not Detected
   ▶ SATA_4 : Not Detected
   ▶ SATA_5 : Not Detected
   ▶ SATA_6 : Not Detected
   ▶ SATA_7 : Not Detected

      SSATA Controller             [Enabled]         ←→: Select Screen
      SSATA/M.2_SATA Mode Selection [AHCI]           ↑↓: Select Item
      SSATA ALPM                   [Enabled]         Enter: Select
                                                     +/-: Change Option
   ▶ SSATA_0/M2_1(SATA) : Not Detected               F1: General Help
   ▶ SSATA_1/M2_2(SATA) : Not Detected               F7: Discard Changes
                                                     F9: Load UEFI Defaults
                                                     F10: Save and Exit
                                                     ESC: Exit



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```

### SATA Controller

Use this item to enable or disable SATA Controllers.

### SATA Mode Selection

Identify the SATA port is connected to Solid State Drive or Hard Disk Drive. Press <Ctrl+I> to enter RAID ROM during UEFI POST process.

### SATA ALPM

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

### SSATA Controller

Use this item to enable or disable SATA Controllers.

### SSATA Mode Selection

Identify the SATA port is connected to Solid State Drive or Hard Disk Drive. Press <Ctrl+I> to enter RAID ROM during UEFI POST process.

### SSATA ALPM

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

## 3.3.5  NVMe Configuration

```
                         Aptio Setup - AMI
        Advanced

 NVMe Configuration

 No NVME Device Found




                                            ↔: Select Screen
                                            ↑↓: Select Item
                                            Enter: Select
                                            +/-: Change Option
                                            F1: General Help
                                            F7: Discard Changes
                                            F9: Load UEFI Defaults
                                            F10: Save and Exit
                                            ESC: Exit



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```
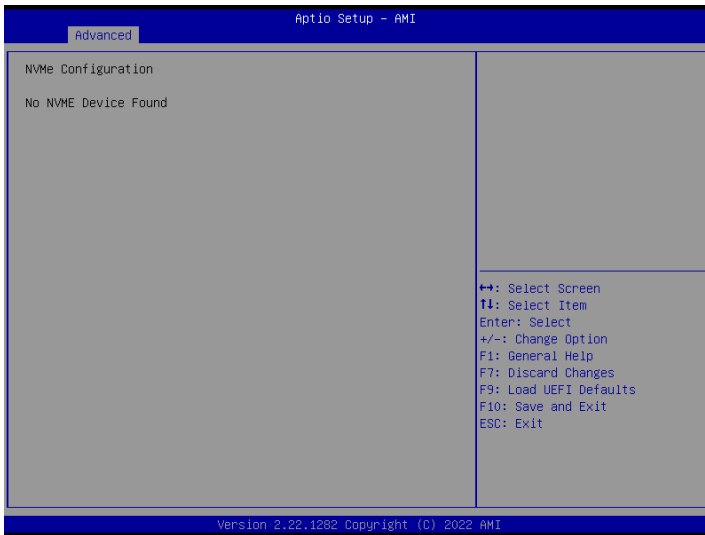
If there is a NVMe device installed on the motherboard, the NVMe Configuration page will display the relevant information of the NVMe device you are using.

*Please note that the information and items shown here may vary depending on the NVMe device you use.*

### Self Test Option

Select either Short or Extended Self Test. Short option will take a couple of minutes and extended option will take several minutes to complete.

### Self Test Action

Select either to test Controller alone or Controller and NameSpace. Selecting Controller and Namespace option will take much longer to complete the test.

### Run Device Self Test

Perform device self test for the corresponding Option and Action selected by the user. Pressing 'ESC' key will abort the test. Result shown below is the recent result logged in the device.

English

## 3.3.6  ACPI Configuration

```
                              Aptio Setup - AMI
        Advanced

  PCIE Devices Power On              [Disabled]            Allow the system to be waked
  Ring-In Power On                   [Disabled]            up by a PCIE device and enable
  RTC Alarm Power On                 [By OS]               wake on LAN.




