OPEN
Industry Standard, Flexible Architecture

GREEN
Less Heat, Less Power Consumption

STABLE
Robust Design, Quality Parts

Stable and
Reliable Solution

Server/Workstation
Motherboard

# SP2C621D16N-2L2T
# SP2C621D16N

## User Manual

English

Version 1.0
Published March 2023


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

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

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Taipei City 112, Taiwan (R.O.C.)

## Contents

# Chapter 1 Introduction

Thank you for purchasing ASRock Rack ***SP2C621D16N-2L2T / SP2C621D16N*** 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 SP2C621D16N-2L2T/SP2C621D16N Motherboard (EEB Form Factor: 12.2-in x 13.12-in, 31.0 cm x 33.3 cm)
- Quick Installation Guide
- 1 x Screw for M.2 Socket
- 2 x CPU Non-Fabric Carriers
- 1 x I/O Shield
- 1 x SATA3 Cable (60cm)
- 1 x Mini SAS HD to 4 SATA Cable (12G) (60cm)
- 1 x LP SLIM TO 2*8639+4P (50cm) (Optional)

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

English

## 1.2 Specifications

| SP2C621D16N-2L2T / SP2C621D16N | |
|---|---|
| MB Physical Status | |
| Form Factor | EEB |
| Dimension | 12.2" x 13.12 (31 cm x 33.3 cm) |
| Processor System | |
| CPU | 3rd Gen Intel Xeon Scalable Processors |
| Socket | 1+1 Socket P+ (LGA 4189) |
| Thermal Design Power | 205W |
| Chipset | Intel® C621A |
| System Memory | |
| Capacity | 16 x 288-pin DDR4 DIMM slots |
| Type | - 8 Channels memory technology (1DPC)<br>- Supports DDR4 RDIMM/ RDIMM-3DS/ LRDIMM/ LRDIMM-3DS/Intel®Optane™ Persistent Memory 200 Series |
| DIMM Size Per DIMM | - RDIMM: 64GB, 32GB, 16GB, 8GB<br>- RDIMM-3DS: 256GB, 128GB, 64GB, 32GB<br>- LRDIMM: 128GB, 64GB, 32GB<br>- LRDIMM-3DS: 256GB, 128GB, 64GB, 32GB, 16GB, 8GB |
| DIMM Frequency | - RDIMM: 3200/2933/2666/2400/2133 MHz<br>- RDIMM-3DS: 3200/2933/2666/2400/2133 MHz<br>- LRDIMM: 3200/2933/2666/2400/2133 MHz<br>- LRDIMM-3DS: 3200/2933/2666/2400/2133 MHz<br>**Max. memory capacity and frequency are to be validated* |
| Voltage | 1.2V |
| Expansion Slot | |
| PCIe 4.0 x 16 | PCIE7: Gen4 x16 link [CPU0]<br>PCIE6: Gen4 x16 link [CPU0]<br>PCIE4: Gen4 x16 link [CPU1] |
| PCIe 4.0 x 8 | PCIE5: Gen4 x8 link [CPU1]<br>PCIE3: Gen4 x8 link [CPU1] |
| Storage | |
| SATA Controller | Intel® C621A (7 SATA 6Gb/s, support RAID 0/1/5/10):<br>1 Mini-SAS HD, 2 SATA 7-pin, 1 M.2 |
| M.2 | 1 M-key (M2_1: 2260/2280, PCIe3.0 x4 or SATA 6Gb/s) [PCH] |
| SlimSAS | 1 Low-Profile SlimSAS (PCIe4.0x8) [CPU0]<br>2 Low-Profile SlimSAS (PCIe4.0x8) [CPU1] |

| | |
|---|---|
| Ethernet | |
| Interface | **SP2C621D16N-2L2T:**<br>10000/1000/100 Mbps by Intel®X550-AT2<br>1000/100/10 Mbps by Intel®i210<br><br>**SP2C621D16N:**<br>1000/100/10 Mbps by Intel®i210 |
| LAN controller | **SP2C621D16N-2L2T:**<br>- 2 x RJ45 10GbE RJ45 by X550-AT2<br>- 2 x RJ45 1GbE RJ45 by i210<br>- 1 x RJ45 Dedicated IPMI LAN port by RTL8211E<br>- Supports Wake-On-LAN<br>- Supports Energy Effcient Ethernet 802.3az<br>- Supports Dual LAN with Teaming function<br>- Supports PXE<br>- LAN1 supports NCSI<br><br>**SP2C621D16N:**<br>- 2 x RJ45 1GbE RJ45 by i210<br>- 1 x RJ45 Dedicated IPMI LAN port by RTL8211E<br>- Supports Wake-On-LAN<br>- Supports Energy Effcient Ethernet 802.3az<br>- Supports Dual LAN with Teaming function<br>- Supports PXE<br>- LAN1 supports NCSI |
| Management | |
| BMC Controller | ASPEED AST2500 |
| IPMI Dedicated GLAN | 1 x Realtek RTL8211E for dedicated management GLAN |
| Features | - Watch Dog<br>- NMI |
| Graphics | |
| Controller | ASPEED AST2500 |
| VRAM | DDR4 256MB |
| Rear Panel I/O | |
| VGA Port | 1 (D-sub) |
| USB 3.2 Gen1 Port | 2 |
| LAN Port | **SP2C621D16N-2L2T:**<br>- 4 +1 RJ45 Gigabit Ethernet LAN port<br>- LAN Ports with LED (ACT/LINK LED and SPEED LED)<br><br>**SP2C621D16N:**<br>- 2 +1 RJ45 Gigabit Ethernet LAN port<br>- LAN Ports with LED (ACT/LINK LED and SPEED LED) |
| UID Button/LED | 1 |

English

| Internal Connector | |
|---|---|
| Auxiliary Panel Header | 1 (includes chassis intrusion , location button & LED , front LAN LED) |
| Front Panel Header | 1 |
| NMI Header | 1 |
| SPI TPM Header | 1 (13-pin) |
| Smbus from BMC | 2 |
| IPMB Header | 1 |
| Fan Header | 4 x System Fans (6-pin) + 2 x CPU Fans (4-pin) |
| ATX Power | 1 (24-pin) + 3 (8-pin) |
| PSU SMB | 1 |
| Front VGA Header | 1 |
| USB 3.2 Gen1 Header | 1 (supports 2 USB 3.2 Gen1 ports) |
| COM Header | 1 |
| RAID Header | 1 |
| CPU_HSBP | 2 |
| LED_LAN3_4 Header | 1 *(SP2C621D16N-2L2T only)* |
| ME Recovery | 1 |
| CPU VSENSE | 1 |
| ClearCMOS | 1 (short pad) |
| OH/FanFail LED | 4 (only Fan Fail LED) |
| System BIOS | |
| BIOS Type | 256Mb AMI UEFI Legal BIOS |
| BIOS Features | - Plug and Play (PnP)<br>- ACPI 2.0 Compliance Wake Up Events<br>- SMBIOS 2.8 Support<br>- ASRock Rack Instant Flash |
| Hardware Monitor | |
| Temperature | - CPU Temperature Sensing<br>- PCH Temperature Sensing<br>- MB Temperature Sensing<br>- Card Side Temperature Sensing |
| Fan | - CPU/Rear/Front Fan Tachometer<br>- CPU Quiet Fan (Allow Chassis Fan Speed Auto-Adjust by CPU Temperature)<br>- CPU/Rear/Front Fan Multi-Speed Control |

| | |
|---|---|
| Voltage | Voltage Monitoring: 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 |
| Support OS | |
| OS | Microsoft® Windows®<br>- Server 2016 (64 bit)<br>- Server 2019 (64 bit)<br>- Server 2022 (64 bit)<br><br>Linux®<br>- Red Hat Enterprise Linux Server 7.9 (64 bit) / 8.5 (64 bit)<br>- CentOs 7.9 (64 bit) / 8.5 (64 bit)<br>- SUSE Enterprise Linux Server 15 SP2 (64 bit)<br>- Ubuntu 20.04.2 (64 bit) / 21.04 (64 bit) / 21.10 (64 bit)<br><br>Hypervisor:<br>- VMWare® ESXi 6.7.0 U3 / vSphere 6.7.0 U3<br>- VMWare® ESXi 7.0 U3c / vSphere 7.0 U3c<br><br>**Please refer to our website for the latest OS support list.* |
| Environment | |
| Temperature | Operation temperature: 10°C ~ 35°C / Non operation temperature: -40°C ~ 70°C |

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

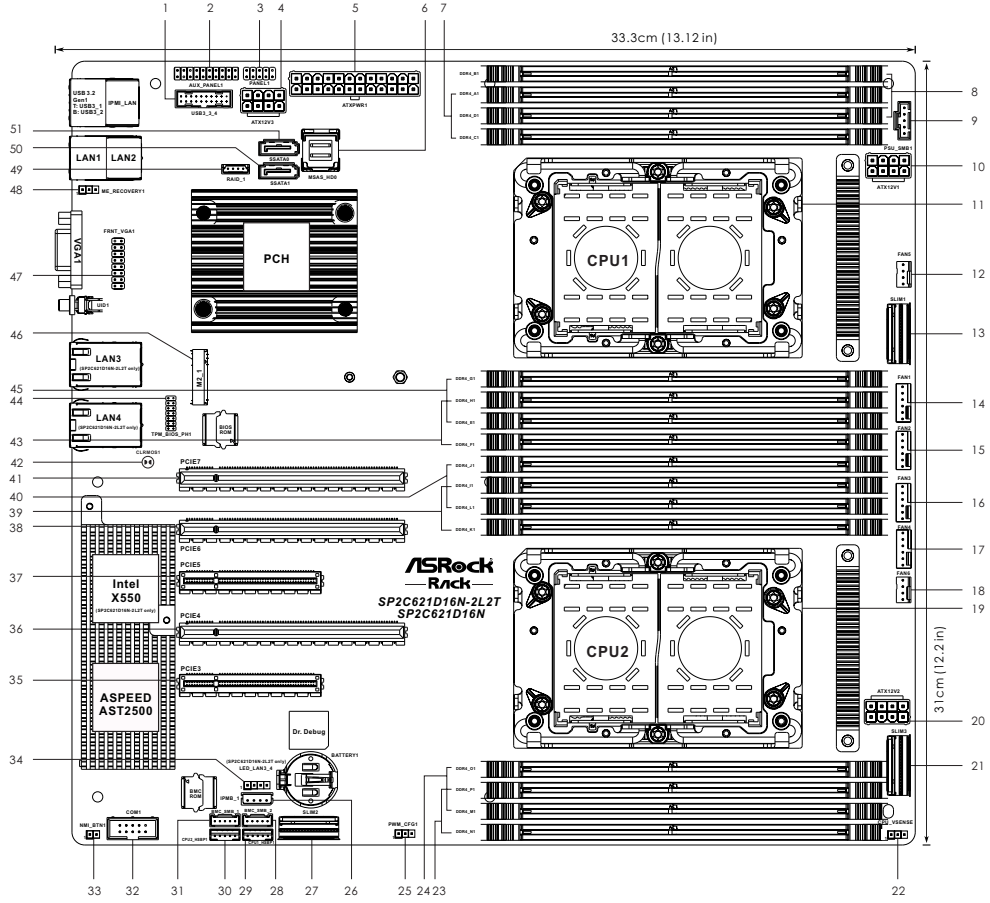
*This motherboard supports Wake from on Board LAN. To use this function, please make sure that the "Wake on Magic Packet from power off state" is enabled in Device Manager > Intel® Ethernet Connection > Power Management. And the "PCI Devices Power On" is enabled in UEFI SETUP UTILITY > Advanced > ACPI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

