GIGABYTE™

# MP72-HB0

Ampere® Altra® or Altra® Max ARM Server Motherboard

User Manual

Rev. 1.0

## Copyright



## Disclaimer



## Documentation Classifications

In order to assist in the use of this product, GIGABYTE provides the following types of documentation:

- User Manual: detailed information & steps about the installation, configuration and use this product (e.g. motherboard, server barebones), covering hardware and BIOS.
- User Guide: detailed information about the installation & use of an add-on hardware or software component (e.g. BMC firmware, rail-kit) compatible with this product.
- Quick Installation Guide: a short guide with visual diagrams that you can reference easily for installation purposes of this product (e.g. motherboard, server barebones).

Please see the support section of the online product page to check the current availability of these documents

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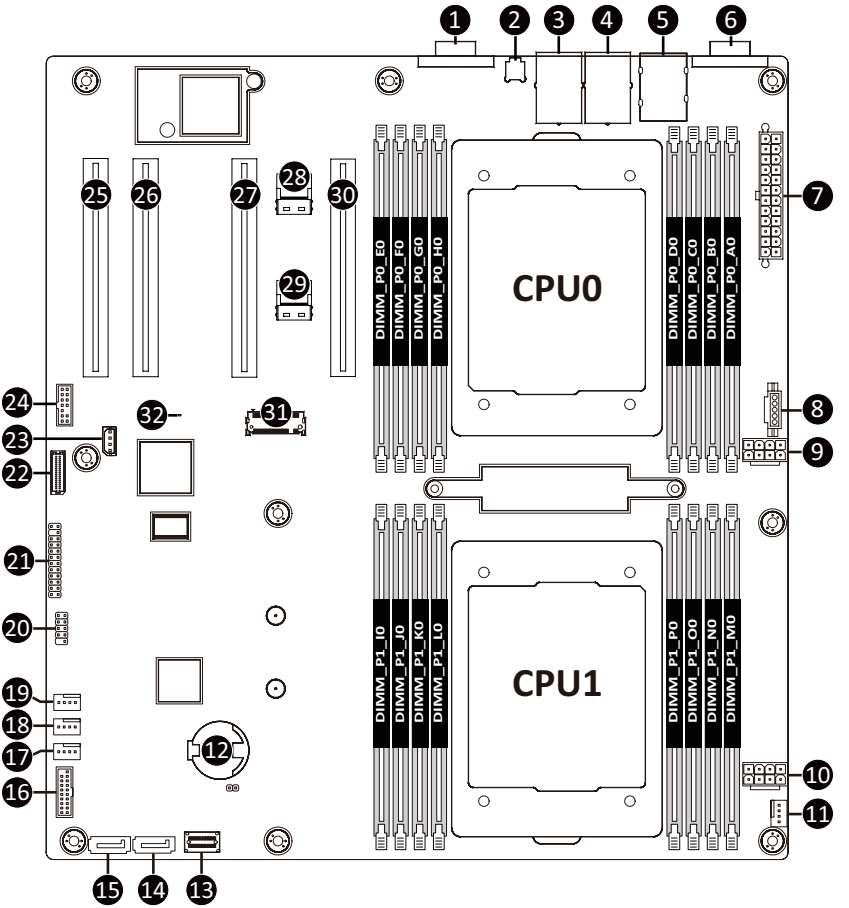
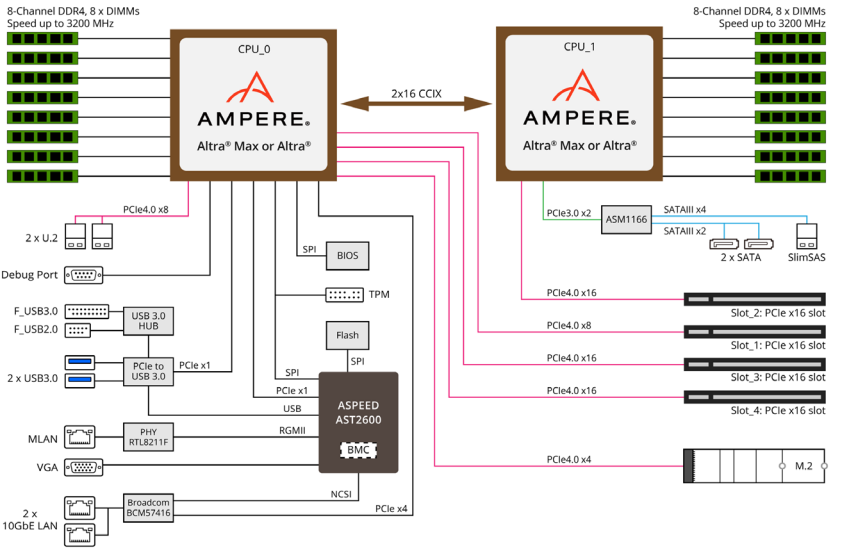
# MP72-HB0 Motherboard Layout



| Item | Code | Description |
|---|---|---|
| 1 | VGA1 | VGA Port |
| 2 | SW_ID1 | ID Button with LED |
| 3 | LAN2 | 10GbE LAN Port #2 |
| 4 | LAN1 | 10GbE LAN Port #1 |
| 5 | USB3_MLAN1 | Server Management LAN Port (Top)/ USB3.0 Ports (Bottom) |
| 6 | DEBUG PORT | Debug Port |
| 7 | ATX1 | 2 x 12 Pin Main Power Connector |
| 8 | PMBUS1 | PMBus Connector |
| 9 | P12V_1 | 2 x 4 Pin 12V Power Connector (for CPU0) |
| 10 | P12V_2 | 2 x 4 Pin 12V Power Connector (for CPU1) |
| 11 | CPU0_FAN | CPU0 Fan Connector |
| 12 | BAT1 | Battery Socket |
| 13 | SATA1 | Slimline Connector (SATAIII 6Gb/s Signal) |
| 14 | SATA3 | SATAIII 6Gb/s Connector #3 |
| 15 | SATA2 | SATAIII 6Gb/s Connector #2 |
| 16 | F_USB2 | Front Panel USB 3.0 Connector |
| 17 | CPU1_FAN | CPU1 Fan Connector |
| 18 | SYS_FAN1 | System Fan Connector #1 |
| 19 | SYS_FAN0 | System Fan Connector #0 |
| 20 | F_USB1 | USB 2.0 Header |
| 21 | FP_1 | Front Panel Header |
| 22 | BP_1 | HDD Back Plane Board Connector |
| 23 | IPMB1 | IPMB Connector |
| 24 | CON1 | TPM Connector |
| 25 | PCIE_1 | PCIe x16 Slot #1 (Gen4 x8) |
| 26 | PCIE_2 | PCIe x16 Slot #2 (Gen4 x16) |
| 27 | PCIE_3 | PCIe x16 Slot #3 (Gen4 x16) |
| 28 | NVME_2 | Slimline SAS 4i Connector (NVMe/PCIe Gen4 x4) |
| 29 | NVME_1 | Slimline SAS 4i Connector (NVMe/PCIe Gen4 x4) |
| 30 | PCIE_4 | PCIe x16 Slot #4 (Gen4 x16) |
| 31 | P0_M2_SK1 | M.2 slot (PCIe Gen4 x4, Support NGFF-2280/22110) |
| 32 | LED_BMC1 | BMC Firmware Readiness LED |

# Block Diagram



# Chapter 1 Hardware Installation

## 1-1 Installation Precautions

The motherboard contains numerous delicate electronic circuits and components which can become damaged as a result of electrostatic discharge (ESD). Prior to installation, carefully read the user's manual and follow these procedures:

- Prior to installation, do not remove or break motherboard S/N (Serial Number) sticker or warranty sticker provided by your dealer. These stickers are required for warranty validation.
- Always remove the AC power by unplugging the power cord from the power outlet before installing or removing the motherboard or other hardware components.
- When connecting hardware components to the internal connectors on the motherboard, make sure they are connected tightly and securely.
- When handling the motherboard, avoid touching any metal leads or connectors.
- It is best to wear an electrostatic discharge (ESD) wrist strap when handling electronic components such as a motherboard, CPU or memory. If you do not have an ESD wrist strap, keep your hands dry and first touch a metal object to eliminate static electricity.
- Prior to installing the motherboard, please have it on top of an antistatic pad or within an electrostatic shielding container.
- Before unplugging the power supply cable from the motherboard, make sure the power supply has been turned off.
- Before turning on the power, make sure the power supply voltage has been set according to the local voltage standard.
- Before using the product, please verify that all cables and power connectors of your hardware components are connected.
- To prevent damage to the motherboard, do not allow screws to come in contact with the motherboard circuit or its components.
- Make sure there are no leftover screws or metal components placed on the motherboard or within the computer casing.
- Do not place the computer system on an uneven surface.
- Do not place the computer system in a high-temperature environment.
- Turning on the computer power during the installation process can lead to damage to system components as well as physical harm to the user.
- If you are uncertain about any installation steps or have a problem related to the use of the product, please consult a certified computer technician.

## 1-2 Product Specifications

**NOTE:**

**We reserve the right to make any changes to the product specifications and product-related information without prior notice.**

| | |
|---|---|
| Form Factor | ◆ E-ATX<br>◆ 305W x 330D (mm) |
| CPU | ◆ Ampere® Altra® or Altra® Max Processor<br>◆ Dual processors, 7nm technology, LGA4926<br>◆ Up to 128-core per processor, TDP 250W<br>NOTE:<br>If only 1 CPU is installed, some PCIe or memory functions might be unavailable |
| Chipset | ◆ System on Chip |
| Memory | ◆ 16 x DIMM slots<br>◆ DDR4 memory supported only<br>◆ 8-Channel memory architecture<br>◆ RDIMM modules up to 256GB supported<br>◆ Up to 4TB of memory capacity supported per processor<br>◆ Memory speed: Up to 3200 MHz<br>NOTE: Only supports configurations with 1, 2, 4, 6, 8 DIMMs (1DPC) |
| LAN | ◆ 2 x 10Gb/s BASE-T LAN ports (Broadcom® BCM57416)<br>◆ 1 x 10/100/1000 management LAN |
| Onboard Graphics | ◆ Integrated in Aspeed® AST2600<br>◆ 2D Video Graphic Adapter with PCIe bus interface<br>◆ 1920x1200@60Hz 32bpp, DDR4 SDRAM |
| Storage Interface | ◆ 2 x 7-pin SATA 6Gb/s ports<br>◆ 1 x SlimSAS with 4 x SATA 6Gb/s ports |
| Expansion Slots | ◆ Slot_4: 1 x PCIe x16 (Gen4 x16 bus) slot, from CPU_0<br>◆ Slot_3: 1 x PCIe x16 (Gen4 x16 bus) slot, from CPU_0<br>◆ Slot_2: 1 x PCIe x16 (Gen4 x16 bus) slot, from CPU_1<br>◆ Slot_1: 1 x PCIe x16 (Gen4 x8 bus) slot, from CPU_0<br><br>◆ 2 x NVMe ports:<br>- SlimSAS 4i type<br>- PCIe Gen4 x4 per port<br><br>◆ 1 x M.2 slot:<br>- M-key<br>- PCIe Gen4 x4 per slot<br>- Supports NGFF-22110/2280 cards<br>- From CPU_0 |

| | |
|---|---|
| Internal I/O Connectors | ◆ 1 x 24-pin ATX main power connector<br>◆ 2 x 8-pin ATX 12V power connectors<br>◆ 2 x SlimSAS connectors<br>◆ 1 x SlimSAS vertical connector<br>◆ 2 x 7-pin SATA connectors<br>◆ 1 x M.2 slots<br>◆ 1 x HDD back plane board header<br>◆ 2 x CPU fan headers<br>◆ 2 x System fan headers<br>◆ 1 x USB 3.2 Gen1 header<br>◆ 1 x USB 2.0 Gen1 header<br>◆ 1 x TPM header<br>◆ 1 x Front panel header<br>◆ 1 x PMBus connector<br>◆ 1 x IPMB connector<br>◆ 1 x Clear CMOS jumper<br>◆ 1 x BIOS recovery jumper<br>◆ 1 x Case open header |
| Rear I/O Connectors | ◆ 2 x USB 3.2 Gen1<br>◆ 1 x VGA<br>◆ 1 x Debug port<br>◆ 2 x RJ45<br>◆ 1 x MLAN<br>◆ 1 x ID button with LED |
| TPM | ◆ 1 x TPM header with SPI interface<br>◆ Optional TPM2.0 kit: CTM010 |

| | | |
|---|---|---|
| | Board Management | ◆ Aspeed® AST2600 management controller<br>◆ GIGABYTE Management Console (AMI MegaRAC SP-X) web interface<br><br>◆ Dashboard<br>◆ HTML5 KVM<br>◆ Sensor Monitor (Voltage, RPM, Temperature, CPU Status …etc.)<br>◆ Sensor Reading History Data<br>◆ FRU Information<br>◆ SEL Log in Linear Storage / Circular Storage Policy<br>◆ Hardware Inventory<br>◆ Fan Profile<br>◆ System Firewall<br>◆ Power Consumption<br>◆ Power Control<br>◆ LDAP / AD / RADIUS Support<br>◆ Backup & Restore Configuration<br>◆ Remote BIOS/BMC/CPLD Update<br>◆ Event Log Filter<br>◆ User Management<br>◆ Media Redirection Settings<br>◆ PAM Order Settings<br>◆ SSL Settings<br>◆ SMTP Settings |
| | Operating Properties | ◆ Operating temperature: 10°C to 40°C<br>◆ Operating humidity: 8-80% (non-condensing)<br>◆ Non-operating temperature: -40°C to 60°C<br>◆ Non-operating humidity: 20%-95% (non-condensing) |

## 1-3 Installing and Removing the CPU

Read the following guidelines before you begin to install the CPU:

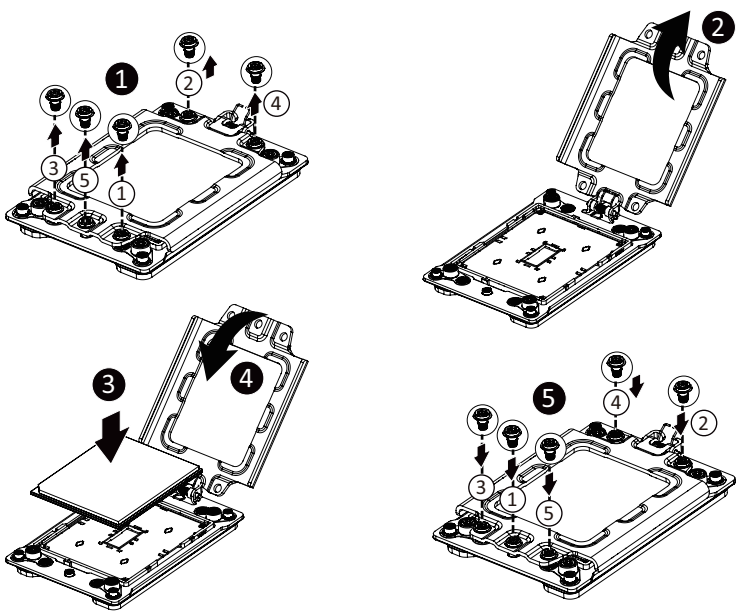
- Make sure that the motherboard supports the CPU.
- Always turn off the computer and unplug the power cord from the power outlet before installing the CPU to prevent hardware damage.
- Unplug all cables from the power outlets.
- Disconnect all telecommunication cables from their ports.
- Place the system unit on a flat and stable surface.
- Open the system according to the instructions.

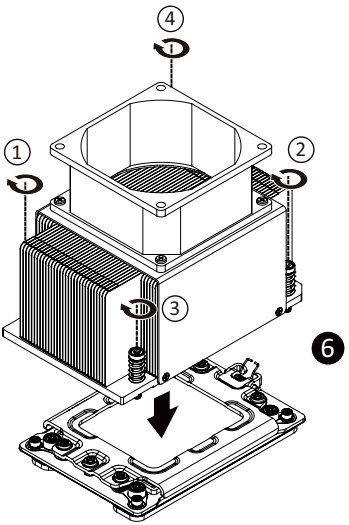
**WARNING!**

Failure to properly turn off the server before you start installing components may cause serious damage. Do not attempt the procedures described in the following sections unless you are a qualified service technician.

### Follow these instructions to Install the CPU:

1. Loosen the three captive screws in sequential order (1→2→3→4→5) securing the CPU cover.
2. Flip open the CPU cover.
3. Install the CPU into place in the CPU socket.
4. Flip the CPU cover into place over the CPU socket.
5 Tighten the CPU cover screws in sequential order (1→2→3→4→5) to secure the CPU cover in place.
6. Lower and place the fan-sink onto the top of the CPU socket. Then tighten the scews in sequential order (1→2→3→4).
7. To remove the CPUs, follow steps 1-5 in reverse order.