                                                           ↔: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Option
                                                           F1: General Help
                                                           F7: Discard Changes
                                                           F9: Load UEFI Defaults
                                                           F10: Save and Exit
                                                           ESC: Exit


                      Version 2.22.1282 Copyright (C) 2022 AMI
```
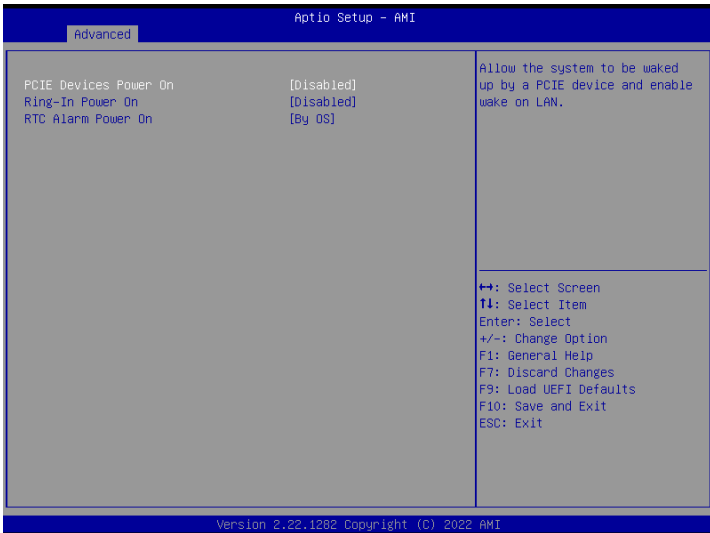
### PCIE Devices Power On

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

### Ring-In Power On

Use this item to enable or disable Ring-In signals to turn on the system from the power-soft-off mode.

### 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 your operating system.

## 3.3.7 USB Configuration

```
                          Aptio Setup - AMI
      Advanced

 Legacy USB Support              [Enabled]          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.




                                                    ↔: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Option
                                                    F1: General Help
                                                    F7: Discard Changes
                                                    F9: Load UEFI Defaults
                                                    F10: Save and Exit
                                                    ESC: Exit



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```

### Legacy USB Support

Enable or disable Legacy OS Support for USB 2.0 devices. If you encounter USB compatibility issues it is recommended to disable legacy USB support.
Select UEFI Setup Only to support USB devices under the UEFI setup and Windows/Linux operating systems only.

## 3.3.8 Super IO Configuration



```
                            Aptio Setup - AMI
    Advanced

 AST2500 Super IO Configuration                          Set Parameters of COM1

 Super IO Chip                    AST2500
▶ Serial Port 1 Configuration
▶ SOL Configuration




                                                         ↔: Select Screen
                                                         ↑↓: Select Item
                                                         Enter: Select
                                                         +/-: Change Option
                                                         F1: General Help
                                                         F7: Discard Changes
                                                         F9: Load UEFI Defaults
                                                         F10: Save and Exit
                                                         ESC: Exit


                    Version 2.22.1282 Copyright (C) 2022 AMI
```
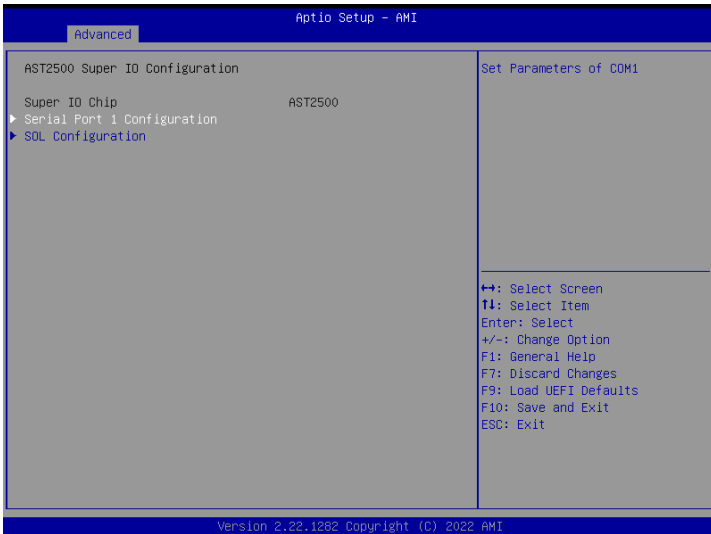
### Serial Port 1 Configuration

Use this item to set parameters of SOL.

### Serial Port

Use this item to enable or disable 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

```
                              Aptio Setup - AMI
          Advanced

                                                    Console Redirection Enable or
   COM1                                             Disable.
   Console Redirection              [Disabled]
 ▶ Console Redirection Settings

   SOL
   Console Redirection              [Disabled]
 ▶ Console Redirection Settings

   Legacy Console Redirection
 ▶ Legacy Console Redirection Settings

   Serial Port for Out-of-Band Management/
   Windows Emergency Management Services (EMS)      ↔: Select Screen
   Console Redirection EMS          [Enabled]       ↑↓: Select Item
 ▶ Console Redirection Settings                     Enter: Select
                                                    +/-: Change Option
                                                    F1: General Help
                                                    F7: Discard Changes
                                                    F9: Load UEFI Defaults
                                                    F10: Save and Exit
                                                    ESC: Exit


                      Version 2.22.1282 Copyright (C) 2022 AMI
```

### COM1/SOL

### Console Redirection

Use this option to enable or disable Console Redirection. If this item is set to Enabled, you 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 your computer and the host computer to which you 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 |

English

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**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.