*If 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 Motherboard Layout

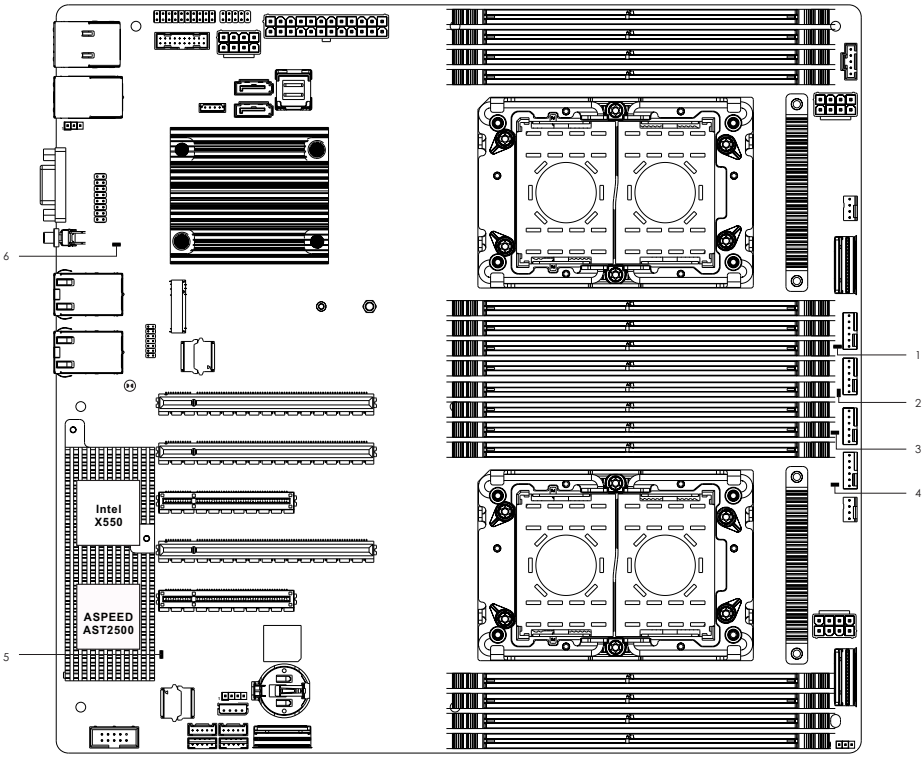


| No. | Description |
|---|---|
| 1 | USB 3.2 Gen1 Header (USB3_3_4) |
| 2 | Auxiliary Panel Header (AUX_PANEL1) |
| 3 | System Panel Header (PANEL1) |
| 4 | ATX 12V Power Connector (ATX12V3) |
| 5 | ATX Power Connector (ATXPWR1) |
| 6 | Mini-SAS HD Connector (MSAS_HD0) |
| 7 | 2 x 288-pin DDR4 DIMM Slots (DDR4_A1, DDR_C1)* |
| 8 | 2 x 288-pin DDR4 DIMM Slots (DDR4_B1, DDR_D1)* |
| 9 | PSU SMBus (PSU_SMB1) |
| 10 | ATX 12V Power Connector (ATX12V1) |
| 11 | LGA 4189 CPU Socket (CPU1) |
| 12 | CPU Fan Connector (FAN5) |
| 13 | Low-Profile SlimSAS or Slimline x4 Connector (SLIM1) |
| 14 | System Fan Connector (FAN1) |
| 15 | System Fan Connector (FAN2) |
| 16 | System Fan Connector (FAN3) |
| 17 | System Fan Connector (FAN4) |
| 18 | CPU Fan Connector (FAN6) |
| 19 | LGA 4189 CPU Socket (CPU2) |
| 20 | ATX 12V Power Connector (ATX12V2) |
| 21 | Low-Profile SlimSAS or Slimline x4 Connector (SLIM3) |
| 22 | CPU VSENSE Header (CPU_VSENSE) |
| 23 | 2 x 288-pin DDR4 DIMM Slots (DDR4_N1, DDR_P1)* |
| 24 | 2 x 288-pin DDR4 DIMM Slots (DDR4_M1, DDR_O1)* |
| 25 | PWM Configuration Header (PWM_CFG1) |
| 26 | Intelligent Platform Management Bus Header (IPMB_1) |
| 27 | Low-Profile SlimSAS or Slimline x4 Connector (SLIM2) |
| 28 | BMC SMBus Header (BMC_SMB_2) |
| 29 | Backplane PCI Express Hot-Plug Connector (CPU1_HSBP1) |
| 30 | Backplane PCI Express Hot-Plug Connector (CPU2_HSBP1) |
| 31 | BMC SMBus Header (BMC_SMB_1) |
| 32 | COM Port Header (COM1) |
| 33 | Non Maskable Interrupt Button (NMI_BTN1) |

| No. | Description |
|---|---|
| 34 | Front LAN LED Header (LED_LAN3_4) *(SP2C621D16N-2L2T only)* |
| 35 | PCI Express 4.0 x8 Card Slot (PCIE3) |
| 36 | PCI Express 4.0 x16 Card Slot (PCIE4) |
| 37 | PCI Express 4.0 x8 Card Slot (PCIE5) |
| 38 | PCI Express 4.0 x16 Card Slot (PCIE6) |
| 39 | 2 x 288-pin DDR4 DIMM Slots (DDR4_I1, DDR_K1)* |
| 40 | 2 x 288-pin DDR4 DIMM Slots (DDR4_J1, DDR_L1)* |
| 41 | PCI Express 4.0 x16 Card Slot (PCIE7) |
| 42 | Clear CMOS Pad (CLRMOS1) |
| 43 | 2 x 288-pin DDR4 DIMM Slots (DDR4_F1, DDR_H1)* |
| 44 | TPM-SPI Header (TPM_BIOS_PH1) |
| 45 | 2 x 288-pin DDR4 DIMM Slots (DDR4_E1, DDR_G1)* |
| 46 | M.2 Socket (M2_1, M Key) (Type 2260/2280) [from FCH] |
| 47 | Front VGA Header (FRONT_VGA1) |
| 48 | ME Recovery Jumper (ME_RECOVERY1) |
| 49 | Virtual RAID On CPU Header (RAID_1) |
| 50 | SATA3 Connectors (SSATA1) |
| 51 | SATA3 Connectors (SSATA0) |

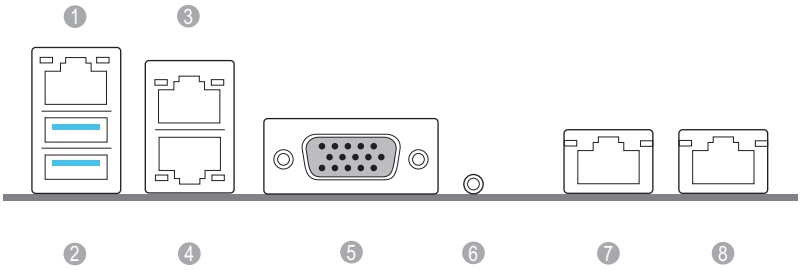
* *For DIMM installation and configuration instructions, please see p.22 (Installation of Memory Modules (DIMM)) for more details.*

## 1.5 Onboard LED Indicators




| No. | Item | Status | Description |
|---|---|---|---|
| 1 | FAN_LED1 | Red | FAN1 failed |
| 2 | FAN_LED2 | Red | FAN2 failed |
| 3 | FAN_LED3 | Red | FAN3 failed |
| 4 | FAN_LED4 | Red | FAN4 failed |
| 5 | BMC_LED1 | Green | BMC heartbeat LED |
| 6 | SB_PWR1 | Green | STB PWR ready |

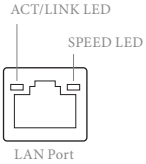
## 1.6 I/O Panel




| No. | Description | No. | Description |
|---|---|---|---|
| 1 | IPMI LAN Header (IPMI_LAN1)* | 5 | VGA Header (VGA1) |
| 2 | USB 3.2 Gen1 Ports (USB3_1_2) | 6 | UID Switch (UID) |
| 3 | 1G LAN RJ-45 Port (LAN1)** | 7 | 10G LAN RJ-45 Port (LAN3)***<br>*(SP2C621D16N-2L2T only)* |
| 4 | 1G LAN RJ-45 Port (LAN2)** | 8 | 10G LAN RJ-45 Port (LAN4)***<br>*(SP2C621D16N-2L2T only)* |

### 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.

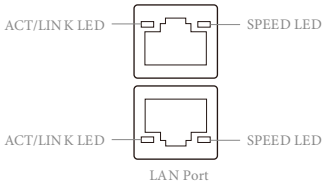



**Dedicated IPMI LAN Port LED Indications**

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

English

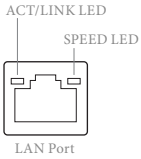
**There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.