4
1
2
3
6

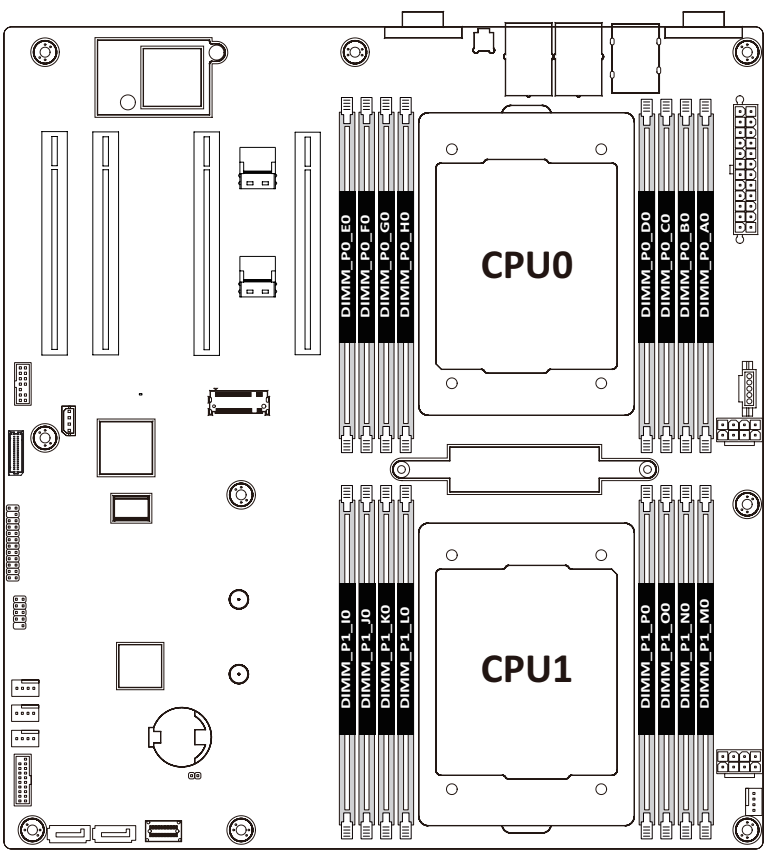
## 1-4 Installing and Removing Memory

Read the following guidelines before you begin to install the memory:

- Make sure that the motherboard supports the memory. It is recommended that memory of the same capacity, brand, speed, and chips be used.
- Always turn off the computer and unplug the power cord from the power outlet before installing the memory to prevent hardware damage.
- Memory modules have a foolproof design. A memory module can be installed in only one direction. If you are unable to insert the memory, switch the direction.

### 1-4-1 8-Channel Memory Configuration

This motherboard provides 16 DDR4 memory slots and supports 8-Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity of the memory.

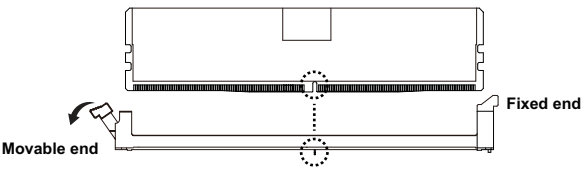


## 1-4-2 Installing and Removing the Memory Module

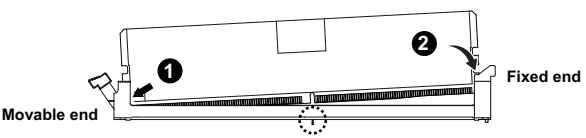
**Before installing a memory module, make sure to turn off the computer and unplug the power cord from the power outlet to prevent damage to the memory module.**
**Be sure to install DDR4 DIMMs on to this motherboard.**

**Follow these instructions to install a DIMM module:**

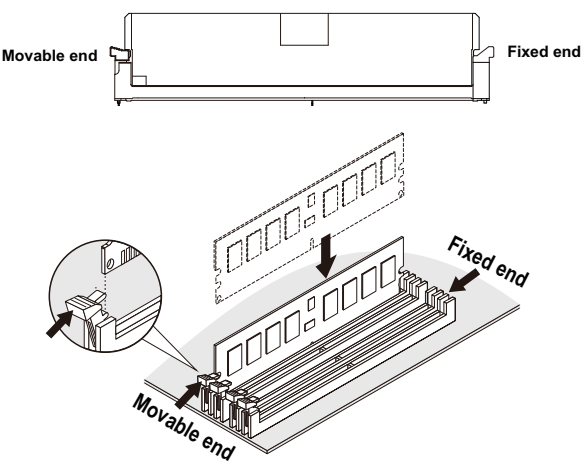
1. Open the plastic latch of the memory slot, then place the memory module as pre-inserted vertically position.




2. Hold it with both hands, insert the memory module into the movable end first, and then insert the memory module into the fixed end.




3. Then use both hands to insert the memory module vertically into the DIMM slot and push it down. Close the plastic latch at the edge of the DIMM slots to lock the memory module.




4. Reverse the installation steps when you want to remove the memory module.

## 1-4-3 DIMM Population Table

| Type | Ranks Per DIMM and Data Width | DIMM Capacity (GB) | Speed (MT/s); Voltage (V); Slots per Channel(SPC) and DIMM per Channel (DPC) | | |
|---|---|---|---|---|---|
| | | | 1 Slot per Channel | 2 Slots per Channel | |
| | | DIMM Density | 1DPC | 1DPC | 2DPC |
| | | 8Gb | 1.2V | 1.2V | 1.2V |
| RDIMM | SRx4 | 16GB | 3200 | 3200 | 3200 |
| RDIMM | DRx8 | 16GB | | | |

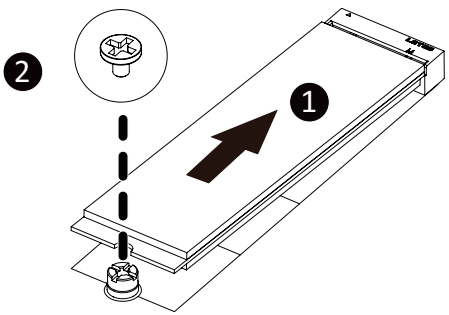
## 1-4-4 Altra Platform DDR4 Suggest Configuration Table

| Memory Q'ty for each CPU | CPU0 | | | | | | | | CPU1 | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | E0 | F0 | G0 | H0 | D0 | C0 | B0 | A0 | M0 | N0 | O0 | P0 | L0 | K0 | J0 | I0 |
| 1 DIMM | | | | | | | | V | | | | | | | | V |
| 2 DIMM | V | | | | | | | V | V | | | | | | | V |
| 4 DIMM | V | V | | | | | V | V | V | V | | | | | V | V |
| 6 DIMM | V | V | V | | | V | V | V | V | V | V | | | V | V | V |
| 8 DIMM | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V | V |

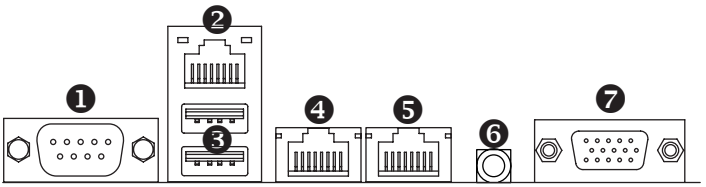
## 1-5 Installing and Removing the M.2 SSD Module

Follow the steps below to install an optional M.2 SSD module on your motherboard.

Step1. Insert the M.2 SSD module into the slot.
Step2. Secure it with the screw, tightening as necessary to fasten the M.2 SSD module in place.



## 1-6 Back Panel Connectors




### ❶ Debug Port

Connects to USB-DB9 console for debug log.

### ❷ 10/100/1000 Server Management LAN Port

The LAN port provides Internet connection with data transfer speeds of 10/100/1000Mbps. This port is the dedicated LAN port for Server Management.

### ❸ USB 3.2 Gen1 Ports

The USB port supports the USB 3.0 specification. Use this port for USB devices such as a USB keyboard/mouse, USB printer, USB flash drive etc.

### ❹ 10GBASE-T RJ-45 LAN Port #1

The 10 Gigabit Ethernet LAN port provides Internet connection at up to 10 Gbps data rate. See the section below for a description of the states of the LAN port LEDs.

### ❺ 10GBASE-T RJ-45 LAN Port #2

The 10 Gigabit Ethernet LAN port provides Internet connection at up to 10 Gbps data rate. See the section below for a description of the states of the LAN port LEDs.

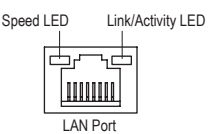
### ❻ ID button with LED

When the system identification is active, the ID LED on the front/ back panel glows blue.

### ❼ VGA Port

Connects to a monitor device.

**LAN and ID Button LEDs**




**10GbE LAN LED:**

| State | Description |
|---|---|
| Yellow On | 5Gbps, 2.5Gbps, 1Gps data rate |
| Green On | 10Gbps data rate |
| Off | 100Mbps data rate |

**10/100/1000 LAN LED:**

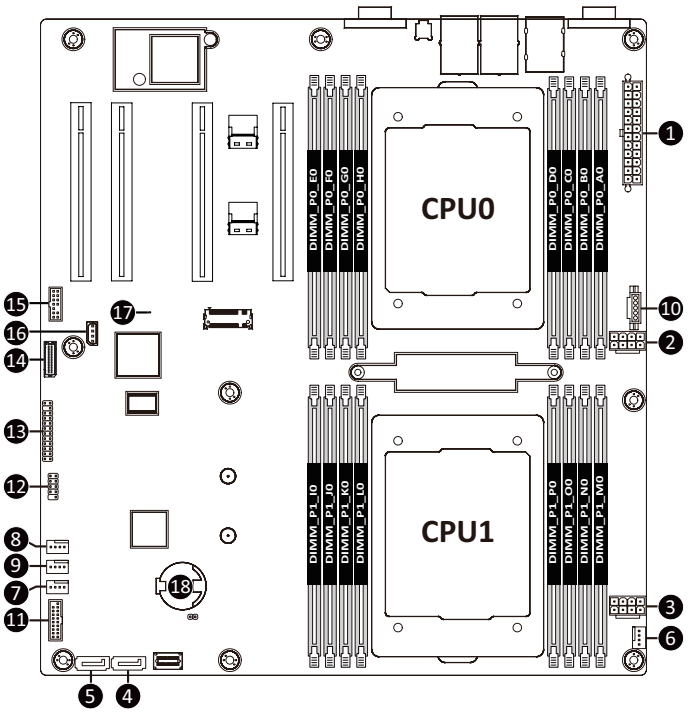
| State | Description |
|---|---|
| Yellow On | 1Gbps data rate |
| Green On | 100Mbps data rate |
| Off | 10Mbps data rate |

**ID button/LED:**

| State | Description |
|---|---|
| Blue On | System identification is active |
| Off | System identification is disabled |

- When removing the cable connected to a back panel connector, first remove the cable from your device and then remove it from the motherboard.
- When removing the cable, pull it straight out from the connector. Do not rock it side to side to prevent an electrical short inside the cable connector.

## 1-7 Internal Connectors




| | | | |
|---|---|---|---|
| 1) | ATX1 | 11) | F_USB2 |
| 2) | P12V_1 (for CPU0) | 12) | F_USB1 |
| 3) | P12V_2 (for CPU1) | 13) | FP_1 |
| 4) | SATA3 | 14) | BP_1 |
| 5) | SATA2 | 15) | CON1 |
| 6) | CPU0_FAN | 16) | IPMB1 |
| 7) | CPU1_FAN | 17) | LED_BMC1 |
| 8) | SYS_FAN0 | 18) | BAT1 |
| 9) | SYS_FAN1 | -- | -- |
| 10) | PMBUS1 | -- | -- |

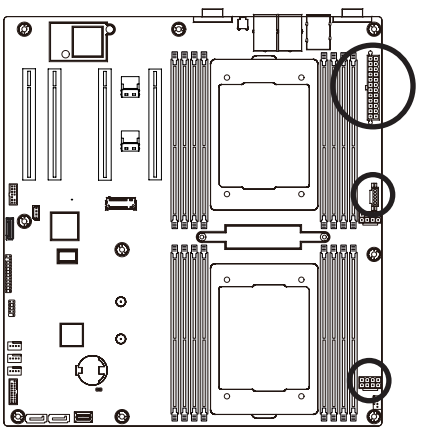
Read the following guidelines before connecting external devices:

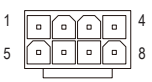
- First make sure your devices are compliant with the connectors you wish to connect.
- Before installing the devices, be sure to turn off the devices and your computer. Unplug the power cord from the power outlet to prevent damage to the devices.
- After installing the device and before turning on the computer, make sure the device cable has been securely attached to the connector on the motherboard.

### 1/2/3) ATX1/P12V_1/P12V_2 (2x12 Main Power Connector and 2x4 12V Power Connector)

With the use of the power connector, the power supply can supply enough stable power to all the components on the motherboard. Before connecting the power connector, first make sure the power supply is turned off and all devices are properly installed. The power connector possesses a foolproof design. Connect the power supply cable to the power connector in the correct orientation. The 12V power connector mainly supplies power to the CPU. If the 12V power connector is not connected, the computer will not start.

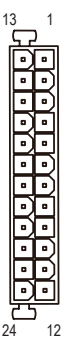
To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power supply is used that does not provide the required power, the result can lead to an unstable or unbootable system.






**P12V_1/ P12V_2**

| Pin No. | Definition |
|---|---|
| 1 | GND |
| 2 | GND |
| 3 | GND |
| 4 | GND |
| 5 | +12V |
| 6 | +12V |
| 7 | +12V |
| 8 | +12V |

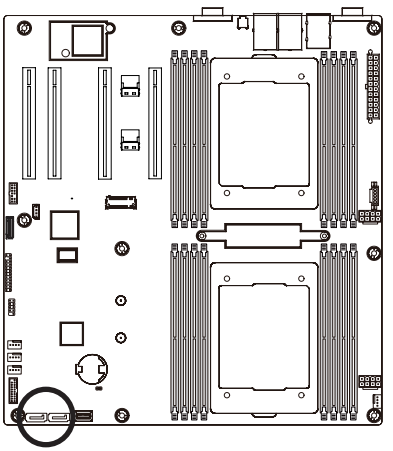


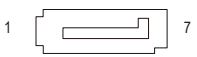

**ATX**

| Pin No. | Definition | Pin No. | Definition |
|---|---|---|---|
| 1 | 3.3V | 13 | 3.3V |
| 2 | 3.3V | 14 | -12V |
| 3 | GND | 15 | GND |
| 4 | +5V | 16 | PS_ON |
| 5 | GND | 17 | GND |
| 6 | +5V | 18 | GND |
| 7 | GND | 19 | GND |
| 8 | Power Good | 20 | -5V |
| 9 | 5VSB | 21 | +5V |
| 10 | +12V | 22 | +5V |
| 11 | +12V | 23 | +5V |
| 12 | 3.3V | 24 | GND |

### 4/5) SATA3/SATA2 (SATA 6Gb/s Connectors)

The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s standard. Each SATA connector supports a single SATA device.

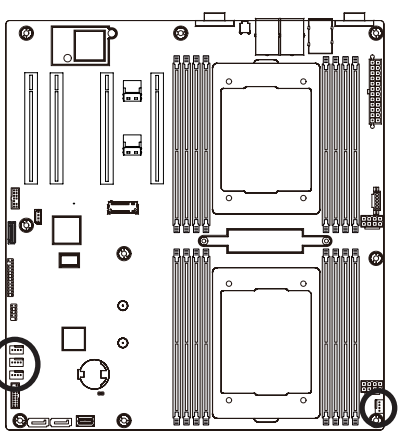


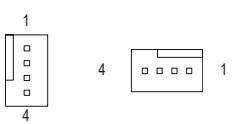



| Pin No. | Definition |
|---|---|
| 1 | GND |
| 2 | TXP |
| 3 | TXN |
| 4 | GND |
| 5 | RXN |
| 6 | RXP |
| 7 | GND |

### 6/7/8/9) CPU0_FAN/CPU1_FAN/SYS_FAN0/SYS_FAN1 (CPU FAN/System FAN Headers)

The motherboard has two 4-pin CPU fan headers and two 4-pin system fan headers. Most fan headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). For optimum heat dissipation, it is recommended that a system fan be installed inside the chassis.



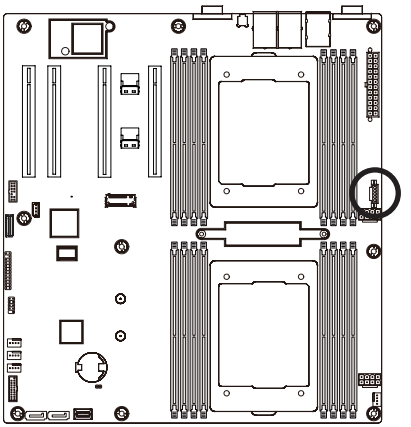



| Pin No. | Definition |
|---|---|
| 1 | GND |
| 2 | +12V |
| 3 | Sense |
| 4 | Speed Control |

- Be sure to connect fan cables to the fan headers to prevent your system from overheating. Overheating may result in damage to the system may hang.
- These fan headers are not configuration jumper blocks. Do not place a jumper cap on the headers.

