

GIGABYTE™

S461-3T0

4U 60-Bay Dual Processors Storage Server

User Manual

Rev. 1.0

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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 of 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.

For More Information

For related product specifications, the latest firmware and software, and other information please visit our website at <http://www.gigabyte.com>




For GIGABYTE distributors and resellers, additional sales & marketing materials are available from our reseller portal: <http://reseller.b2b.gigabyte.com>

For further technical assistance, please contact your GIGABYTE representative or visit <https://esupport.gigabyte.com/> to create a new support ticket

For any general sales or marketing enquiries, you may also message GIGABYTE server directly by email: server.grp@gigabyte.com

Conventions

The following conventions are used in this user's guide:

| | |
|---|--|
|  | <p>NOTE!</p> <p>Gives bits and pieces of additional information related to the current topic.</p> |
|  | <p>CAUTION!</p> <p>Gives precautionary measures to avoid possible hardware or software problems.</p> |
|  | <p>WARNING!</p> <p>Alerts you to any damage that might result from doing or not doing specific actions.</p> |

Server Warnings and Cautions

Before installing a server, be sure that you understand the following warnings and cautions.



WARNING!

To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.



WARNING!

To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.



WARNING!

This server is equipped with high speed fans. Keep away from hazardous moving fan blades during servicing.



WARNING!

This equipment is not suitable for use in locations where children are likely to be present.



CAUTION!

- Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.
- Danger of explosion if battery is incorrectly replaced.
- Replace only with the same or equivalent type recommended by the manufacturer.
- Dispose of used batteries according to the manufacturer's instructions.

Electrostatic Discharge (ESD)



CAUTION!

ESD CAN DAMAGE DRIVES, BOARDS, AND OTHER PARTS. WE RECOMMEND THAT YOU PERFORM ALL PROCEDURES AT AN ESD WORKSTATION. IF ONE IS NOT AVAILABLE, PROVIDE SOME ESD PROTECTION BY WEARING AN ANTI-STATIC WRIST STRAP ATTACHED TO CHASSIS GROUND -- ANY UNPAINTED METAL SURFACE -- ON YOUR SERVER WHEN HANDLING PARTS.

Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges without any component and pin touching. After removing a board from its protective wrapper or from the system, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

System power on/off: To remove power from system, you must remove the system from rack. Make sure the system is removed from the rack before opening the chassis, adding, or removing any non hot-plug components.

Hazardous conditions, devices and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the cables attached to the system before servicing it. Otherwise, personal injury or equipment damage can result.

Electrostatic discharge (ESD) and ESD protection: ESD can damage drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide some ESD protection by wearing an antistatic wrist strap attached to chassis ground (any unpainted metal surface on the server) when handling parts.

ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to electrostatic discharge (ESD). Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

Installing or removing jumpers: A jumper is a small plastic encased conductor that slips over two jumper pins. Some jumpers have a small tab on top that can be gripped with fingertips or with a pair of fine needle nosed pliers. If the jumpers do not have such a tab, take care when using needle nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to grip with, but not squeeze, the pliers or other tool used to remove a jumper, or the pins on the board may bend or break.

**CAUTION!**

Risk of explosion if battery is replaced incorrectly or with an incorrect type. Replace the battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Table of Contents

| | |
|---|----|
| Chapter 1 Hardware Installation | 11 |
| 1-1 Installation Precautions | 11 |
| 1-2 Product Specifications | 12 |
| 1-3 System Block Diagram | 16 |
| Chapter 2 System Appearance | 17 |
| 2-1 Front View | 17 |
| 2-2 Rear View | 18 |
| 2-3 Front Panel LEDs and Buttons | 19 |
| 2-4 Rear System LAN LEDs | 21 |
| 2-5 Power Supply Unit LED | 22 |
| Chapter 3 System Hardware Installation | 23 |
| 3-1 Removing and Installing the Chassis Cover | 24 |
| 3-2 System Components | 25 |
| 3-3 Removing and Installing the Fan Duct | 27 |
| 3-4 Removing and Installing the Heat Sink | 28 |
| 3-5 Removing and Installing the CPU | 29 |
| 3-6 Removing and Installing Memory | 31 |
| 3-6-1 Six-Channel Memory Configuration | 31 |
| 3-6-2 Removing and Installing a Memory Module | 32 |
| 3-6-3 DIMM Population Table | 32 |
| 3-6-4 Intel Optane DCPMM DIMM Population Rule | 33 |
| 3-7 Removing and Installing the PCIe/Riser Card | 34 |
| 3-8 Removing and Installing the Hard Disk Drive | 36 |
| 3-9 Replacing the Fan Assembly | 38 |
| 3-10 Removing and Installing the Power Supply | 39 |
| 3-11 Cable Routing | 40 |
| Chapter 4 Motherboard Components | 43 |
| 4-1 Motherboard Components | 43 |
| 4-2 Jumper Settings | 45 |
| Chapter 5 BIOS Setup | 47 |
| 5-1 The Main Menu | 49 |
| 5-2 Advanced Menu | 52 |
| 5-2-1 Trusted Computing | 53 |
| 5-2-2 Serial Port Console Redirection | 54 |