**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 Yellow | 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.

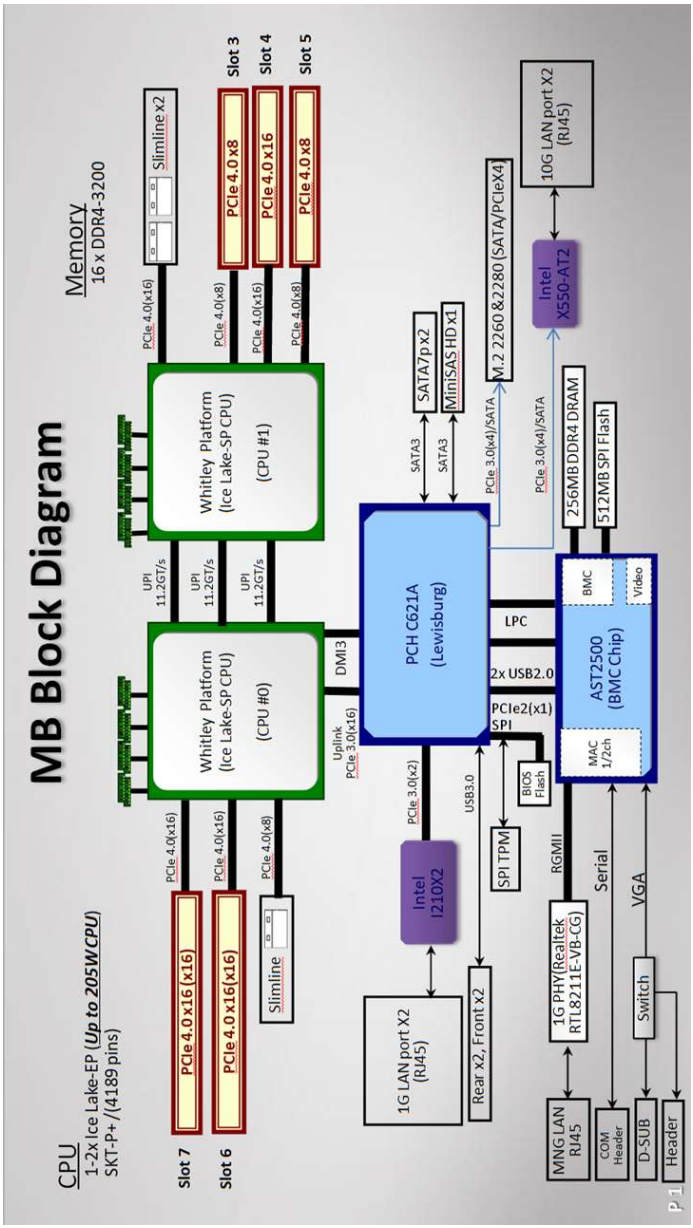



**10G LAN Port (LAN3, LAN4) LED Indications** *(SP2C621D16N-2L2T only)*

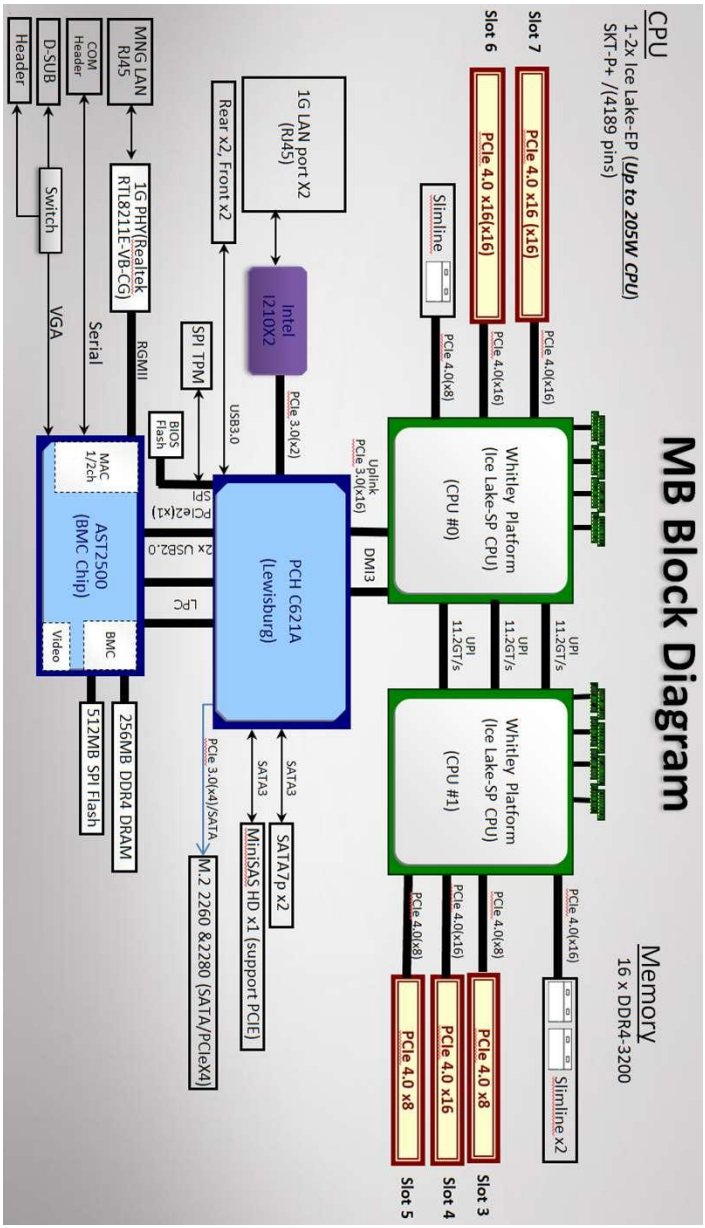
| Activity / Link LED | | Speed LED | |
|---|---|---|---|
| **Status** | **Description** | **Status** | **Description** |
| Off | No Link | Off | 10Mbps/100Mbps connection or no link |
| Blinking Green | Data Activity | Orange | 1Gbps connection |
| On | Link | Green | 10Gbps connection |

## 1.7 Block Diagram

SP2C621D16N-2L2T



SP2C621D16N






English

# Chapter 2 Installation

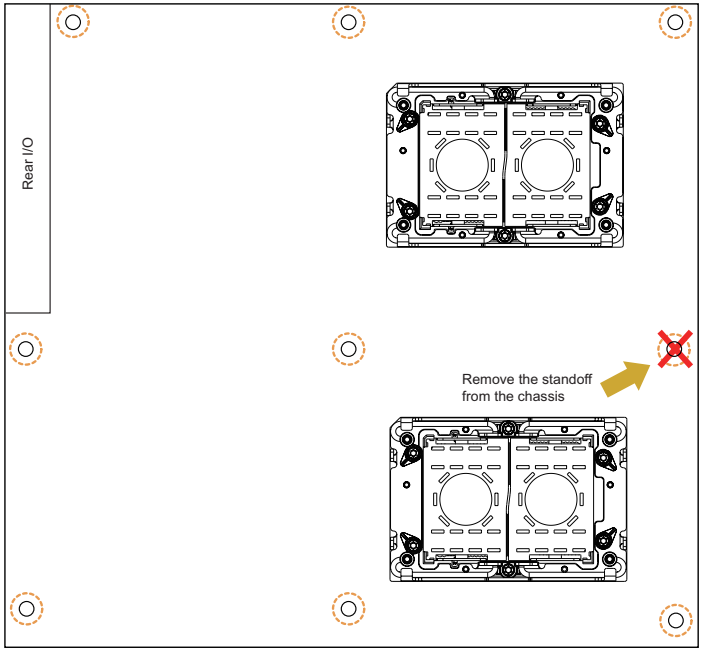
This is an EEB form factor (12.2" x 13.12", 31 cm x 33.3 cm) motherboard. Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.

*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.

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



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

## 2.2 Pre-installation Precautions

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

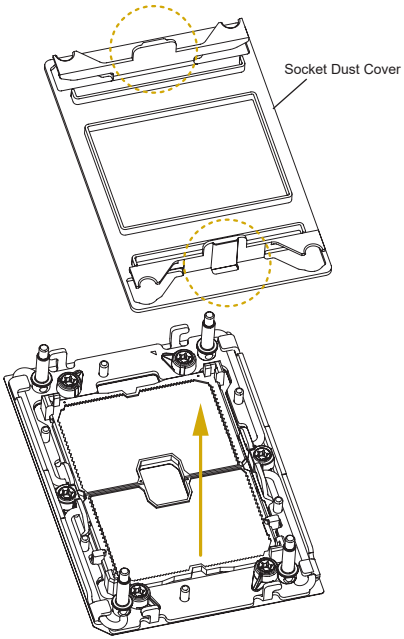
1. Unplug the power cord from the wall socket before touching any components.
2. To avoid damaging the motherboard's components due to static electricity, NEVER place your motherboard directly on the carpet or the like. Also remember to use a grounded wrist strap or touch a safety grounded object before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

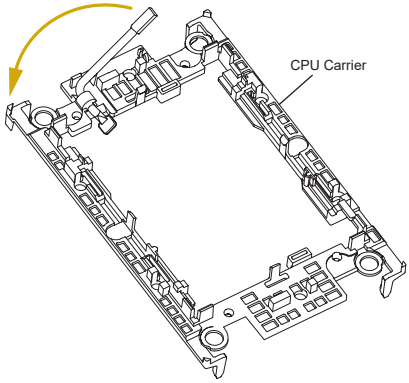
1. *Before you insert the CPU into the socket, please check if the PnP cap is on the socket, if the CPU surface is unclean, or if there are any bent pins in the socket. Do not force to insert the CPU into the socket if above situation is found. Otherwise, the CPU will be seriously damaged.*
2. *Unplug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

1

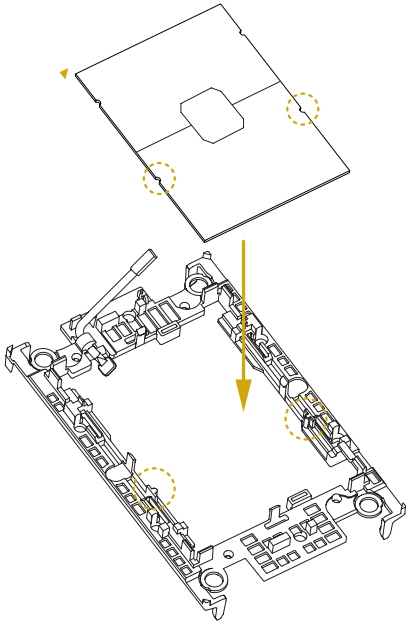


1. *Before you installed the heatsink, you need to spray thermal interface material between the CPU and the heatsink to improve heat dissipation.*
2. *Illustration in this documentation are examples only. Heatsink or fan cooler type may differ.*

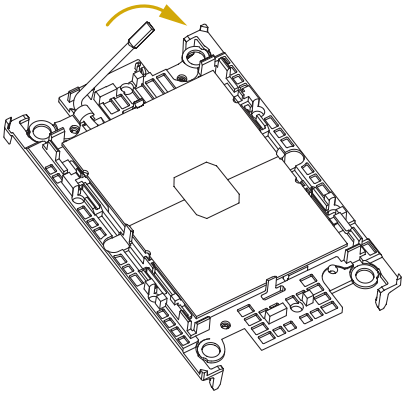
2




3



4



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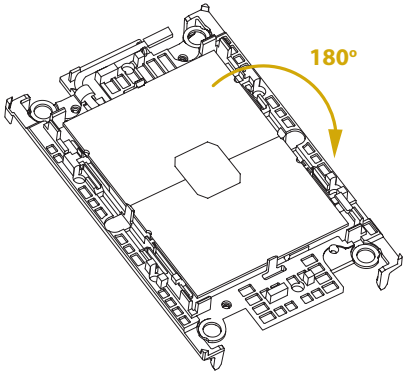

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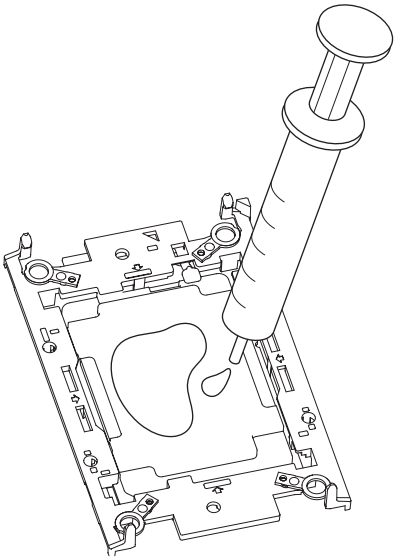
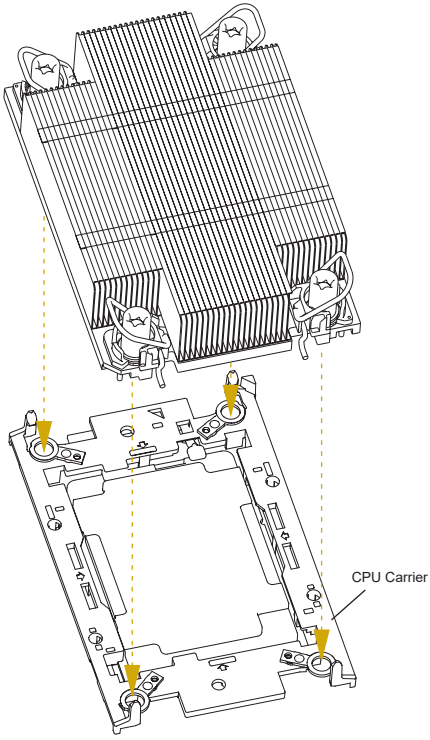
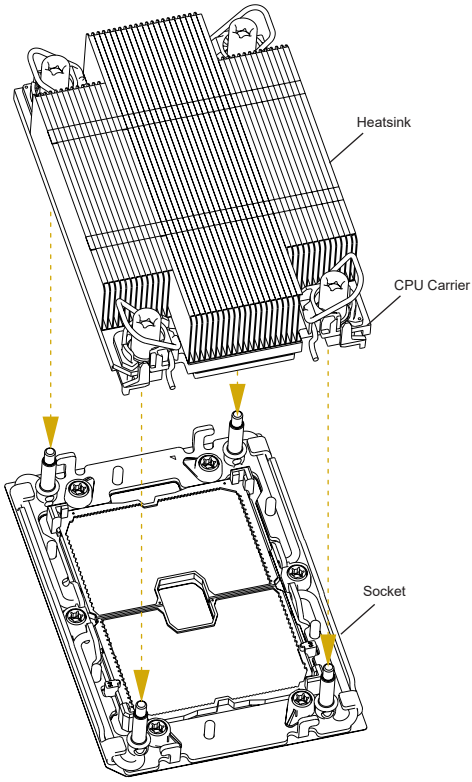


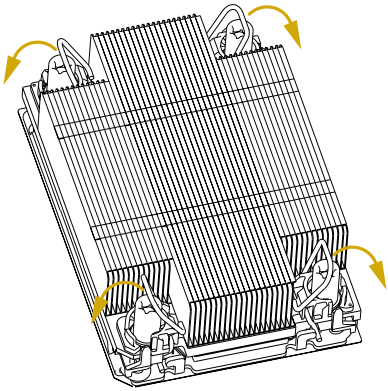
7



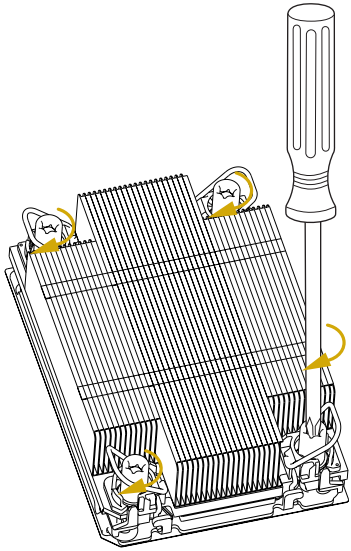
8



9



10



## 2.4 Installation of Memory Modules (DIMM)

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

1. *Before installing a memory module, make sure to turn off the computer and unplug the powercord from the power outlet to prevent damage to the memory module.*
2. *For eight channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR4 DIMMs.*
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.*