## 10) PMBus Connector

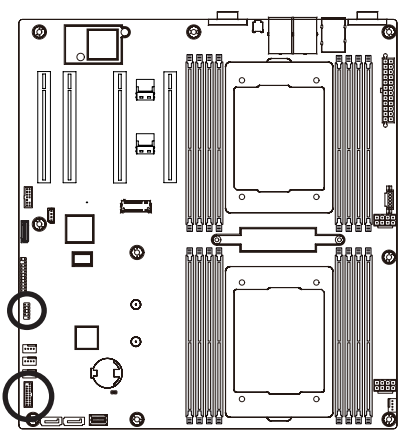
The Power Management Bus (PMBus) is a variant of the System Management Bus (SMBus) which is targeted at digital management of power supplies.




| Pin No. | Definition |
|---|---|
| 1 | PMBus Clock |
| 2 | PMBus Data |
| 3 | PMBus Alert |
| 4 | GND |
| 5 | 3.3V Sense |

## 11/12) F_USB2/ F_USB1 (USB 3.0 Connector/ 2.0 Header)

The connector/header conform to USB 2.0/ 3.0 specification. Each USB connector/header can provide two USB ports via an optional USB bracket. For purchasing the optional USB bracket, please contact the local dealer.



**USB 2.0 Header**

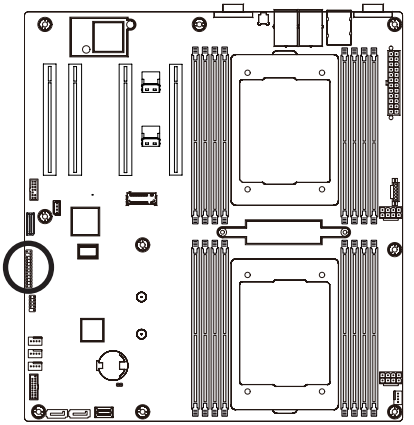

| Pin No. | Definition | Pin No. | Definition |
|---|---|---|---|
| 1 | Power (5V) | 6 | USB DY+ |
| 2 | Power (5V) | 7 | GND |
| 3 | USB DX- | 8 | GND |
| 4 | USB DY- | 9 | No Pin |
| 5 | USB DX+ | 10 | No Connect |

**USB 3.0 Connector**


| Pin No. | Definition | Pin No. | Definition |
|---|---|---|---|
| 1 | Power | 11 | IntA_P2_D+ |
| 2 | IntA_P1_SSRX- | 12 | IntA_P2_D- |
| 3 | IntA_P1_SSRX+ | 13 | GND |
| 4 | GND | 14 | IntA_P2_SSTX+ |
| 5 | IntA_P1_SSTX- | 15 | IntA_P2_SSTX- |
| 6 | IntA_P1_SSTX+ | 16 | GND |
| 7 | GND | 17 | IntA_P2_SSRX+ |
| 8 | IntA_P1_D- | 18 | IntA_P2_SSRX- |
| 9 | IntA_P1_D+ | 19 | Power |
| 10 | NC | 20 | No Pin |

## 13) FP_1 (Front Panel Header)

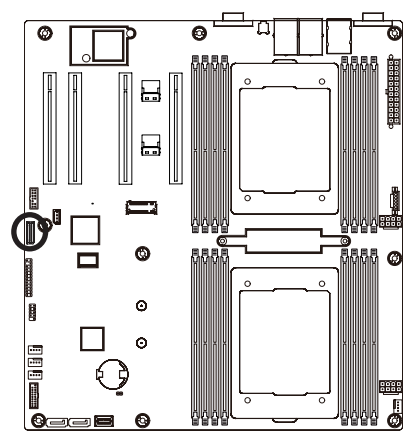
Connect the power switch, reset switch, speaker, chassis intrusion switch/sensor and system status indicator on the chassis to this header according to the pin assignments below. Note the positive and negative pins before connecting the cables.




| Pin No. | Definition | Pin No. | Definition |
|---|---|---|---|
| 1 | Power LED+ | 2 | 5V Standby |
| 3 | No Pin | 4 | ID LED+ |
| 5 | Power LED- | 6 | ID LED- |
| 7* | HDD LED+ | 8 | System Status LED+ |
| 9* | HDD LED- | 10 | System Status LED- |
| 11 | Power Button | 12 | LAN1 Active LED+ |
| 13 | GND | 14 | LAN1 Link LED- |
| 15 | Reset Button | 16 | SMBus Data |
| 17 | GND | 18 | SMBus Clock |
| 19 | ID Button | 20 | Case Open |
| 21 | GND | 22 | LAN2 Actve LED+ |
| 23 | NMI Switch | 24 | LAN2 Link LED- |

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 etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.

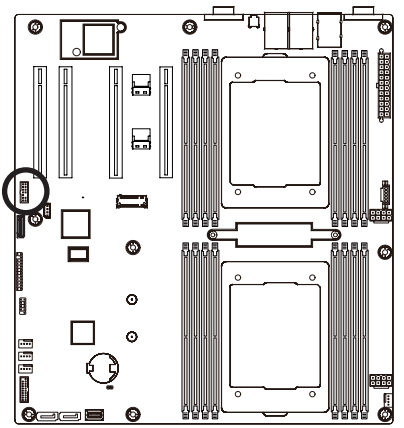
## 14) BP_1 (HDD Backplane Board Header)

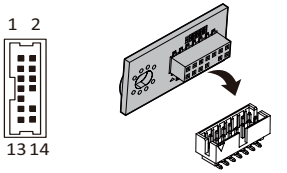



| Pin No. | Definition | Pin No. | Definition |
|---|---|---|---|
| 1 | HP_ALERT_L | 2 | BPMI DIN/OUT |
| 3 | GND | 4 | BPMI DIN/IN |
| 5 | BPMI_LOAD | 6 | GND |
| 7 | BPMI_CLK | 8 | PLD_Program_EN |
| 9 | GLED_AMB_N | 10 | GLED_GRN_N |
| 11 | FAN_IRQ_N | 12 | Reserved |
| 13 | BP_SCL | 14 | GND |
| 15 | BP_SDA | 16 | BP_RST_N |
| 17 | SMB_U2_TMP_SCL | 18 | GND |
| 19 | SMB_U2_TMP_SDA | 20 | I2C_DEV_RST |
| 21 | PH_HP_SCL0 | 22 | GND |
| 23 | PH_HP_SDA0 | 24 | GND |
| 25 | PH_HP_SCL1 | 26 | GND |
| 27 | PH_HP_SDA1 | 28 | GND |
| 15 | P3V3_AUX | 30 | P3V3_AUX |

## 15) CON1 (Trusted Platform Module Connector)

Trusted Platform Module (TPM) is an international standard for a secure cryptoprocessor, a dedicated microcontroller designed to secure hardware through integrated cryptographic keys.

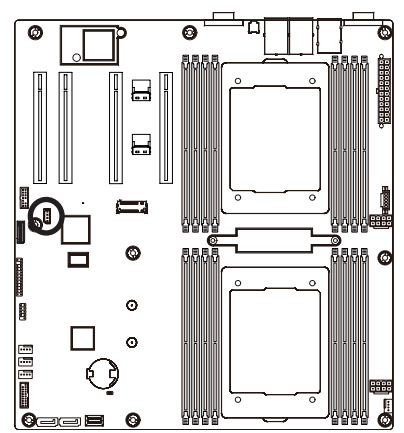





| Pin No. | Definition | Pin No. | Definition |
|---|---|---|---|
| 1 | Clock | 8 | NC |
| 2 | P_3V3_SOC_S0 | 9 | NC |
| 3 | LPC_RST | 10 | No Pin |
| 4 | P_3V3_SOC_S0 | 11 | NC |
| 5 | SPI_MISO | 12 | GND |
| 6 | IRQ_SPI | 13 | SPI_CS_N |
| 7 | SPI_MOSI | 14 | GND |

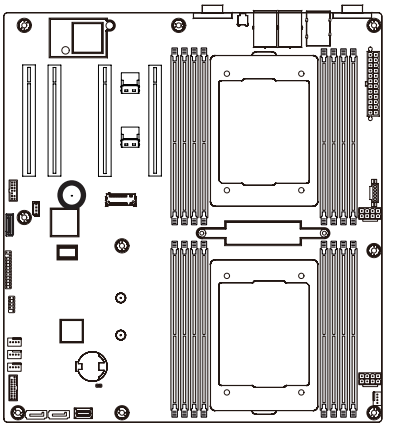
## 16) IPMB (Intelligent Platform Management Bus) Connector

The Intelligent Platform Management Bus Communications Protocol defines a byte-level transport for transferring Intelligent Platform Management Interface Specification (IPMI) messages between intelligent I2C devices.




| Pin No. | Definition |
|---|---|
| 1 | Clock |
| 2 | GND |
| 3 | Data |
| 4 | VCC |

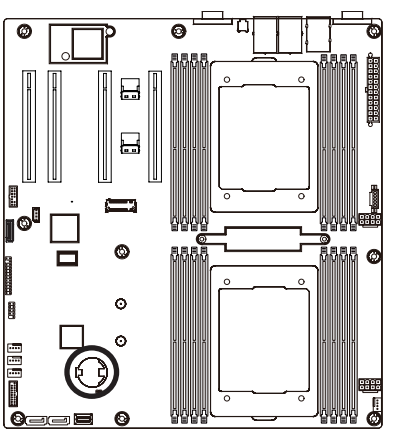
## 17) LED_BMC1 (BMC Firmware Readiness LED)

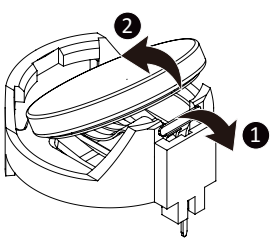


| State | Description |
|---|---|
| On | BMC firmware is initial |
| Blink | BMC firmware is ready |
| Off | AC loss |

## 18) BAT (Battery Socket)

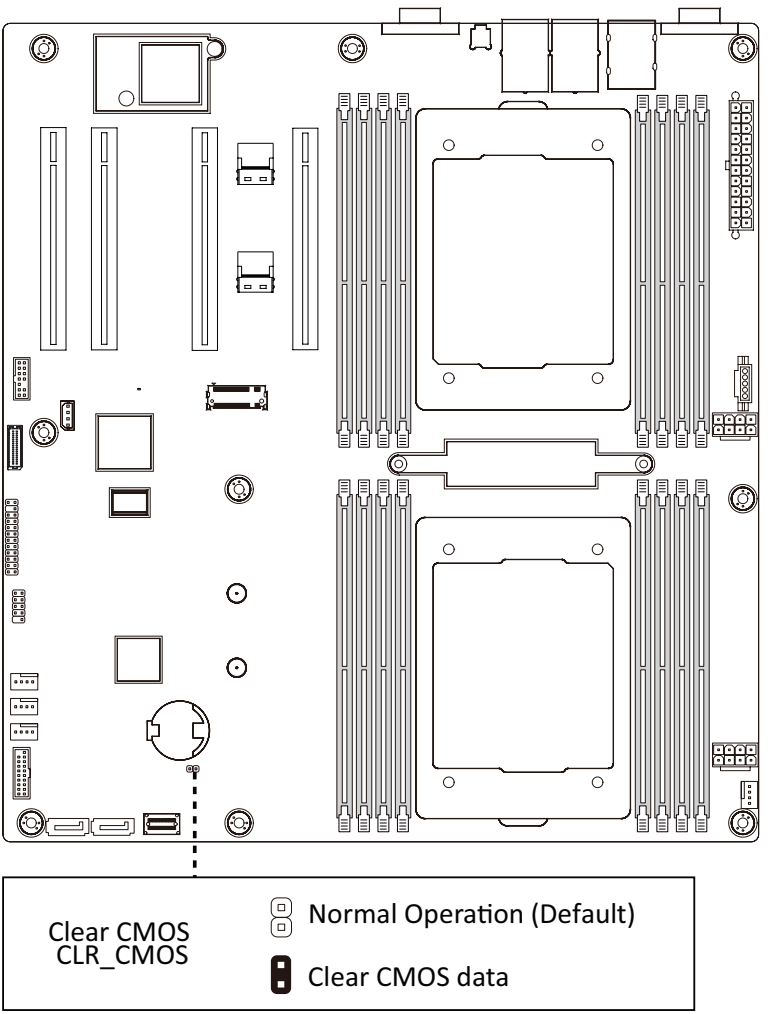
The battery provides power to keep the values (such as BIOS configurations, date, and time information) in the CMOS when the computer is turned off. Replace the battery when the battery voltage drops to a low level, or the CMOS values may not be accurate or may be lost.






- Always turn off your computer and unplug the power cord before replacing the battery.
- Replace the battery with an equivalent one. Danger of explosion if the battery is replaced with an incorrect model.
- Contact the place of purchase or local dealer if you are not able to replace the battery by yourself or uncertain about the battery model.
- Used batteries must be handled in accordance with local environmental regulations.

## 1-8 Jumper Settings



# Chapter 2 BIOS Setup

BIOS (Basic Input and Output System) records hardware parameters of the system in the EFI on the motherboard. Its major functions include conducting the Power-On Self-Test (POST) during system startup, saving system parameters, loading the operating system etc. The BIOS includes a BIOS Setup program that allows the user to modify basic system configuration settings or to activate certain system features. When the power is turned off, the battery on the motherboard supplies the necessary power to the CMOS to keep the configuration values in the CMOS.

To access the BIOS Setup program, press the <DEL> key during the POST when the power is turned on.

- BIOS flashing is potentially risky, if you do not encounter any problems when using the current BIOS version, it is recommended that you don't flash the BIOS. To flash the BIOS, do it with caution. Inadequate BIOS flashing may result in system malfunction.
- It is recommended that you not alter the default settings (unless you need to) to prevent system instability or other unexpected results. Inadequately altering the settings may result in system's failure to boot. If this occurs, try to clear the CMOS values and reset the board to default values. (Refer to the **Exit** section in this chapter or introductions of the battery/clearing CMOS jumper in Chapter 1 for how to clear the CMOS values.)

### BIOS Setup Program Function Keys

| | |
|---|---|
| <←><→> | Move the selection bar to select the screen |
| <↑><↓> | Move the selection bar to select an item |
| <+> | Increase the numeric value or make changes |
| <-> | Decrease the numeric value or make changes |
| <Enter> | Execute command or enter the submenu |
| <Esc> | Main Menu: Exit the BIOS Setup program<br>Submenus: Exit current submenu |
| <F1> | Show descriptions of general help |
| <F3> | Restore the previous BIOS settings for the current submenus |
| <F9> | Load the Optimized BIOS default settings for the current submenus |
| <F10> | Save all the changes and exit the BIOS Setup program |

- **Main**
  This setup page includes all the items of the standard compatible BIOS.
- **Advanced**
  This setup page includes all the items of AMI BIOS special enhanced features.
  (ex: Auto detect fan and temperature status, automatically configure hard disk parameters.)
- **Chipset**
  This setup page includes all the submenu options for configuring the function of processor, network, North Bridge, South Bridge, and System event logs.
- **Server Management**
  Server additional features enabled/disabled setup menus.
- **Security**
  Change, set, or disable supervisor and user password. Configuration supervisor password allows you to restrict access to the system and BIOS Setup.
  A supervisor password allows you to make changes in BIOS Setup.
  A user password only allows you to view the BIOS settings but not to make changes.
- **Boot**
  This setup page provides items for configuration of the boot sequence.
- **Save & Exit**
  Save all the changes made in the BIOS Setup program to the CMOS and exit BIOS Setup. (Pressing <F10> can also carry out this task.)
  Abandon all changes and the previous settings remain in effect. Pressing <Y> to the confirmation message will exit BIOS Setup. (Pressing <Esc> can also carry out this task.)

# 2-1 The Main Menu

Once you enter the BIOS Setup program, the Main Menu (as shown below) appears on the screen. Use arrow keys to move among the items and press <Enter> to accept or enter other sub-menu.

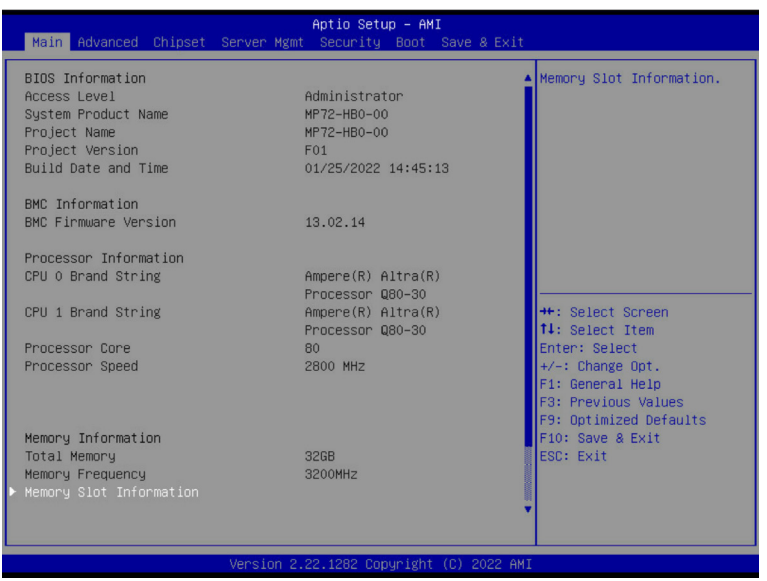
**Main Menu Help**

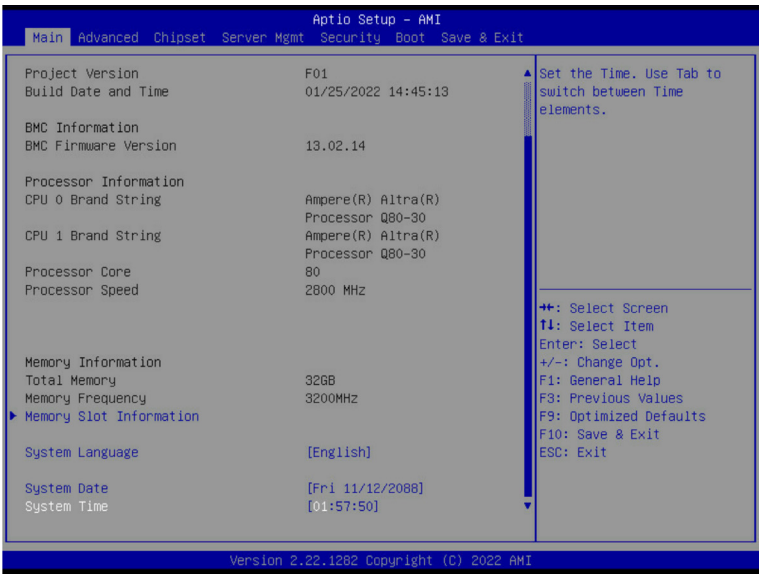
The on-screen description of a highlighted setup option is displayed on the bottom line of the Main Menu.