## Legacy Console Redirection

## Legacy Console Redirection Settings

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

**Redirection COM Port**

Use this item to 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.

**Redirection After POST**

If the [Bootloader] is selected, legacy console redirection is disabled before booting to legacy OS. If [Always Enable] is selected, legacy console redirection is enabled for legacy OS. The default value is [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, you 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 your computer and the host computer to which you are connected exchange information.

**Out-of-Band Mgmt Port**

Microsof t 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/

English

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CTS], and [Software Xon/Xoff].

**Data Bits EMS**

**Parity EMS**

**Stop Bits EMS**

## 3.3.10  H/W Monitor

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

```
                                    Aptio Setup - AMI
           Advanced

  VOLT_3.3VSB                    : 3.36 V          ▲  Watch Dog Timer
  VOLT_5VSB                      : 4.98 V
  VOLT_CPU1_VCCIN                : 1.82 V
  VOLT_CPU2_VCCIN                : N/A
  VOLT_VDDQ_ABCD                 : 1.23 V
  VOLT_VDDQ_EFGH                 : 1.23 V
  VOLT_VDDQ_IJKL                 : N/A
  VOLT_VDDQ_MNOP                 : N/A
  VOLT_PCH_PVNN                  : 1    V
  VOLT_PCH_1.05V                 : 1.05 V
  VOLT_PCH_1.8V                  : 1.8  V
  VOLT_BAT                       : 2.9  V
  VOLT_3.3V                      : 3.36 V
  VOLT_5V                        : 4.98 V          ↔: Select Screen
  VOLT_12V                       : 12   V          ↑↓: Select Item
  VOLT_PSU1_VIN                  : N/A             Enter: Select
  VOLT_PSU2_VIN                  : 118 V           +/-: Change Option
  CUR_PSU1_IOUT                  : N/A             F1: General Help
  CUR_PSU2_IOUT                  : 10.4 A          F7: Discard Changes
  TEMP_CPU1                      : 44   ˚C         F9: Load UEFI Defaults
  TEMP_CPU2                      : N/A             F10: Save and Exit
  TEMP_PCH                       : 39   ˚C         ESC: Exit
  TEMP_MB1                       : 35   ˚C
  TEMP_MB2                       : 27   ˚C
  TEMP_CARDSIDE1                 : 30   ˚C      ▼

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```

### Watch Dog Timer

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

English

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## 3.3.11 Runtime Error Logging

```
                          Aptio Setup - AMI
        Advanced

  WHEA Support                      [Enabled]          Enable or disable Windows
                                                       Hardware Error Architecture.
  System Error                      [Enabled]
  S/W Error Injection Support       [Disabled]
  Memory Error                      [Enabled]
   Correctable Error Threshold      FF

  PCIE Corrected Error Enable       [Disabled]
  PCIE  Uncorrected Error Enable    [Enabled]
  PCIE  Fatal Error Enable          [Enabled]



                                                       ↔: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Option
                                                       F1: General Help
                                                       F7: Discard Changes
                                                       F9: Load UEFI Defaults
                                                       F10: Save and Exit
                                                       ESC: Exit



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```

### WHEA Support

Use this item to enable or disable Windows Hardware Error Architecture.

### System Error

Use this item to enable or disable System Error feature. When it is set to [Enabled], you can configure Memory Error and PCIE Error log features.

### S/W Error Injection Support

When it is set to [Enabled], S/W Error Injection is supported by unlocking MSR Ox790.

### Memory Error

Memory enabling and logging setup option.

### Correctable Error Threshold

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

### PCIE Corrected Error Enable

Use this item to enable or disable PCIe Correctable errors.

### PCIE Uncorrected Error Enable

Use this item to enable or disable PCIe Uncorrectable errors.

### PCIE Fatal Error Enable

Use this item to enable or disable PCIe Ftal errors.