| | | |
|--------|--|-----|
| 5-2-3 | SIO Configuration | 57 |
| 5-2-4 | PCI Subsystem Settings | 58 |
| 5-2-5 | USB Configuration | 60 |
| 5-2-6 | Post Report Configuration | 61 |
| 5-2-7 | NVMe Configuration | 62 |
| 5-2-8 | Chipset Configuration | 63 |
| 5-2-9 | Network Stack Configuration | 64 |
| 5-2-10 | iSCSI Configuration | 65 |
| 5-2-11 | Intel(R) I210 Gigabit Network Connection | 66 |
| 5-2-12 | VLAN Configuration | 68 |
| 5-2-13 | QLogic FastLinQ..... | 70 |
| 5-2-14 | Driver Health..... | 72 |
| 5-3 | Chipset Setup Menu..... | 73 |
| 5-3-1 | Processor Configuration | 74 |
| 5-3-2 | Common RefCode Configuration | 77 |
| 5-3-3 | UPI Configuration | 78 |
| 5-3-4 | Memory Configuration | 79 |
| 5-3-5 | IIO Configuration | 81 |
| 5-3-6 | Advanced Power Management Configuration | 83 |
| 5-3-7 | PCH Configuration | 86 |
| 5-3-8 | Miscellaneous Configuration | 88 |
| 5-3-9 | Server ME Configuration | 89 |
| 5-3-10 | Runtime Error Logging | 90 |
| 5-3-11 | Power Policy..... | 92 |
| 5-4 | Server Management Menu..... | 94 |
| 5-4-1 | System Event Log | 96 |
| 5-4-2 | View FRU Information | 97 |
| 5-4-3 | BMC VLAN Configuration..... | 98 |
| 5-4-4 | BMC Network Configuration | 99 |
| 5-4-5 | IPv6 BMC Network Configuration | 100 |
| 5-5 | Security Menu | 101 |
| 5-5-1 | Secure Boot | 102 |
| 5-6 | Boot Menu..... | 104 |
| 5-6-1 | UEFI NETWORK Drive BBS Priorities | 106 |
| 5-6-2 | UEFI Application Boot Priorities | 107 |
| 5-7 | Save & Exit Menu..... | 108 |
| 5-8 | BIOS POST Codes | 110 |
| 5-8-1 | AMI Standard - PEI..... | 110 |
| 5-8-2 | AMI Standard - DXE | 110 |
| 5-8-3 | AMI Standard - ERROR | 112 |
| 5-8-4 | Intel UPI POST Codes..... | 113 |

| | | |
|-------|--|-----|
| 5-8-5 | Intel UPI Error Codes | 113 |
| 5-8-6 | Intel MRC POST Codes | 114 |
| 5-8-7 | Intel MRC Error Codes | 114 |
| 5-8-8 | Intel PM POST Codes | 115 |
| 5-8-9 | Intel PM POST Codes | 115 |
| 5-9 | BIOS POST Beep code (AMI standard) | 116 |
| 5-9-1 | PEI Beep Codes | 116 |
| 5-9-2 | DXE Beep Codes | 116 |

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Chapter 1 Hardware Installation

1-1 Installation Precautions

The motherboard/system contain numerous delicate electronic circuits and components which can become damaged as a result of electrostatic discharge (ESD). Prior to installation, carefully read the service guide 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.

| | |
|---|---|
| System Dimension | <ul style="list-style-type: none">◆ 4U◆ 438(W) x 176(H) x 1002 (D) mm |
|  CPU | <ul style="list-style-type: none">◆ 2nd Generation Intel® Xeon® Scalable and Intel® Xeon® Scalable Processors◆ Intel® Xeon® Platinum Processor, Intel® Xeon® Gold Processor, Intel® Xeon® Silver Processor and Intel® Xeon® Bronze Processor <p>NOTE: If only 1 CPU is installed, some PCIe or memory functions might be unavailable</p> |
|  Socket | <ul style="list-style-type: none">◆ 2 x LGA 3647◆ Socket P◆ CPU TDP up to 165W |
|  Chipset | <ul style="list-style-type: none">◆ Intel® C621 Express Chipset |
|  Memory | <ul style="list-style-type: none">◆ 16 x DIMM slots◆ DDR4 memory supported only◆ 6-channel memory per processor architecture◆ RDIMM modules up to 64GB supported◆ LRDIMM modules up to 128GB supported◆ Supports Intel® Optane™ DC Persistent Memory (DCPMM)◆ 1.2V modules: 2933(1DPC)/2666/2400/2133 MHz <p>Maximum verified DCPMM configuration:</p> <ul style="list-style-type: none">◆ * Ambient temperature 30°C◆ * 2nd Generation Intel® Xeon® Scalable processor 165W (Max.)◆ * DCPMM 256GB x4 pcs <p>◆ DCPMM installation locations:</p> <ul style="list-style-type: none">◆ DIMM_P0_(A1, D1)◆ DIMM_P1_(G1, J1) <p>NOTE:</p> <ol style="list-style-type: none">1. 2933MHz for 2nd Generation Intel® Xeon® Scalable Processors only2. Intel® Optane™ DC Persistent Memory for 2nd Generation Intel® Xeon® Scalable Processors only3. The maximum number of DCPMM that can be installed is based on a maximum operating (ambient) temperature of 30°C4. To enquire about installing a greater number of DCPMM, please consult with your GIGABYTE technical or sales representative |