**Submenu Help**

While in a submenu, press <F1> to display a help screen (General Help) of function keys available for the menu. Press <Esc> to exit the help screen. Help for each item is in the Item Help block on the right side of the submenu.

- When the system is not stable as usual, select the **Restore Defaults** item to set your system to its defaults.
- The BIOS Setup menus described in this chapter are for reference only and may differ by BIOS version.






| Parameter | Description |
|---|---|
| BIOS Information | |
| Access Level | Displays the privileges level information. |
| System Project Name | Displays the system project name information. |
| Project Name | Displays the motherboard project name information |
| Project Version | Displays version number of the BIOS setup utility. |
| Build Date and Time | Displays the date and time when the BIOS setup utility was created. |
| BMC Information(Note1) | |
| BMC Firmware Version(Note1) | Displays BMC firmware version information. |
| Processor Information | |
| CPU Brand String / Processor Core/ Processor Speed | Displays the technical specifications for the installed processor. |
| Memory Information | |
| Total Memory(Note2) | Displays the total memory size of the installed memory. |
| Memory Frequency(Note2) | Displays the frequency information of the installed memory. |
| Memory Slot Information | Press [Enter] to view installed memory slot information. |

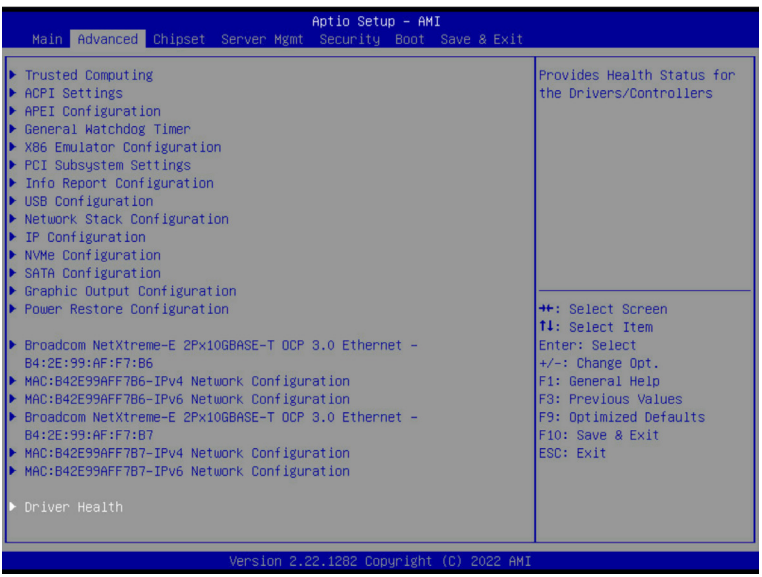
(Note1) Functions available on selected models.

(Note2) This section will display capacity and frequency information of the memory that the customer has installed.

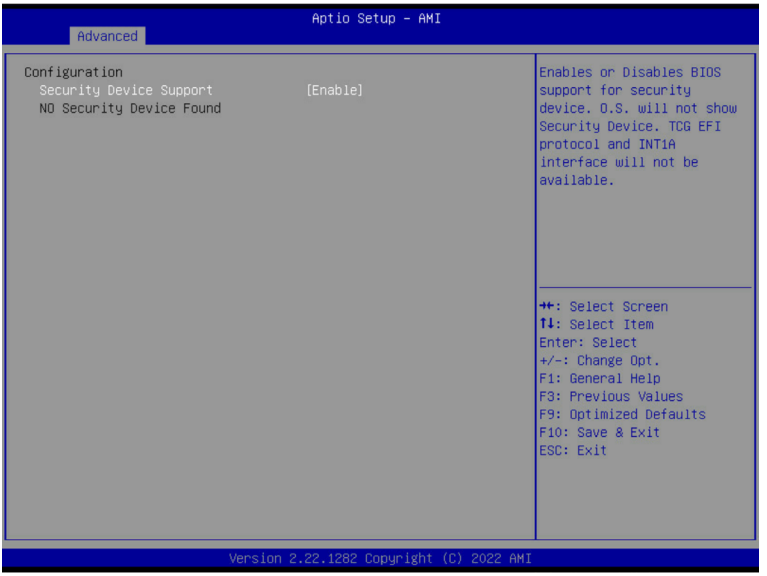
| Parameter | Description |
|---|---|
| System Language | Option: English. |
| System Date | Sets the date following the weekday-month-day-year format. |
| System Time | Sets the system time following the hour-minute-second format. |

## 2-2 Advanced Menu

The Advanced Menu displays submenu options for configuring the function of various hardware components. Select a submenu item, then press <Enter> to access the related submenu screen.

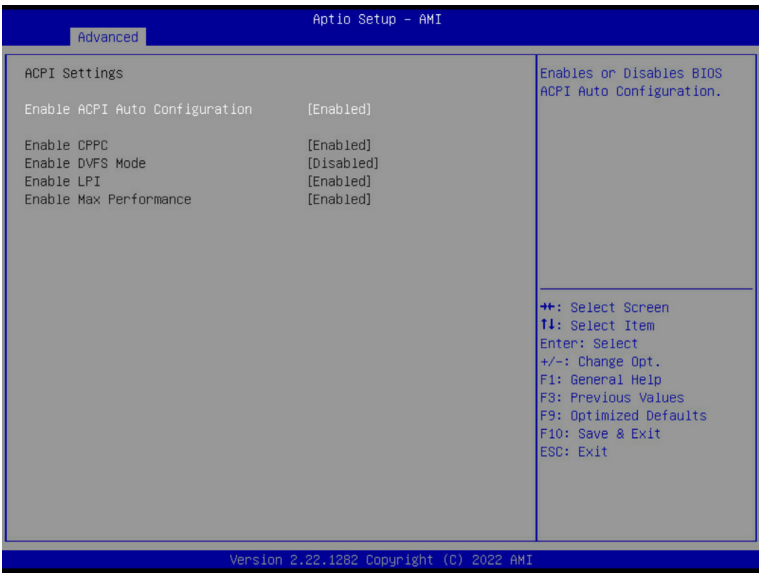


## 2-2-1 Trusted Computing




| Parameter | Description |
|---|---|
| Configuration | |
| Security Device Support | Enable/Disable BIOS support for security device. OS will not show security device. TCG EFI protocol and INT1A interface will not be available.<br>Options available: Enable, Disable. Default setting is **Enable**. |

## 2-2-2 ACPI Settings



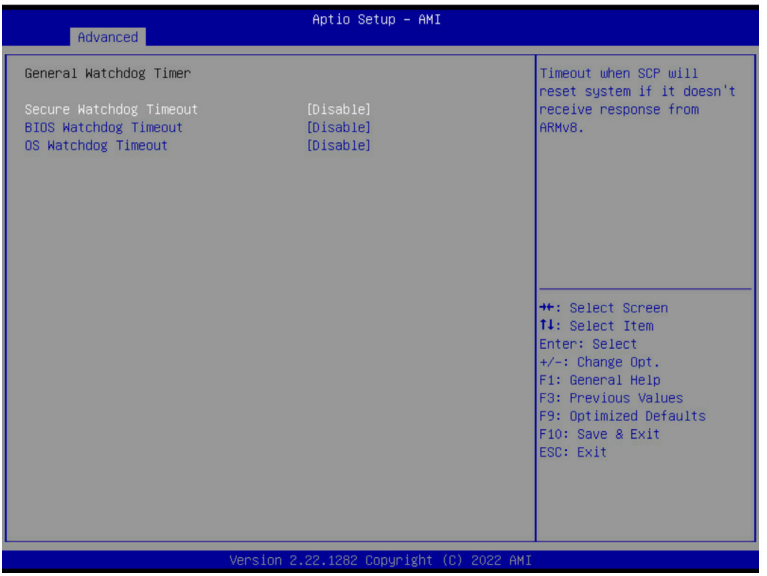

| Parameter | Description |
|---|---|
| ACPI Settings | |
| Enable ACPI Auto Configuration | Enable/Disable BIOS ACPI auto configuration.<br>Options available: Disabled, Enabled. Default setting is **Enabled**. |
| Enable CPPC(Note) | Options available: Disabled, Enabled. Default setting is **Enabled**. |
| Enable DVFS Mode | Default setting is **Disabled**. |
| Enable LPI(Note) | Options available: Disabled, Enabled. Default setting is **Enabled**. |
| Enable Max Performance(Note) | Options available: Disabled, Enabled. Default setting is **Enabled**. |

(Note) This item is available when **Enable ACPI Auto Configuration** is set to **Disabled**.

## 2-2-3 APEI Configuration


| Parameter | Description |
|---|---|
| APEI Configuration | |
| APEI Enable | Enable/Disable ACPI platform Error Interface support.<br>Options available: Disabled, Enabled. Default setting is **Disabled**. |

## 2-2-4 General Watchdog Timer

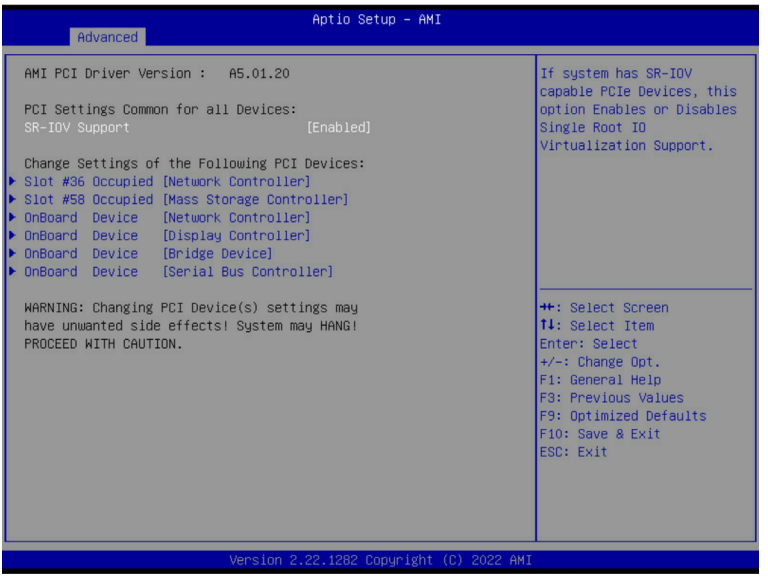


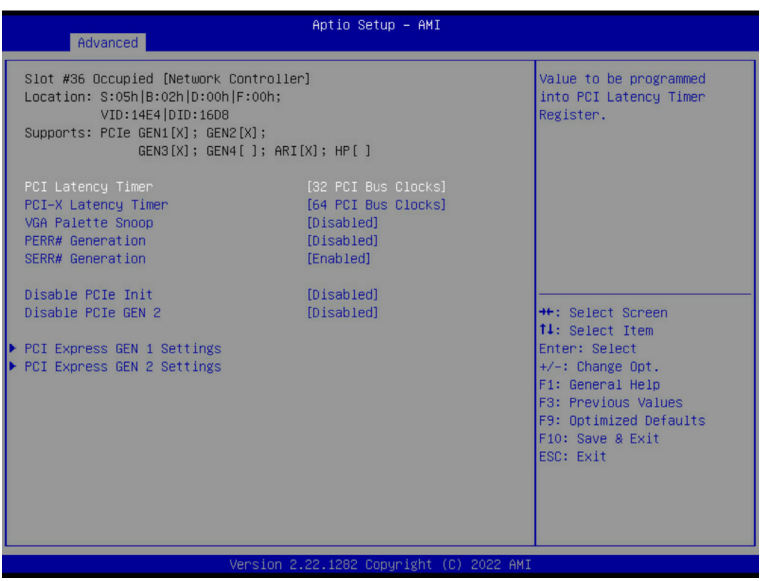

| Parameter | Description |
|---|---|
| General Watchdog Timer | |
| Secure Watchdog Timeout | Timeout when SCP will reset system if it doesn't receive response from ARMv8. Options available: Disable, 5 minutes, 6 minutes, 10 minutes, 15 minutes, 20 minutes. Default setting is **Disable**. |
| BIOS Watchdog Timeout | Options available: Disable, 5 minutes, 6 minutes, 10 minutes, 15 minutes, 20 minutes. Default setting is **Disable**. |
| OS Watchdog Timeout | Options available: Disable, 3 minutes, 4 minutes, 5 minutes, 6 minutes, 10 minutes, 15 minutes, 20 minutes. Default setting is **Disable**. |

## 2-2-5 X86 Emulation Configuration


| Parameter | Description |
|---|---|
| X86 Emulator Configuration | |
| X86 Emulator Enable | Enable/Disable X86 Emulator support.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |

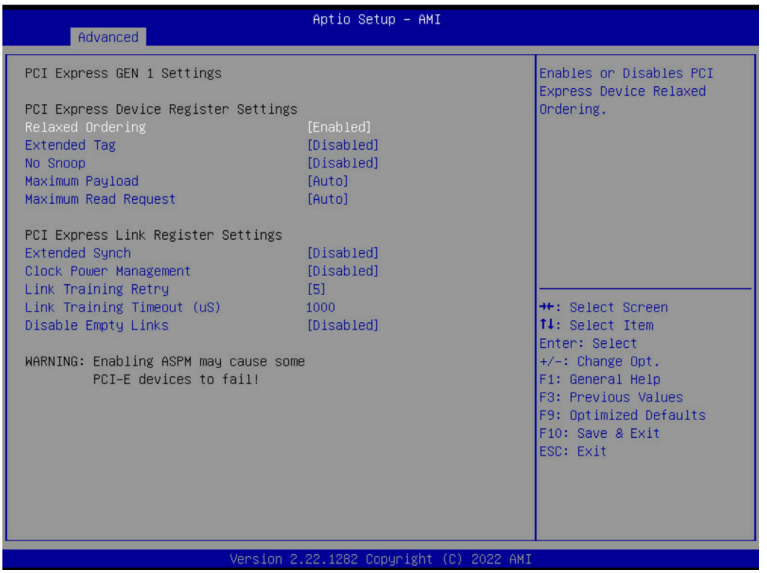
## 2-2-6 PCI Subsystem Settings



| Parameter | Description |
|---|---|
| AMI PCI Driver Version | Displays the AMI PCI Bus Driver version information |
| PCI Settings Common for all Devices: | |
| SR-IOV Support | Enable/Disable Single Root IO virtualization support.<br>Options available: Disabled, Enabled. Default setting is **Enabled**. |
| Change Settings of the following PCI Devices: | |
| Slot # Occupied<br>OnBoard Device | Press [Enter] to configure advanced items.<br>◆ PCI Latency Timer<br>– Value to be programmed into PCI latency timer register.<br>– Options available: 32,64,96,128,160,192,224,248 PCI Bus Clocks. Default setting is **32 PCI Bus Clocks**.<br>◆ PCI-X Latency Timer<br>– Value to be programmed into PCI latency timer register.<br>– Options available: 32,64,96,128,160,192,224,248 PCI Bus Clocks. Default setting is **64 PCI Bus Clocks**.<br>◆ VGA Palette Snoop<br>– Enable/Disable VGA Palette Registers Snooping.<br>– Options available: Disabled, Enabled. Default setting is **Disabled**.<br>◆ PERR# Generation<br>– Enable/Disable PCI Device to Generate PERR#.<br>– Options available: Disabled, Enabled. Default setting is **Disabled**.<br>◆ SERR# Generation<br>– Enable/Disable PCI Device to Generate SERR#.<br>– Options available: Disabled, Enabled. Default setting is **Enabled**.<br>◆ Disable PCIe Init<br>– Disable BIOS built-in PCI Express initialization for currently selected and down stream PCI device(s).<br>– Options available: Disabled, Enabled. Default setting is **Disabled**.<br>◆ Disable PCIe GEN2<br>– Disable BIOS built-in PCI Express GEN2 initialization for currently selected and down stream PCI device(s).<br>– Options available: Disabled, Enabled. Default setting is **Disabled**. |
| PCI Express GEN 1 Settings | Press [Enter] to configure advanced items. |
| PCI Express GEN 2 Settings | Press [Enter] to configure advanced items. |