### 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).

**1 CPU Configuration (DDR4)**

| | CPU1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 |
| 1 DIMM | # | | | | | | | |
| 2 DIMMS | # | | | | # | | | |
| 4 DIMMS | # | | # | | # | | # | |
| 6 DIMMS | # | | # | # | # | | # | # |
| 8 DIMMS | # | # | # | # | # | # | # | # |

*Note: "#" indicates the slot is populated with a memory module.*

English

**2 CPU Configuration (DDR4)**

| | CPU1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DDR4 | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 |
| 1 DIMM | # | | | | | | | |
| 2 DIMMS | # | | | | | | | |
| 4 DIMMS | # | | | | # | | | |
| 8 DIMMS | # | | # | | # | | # | |
| 16 DIMMS | # | # | # | # | # | # | # | # |

| | CPU2 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DDR4 | I1 | J1 | K1 | L1 | M1 | N1 | O1 | P1 |
| 1 DIMM | | | | | | | | |
| 2 DIMMS | # | | | | | | | |
| 4 DIMMS | # | | | | # | | | |
| 8 DIMMS | # | | # | | # | | # | |
| 16 DIMMS | # | # | # | # | # | # | # | # |

*Note: "#" indicates the slot is populated with a memory module.*

## 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)**

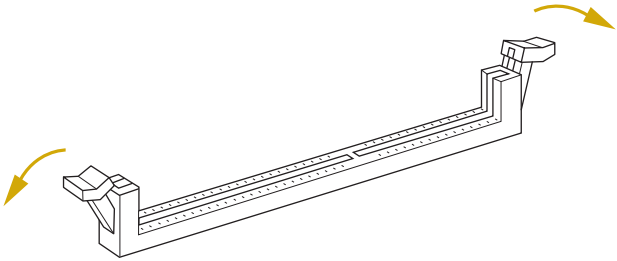
| | CPU1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DDR4 + BPS | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 |
| 4 DDR4 + 4 BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS |
| 6 DDR4 + 1 BPS | DDR4 | DDR4 | DDR4 | BPS | DDR4 | DDR4 | DDR4 | N/A |

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

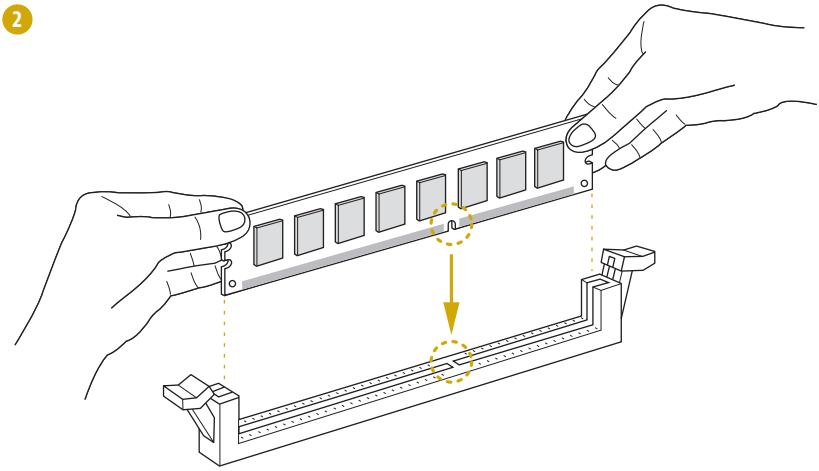
| | CPU1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DDR4 + BPS | A1 | B1 | C1 | D1 | E1 | F1 | G1 | H1 |
| 8 DDR4 + 8 BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS | DDR4 | BPS |
| 12 DDR4 + 2 BPS | DDR4 | DDR4 | DDR4 | BPS | DDR4 | DDR4 | DDR4 | N/A |

| | 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 |

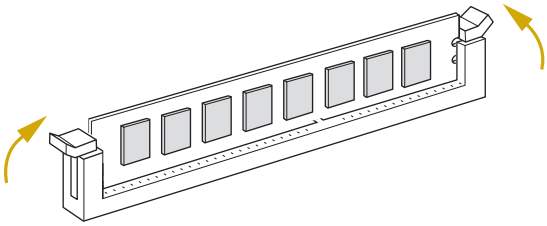
1



2



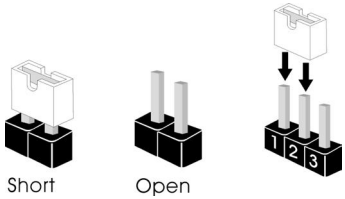
3



English

## 2.5 Jumper Setup

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




| | | |
|---|---|---|
| ME Recovery Jumper<br>(3-pin ME_RECOVERY1)<br>(see p.7, No. 48) |  <br>Normal Mode (Default) |  <br>ME Recovery Mode |

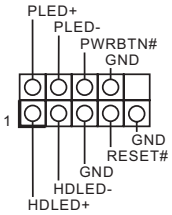
The illustration shows how jumpers are setup. When the jumper cap is placed on the pins, the jumper is “Short”. If no jumper cap is placed on the pins, the jumper is “Open”.

English

## 2.6 Onboard Headers and Connectors

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

System Panel Header
(9-pin PANEL1)
(see p.7, No. 3)




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.*

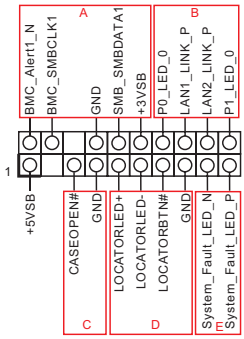
***RESET (Reset Switch):***
*Connect to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.*

***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. 2)




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

*A. Front panel SMBus connecting pin (6-1 pin FPSMB)*
*This header allows you to connect SMBus (System Management Bus) equipment. It can be used for communication between peripheral equipment in the system, which has slower transmission rates, and power management equipment.*

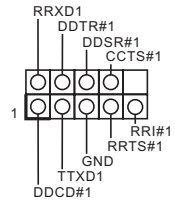
*B. Internet status indicator (2-pin LAN1_LED, LAN2_LED)*
*These two 2-pin headers allow you to use the Gigabit internet indicator cable to connect to the LAN status indicator. When this indicator flickers, it means that the internet is properly connected.*

*C. Chassis intrusion pin (2-pin CHASSIS)*
*This header is provided for host computer chassis with chassis intrusion detection designs. In addition, it must also work with external detection equipment, such as a chassis intrusion detection sensor or a microswitch. When this function is activated, if any chassis component movement occurs, the sensor will immediately detect it and send a signal to this header, and the system will then record this chassis intrusion event. The default setting is set to the CASEOPEN and GND pin; this function is off.*

*D. Locator LED (4-pin LOCATOR)*
*This header is for the locator switch and LED on the front panel.*

*E. System Fault LED (2-pin LOCATOR)*
*This header is for the Fault LED on the system.*

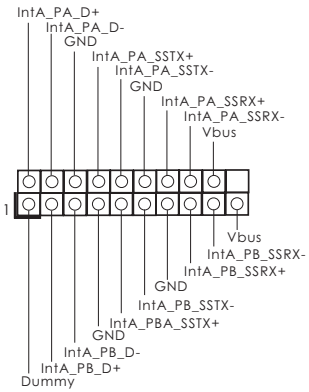
Serial Port Header
(9-pin COM1)
(see p.7, No. 32)




This COM header supports a serial port module.

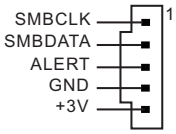
English

USB 3.2 Gen1 Header
(19-pin USB3_3_4)
(see p.7, No. 1)




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

PSU SMBus Header
(PSU_SMB1)
(see p.7, No. )

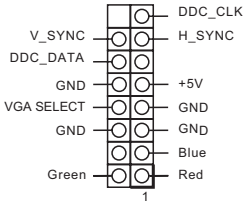



PSU SMBus monitors the status of the power supply, fan and system temperature.

Non Maskable Interrupt
Button Header
(2-pin NMI_BTN1)
(see p.7, No. 33)


Please connect a NMI device to this header.

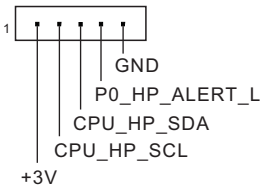
Front VGA Header
(15-pin VGA1)
(see p.7, No. 47)




Please connect either end of VGA cable to VGA header.

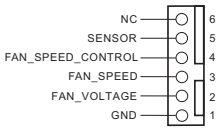
English

Backplane PCI Express Hot-Plug Connectors
(5-pin CPU1_ HSBP1)
(see p.7, No. 29)
(5-pin CPU2_ HSBP1)
(see p.7, No. 30)



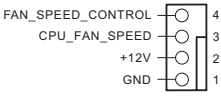

These headers are used for the hot plug feature of HDDs on the backplane.

System Fan Connectors
(6-pin FAN1)
(see p.7, No. 14)
(6-pin FAN2)
(see p.7, No. 15)
(6-pin FAN3)
(see p.7, No. 16)
(6-pin FAN4)
(see p.7, No. 17)



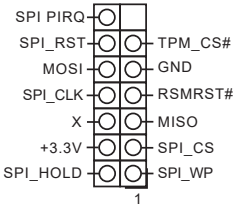

Please connect fan cables to the fan connectors and match the black wire to the ground pin. All fans support Fan Control.

CPU Fan Connectors
(4-pin FAN5)
(see p.7, No. 12)
(4-pin FAN6)
(see p.7, No. 18)




This motherboard provides two 4-Pin CPU fan (Quiet Fan) connectors. If you plan to connect a 3-Pin CPU fan, please connect it to Pin 1-3.

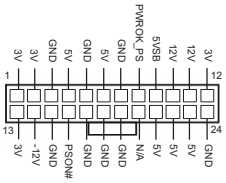
SPI TPM Header
(13-pin TPM_BIOS_PH1)
(see p.7, No. 44)




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.

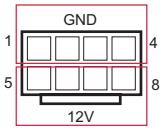
English

ATX Power Connector
(24-pin ATXPWR1)
(see p.7, No. 5)

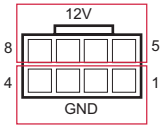



This motherboard provides a 24-pin ATX power connector. To use a 20-pin ATX power supply, please plug it along Pin 1 and Pin 13.

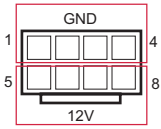
ATX Power Connectors
(8-pin ATX12V1)
(see p.7, No. 10)




(8-pin ATX12V2)
(see p.7, No. 20)

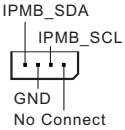



(8-pin ATX12V3)
(see p.7, No. 4)



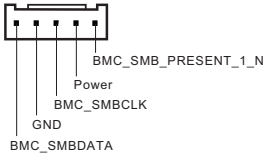

This motherboard provides three ATX power connectors.

Intelligent Platform Management Bus Header
(4-pin IPMB1_)
(see p.7, No. 26)

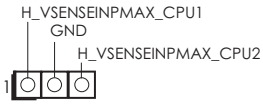
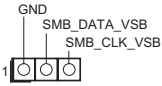
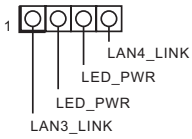



This 4-pin connector is used to provide a cabled baseboard or front panel connection for value added features and 3rd-party add-in cards, such as Emergency Management cards, that provide management features using the IPMB.