## 3.3.12  Intel SPS Configuration

```
                              Aptio Setup - AMI
        Advanced

     SPS Version                    4.4.4.62
     SPS FW State                   Operational



                                                    ↔: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Option
                                                    F1: General Help
                                                    F7: Discard Changes
                                                    F9: Load UEFI Defaults
                                                    F10: Save and Exit
                                                    ESC: Exit



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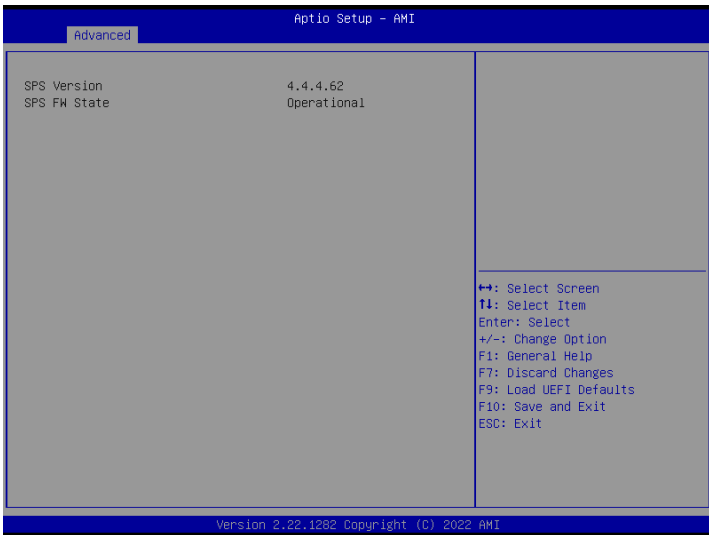
SPS screen displays the Intel SPS Configuration information, such as Operational Firmware Version and Firmware State.

## 3.3.13 Intel® VMD technology
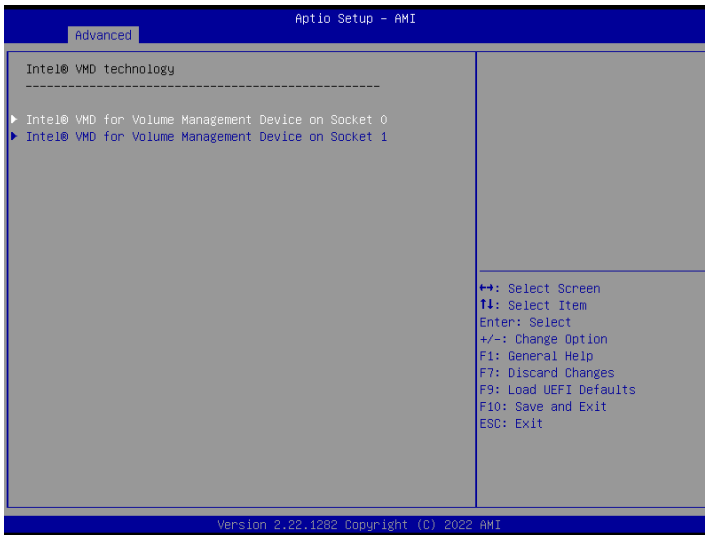


Press <Enter> to bring up the Intel® VMD for Volume Management Device Configuration menu.

### Intel® VMD for Volume Management Device on Socket 0

### VMD Config for IOU 1 (PCIE1)

### Enable/Disable VMD

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.
When [Enabled], users are allowed to configure the options below.

### 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.

### Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports.

### VMD Config for IOU 3 (PCIE1)

### Enable/Disable VMD

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.
When [Enabled], users are allowed to configure the options below.

### 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.

### Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports.

### VMD Config for IOU 4 (SLIMLIN2 / SLIMLIN1)

### Enable/Disable VMD

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.
When [Enabled], users are allowed to configure the options below.

### 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.

### Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports.

## Intel® VMD for Volume Management Device on Socket 1

### VMD Config for IOU 0 (PCIE3)

### Enable/Disable VMD

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.
When [Enabled], users are allowed to configure the options below.

### 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.

### Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports.

### VMD Config for IOU 1 (PCIE2)

### Enable/Disable VMD

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.
When [Enabled], users are allowed to configure the options below.

### 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.

### Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports.

### VMD Config for IOU 3 (PCIE2)

### Enable/Disable VMD

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.
When [Enabled], users are allowed to configure the options below.

### 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.

### Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports.

### VMD Config for IOU 4 (SLIMLIN4/SLIMLIN3)

### Enable/Disable VMD

Use this item to enable or disable Intel(R) Volume Management Device Technology in this Stack.
When [Enabled], users are allowed to configure the options below.

### 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.

### Hot Plug Capable

Use this item to enable or disable Hot Plug for PCIe Root Ports.

**English**

## 3.3.14 Tls Auth Configuratio



### 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.

### 3.3.15  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 first like MS-DOS or Windows*. Just save the new UEFI file to your USB flash drive, floppy disk or hard drive and launch this tool, then you can update your UEFI only in a few clicks without preparing an additional floppy diskette or other compli-cated flash utility. Please be noted that the USB flash drive or hard drive must use FAT32/16/12 file system. If you execute 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 your system after the UEFI update process is completed.

## 3.4 Security

In this section, you may set or change the supervisor/user password for the system. For the user password, you may also clear it.