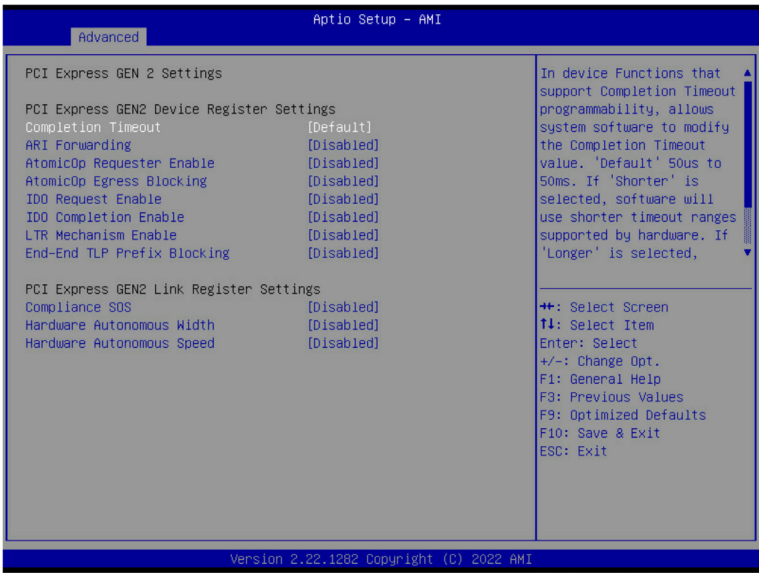
## 2-2-6-1 PCI Express GEN 1 Settings




| Parameter | Description |
|---|---|
| PCI Express Device Register Settings | |
| Relaxd Ordering | Enable/disable PCI Express Device Relaxed Ordering.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| Extended Tag | If enabled, allows device to use 8-bit tag field as a requester.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| No Snoop | Enable/disable PCI Express Device No Snoop option.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| Maximum Payload | Set maximum payload of PCI express device or allow system BIOS to select the value.<br>Options available: Auto, 128 Bytes, 256 Bytes, 512 Bytes. Default setting is **Auto**. |
| Maximum Read Request | Set maximum Read Request size of PCI express device or allow system BIOS to select the value.<br>Options available: Auto, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, 4096 Bytes. Default setting is **Auto**. |
| PCI Express Link Register Settings | |
| Extended Synch | If enabled, allows generation of extended synchronization patterns.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |

| Parameter | Description |
|---|---|
| Clock Power Management | If supported by hardware and set to "Enabled", the device is permitted to use CLKREQ# signal for power management of Link clock in accordance to protocol defined in appropriate form factor specification.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| Link Training Retry | Defines number of Retry attempts software will take to retrain the link if previous training attempt was unsuccessful.<br>Options available: Disabled, 2, 3, 5. Default setting is **5**. |
| Link Training Timeout (uS) | Defines number of microseconds software will wait before polling 'Link Training' bit in link status register. Value range from 10 to 10000 uS. |
| Disable Empty Links | In order to save power, software will disable unpopulated PCI express links, if this option set to "Disable Link.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |

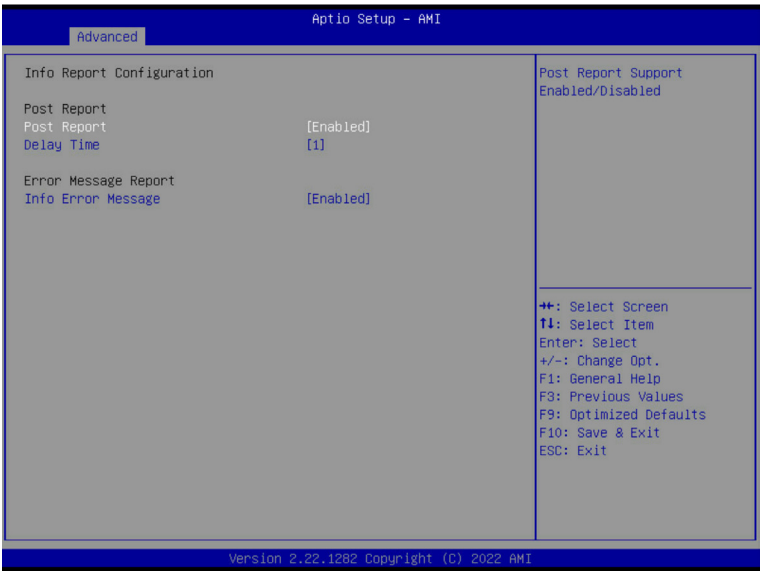
## 2-2-6-2 PCI Express GEN 2 Settings




| Parameter | Description |
|---|---|
| PCI Express GEN2 Device Register Settings | |
| Completion Timeout | In device functions that support completion timeout programmability, allows system software to modify the completion timeout value. 'Default' 50us to 50ms. If 'Shorter' is selected, software will use shorter timeout ranges supported by hardware. If 'Longer' is selected, software will use longer timeout ranges. Options available: Default, Shorter, Longer, Disabled. Default setting is **Default**. |
| ARI Forwarding | If supported by hardware and set to 'Enabled', the Downstream Port disables its traditional Device Number field being 0 enforcement when turning a Type1 Configuration Request into a Type0 Configuration Request, permitting access to Extended Functions in an ARI Device immediately below the Port. Options available: Enabled, Disabled. Default setting is **Disabled**. |
| AtomicOp Requester Enable | If supported by hardware and set to 'Enabled', this function initiates AtomicOp Requests only if Bus Master Enable bit is in the Command Register Set.. Options available: Enabled, Disabled. Default setting is **Disabled**. |

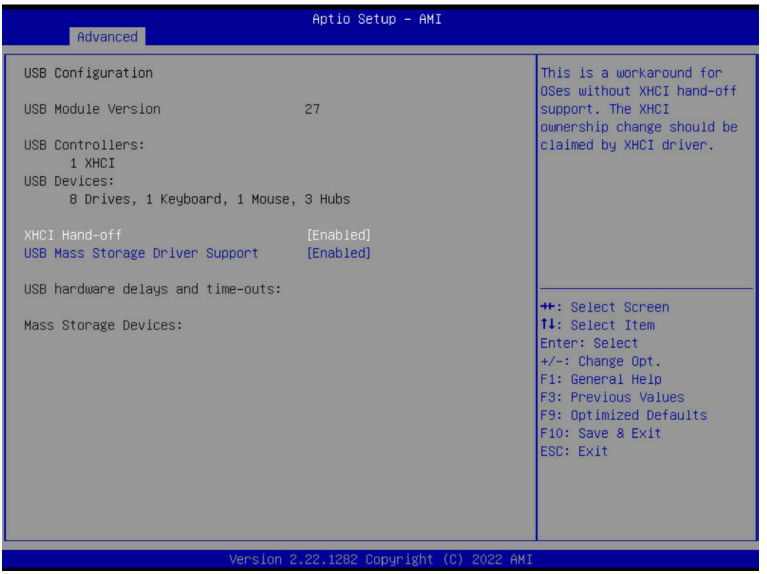
| Parameter | Description |
|---|---|
| AtomicOp Egress Blocking | If supported by hardware and set to 'Enabled', outbound AtomicOp Requestsvia Egress Ports will be blocked.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| IDO Request Enable | If supported by hardware and set to 'Enabled', this permits setting the number of ID-Based Ordering (IDO) bit (Attribute[2]) requests to be initiated.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| IDO Completion Enable | If supported by hardware and set to 'Enabled', this permits setting the number of ID-Based Ordering (IDO) bit (Attribute[2]) requests to be initiated.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| LTR Mechanism Enable | If supported by hardware and set to 'Enabled', this enables the Latency Tolerance Reporting (LTR) Mechanism.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| End-End TLP Prefix Blocking | If supported by hardware and set to 'Enabled', this function will block forwarding of TLPs containing End-End TLP Prefixes.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| PCI Express GEN2 Link Register Settings | |
| Compliance SOS | If supported by hardware and set to 'Enabled', this will force LTSSM to send SKP Ordered Sets between sequences when sending Compliance Pattern or Modified Compliance Pattern.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| Hardware Autonomous Width | If supported by hardware and set to 'Disabled', this will disable the hardware's ability to change link width except width size reduction for the purpose of correcting unstable link operation.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| Hardware Autonomous Speed | If supported by hardware and set to 'Disabled', this will disable the hardware's ability to change link speed except speed rate reduction for the purpose of correcting unstable link operation.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |

## 2-2-7 Info Report Configuration




| Parameter | Description |
|---|---|
| Post Report | |
| Post Report | Enable/disable post report support.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| Delay Time | Options available: 0,1,2,3,4,5,6,7,8,9,10, Until Press ESC.<br>Default setting is **1**. |
| Error Message Report | |
| Info Error Message | Enable/disable Info error message support.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |

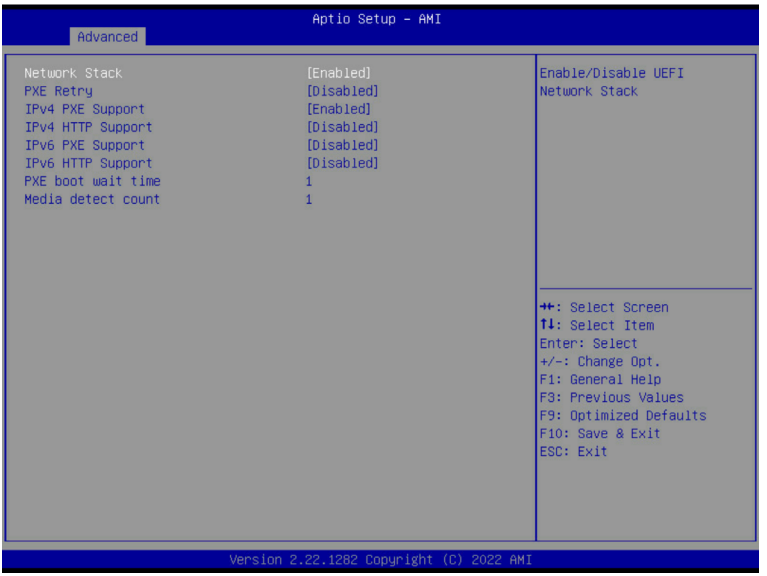
## 2-2-8 USB Configuration




| Parameter | Description |
|---|---|
| USB Configuration | |
| USB Module Version | Displays the USB module version information. |
| USB Controllers | Displays the supported USB controllers. |
| USB Devices: | Displays the USB devices connected to the system. |
| XHCI Hand-off | Enable/Disable the XHCI (USB 3.0) Hand-off support.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| USB Mass Storage Driver Support(Note) | Enable/Disable the USB Mass Storage Driver Support.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |

(Note) This item is present only if you attach USB devices.

## 2-2-9 Network Stack Configuration



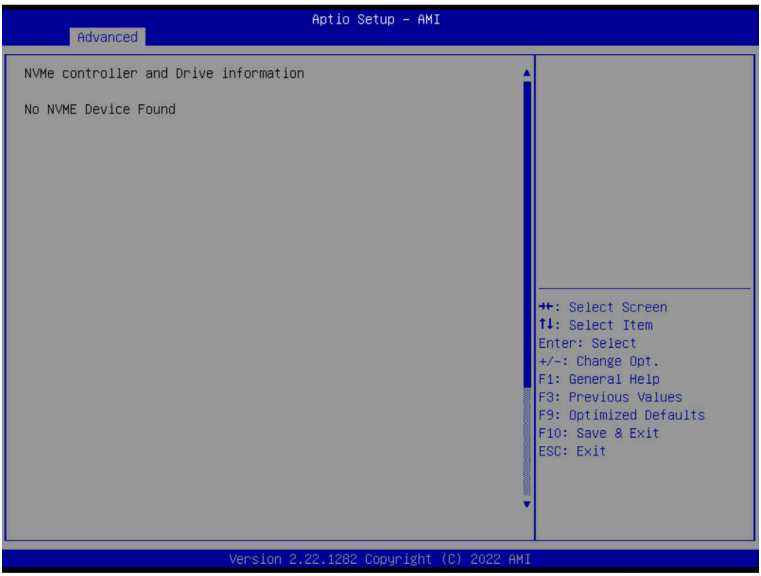

| Parameter | Description |
|---|---|
| Network Stack | Enable/Disable the UEFI network stack.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| PXE Retry(Note) | Options available: Enabled, Disabled. Default setting is **Disabled**. |
| Ipv4 PXE Support(Note) | Enable/Disable the Ipv4 PXE feature.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| Ipv4 HTTP Support(Note) | Enable/Disable the Ipv4 HTTP feature.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| Ipv6 PXE Support(Note) | Enable/Disable the Ipv6 PXE feature.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| Ipv6 HTTP Support(Note) | Enable/Disable the Ipv6 HTTP feature.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| PXE boot wait time(Note) | Wait time in seconds to press ESC key to abort the PXE boot.<br>Press the <+> / <-> keys to increase or decrease the desired values. |
| Media detect count(Note) | Number of times the presence of media will be checked.<br>Press the <+> / <-> keys to increase or decrease the desired values. |

(Note) This item appears when **Network Stack** is set to **Enabled**.

## 2-2-10 IP Configuration

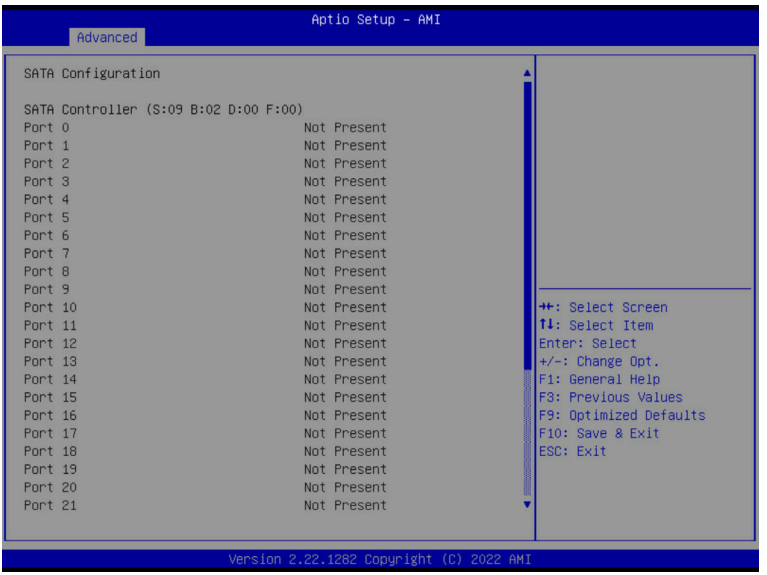

| Parameter | Description |
|---|---|
| IP Configuration Settings | |
| Provides the Options to Configure the IP Address | |
| Auto Configuration | Options available: Disabled, Every Boot, On Demand.<br>Default setting is **Disabled**. |

## 2-2-11 NVMe Configuration



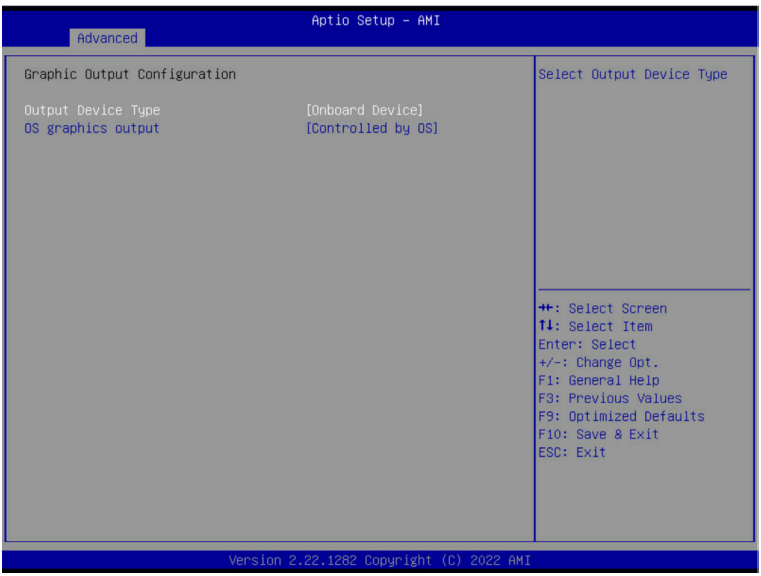

| Parameter | Description |
|---|---|
| NVMe controller and Drive information | Displays the NVMe devices connected to the system |

## 2-2-12 SATA Configuration



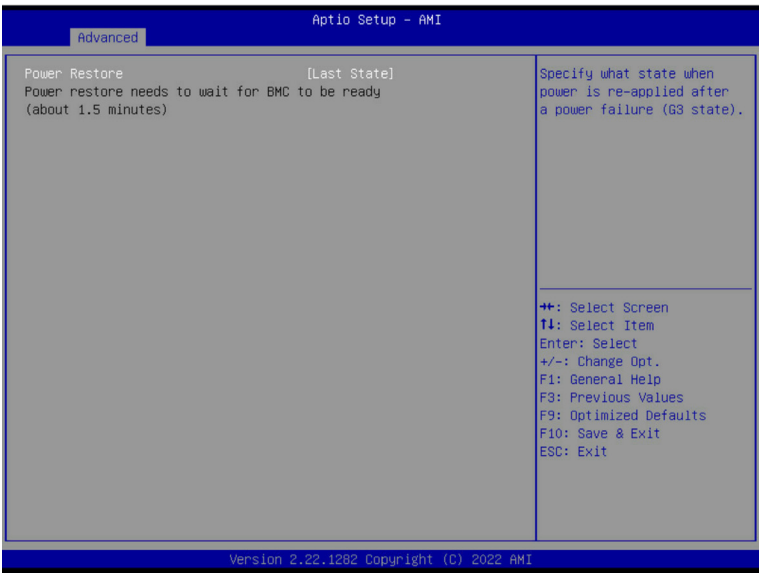

| Parameter | Description |
|---|---|
| SATA Configuration | Displays the installed HDD devices information. System will automatically detect HDD type. |