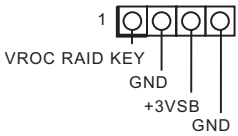
BMC SMB Headers
(5-pin BMC_SMB_1)
(see p.7, No. 31)
(5-pin BMC_SMB_2)
(see p.7, No. 28)




These headers are used for the SM BUS devices.

| | | |
|---|---|---|
| CPU VSENSE Header<br>(3-pin CPU_VSENSE)<br>(see p.7, No. 22) |  | This header is used to detect CPU1 VSENSE. |
| Serial ATA3 Connectors<br>(SSATA0)<br>(see p.7, No. 51)<br>(SSATA1)<br>(see p.7, No. 50) |  | These two SATA3 connectors support SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate. |
| Mini-SAS HD Connector<br>(MSAS_HD0)<br>(see p.7, No. 6) |  | The connector supports MiniSAS-to-SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate. |
| Clear CMOS Pad<br>(CLRMOS1)<br>(see p.7, No. 42) |  | This allows you to clear the data in CMOS. To clear CMOS, take out the CMOS battery and short the Clear CMOS Pad. |
| PWM Configuration Header<br>(3-pin PWM_CFG1)<br>(see p.7, No. 25) |  | This header is used for PWM configurations. |
| Front LAN LED Headers<br>(4-pin LED_LAN3_4)<br>(see p.7, No. 34)<br>*(SP2C621D16N-2L2T only)* |  | These 4-pin connectors are used for the front LAN status indicators. |

English

| | | |
|---|---|---|
| Virtual RAID On CPU Header (4-pin RAID_1) (see p.7, No. 49) |  | This connector supports Intel® Virtual RAID on CPU and NVME/AHCI RAID on CPU PCIE. |

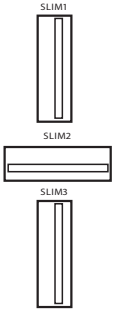
With the introduction of the Intel VROC product, there are three modes of operation:

| 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>ISS | VROCPREMMOD<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.

Low-Profile Slimline SAS Connectors
(SLIM1)
(see p.7, No. 13)
(SLIM2)
(see p.7, No. 27)
(SLIM3)
(see p.7, No. 21)




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 | SIDEBAND_3A | B10 | SIDEBAND_2A |
| 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 | SIDEBAND_3B | B28 | SIDEBAND_2B |
| 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 | P_GND_2 | 78 | P_GND_3 |
| 76 | P_GND_4 | 79 | NP_NC_1 |
| 77 | P_GND_1 | 80 | NP_NC_2 |

## 2.7 Dr. Debug

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

| Code | Description |
|---|---|
| 0x10 | PEI_CORE_STARTED |
| 0x11 | PEI_CAR_CPU_INIT |
| 0x15 | PEI_CAR_NB_INIT |
| 0x19 | PEI_CAR_SB_INIT |
| 0x31 | PEI_MEMORY_INSTALLED |
| 0x32 | PEI_CPU_INIT |
| 0x33 | PEI_CPU_CACHE_INIT |
| 0x34 | PEI_CPU_AP_INIT |
| 0x35 | PEI_CPU_BSP_SELECT |
| 0x36 | PEI_CPU_SMM_INIT |
| 0x37 | PEI_MEM_NB_INIT |
| 0x3B | PEI_MEM_SB_INIT |
| 0x4F | PEI_DXE_IPL_STARTED |
| 0x60 | DXE_CORE_STARTED |
| 0x61 | DXE_NVRAM_INIT |
| 0x62 | DXE_SBRUN_INIT |

| | |
|---|---|
| 0x63 | DXE_CPU_INIT |
| 0x68 | DXE_NB_HB_INIT |
| 0x69 | DXE_NB_INIT |
| 0x6A | DXE_NB_SMM_INIT |
| 0x70 | DXE_SB_INIT |
| 0x71 | DXE_SB_SMM_INIT |
| 0x72 | DXE_SB_DEVICES_INIT |
| 0x78 | DXE_ACPI_INIT |
| 0x79 | DXE_CSM_INIT |
| 0x90 | DXE_BDS_STARTED |
| 0x91 | DXE_BDS_CONNECT_DRIVERS |
| 0x92 | DXE_PCI_BUS_BEGIN |
| 0x93 | DXE_PCI_BUS_HPC_INIT |
| 0x94 | DXE_PCI_BUS_ENUM |
| 0x95 | DXE_PCI_BUS_REQUEST_RESOURCES |
| 0x96 | DXE_PCI_BUS_ASSIGN_RESOURCES |
| 0x97 | DXE_CON_OUT_CONNECT |
| 0x98 | DXE_CON_IN_CONNECT |

| | |
|---|---|
| 0x99 | DXE_SIO_INIT |
| 0x9A | DXE_USB_BEGIN |
| 0x9B | DXE_USB_RESET |
| 0x9C | DXE_USB_DETECT |
| 0x9D | DXE_USB_ENABLE |
| 0xA0 | DXE_IDE_BEGIN |
| 0xA1 | DXE_IDE_RESET |
| 0xA2 | DXE_IDE_DETECT |
| 0xA3 | DXE_IDE_ENABLE |
| 0xA4 | DXE_SCSI_BEGIN |
| 0xA5 | DXE_SCSI_RESET |
| 0xA6 | DXE_SCSI_DETECT |
| 0xA7 | DXE_SCSI_ENABLE |
| 0xA8 | DXE_SETUP_VERIFYING_PASSWORD |
| 0xA9 | DXE_SETUP_START |
| 0xAB | DXE_SETUP_INPUT_WAIT |
| 0xAD | DXE_READY_TO_BOOT |
| 0xAE | DXE_LEGACY_BOOT |

| | |
|---|---|
| 0xAF | DXE_EXIT_BOOT_SERVICES |
| 0xB0 | RT_SET_VIRTUAL_ADDRESS_MAP_BEGIN |
| 0xB1 | RT_SET_VIRTUAL_ADDRESS_MAP_END |
| 0xB2 | DXE_LEGACY_OPROM_INIT |
| 0xB3 | DXE_RESET_SYSTEM |
| 0xB4 | DXE_USB_HOTPLUG |
| 0xB5 | DXE_PCI_BUS_HOTPLUG |
| 0xB6 | DXE_NVRAM_CLEANUP |
| 0xB7 | DXE_CONFIGURATION_RESET |
| 0xF0 | PEI_RECOVERY_AUTO |
| 0xF1 | PEI_RECOVERY_USER |
| 0xF2 | PEI_RECOVERY_STARTED |
| 0xF3 | PEI_RECOVERY_CAPSULE_FOUND |
| 0xF4 | PEI_RECOVERY_CAPSULE_LOADED |
| 0xE0 | PEI_S3_STARTED |
| 0xE1 | PEI_S3_BOOT_SCRIPT |
| 0xE2 | PEI_S3_VIDEO_REPOST |

| | |
|---|---|
| 0xE3 | PEI_S3_OS_WAKE |
| 0x50 | PEI_MEMORY_INVALID_TYPE |
| 0x53 | PEI_MEMORY_NOT_DETECTED |
| 0x55 | PEI_MEMORY_NOT_INSTALLED |
| 0x57 | PEI_CPU_MISMATCH |
| 0x58 | PEI_CPU_SELF_TEST_FAILED |
| 0x59 | PEI_CPU_NO_MICROCODE |
| 0x5A | PEI_CPU_ERROR |
| 0x5B | PEI_RESET_NOT_AVAILABLE |
| 0xD0 | DXE_CPU_ERROR |
| 0xD1 | DXE_NB_ERROR |
| 0xD2 | DXE_SB_ERROR |
| 0xD3 | DXE_ARCH_PROTOCOL_NOT_AVAILABLE |
| 0xD4 | DXE_PCI_BUS_OUT_OF_RESOURCES |
| 0xD5 | DXE_LEGACY_OPROM_NO_SPACE |
| 0xD6 | DXE_NO_CON_OUT |
| 0xD7 | DXE_NO_CON_IN |

| | |
|---|---|
| 0xD8 | DXE_INVALID_PASSWORD |
| 0xD9 | DXE_BOOT_OPTION_LOAD_ERROR |
| 0xDA | DXE_BOOT_OPTION_FAILED |
| 0xDB | DXE_FLASH_UPDATE_FAILED |
| 0xDC | DXE_RESET_NOT_AVAILABLE |
| 0xE8 | PEI_MEMORY_S3_RESUME_FAILED |
| 0xE9 | PEI_S3_RESUME_PPI_NOT_FOUND |
| 0xEA | PEI_S3_BOOT_SCRIPT_ERROR |
| 0xEB | PEI_S3_OS_WAKE_ERROR |

## 2.8 Identification purpose LED/Switch

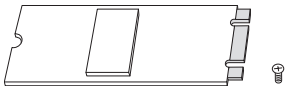
With the UID button, You are able to locate the server you're working on from behind a rack of servers.

| | | |
|---|---|---|
| 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. |

## 2.9 M.2 SSD Module Installation Guide

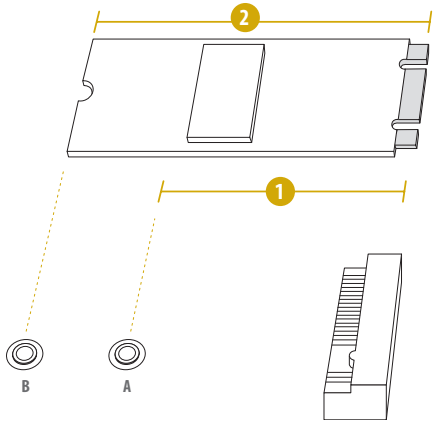
The Ultra M.2 socket (M2_1, Key M) supports type 2260/2280 M.2 SATA3 6.0 Gb/s module or a M.2 PCI Express module up to Gen 3 x4 (32Gb/s).

### Installing the M.2 SSD Module



***Step 1***

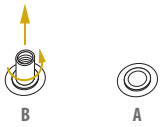
Prepare a M.2 SSD module and the screw.

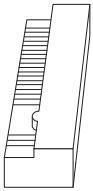



***Step 2***

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

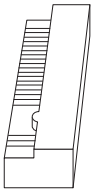
| No. | 1 | 2 |
|---|---|---|
| Nut Location | A | B |
| PCB Length | 6cm | 8cm |
| Module Type | Type 2260 | Type 2280 |



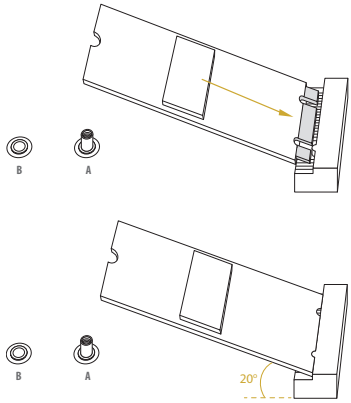
***Step 3***

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

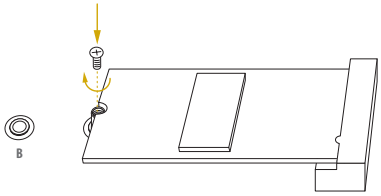
***Step 4***

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




***Step 5***

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




***Step 6***

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

# 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.

English

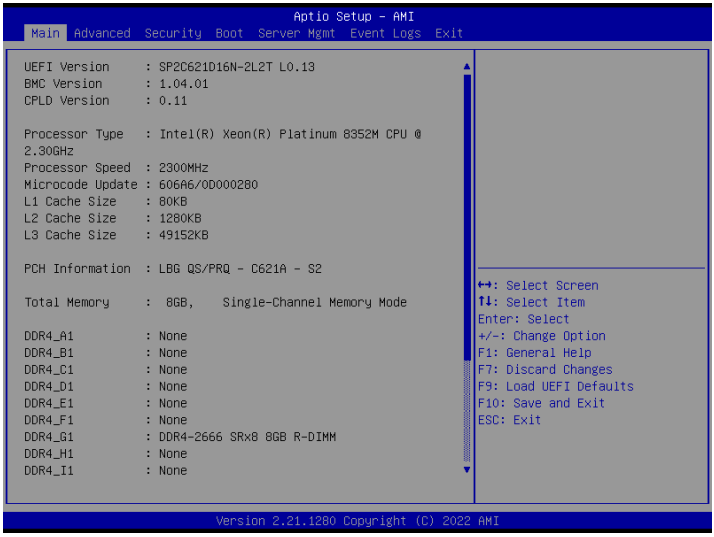
### 3.1.2 Navigation Keys

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

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

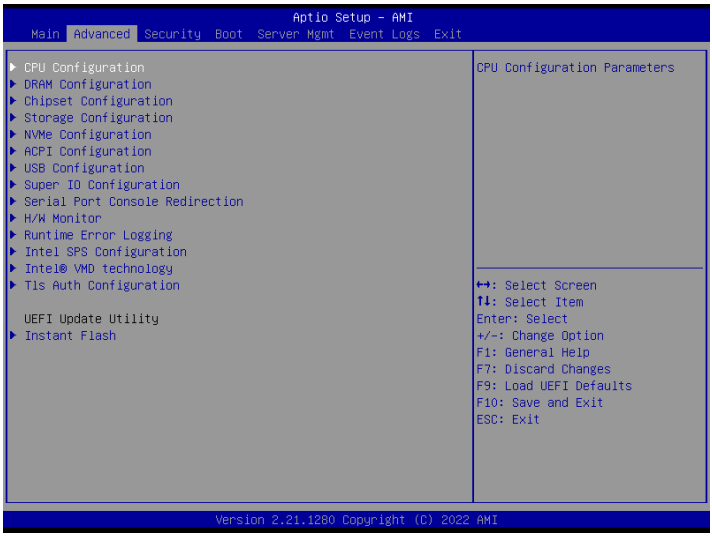
## 3.2 Main Screen

Once 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.