```
                          Aptio Setup - AMI
      Main  Advanced  Security  Boot  Server Mgmt  Event Logs  Exit

    Supervisor Password          Not Installed        Set or change the password for
    User Password                Not Installed        the administrator account.
                                                      Only the administrator has
    Supervisor Password                               authority to change the
    User Password                                     settings in the UEFI Setup
                                                      Utility. Leave it blank and
  ▶ Secure Boot                                       press enter to remove the
                                                      password.



                                                      ←→: Select Screen
                                                      ↑↓: Select Item
                                                      Enter: Select
                                                      +/-: Change Option
                                                      F1: General Help
                                                      F7: Discard Changes
                                                      F9: Load UEFI Defaults
                                                      F10: Save and Exit
                                                      ESC: Exit



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```

### 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.

## 3.4.1 Key Management

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

```
                              Aptio Setup - AMI
            Security

  Vendor Keys                         Valid                 Install factory default Secure
                                                            Boot keys after the platform
  Factory Key Provision              [Disabled]             reset and while the System is
▶ Install default Secure Boot keys                          in Setup mode
▶ Clear Secure Boot keys
▶ Export Secure Boot variables
▶ Enroll Efi Image

  Device Guard Ready
▶ Remove 'UEFI CA' from DB
▶ Restore DB defaults

  Secure Boot variable | Size| Keys| Key Source
▶ Platform Key(PK)      |    0|    0| No Keys        ↔: Select Screen
▶ Key Exchange Keys     |    0|    0| No Keys        ↑↓: Select Item
▶ Authorized Signatures |    0|    0| No Keys        Enter: Select
▶ Forbidden  Signatures |    0|    0| No Keys        +/-: Change Option
▶ Authorized TimeStamps |    0|    0| No Keys        F1: General Help
▶ OsRecovery Signatures |    0|    0| No Keys        F7: Discard Changes
                                                     F9: Load UEFI Defaults
                                                     F10: Save and Exit
                                                     ESC: Exit


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```

### 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 you use secure boot.

### Clear Secure Boot keys

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

### Export Secure Boot variables

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

### 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).

English

### Remove 'UEFI CA' from DB

Device Guard ready system must not list 'Microsoft UEFI CA' Certificate in Authorized Signature database (db).

### Restore DB Defaults

Restore DB variable to factory defaults.

### 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_SHAXXX

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed

### Key Exchange Keys

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_SHAXXX

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed

### Authorized Signatures

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_SHAXXX

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed

## Forbidden Signatures

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_SHAXXX

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed

## Authorized TimeStamps

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_SHAXXX

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed

**English**

### OsRecovery Signatures

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_SHAXXX

2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed

## 3.5 Boot Screen

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

```
                              Aptio Setup - AMI
        Main  Advanced  Security  Boot  Server Mgmt  Event Logs  Exit

    Boot Option Priorities                              Sets the system boot order
    Boot Option #1                  [UEFI: Built-in EFI
                                    Shell]

    Boot option filter              [UEFI and Legacy]

    Boot From Onboard LAN           [Disabled]

    Setup Prompt Timeout            1
    Bootup Num-Lock                 [On]
    Boot Beep                       [Disabled]
    Full Screen Logo                [Enabled]
      AddOn ROM Display             [Enabled]
                                                        ↔: Select Screen
  ▶ CSM(Compatibility Support Module)                   ↑↓: Select Item
                                                        Enter: Select
                                                        +/-: Change Option
                                                        F1: General Help
                                                        F7: Discard Changes
                                                        F9: Load UEFI Defaults
                                                        F10: Save and Exit
                                                        ESC: Exit




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```

### Boot Option #1

Use this item to set the system boot order.

### Boot Option Filter

This option controls Legacy/UEFI ROMs priority.

### Boot From Onboard LAN

Use this item to enable or disable the Boot From Onboard LAN feature.

### 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.

### Boot Beep

Select whether the Boot Beep should be turned on or off when the system boots up. Please note that a buzzer is needed.