## 2-2-13 Graphic Output Configuration



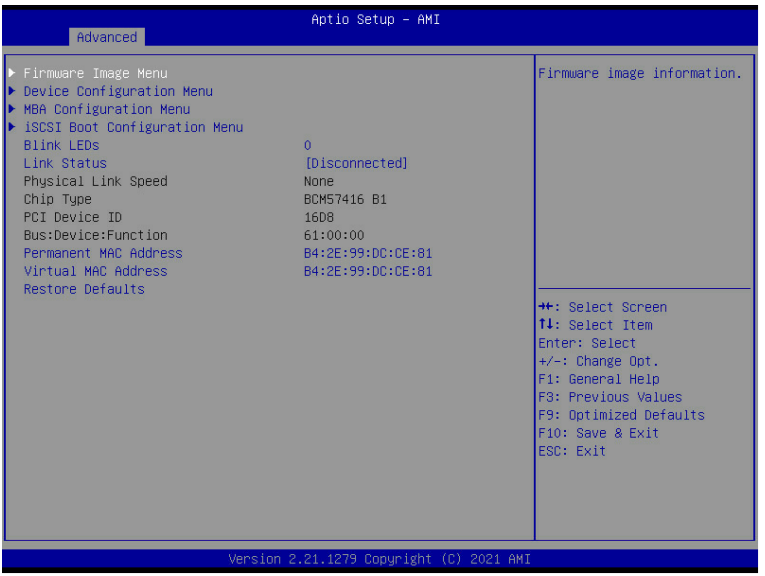

| Parameter | Description |
|---|---|
| Graphic Output Configuration | |
| Output Device Type | Selects output device type.<br>Options available: First loaded Device, Onboard Device, External Device, Specific Device. Default setting is **Onboard Device**. |
| OS graphics output | Use Onboard graphics output under OS (BMC KVM requires onboard graphics output).<br>Options available: Controlled by OS, Onboard VGA.<br>Default setting is **Controlled by OS**. |

## 2-2-14 Power Restore Configuration




| Parameter | Description |
|---|---|
| Power Restore | Specifies what state when power is re-applied after a power failure (G3 state).<br>Options available: Power Off, Power On, Last State.<br>Default setting is **Last State**. |

## 2-2-15 Broadcom NetXtreme-E 2Px10GBASE-T OCP 3.0 Ethernet

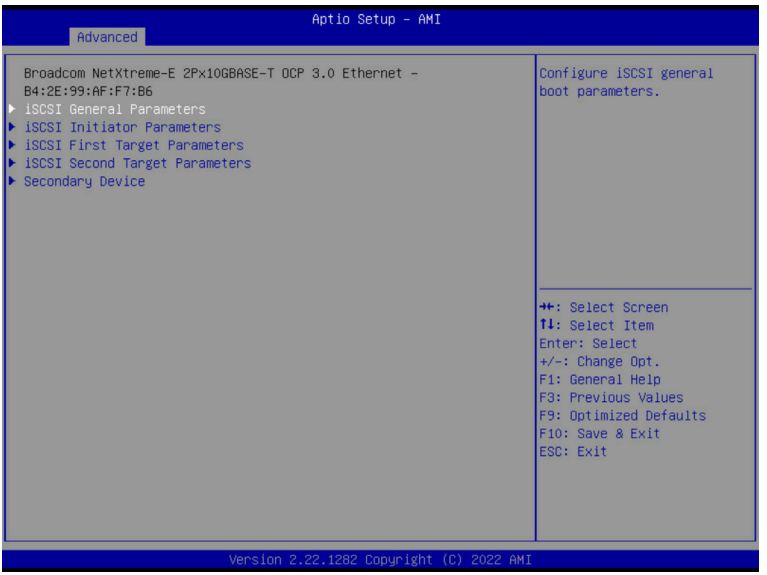



| Parameter | Description |
|---|---|
| Firmware Image Menu | Press [Enter] to view firmware image information. |
| Device Configuration Menu | Press [Enter] to configure advanced items.<br>◆ Multi-Function Mode<br>– Configures the NIC Hardware Mode.<br>– Options available: SF, NPAR 1.0. Default setting is **SF**.<br>◆ Number of VFs Per PF<br>– Configures the number of Virtual Functions Per Physical Function in multiples of 8 (1-128). This field is only applicable when SR-IOV is enabled.<br>– Default setting is **8**.<br>◆ SR-IOV<br>– Enable/Disable Single Root I/O Virtualization.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ Number of MSI-X Vectors per VF<br>– Configures the number of MSI-X Vectors per VF (0-128).<br>– Default setting is **16**.<br>◆ Maximum Number of PF MSI-X Vectors<br>– Configures the maximum number of PF MSI-X Vectors (0-512 per controller).<br>– Default setting is **74**. |

| Parameter | Description |
|---|---|
| Device Configuration Menu (continued) | ◆ Energy Efficient Ethernet<br>– Enable/Disable Energy Efficient Ethernet operation.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ Operational Link Speed<br>– Configures the link speed setting to be used as the default link speed for the selected port.<br>– Default setting is **AutoNeg**.<br>◆ Support RDMA<br>– Enable/Disable RDMA support for this port.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ DCB Protocol<br>– Enable/Disable DCB protocol.<br>– Options available: Disabled, Enabled (IEEE only), CEE (only), Both (IEEE preferred with fallback to CEE). Default setting is **Disabled**.<br>◆ LLDP nearest bridge<br>– Enable/Disable LLDP nearest bridge state.<br>– Options available: Enabled, Disabled. Default setting is **Enabled**.<br>◆ Default EVB Mode<br>– Configures the default Edge Virtual Bridging mode.<br>– Options available: VEB, VEPA, None. Default setting is **VEB**.<br>◆ Enable PME Capability<br>– Enable/Disable PME Capability support.<br>– Options available: Enabled, Disabled. Default setting is **Enabled**.<br>◆ Flow Offload<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ Live Firmware Upgrade<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ Adapter Error Recovery<br>– Options available: Enabled, Disabled. Default setting is **Disabled**. |
| MBA Configuration Menu | Press [Enter] to configure advanced items.<br>◆ Option ROM<br>– Enable/Disable Boot Option ROM.<br>– Options available: Enabled, Disabled. Default setting is **Enabled**.<br>◆ Legacy Boot Protocol<br>– Selects non-UEFI Boot Protocol: Preboot Execution Environment (PXE)/iSCSI.<br>– Options available: PXE, iSCSI, NONE. Default setting is **PXE**.<br>◆ Boot Strap Type<br>– Selects the boot strap type. Options available: Auto Detect, BBS, Int 18h, Int 19h. Default setting is **Auto Detect**.<br>◆ Hide Setup Prompt<br>– Configures whether the Setup Prompt is displayed during ROM initialization.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**. |

| Parameter | Description |
|---|---|
| MBA Configuration Menu (continued) | ◆ Setup Key Stroke<br>– Configures key strokes to invoke the configuration menu.<br>– Options available: Ctrl-S, Ctrl-B. Default setting is **Ctrl-S**.<br>◆ Banner Message Timeout<br>– Selects the timeout value. (0 defaults to 4 seconds, 15 is no delay, 1-14 is timeout value in seconds)<br>– Default setting is **5**.<br>◆ Pre-boot Wake On LAN<br>– Configures Pre-boot Wake on LAN (WOL).<br>– Options available: Enabled, Disabled. Default setting is **Enabled**.<br>◆ VLAN Mode<br>– Configures the virtual LAN (VLAN) mode.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ VLAN ID<br>– Configures the VLAN ID (1…4094).<br>– This item is available only when VLAN Mode is Enabled.<br>◆ Boot Retry Count<br>– Selects the number of boot retries.<br>– Options available: No Retry, 1 Retry, 2 Retries, 3 Retries, 4 Retries, 5 Retries, 6 Retries, Indefinite Retries. Default setting is **5 Retries**. |
| iSCSI Boot Configuration Menu | Press [Enter] to configure advanced items. |
| Blink LEDs | Identifies the physical network port by blinking the associated LED.<br>Press the numeric keys to adjust desired values. |
| Link Status | Specifies the link status of the port. |
| Physical Link Speed | Displays the technical specifications for the Network Interface Controller. |
| Chip Type | Displays the technical specifications for the Network Interface Controller. |
| PCI Device ID | Displays the technical specifications for the Network Interface Controller. |
| Bus:Device:Function | Displays the technical specifications for the Network Interface Controller. |
| Permanent MAC Address | Displays the MAC address of the Ethernet controller. |
| Virtual MAC Address | Displays the virtual MAC address of the Ethernet controller. |
| Restore Defaults | Resets the adapter to factory defaults. |

## 2-2-15-1 iSCSI Boot Configuration Menu

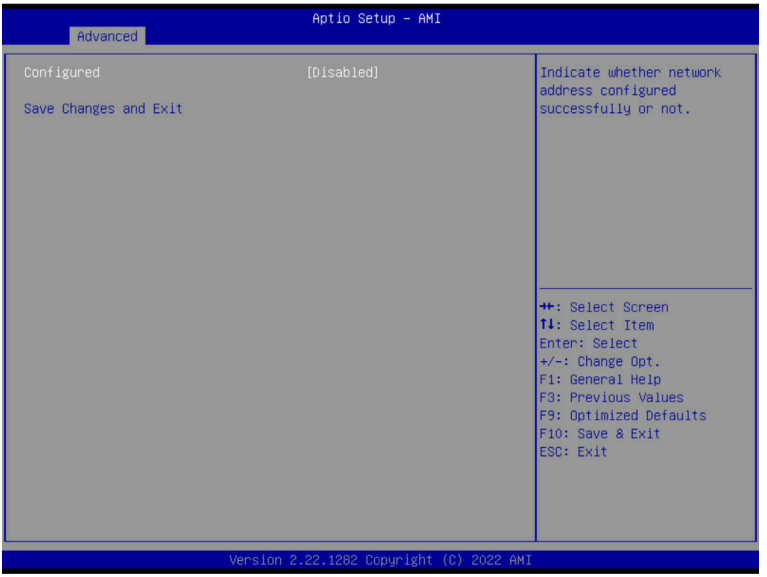



| Parameter | Description |
|---|---|
| iSCSI General Parameters | Press [Enter] to configure advanced items.<br>◆ TCP/IP Parameters via DHCP<br>– Acquires TCP/IP Parameters via DHCP.<br>– Options available: Enabled, Disabled. Default setting is **Enabled**.<br>◆ IP Autoconfiguration<br>– Auto-configures the IP configuration.<br>– Options available: Enabled, Disabled. Default setting is **Enabled**.<br>◆ iSCSI Parameters via DHCP<br>– Acquires iSCSI Parameters via DHCP.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ CHAP Authentication<br>– Enable/Disable the CHAP authentication.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ Boot to iSCSI Target<br>– Enable/Disable booting to iSCSI target after log-on.<br>– Options available: Enabled, Disabled, One Time Disabled. Default setting is **Enabled**.<br>◆ DHCP Vendor ID<br>– Configures the DHCP vendor ID (up to 32 characters long).<br>◆ Link Up Delay Time<br>– Configures the link up delay time in seconds (0-225). |

| Parameter | Description |
|---|---|
| iSCSI General Parameters (continued) | ◆ Use TCP Timestamp<br>– Enable/Disable the TCP timestamp.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ Target as First HDD<br>– Enable/Disable target appears as first hard disk drive (HDD) in the system.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ LUN Busy Retry Count<br>– Configures the number of retries in 2 second intervals when LUN is busy (0-60).<br>– Default setting is **0**.<br>◆ IP Version<br>– Displays the IP version supported. Modifying this parameter will reset all IP-related fields.<br>– Options available: IPv4, IPv6. Disabled. Default setting is **IPv4**. |
| iSCSI Initiator Parameters | Press [Enter] to configure advanced items.<br>◆ IP Address<br>– Configures the initiator IP address.<br>◆ Subnet Mask<br>– Configures the IP subnet mask.<br>◆ Default Gateway<br>– Configures the default gateway IP address.<br>◆ Primary DNS<br>– Configures the primary DNS IP address.<br>◆ Secondary DNS<br>– Configures the secondary DNS IP address.<br>◆ iSCSI Name<br>– Configures the iSCSI name.<br>◆ CHAP ID<br>– Configures the Challenge-Handshake Authentication Protocol (CHAP) ID (up to 128 characters in length).<br>◆ CHAP Secret<br>– Configure the Challenge-Handshake Authentication Protocol (CHAP) Secret (12 to 16 characters in length). |
| iSCSI First/Second Target Parameters | Press [Enter] to configure advanced items.<br>◆ Connect<br>– Enable/Disable the target establishment.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ IP Address<br>– Configures the Target IP address.<br>◆ TCP Port<br>– Configures the Target TCP port number (1-65535). |

| Parameter | Description |
|---|---|
| iSCSI First/Second Target Parameters (continued) | ◆ Boot LUN<br>– Configures the Target boot LUN number (0-255).<br>◆ iSCSI Name<br>– Configures the iSCSI name.<br>◆ CHAP ID<br>– Configures the Challenge-Handshake Authentication Protocol (CHAP) ID (up to 128 characters in length).<br>◆ CHAP Secret<br>– Configure the Challenge-Handshake Authentication Protocol (CHAP) Secret (12 to 16 characters in length). |
| Secondary Device | Press [Enter] to configure advanced items.<br>◆ Secondary Device<br>– Inputs the secondary device MAC address.<br>◆ Use Independent Target Portal<br>– Use Independent target portal when multipath I/O is enabled.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**.<br>◆ Use Independent Target Name<br>– Use Independent target name when multipath I/O is enabled.<br>– Options available: Enabled, Disabled. Default setting is **Disabled**. |

## 2-2-16 MAC IPv4 Network Configuration



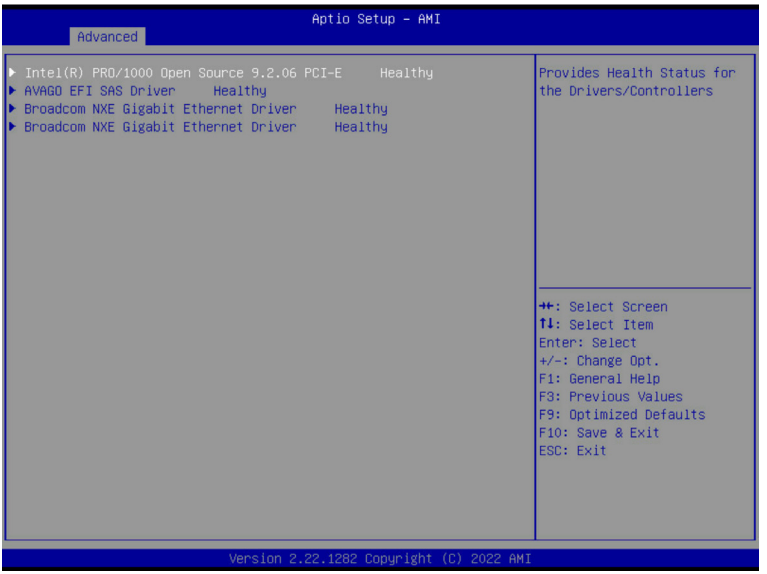

| Parameter | Description |
|---|---|
| Configured | Indicates whether network address is configured successfully or not.<br>Options available: Enabled, Disabled. Default setting is **Disabled.** |
| Enable DHCP(Note) | Options available: Enabled, Disabled. Default setting is **Enabled.** |
| Local IP Address(Note) | Press [Enter] to configure local IP address. |
| Local NetMask(Note) | Press [Enter] to configure local NetMask. |
| Local Gateway(Note) | Press [Enter] to configure local Gateway |
| Local DNS Servers(Note) | Press [Enter] to configure local DNS servers |
| Save Changes and Exit | Press [Enter] to save all configurations. |

(Note) This item appears when **Configured** is set to **Enabled**.