## 3.3 Advanced Screen

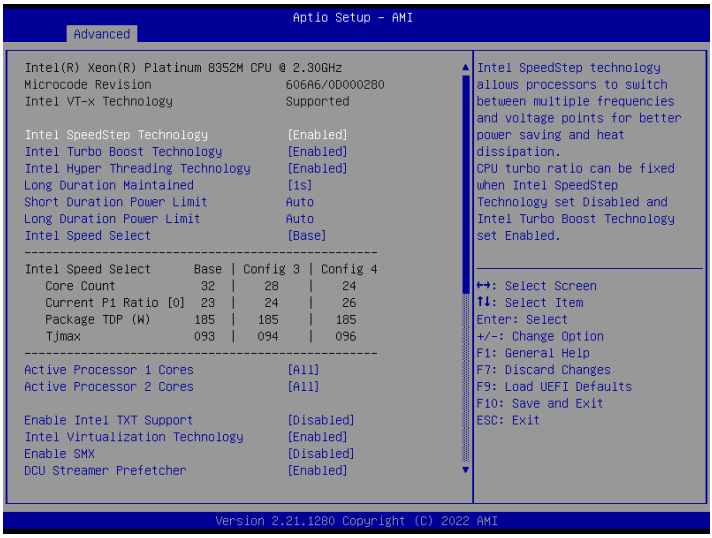
In this section, you may set the configurations for the following items: CPU Configuration, DRAM Configuration, Chipset Configuration, Storage Configuration, NVMe Configuration, ACPI Configuration, USB Configuration, Super IO Configuration, Serial Port Console Redirection, H/W Monitor, Runtime Error Logging, Intel SPS Configuration, Intel VMD Technology, Tls Auth Configuration and Instant Flash.




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

English

### 3.3.1 CPU Configuration




#### Intel SpeedStep Technology

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

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

#### Intel Turbo Boost Technology

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

#### Intel Hyper Threading Technology

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

#### Long Duration 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.

### Intel Speed Select

Intel Speed Select allows user to choose from upto two additional base frequency conditions.

### 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.

### 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).

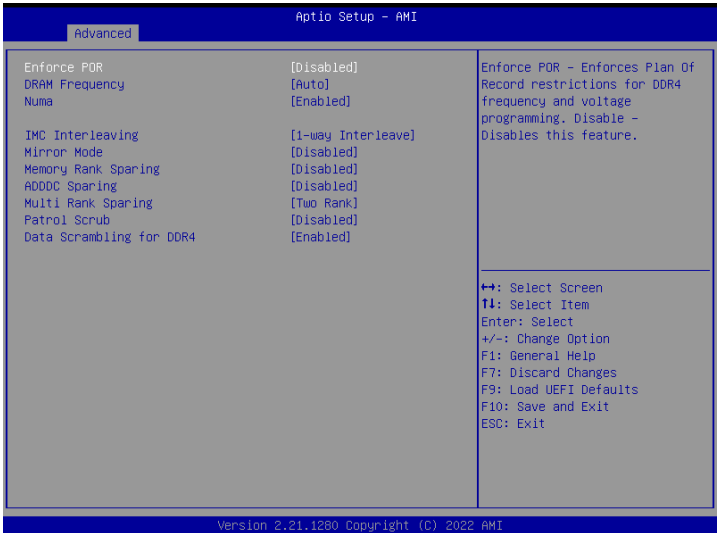
### Enable/Disable SGX Auto MP Registration Agent

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




### 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.

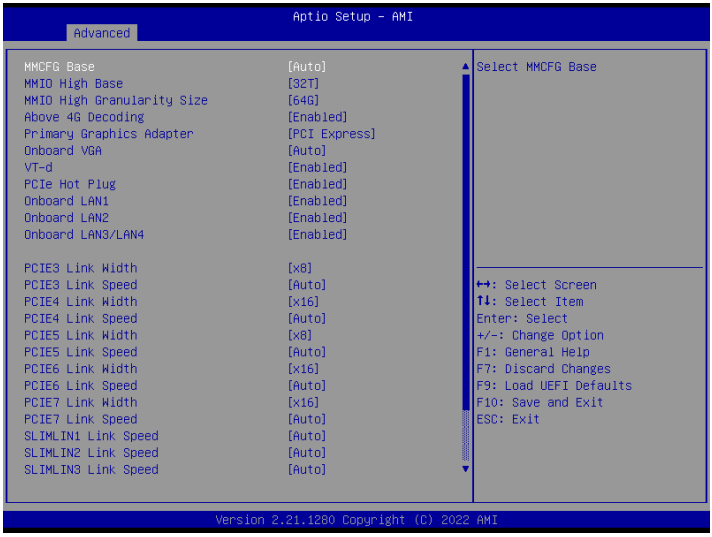
## Patrol Scrub

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




### 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 LAN1

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

### Onboard LAN2

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

### Onboard LAN3/LAN4 *(SP2C621D16N-2L2T only)*

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

### 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 [Auto].

### PCIE4 Link Width

This allows you to select PCIE4 Link Width. The default value is [x16].

### PCIE4 Link Speed

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

### PCIE5 Link Width

This allows you to select PCIE5 Link Width. The default value is [x16].

### PCIE5 Link Speed

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

### PCIE6 Link Width

This allows you to select PCIE6 Link Width. The default value is [x16].

### PCIE6 Link Speed

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

### PCIE7 Link Width

This allows you to select PCIE7 Link Width. The default value is [x16].

### PCIE7 Link Speed

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

### SLIMLIN1 Link Speed

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

### SLIMLIN2 Link Speed

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

### SLIMLIN3 Link Speed

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

### PCI-E ASPM Support (Global)

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

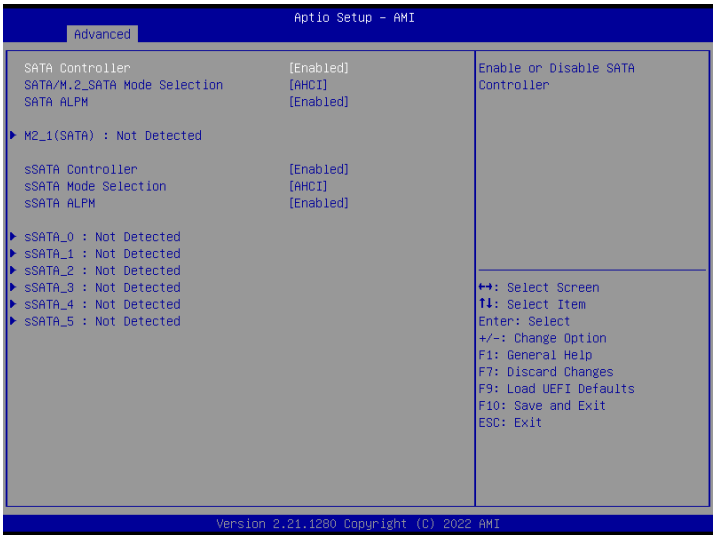
### SR-IOV Support

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




### SATA Controller

Use this item to enable or disable SATA Controllers.

### SATA/M.2_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.

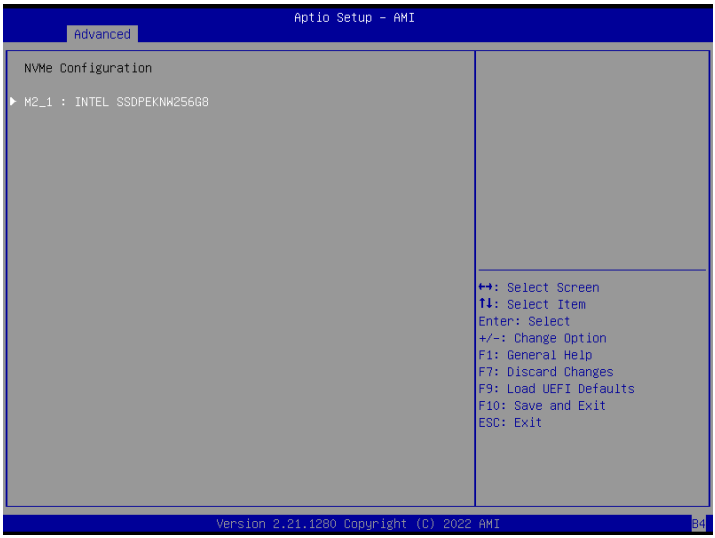
### sSATA Mode Selection

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




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.

## 3.3.6 ACPI Configuration


### PCIE Devices Power On

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

### Ring-In Power On

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

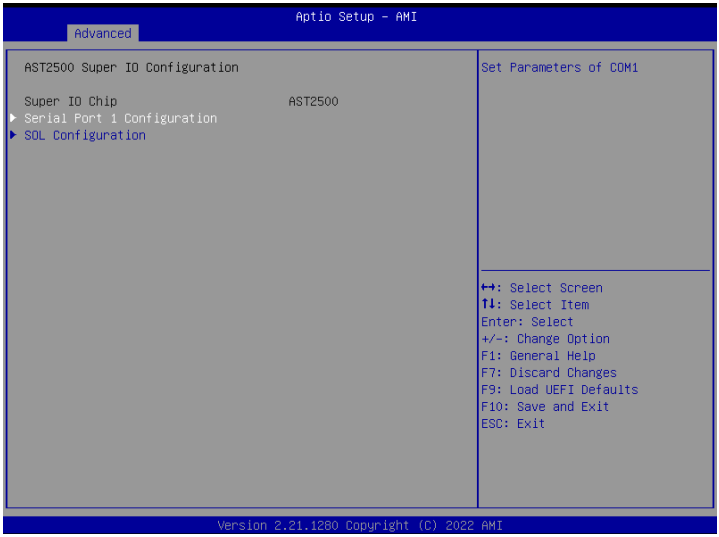
Allow the system to be waked up by the real time clock alarm. Set it to By OS to let it be handled by your operating system.

## 3.3.7 USB Configuration


### 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




### 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

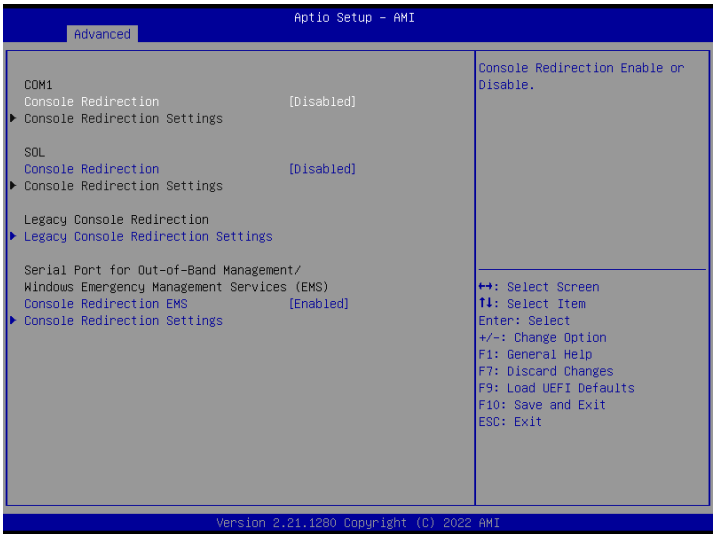
Use this item to enable or disable SOL port.