English

### Full Screen Logo

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

### AddOn ROM Display

Use this option to adjust AddOn ROM Display. If you enable the option "Full Screen Logo" but you want to see the AddOn ROM information when the system boots, please select [Enabled]. Configuration options: [Enabled] and [Disabled]. The default value is [Enabled].

## 3.5.1  CSM Parameters

```
                                    Aptio Setup - AMI
                          Boot

    CSM                              [Custom]              Enable to launch the
    Launch Other Storage OpROM Policy [Legacy only]        Compatibility Support Module.
    Launch Video OpROM Policy        [Legacy only]         If you are using Windows 8 or
                                                           later versions 64-bit UEFI and
    OCP3  Slot OpROM                 [Auto]                all of your devices support
    PCIE1 Slot OpROM                 [Auto]                UEFI, you may also disable CSM
    SLIM2 Slot OpROM                 [Auto]                for faster boot speed.
    SLIM1 Slot OpROM                 [Auto]
    PCIE3 Slot OpROM                 [Auto]
    PCIE2 Slot OpROM                 [Auto]
    SLIM4 Slot OpROM                 [Auto]
    SLIM3 Slot OpROM                 [Auto]
    M2_1 Slot OpROM                  [Auto]
    M2_2 Slot OpROM                  [Auto]                ↔: Select Screen
                                                           ↑↓: Select Item
                                                           Enter: Select
                                                           +/-: Change Option
                                                           F1: General Help
                                                           F7: Discard Changes
                                                           F9: Load UEFI Defaults
                                                           F10: Save and Exit
                                                           ESC: Exit




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```

### CSM

Enable to launch the Compatibility Support Module. Please do not disable unless you're running a WHCK test. If you are using Windows Server 2012 R2 or later versions 64-bit UEFI and all of your devices support UEFI, you may also disable CSM for faster boot speed.

### Launch Other 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.

### OCP3 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

English

### PCIE1 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

### SLIM2 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

### SLIM1 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

### PCIE3 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

### PCIE2 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

### SLIM4 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

### SLIM3 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

### M2_1 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

## M2_2 Slot OpROM

Use this item to select slot storage and Network Option ROM policy. In Auto option, the default is Disabled with NVMe device, but it is Legacy with other devices. (This item can't select Video Option ROM policy.)

## 3.6 Server Mgmt

```
                        Aptio Setup - AMI
     Main   Advanced   Security   Boot   Server Mgmt   Event Logs   Exit

   BMC Self Test Status              PASSED            Wait For BMC response for
   Wait For BMC                      [Enabled]         specified time out. In
 ▶ BMC Network Configuration                           PILOTII, BMC starts at the
                                                       same time when BIOS starts
 ▶ System Event Log                                    during AC power ON. It takes
 ▶ View System Event Log                               around 90 seconds to
 ▶ BMC Tools                                           initialize Host to BMC
                                                       interfaces.



                                                       ↔: Select Screen
                                                       ↑↓: Select Item
                                                       Enter: Select
                                                       +/-: Change Option
                                                       F1: General Help
                                                       F7: Discard Changes
                                                       F9: Load UEFI Defaults
                                                       F10: Save and Exit
                                                       ESC: Exit



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```

### 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.

## 3.6.1 BMC Network Configuration

```
                        Aptio Setup - AMI
                     Server Mgmt

 BMC Network Configuration                                  ▲   Enabled/Disabled BMC Out of
                                                                band Access
 BMC Out of band Access           [No Change]
 Out of band Access               Enabled

 *************************
 Configure IPV4 support
 *************************
 Lan channel (Failover)
 Manual setting IPMI LAN          [No]
 Configuration address source     DHCP
 Station IP address               0.0.0.0
 Current subnet mask              0.0.0.0
 Current MAC address              D0-50-99-E4-0E-58       ↔: Select Screen
 Current router IP address        0.0.0.0                 ↑↓: Select Item
                                                          Enter: Select
 VLAN                             [Disabled]              +/-: Change Option
                                                          F1: General Help
 *************************                                F7: Discard Changes
 Configure IPV6 support                                   F9: Load UEFI Defaults
 *************************                                F10: Save and Exit
 Lan channel 1                                            ESC: Exit
 IPV6 Support                     [Enabled]
 Manual setting IPMI LAN(IPV6)    [No Change]
 Configuration Address source     DHCP                ▼

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```

### BMC Out of Band Access

Enabled/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 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.*

English

97

### VLAN

Enabled/Disabled Virtual Local Area Network.

### IPV6 Support

Enabled/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

```
                        Aptio Setup - AMI
                         Server Mgmt