## 2-2-17 MAC IPv6 Network Configuration


| Parameter | Description |
|---|---|
| Enter Configuration Menu | Press [Enter] to configure advanced items.<br>◆ Displays the MAC Address information.<br>◆ Interface ID<br>– The 64 bit alternative interface ID for the device. The string is colon separated. e.g. ff:dd:88:66:cc:1:2:3.<br>◆ DAD Transmit Count<br>– The number of consecutive Neighbor solicitation messages sent while performing Duplicate Address Detection on a tentative address. A value of zero indicates that Duplicate Address Detection is not performed.<br>◆ Policy<br>– Options available: automatic, manual. Default setting is **automatic**.<br>◆ Save Changes and Exit<br>– Press [Enter] to save all configurations. |

## 2-2-18 Driver Health



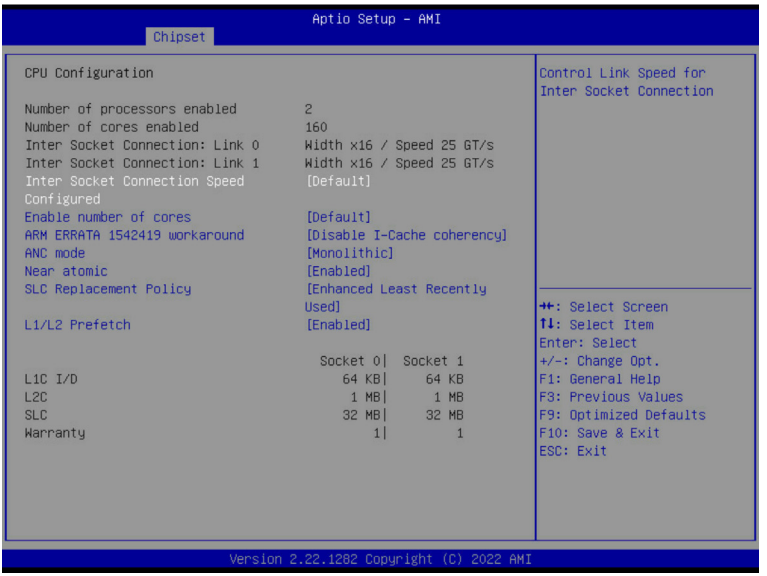

| Parameter | Description |
|---|---|
| Driver Health | Displays health status of the drivers/controllers if installed. |

## 2-3 Chipset Setup Menu

Chipset Setup menu displays submenu options for configuring the function of North Bridge. Select a submenu item, then press <Enter> to access the related submenu screen.


| Parameter | Description |
|---|---|
| CPU Configuration | Press [Enter] for configuration of advanced items. |
| RAS Configuration | Press [Enter] for configuration of advanced items. |
| Memory Slot Information | Press [Enter] for configuration of advanced items. |
| Serialport console | Press [Enter] for configuration of advanced items. |
| PCIE Root Complex Configuration | Press [Enter] for configuration of advanced items. |

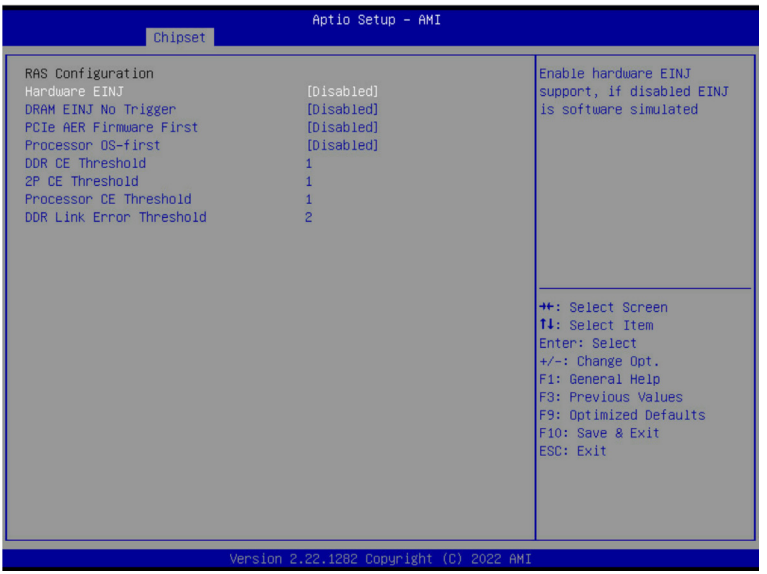
## 2-3-1 CPU Configuration




| Parameter | Description |
|---|---|
| CPU Configuration | |
| Number of processors/cores enabled | Displays the number of installed processor information. |
| Inter Socket Connection: Link0/1 | Displays the Inter socket connection information. |
| Inter Socket Connection Speed Configured | Controls Link speed for Inter socket connection.<br>Options available: Default, 16GT/s, 20GT/s, 25GT/s. Default setting is **Default.** |
| Enable number of cores | Enable number of cores for the system. Default setting is **Default**. |
| ARM ERRATA 1542419 workaround | Options available: Disable I-Cache coherency, Software solution, Disable. Default setting is **Disable I-Cache coherency.** |
| ANC mode | Options available: Monolithic, Hemisphere, Quadrant. Default setting is **Monolithic.** |
| Near atomic | Enable/Disable cacheable atomic instruction executed near in CPU.<br>Options available: Enabled, Disabled. Default setting is **Enabled.** |
| SLC Replacement Policy | Options available: Enhanced Least Recently Used, Linear-Feedback Shift Register. Default setting is **Enhanced Least Recently Used.** |

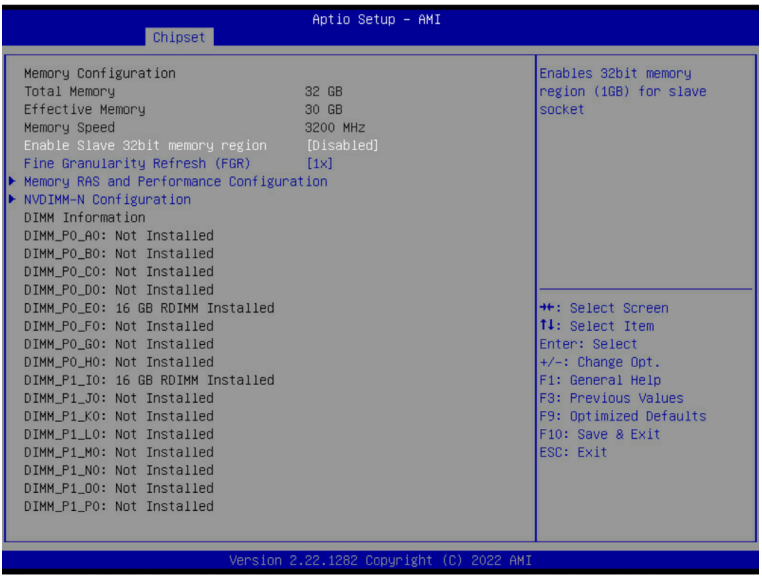
| Parameter | Description |
|---|---|
| L1/L2 Prefetch | Enable/Disable L1/L2 Prefetch for each core.<br>Options available: Enabled, Disabled. Default setting is **Enabled.** |
| L1C I/D<br>L2C<br>SLC<br>Warrenty | Displays the technical specifications for the installed processor |

## 2-3-2 RAS Configuration




| Parameter | Description |
|---|---|
| RAS Configuration | |
| Hardware EINJ | Options available: Disabled, Enabled. Default setting is **Disabled.** |
| DRAM EINJ No Trigger | Options available: Disabled, Enabled. Default setting is **Disabled.** |
| PCIe AER Firmware First | Options available: Disabled, Enabled. Default setting is **Disabled.** |
| Processor OS-first | Options available: Disabled, Enabled. Default setting is **Disabled.** |
| DDR CE Threshold | Press '+" or "-" to configure the threshold. |
| 2P CE Threshold | Press '+" or "-" to configure the threshold. |
| Processor CE Threshold | Press '+" or "-" to configure the threshold. |
| DDR Link Error Threshold | Press '+" or "-" to configure the threshold. |

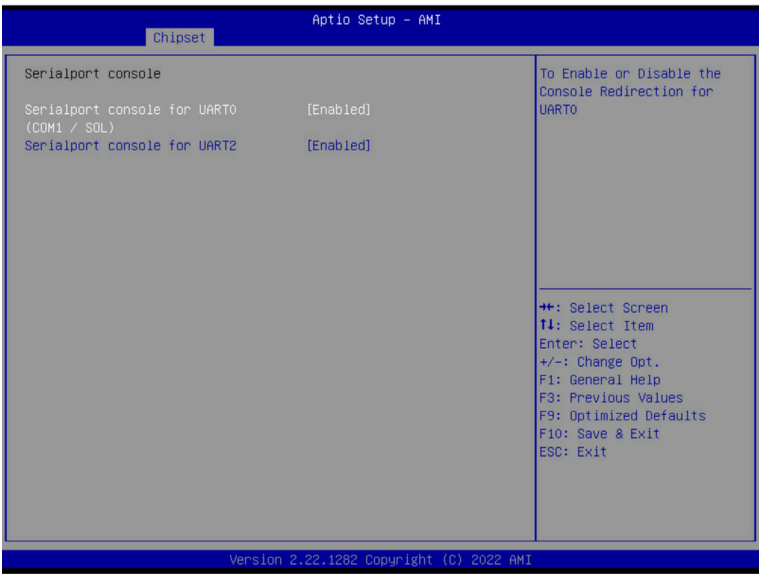
## 2-3-3 Memory Slot Information




| Parameter | Description |
|---|---|
| Memory Configuration | |
| Total Memory/ Effective Memory/ Memory Speed | Displays the technical specifications for the installed memory module. |
| Enable Slave 32bit memory region | Options available: Disabled, Enabled. Default setting is **Disabled.** |
| Fine Granularity Refresh (FGR) | Options available: 1x, 2x, 4x. Default setting is **1x.** |
| Memory RAS and Performance Configuration | Press [Enter] to configure advanced items.<br>◆ ECC mode<br>– Options available: Auto, Disabled, SECDED, Symbol. Default setting is **Auto**.<br>◆ Defer uncorrectable read errors<br>– Options available: Disabled, Enabled. Default setting is **Enabled**.<br>◆ Fault handling interrupt<br>– Options available: Disabled, Enabled. Default setting is **Enabled**.<br>◆ Scrub Patrol duration (hour)<br>– Options available: Disabled, 1,.., 24. Default setting is **24**.<br>◆ Demand scrub<br>– Options available: Disabled, Enabled. Default setting is **Enabled**. |

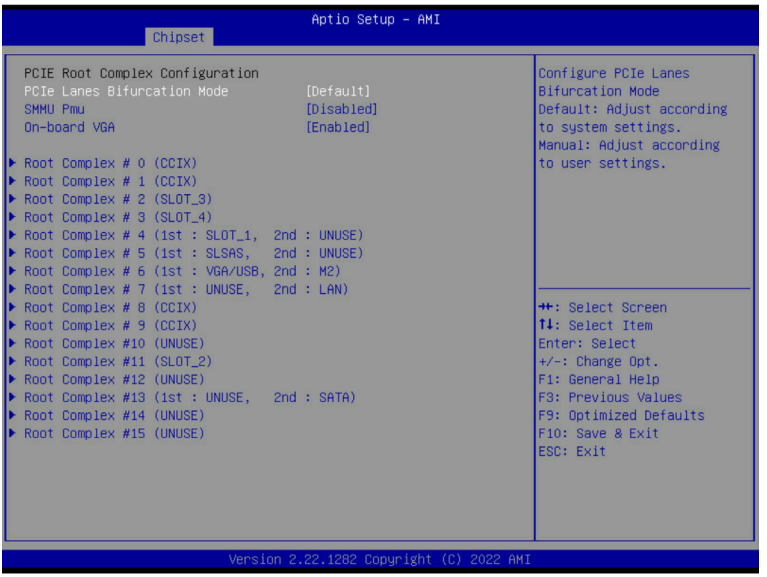
| Parameter | Description |
| --- | --- |
| Memory RAS and Performance Configuration (continued) | ◆ Write CRC<br>– Options available: Disabled, Enabled. Default setting is **Disabled**.<br>◆ CVE-2020-10255 mitigation<br>– Options available: Disabled, Enabled. Default setting is **Disabled**. |
| NVDIMM-N Configuration | Press [Enter] to configure advanced items.<br>◆ Socket0/1 Configured Mode<br>◆ Mode Selection<br>– Options available: Non-NVDIMM, Non-Hashed, Hashed, Auto. Default setting is **Auto**. |

## 2-3-4 Serialport console




| Parameter | Description |
|---|---|
| Serialport console | |
| Serialport console for UART0 (COM1/SOL) | Options available: Disabled, Enabled. Default setting is **Enabled.** |
| Serialport console for UART2 | Options available: Disabled, Enabled. Default setting is **Enabled.** |

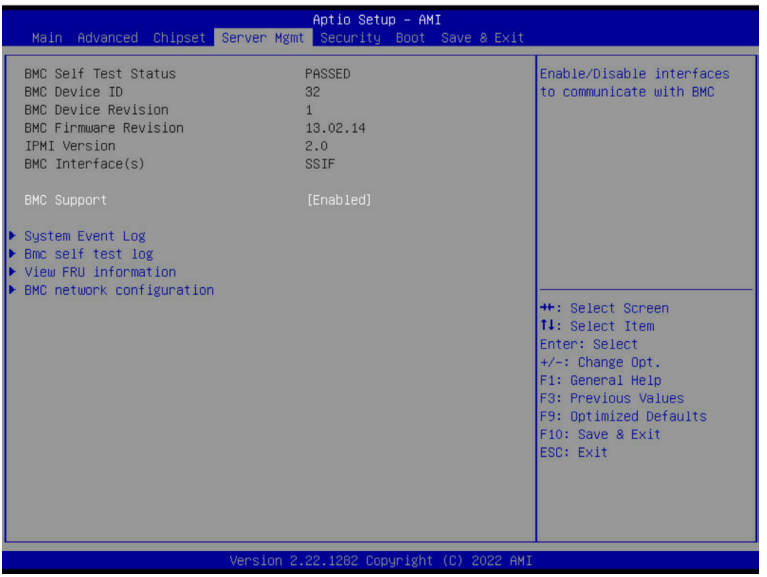
## 2-3-5 PCIE Root Complex Configuration




| Parameter | Description |
|---|---|
| PCIE Root Complex Configuration | |
| PCIe Lanes Bifurcation Mode | Options available: Manual, Default. Default setting is **Default.** |
| SMMU Pmu | Options available: Disabled, Enabled. Default setting is **Disabled.** |
| On-board VGA | Options available: Disabled, Enabled. Default setting is **Enabled.** |
| Root Complex #(Note) | Press [Enter] to view advanced items. |

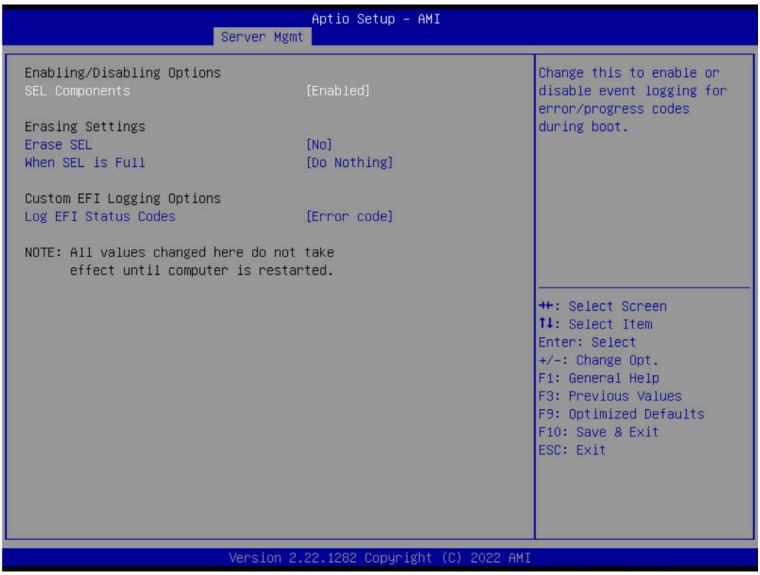
(Note) This item is configurable when **PCIe Lanes Bifurcation Mode** is set to **Manual**.