### Change Settings

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

English

## 3.3.9 Serial Port Console Redirection




### COM1/SOL

### Console Redirection

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

**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/

CTS], and [Software Xon/Xoff].

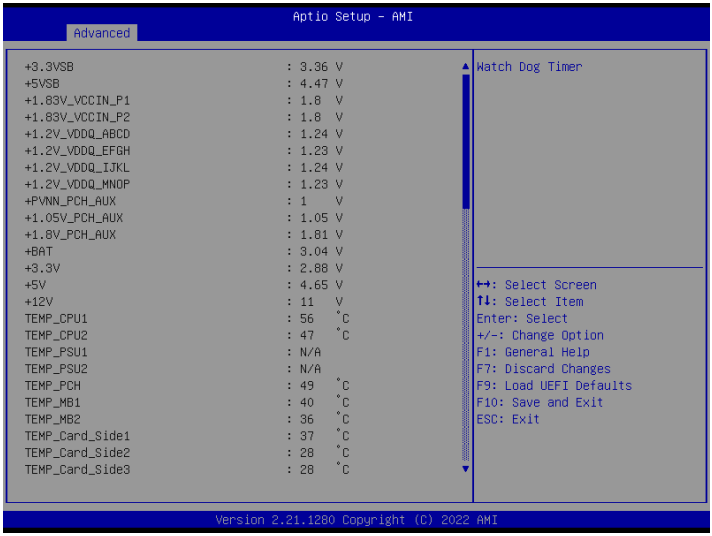
**Data Bits EMS**

**Parity EMS**

**Stop Bits EMS**

## 3.3.10 H/W Monitor

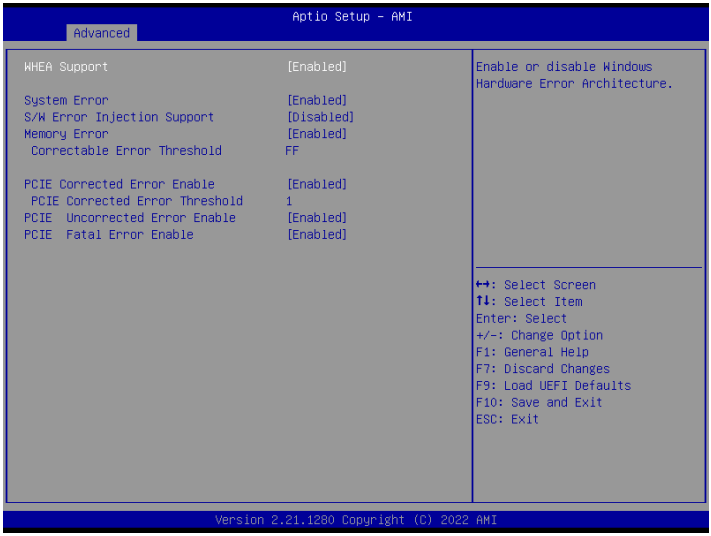
In this section, it allows you to monitor the status of the hardware on your system, including the parameters of the CPU temperature, motherboard temperature, CPU fan speed, chassis fan speed, and the critical voltage.




### Watch Dog Timer

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

## 3.3.11 Runtime Error Logging




### 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 Corrected Error Threshold

PCIE Correctable Error Threshold (0x01-0xFF) used for sparing, tagging, and leaky bucket.

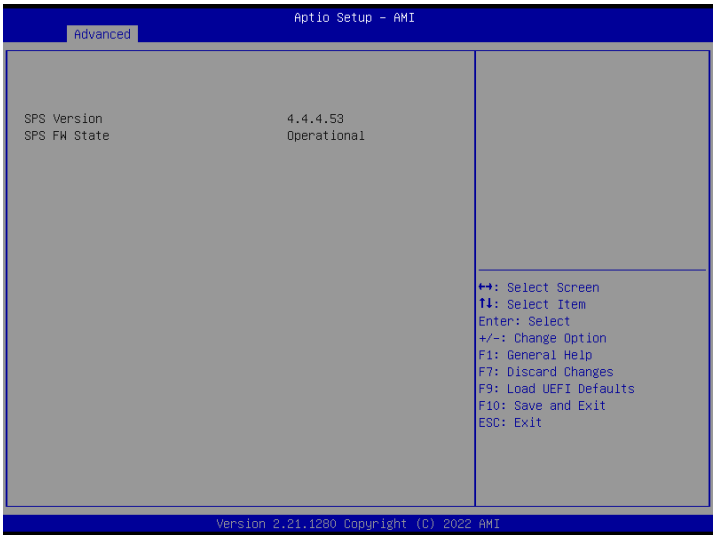
### PCIE Uncorrected Error Enable

Use this item to enable or disable PCIe Uncorrectable errors.

### PCIE Fatal Error Enable

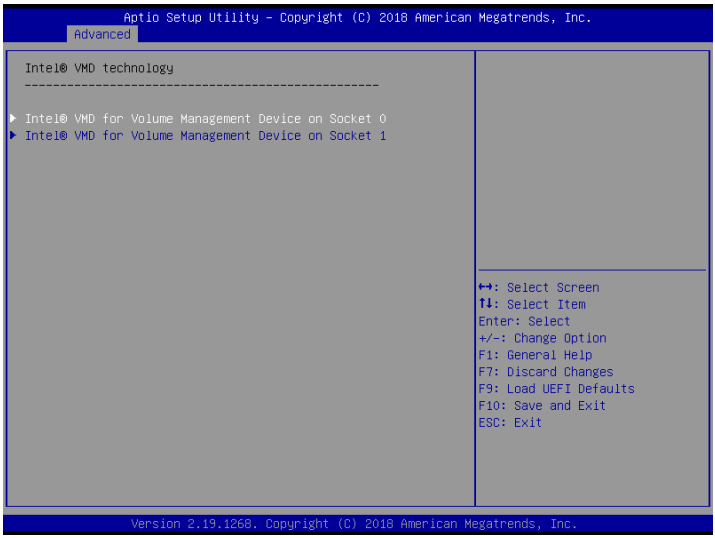
Use this item to enable or disable PCIe Ftal errors.

## 3.3.12 Intel SPS Configuration




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 0 (PCIE7)

### 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 (PCIE6)

### 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 (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.

### 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 (PCIE5/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 (PCIE4)

### 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 (SLIMLIN2)

### 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 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 (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.

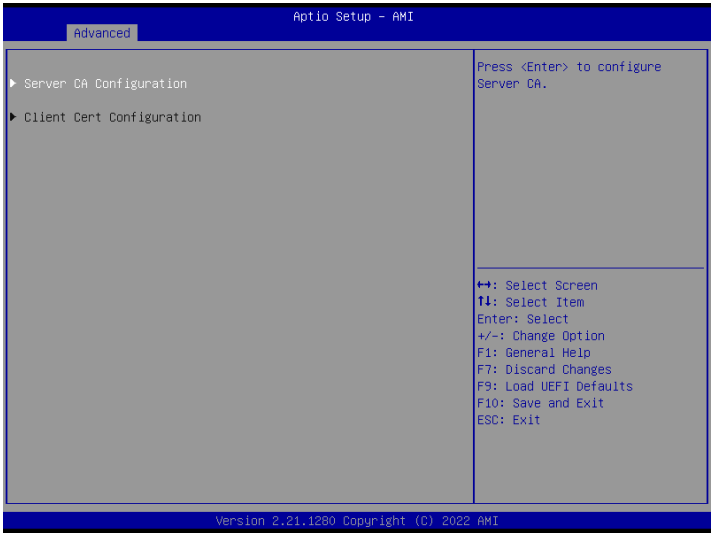
### VMD port B

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

### Hot Plug Capable

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

## 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

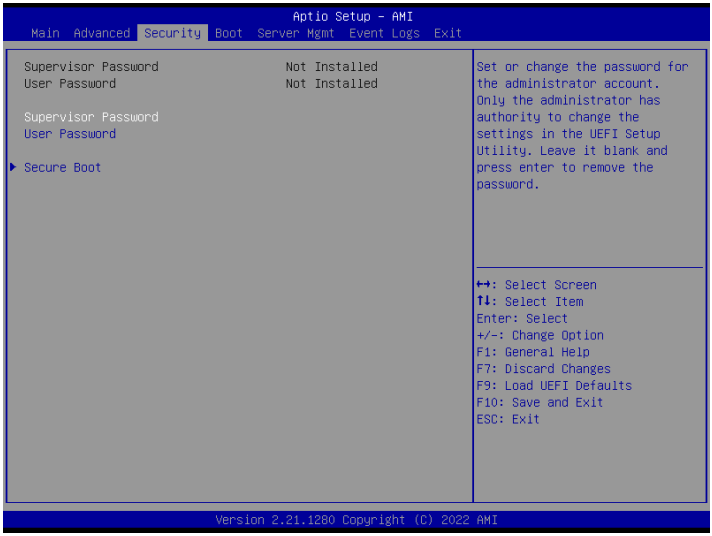
Press <Enter> to delete cert.

### 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 complicated 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.




### 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

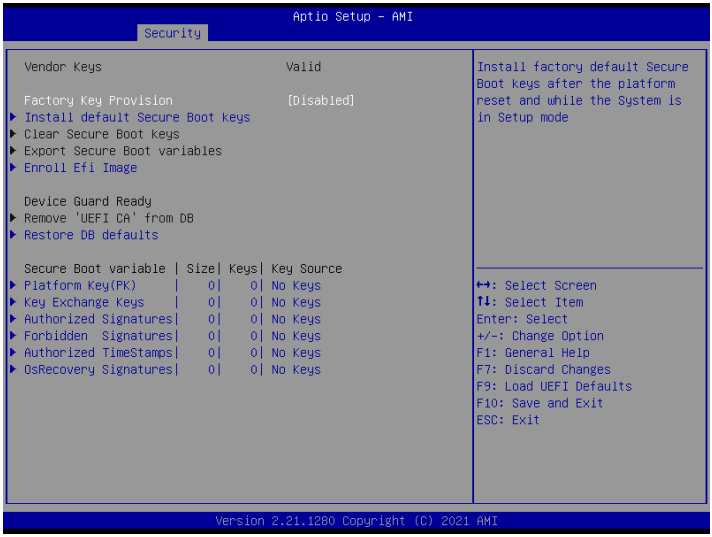
Use this to enable or disable Secure Boot Control. The default value is [Disabled]. Enable to support Windows Server 2012 R2 or later versions Secure Boot.

### 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.




### 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).

## 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, Test

## 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, Test

## 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, Test

## 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, Test

## 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, Test

## 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

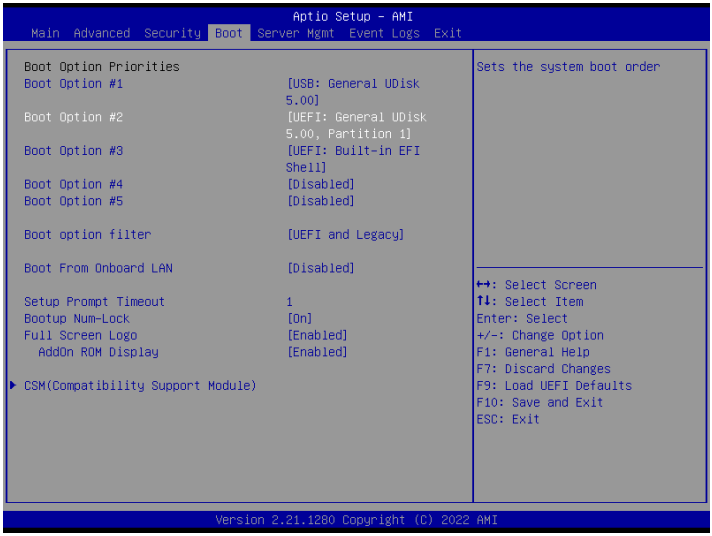
2. Authenticated UEFI Variable

3. EFI PE/COFF Image(SHA256)

Key Source: Default, External, Mixed, Test

## 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.




### Boot Option #1

Use this item to set the system boot order.