 Enabling/Disabling Options                         Change this to enable or
 SEL Components                   [Enabled]          disable event logging for
                                                    error/progress codes during
 Erasing Settings                                   boot.
 Erase SEL                        [No]
 When SEL is Full                 [Do Nothing]

 Custom EFI Logging Options
 Log EFI Status Codes             [Error code]

 PCIe Device Degrade ELog Support [Disabled]

 NOTE: All values changed here do not take
       effect until computer is restarted.          ↔: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
                                                    +/-: Change Option
                                                    F1: General Help
                                                    F7: Discard Changes
                                                    F9: Load UEFI Defaults
                                                    F10: Save and Exit
                                                    ESC: Exit


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```

### SEL Components

Change this to enable ro disable all features of System Event Logging 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  View System Event Log

```
                        Aptio Setup — AMI
                         Server Mgmt

 No. of log entries in SEL : 551              ▲ HEX:
                                                01  00  02  18  00  00
 DATE      TIME      SENSOR TYPE                00  2C  60  04  DC  17
                                                75  A0  17  00
 01/01/70  00:00:24  OEM (Unknown)              Generator ID: BMC — LUN #0
 01/01/70  00:00:24  OEM (Unknown)              (Channel #6)
 01/01/70  00:00:24  OEM (Unknown)              Sensor Number: 0x17  System
 01/01/70  00:00:24  OEM (Unknown)              Chassis
 01/01/70  00:00:24  OEM (Unknown)              Event Description: Record
 01/01/70  00:00:24  OEM (Unknown)              Type—0x02. Assertion Event.
 01/01/70  00:00:24  OEM (Unknown)
 01/01/70  00:00:24  OEM (Unknown)
 01/01/70  00:00:24  OEM (Unknown)
 01/01/70  00:00:24  OEM (Unknown)            ↔: Select Screen
 01/01/70  00:00:24  OEM (Unknown)            ↑↓: Select Item
 01/01/70  00:00:26  OEM (Unknown)            Enter: Select
 01/01/70  00:00:35  OEM (Unknown)            +/-: Change Option
 01/01/70  00:00:39  Power Supply             F1: General Help
 01/01/70  00:00:49  OEM (Unknown)            F7: Discard Changes
 01/01/70  00:02:25  System Event             F9: Load UEFI Defaults
 05/08/22  21:04:07  System Event             F10: Save and Exit
 05/08/22  21:10:20  OEM (Unknown)            ESC: Exit
 05/08/22  21:21:49  Processor
 05/08/22  21:21:49  Processor
 05/08/22  21:21:49  Processor              ▼

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```

This page display the information of the system event log.

## 3.6.4 BMC Tools

```
                          Aptio Setup - AMI
                        Server Mgmt

   BMC Tools                                        Load BMC Default Settings
 ▶ Load BMC Default Settings
   KCS control                       [No change]
      Current State                  Enabled




                                                   ↔: Select Screen
                                                   ↑↓: Select Item
                                                   Enter: Select
                                                   +/-: Change Option
                                                   F1: General Help
                                                   F7: Discard Changes
                                                   F9: Load UEFI Defaults
                                                   F10: Save and Exit
                                                   ESC: Exit