## 2-4 Server Management Menu




| Parameter | Description |
|---|---|
| BMC Self Test Status/ BMC Device ID/ BMC Device Revision/ BMC Firmware Revision/ IPMI Version/ BMC Interface(s) | Displays the technical specification of the BMC controller. |
| BMC Support | Options available: Enabled, Disabled. Default setting is **Enabled**. |
| System Event Log | Press [Enter] to configure advanced items. |
| Bmc self test log | Press [Enter] to configure advanced items. |
| View FRU Information | Press [Enter] to view the FRU information. |
| BMC network configuration | Press [Enter] to configure advanced items. |

## 2-4-1 System Event Log



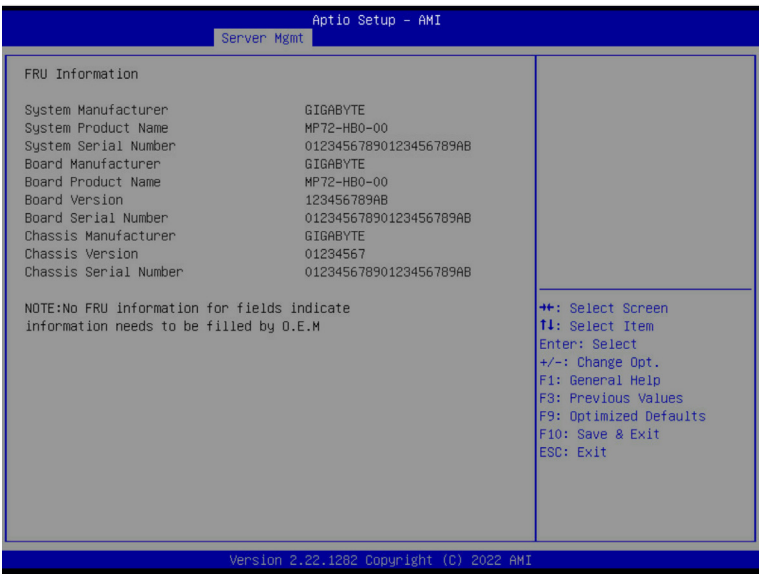

| Parameter | Description |
|---|---|
| Enabling / Disabling Options | |
| SEL Components | Change this item to enable or disable all features of System Event Logging during boot.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| Erasing Settings | |
| Erase SEL | Choose options for erasing SEL.<br>Options available: No/Yes, On next reset/Yes, On every reset. Default setting is **No**. |
| When SEL is Full | Choose options for reactions to a full SEL.<br>Options available: Do Nothing, Erase Immediately, Delete Oldest Record. Default setting is **Do Nothing**. |
| Custom EFI Logging Options | |
| Log EFI Status Codes | Enable/Disable the logging of EFI Status Codes (if not already converted to legacy).<br>Options available: Disabled, Both, Error code, Progress code. Default setting is **Error code**. |

## 2-4-2 Bmc self test log


| Parameter | Description |
|---|---|
| Log area usage = 00 out of 20 logs | |
| Erase Log | Options available: Yes, On every reset/ No. Default setting is **No**. |
| When log is full | Options available: Clear Log, Do not log any more. Default setting is **Do not log any more**. |

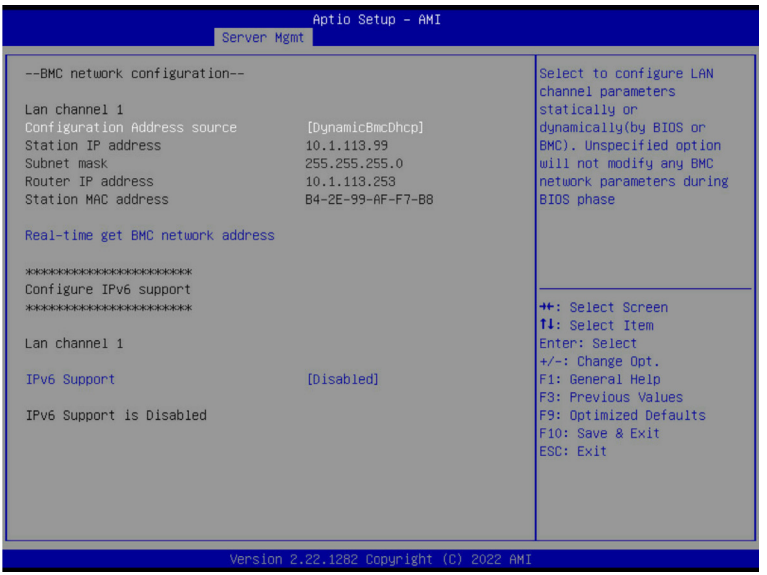
## 2-4-3 View FRU Information

The FRU page is a simple display page for basic system ID information, as well as System product information. Items on this window are non-configurable.




(Note) The model name will vary depends on the product you purchased

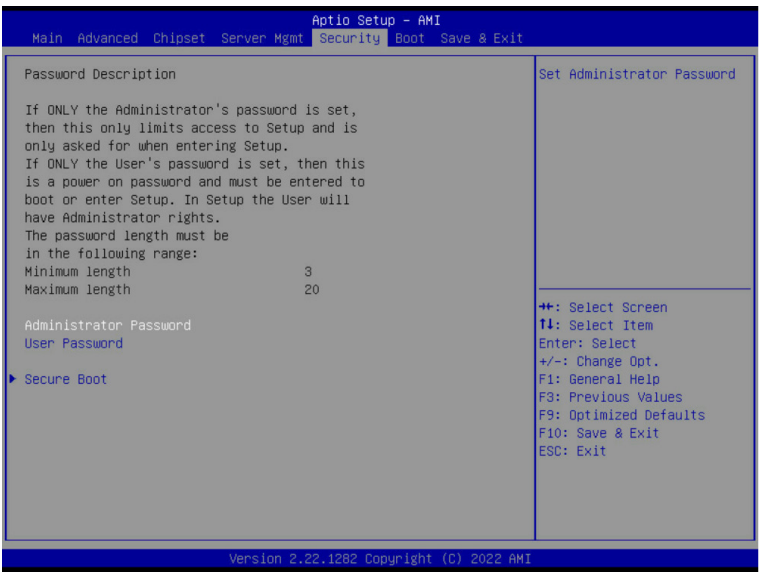
## 2-4-4 BMC Network Configuration




| Parameter | Description |
|---|---|
| BMC network configuration | |
| Lan Channel 1 | |
| Configuration Address source | Selects to configure LAN channel parameters statically or dynamically (DHCP). Do nothing option will not modify any BMC network parameters during BIOS phase.<br>Options available: Unspecified, Static, DynamicBmcDhcp. Default setting is **DynamicBmcDhcp**. |
| Station IP address | Displays IP Address information. |
| Subnet mask | Displays Subnet Mask information.<br>Please note that the IP address must be in three digitals, for example, 192.168.000.001. |
| Router IP address | Displays the Router IP Address information. |
| Station MAC address | Displays the MAC Address information. |
| Real-time get BMC network address | Press [Enter] to synchronize the BMC network address. |
| IPv6 Support | Options available: Enabled, Disabled. Default setting is **Disabled**. |

## 2-5 Security Menu

The Security menu allows you to safeguard and protect the system from unauthorized use by setting up access passwords.




There are two types of passwords that you can set:

- Administrator Password

  Entering this password will allow the user to access and change all settings in the Setup Utility.

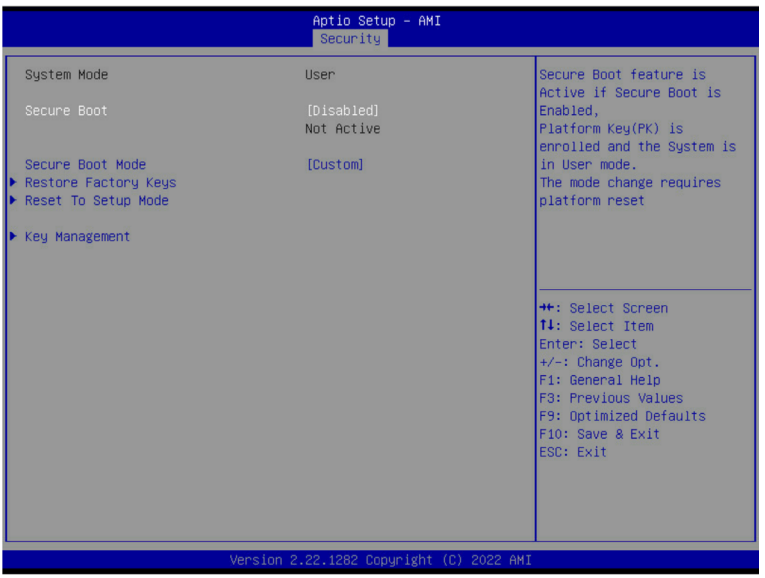
- User Password

  Entering this password will restrict a user's access to the Setup menus. To enable or disable this field, a Administrator Password must first be set. A user can only access and modify the System Time, System Date, and Set User Password fields.

| Parameter | Description |
|---|---|
| Administrator Password | Press [Enter] to configure the administrator password. |
| User Password | Press [Enter] to configure the user password. |
| Secure Boot | Press [Enter] to configure advanced items. |

## 2-5-1 Secure Boot

The Secure Boot submenu is applicable when your device is installed the Windows® 8 (or above) operating system.




| Parameter | Description |
|---|---|
| System Mode | Displays if the system is in User mode or Setup mode. |
| Secure Boot | Enable/ Disable the Secure Boot function.<br>Options available: Enabled, Disabled. Default setting is **Disabled**. |
| Secure Boot Mode(Note) | Secure Boot requires all the applications that are running during the booting process to be pre-signed with valid digital certificates. This way, the system knows all files being loaded before Windows loads to the login screen have not been tampered with.<br>When set to Standard, it will automatically load the Secure Boot keys form the BIOS databases.<br>When set to Custom, you can customize the Secure Boot settings and manually load its keys from the BIOS database.<br>Options available: Standard, Custom. Default setting is **Custom**. |
| Restore Factory Keys | Forces the system to user mode and installs factory default Secure Boot key database. |
| Reset To Setup Mode | Press [Enter] to reset the system mode to Setup mode. |

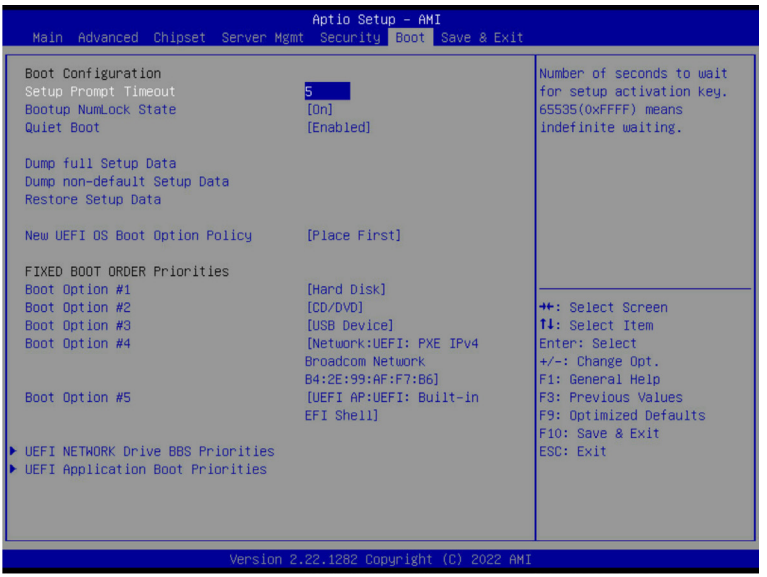
(Note) Advanced items prompt when this item is set to **Custom**.

| Parameter | Description |
|---|---|
| Key Management | Press [Enter] to configure advanced items.<br>**Please note that this item is configurable when Secure Boot Mode is set to Custom.**<br>◆ Factory Key Provision<br>– Allows to provision factory default Secure Boot keys when system is in Setup Mode.<br>– Options available: Enabled, Disabled. Default setting is Disabled.<br>◆ Restore Factory Keys<br>– Installs all factory default keys. It will force the system in User Mode.<br>– Options available: Yes, No.<br>◆ Reset to Setup Mode<br>– Reset the system mode to Setup mode.<br>◆ Export Secure Boot variables<br>– Export all Secure Boot Keys and key variables.<br>◆ Enroll Efi Image<br>– Press [Enter] to enroll SHA256 hash of the binary into Authorized Signature Database (db).<br>◆ Device Guard Ready<br>◆ Remove 'UEFI CA' from DB.<br>◆ Restore DB defaults<br>– Restore DB variable to factory defaults.<br>◆ Secure Boot variable<br>– Displays the current status of the variables used for secure boot.<br>◆ Platform Key (PK)<br>– Displays the current status of the Platform Key (PK).<br>– Press [Enter] to configure a new PK.<br>– Options available: Update.<br>◆ Key Exchange Keys (KEK)<br>– Displays the current status of the Key Exchange Key Database (KEK).<br>– Press [Enter] to configure a new KEK or load additional KEK from storage devices.<br>– Options available: Update, Append.<br>◆ Authorized Signatures (DB)<br>– Displays the current status of the Authorized Signature Database.<br>– Press [Enter] to configure a new DB or load additional DB from storage devices.<br>– Options available: Update, Append.<br>◆ Forbidden Signatures (DBX)<br>– Displays the current status of the Forbidden Signature Database.<br>– Press [Enter] to configure a new dbx or load additional dbx from storage devices.<br>– Options available: Update, Append. |

| Parameter | Description |
| --- | --- |
| Key Management (continued) | ◆ Authorized TimeStamps (DBT)<br>– Displays the current status of the Authorized TimeStamps Database.<br>– Press [Enter] to configure a new DBT or load additional DBT from storage devices.<br>– Options available: Update, Append.<br>◆ OsRecovery Signatures<br>– Displays the current status of the OsRecovery Signature Database.<br>– Press [Enter] to configure a new OsRecovery Signature or load additional OsRecovery Signature from storage devices.<br>– Options available: Update, Append. |

## 2-6 Boot Menu

The Boot menu allows you to set the drive priority during system boot-up. BIOS setup will display an error message if the legacy drive(s) specified is not bootable.

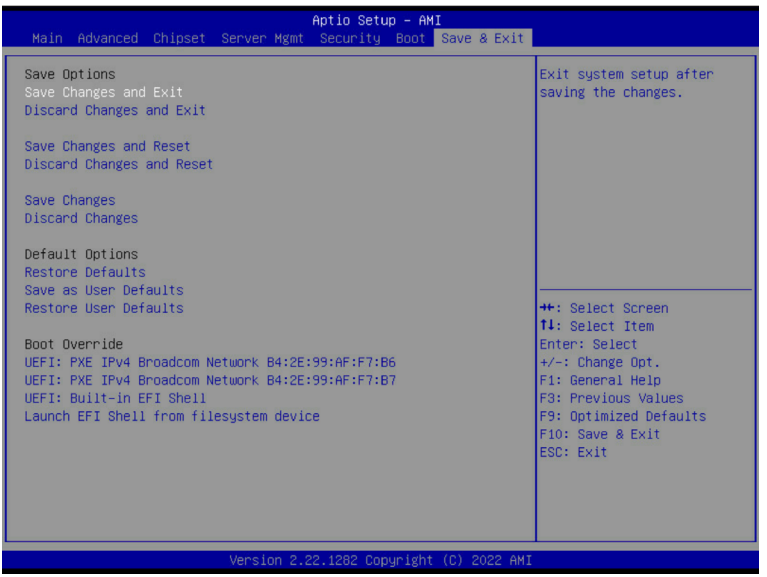



| Parameter | Description |
|---|---|
| Boot Configuration | |
| Setup Prompt Timeout | Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting.<br>Press the numeric keys to input the desired values. |
| Bootup NumLock State | Enable/Disable the Bootup NumLock function.<br>Options available: On, Off. Default setting is **On**. |
| Quiet Boot | Enable/Disable showing the logo during POST.<br>Options available: Enabled, Disabled. Default setting is **Enabled**. |
| Dump full Setup Data | Press [Enter] to dump full setup data to file. |
| Dump non-default Setup Data | Press [Enter] to dump non-default setup data to file. |
| Restore Setup Data | Press [Enter] to restore setup data from file (cJson format). |
| New UEFI OS Boot Option Policy | Controls the placement of newly detected UEFI boot options.<br>Options available: Default, Place First, Place Last. Default setting is **Place First**. |

| Parameter | Description |
|---|---|
| FIXED BOOT ORDER Priorities | |
| Boot Option #1 / #2 / #3 / #4 / #5 | Press [Enter] to configure the boot priority.<br>By default, the server searches for boot devices in the following sequence:<br>1. Hard drive.<br>2. CD-COM/DVD drive.<br>3. USB device.<br>4. Network.<br>5. UEFI. |
| UEFI Network Drive BBS Priorities | Press [Enter] to configure the boot priority. |
| UEFI Application Boot Priorities | Press [Enter] to configure the boot priority. |

## 2-7 Save & Exit Menu

The Save & Exit menu displays the various options to quit from the BIOS setup. Highlight any of the exit options then press <Enter>.




| Parameter | Description |
|---|---|
| Save Options | |
| Save Changes and Exit | Saves changes made and closes the BIOS setup.<br>Options available: Yes, No. |
| Discard Changes and Exit | Discards changes made and exits the BIOS setup.<br>Options available: Yes, No. |
| Save Changes and Reset | Restarts the system after saving the changes made.<br>Options available: Yes, No. |
| Discard Changes and Reset | Restarts the system without saving the changes made.<br>Options available: Yes, No. |
| Save Changes | Saves changes done so far to any of the setup options.<br>Options available: Yes, No. |
| Discard Changes | Options available: Yes, No. |
| Default Options | |

| Parameter | Description |
|---|---|
| Restore Defaults | Loads the default settings for all BIOS setup parameters. Setup Defaults are quite demanding in terms of resources consumption. If you are using low-speed memory chips or other kinds of low-performance components and you choose to load these settings, the system might not function properly.<br>Options available: Yes, No. |
| Save as User Defaults | Press [Enter] to save changes as the user defaults without exit BIOS setup. |
| Restore User Defaults | Press [Enter] to restore the user defaults . |
| Boot Override | Press [Enter] to configure the device as the boot-up drive. |
| Launch EFI Shell from filesystem device | Attempts to Launch EFI Shell application (Shell.efi) from one of the available file system devices. |

## 2-8 BIOS POST Beep code (AMI standard)

### 2-8-1 PEI Beep Codes

| # of Beeps | Description |
|---|---|
| 1 | Memory not Installed. |
| 1 | Memory was installed twice (InstallPeiMemory routine in PEI Core called twice) |
| 2 | Recovery started |
| 3 | DXEIPL was not found |
| 3 | DXE Core Firmware Volume was not found |
| 4 | Recovery failed |
| 4 | S3 Resume failed |
| 7 | Reset PPI is not available |

### 2-8-2 DXE Beep Codes

| # of Beeps | Description |
|---|---|
| 1 | Invalid password |
| 4 | Some of the Architectural Protocols are not available |
| 5 | No Console Output Devices are found |
| 5 | No Console Input Devices are found |
| 6 | Flash update is failed |
| 7 | Reset protocol is not available |
| 8 | Platform PCI resource requirements cannot be met |