### Boot Option #2

Use this item to set the system boot order.

### Boot Option #3

Use this item to set the system boot order.

### Boot Option #4

Use this item to set the system boot order.

### Boot Option #5

Use this item to set the system boot order.

### Boot Option 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.

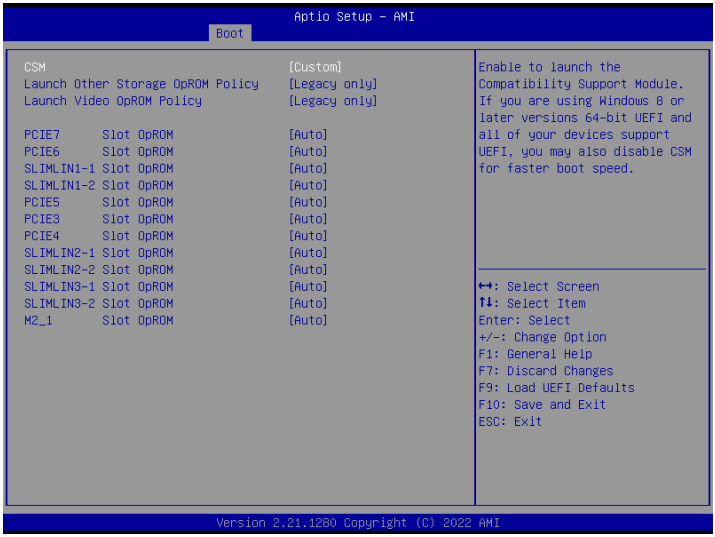
### Full Screen Logo

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




### 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.

### PCIE7 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.)

### PCIE6 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.)

### SLIMLIN1-1 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.)

### SLIMLIN1-2 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.)

### PCIE5 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.)

### PCIE4 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.)

### SLIMLIN2-1 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.)

### SLIMLIN2-2 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.)

### SLIMLIN3-1 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.)

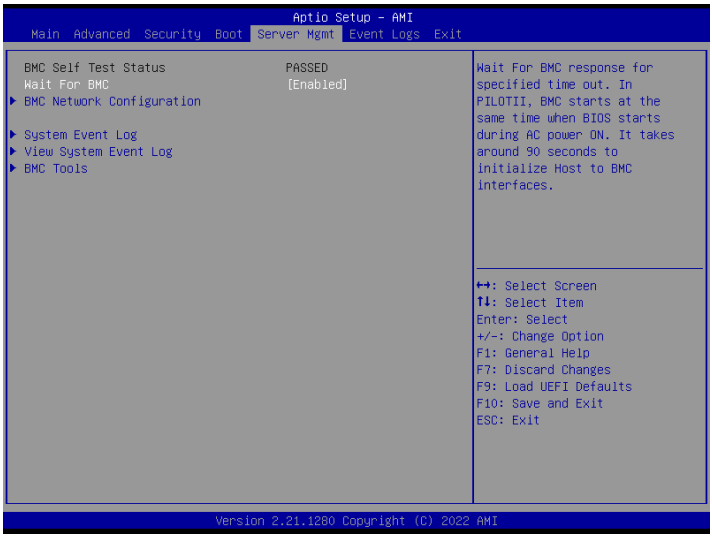
### SLIMLIN3-2 Slot OpROM

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.)

### 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.)

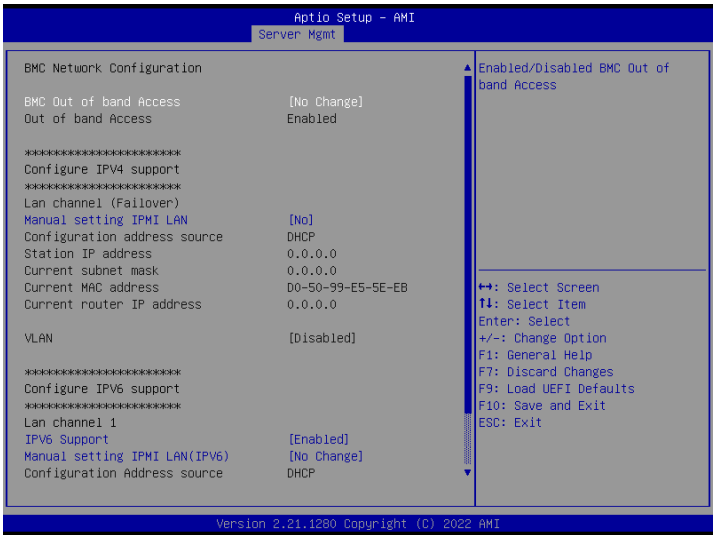
## 3.6 Server Mgmt




### Wait For BMC

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

## 3.6.1 BMC Network Configuration




### 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.*

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

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

## VLAN

Enabled/Disabled Virtual Local Area Network.

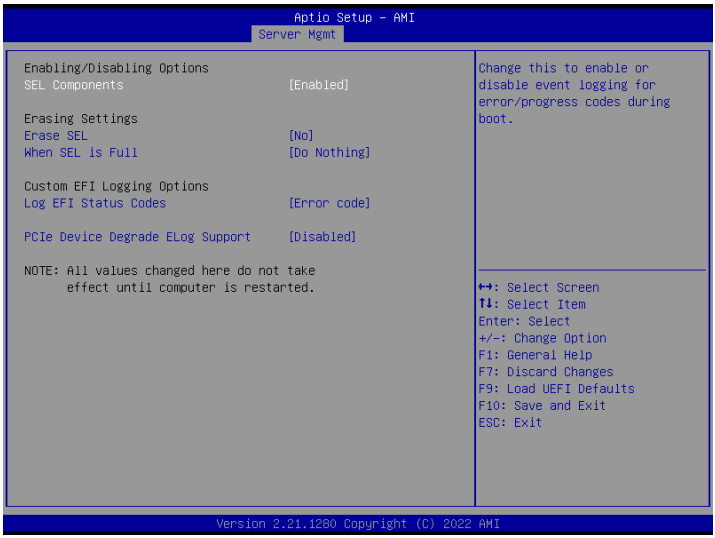
## IPV6 Support

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




### 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.

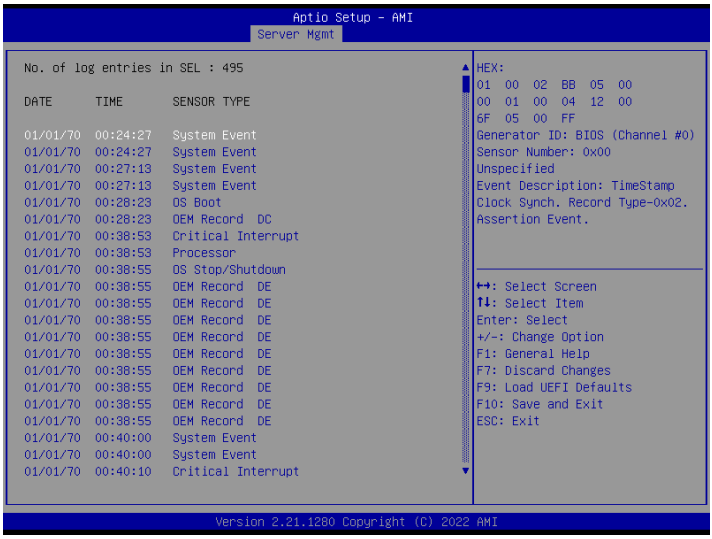
### Log EFI Status Codes

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

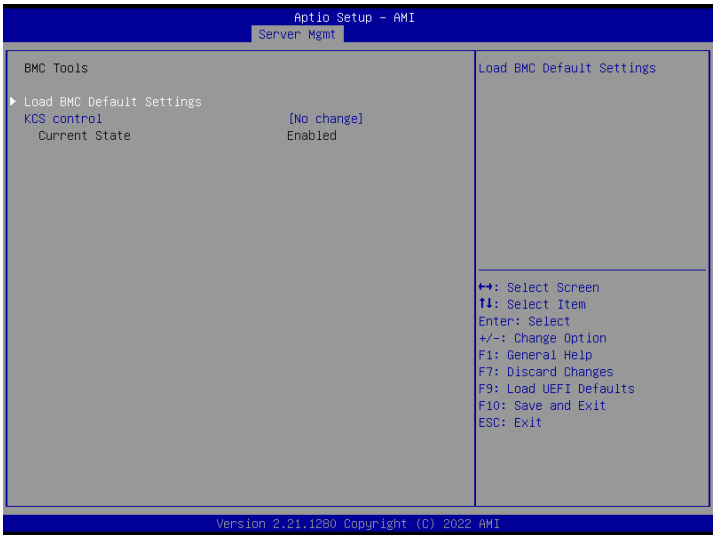
Use this item to enable or disable PCIe Device Degrade Error Logging Support.

## 3.6.3 View System Event Log




This page display the information of the system event log.

## 3.6.4 BMC Tools




### Load BMC Default Settings

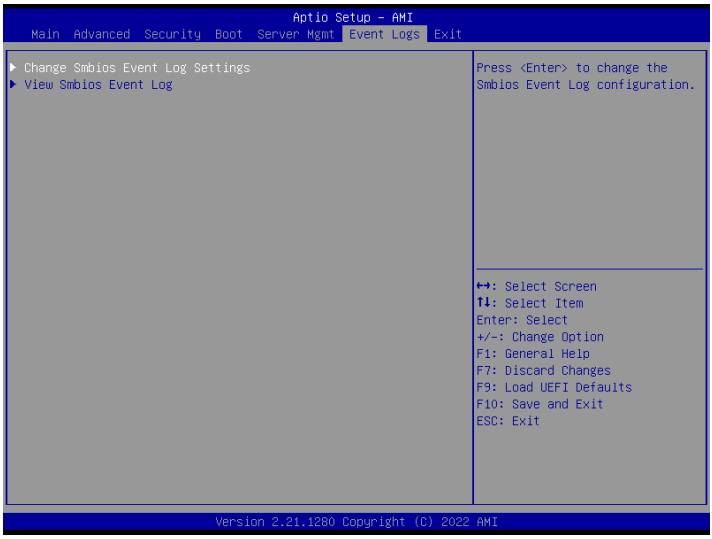
Use this item to Load BMC Default Settings

### 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




### 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**

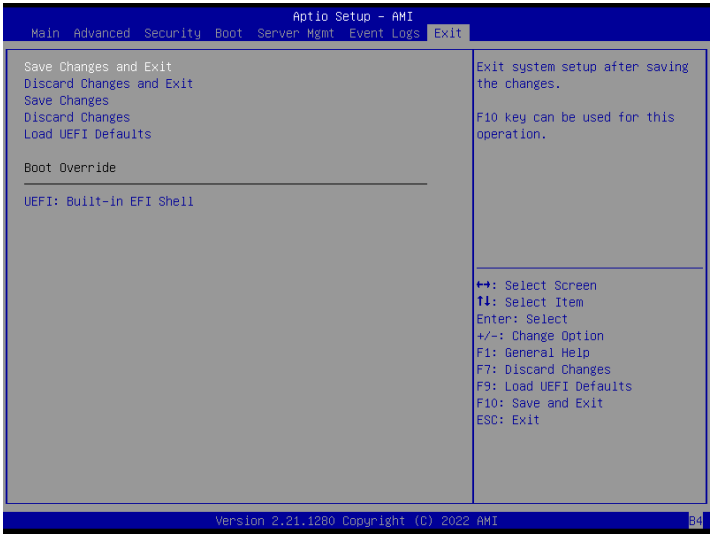
Enable or disable the converting of EFI Status Codes to Standard Smbios Types (Not all may be translated).

## 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




### 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.

**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.