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```

### Load BMC Default Settings
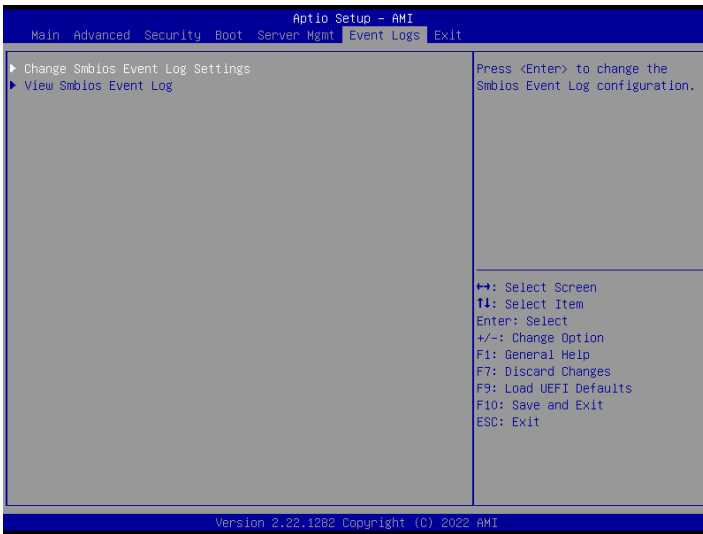
Use this item to Load BMC Default Settings

### 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

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

## 3.7 Event Logs

```
                        Aptio Setup - AMI
      Main  Advanced  Security  Boot  Server Mgmt  Event Logs  Exit

  ▶ Change Smbios Event Log Settings              Press <Enter> to change the
  ▶ View Smbios Event Log                         Smbios Event Log configuration.






                                                 ↔: Select Screen
                                                 ↑↓: Select Item
                                                 Enter: Select
                                                 +/-: Change Option
                                                 F1: General Help
                                                 F7: Discard Changes
                                                 F9: Load UEFI Defaults
                                                 F10: Save and Exit
                                                 ESC: Exit


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```

### Change Smbios Event Log Settings

This allows you to configure the Smbios Event Log Settings.

When entering the item, you will see the followings:

**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/disable logging of System boot event.

**MECI (Multiple Event Count Increment)**
Use this item to enter the increment value for the multiple event counter. The valid range is from 1 to 255.

**METW (Multiple Event Time Window)**
Use this item to specify the number of minutes which must pass between duplicate log

entries which utilize a multiple-event counter. The value ranges from 0 to 99 minutes.

**Log EFI Status Code**
Enable or disable the logging of EFI Status Codes as OEM reserved type E0 (if not already converted to legacy).

**Convert EFI Status Codes to Standard Smbios Type**
Enable or disable the converting of EFI Status Codes to Standard Smbios Types (Not all may be translated).
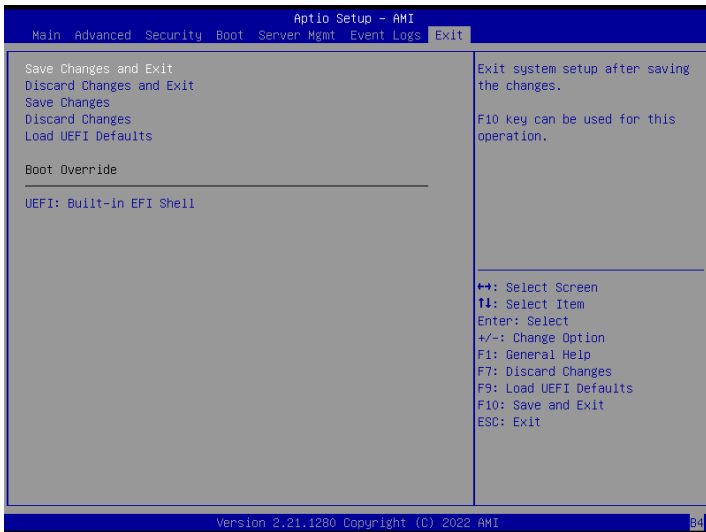
## View Smbios Event Log
Press <Enter> to view the Smbios Event Log records.

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

## 3.8 Exit Screen



```
                         Aptio Setup - AMI
     Main  Advanced  Security  Boot  Server Mgmt  Event Logs  Exit

   Save Changes and Exit                          Exit system setup after saving
   Discard Changes and Exit                       the changes.
   Save Changes
   Discard Changes                                F10 key can be used for this
   Load UEFI Defaults                             operation.

   Boot Override

   UEFI: Built-in EFI Shell

                                                  ↔: Select Screen
                                                  ↑↓: Select Item
                                                  Enter: Select
                                                  +/-: Change Option
                                                  F1: General Help
                                                  F7: Discard Changes
                                                  F9: Load UEFI Defaults
                                                  F10: Save and Exit
                                                  ESC: Exit

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```

### Save Changes and Exit

When you select 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 you select 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 you select this option, the following message "Save changes?" will pop-out. Select [Yes] to save changes done so far to any of the setup options.

### Discard Changes

When you select 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, we suggest you go to our offical 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 Microsoft® Windows® Server / Linux compliant operating systems. Please download the operating system from your OS manufacturer. Please refer to your OS documentation for more instructions.

*\*Please download the Intel® SATA Floppy Image driver from the ASRock Rack's website (www.asrockrack.com) to your 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 our website at http://www.ASRockRack.com.

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

## 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 your 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/ RDIMM-3DS/ LRDIMM/ LRDIMM-3DS.
3. If you have 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.

English

**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 adaquate 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 you have tried the troubleshooting procedures mentioned above and the problems are still unsolved, please contact ASRock Rack's technical support with the following information:

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

You may 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 you return 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 your distributor first for any product related problems during the warranty period.

English

# Contact Information

If you need 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 you may contact your dealer for further information. For technical questions, please submit a support request form at https://event.asrockrack.com/tsd.asp

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