Rear Panel I/O

- ◆ 2 x USB 3.0
- ◆ 1 x VGA
- ◆ 2 x SFP+
- ◆ 2 x RJ45
- ◆ 1 x MLAN
- ◆ 1 x ID button with LED
- ◆ 2 x LAN activity LEDs



Backplane I/O

- ◆ Bandwidth: SATAIII 6Gb/s or SAS 12Gb/s per port



TPM

- ◆ 1 x TPM header with SPI interface
- ◆ TPM2.0 kit: CTM010 (optional)



System Management

- ◆ Aspeed® AST2500 management controller
- ◆ AMI MegaRAC SP-X Solution web interface
- ◆ Dashboard
- ◆ JAVA Based Serial Over LAN
- ◆ HTML5 KVM
- ◆ Sensor Monitor (Voltage, RPM, Temperature, CPU Status etc.)
- ◆ Sensor Reading History Data
- ◆ FRU Information
- ◆ SEL Log in Linear Storage / Circular Storage Policy
- ◆ Hardware Inventory
- ◆ Fan Profile
- ◆ System Firewall
- ◆ Power Consumption
- ◆ Power Control
- ◆ LDAP / AD / RADIUS Support
- ◆ Backup & Restore Configuration
- ◆ Remote BIOS/BMC/CPLD Update
- ◆ Event Log Filter
- ◆ User Management
- ◆ Media Redirection Settings
- ◆ PAM Order Settings
- ◆ SSL Settings
- ◆ SMTP Settings



Power Supply

- ◆ 2 x 2000W redundant PSUs
- ◆ 80 PLUS Platinum

AC Input:

- ◆ - 100-120V~/ 12A, 50-60Hz
- ◆ - 180-240V~/ 10A, 50-60Hz

DC Input:

- ◆ - 240Vdc/ 10A

DC output:

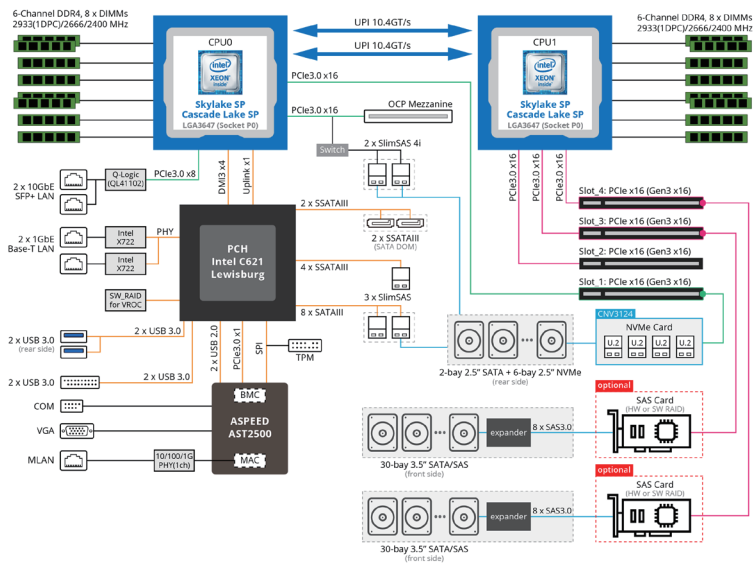
- ◆ - 1000W@100-120V, +12.2V/ 81.5A, +12Vsb/ 2.5A
- ◆ - 1600W@180-199V, +12.2V/ 131A, +12Vsb/ 2.5A
- ◆ - 1800W@200-220V, +12.2V/ 147.5A, +12Vsb/ 2.5A
- ◆ - 2000W@221-240V, +12V/ 163.5A, +12Vsb/ 2.5A



Operating Properties

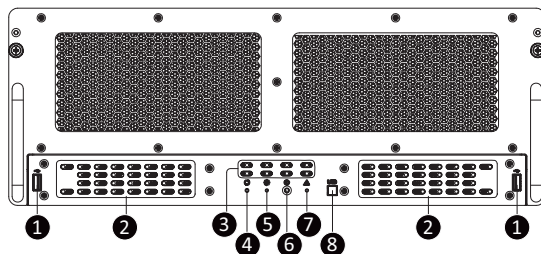
- ◆ Operating temperature: 10°C to 35°C
- ◆ Operating humidity: 8% to 80% (non-condensing)
- ◆ Non-operating temperature: -40°C to 60°C
- ◆ Non-operating humidity: 20% to 95% (non-condensing)

1-3 System Block Diagram



Chapter 2 System Appearance

2-1 Front View

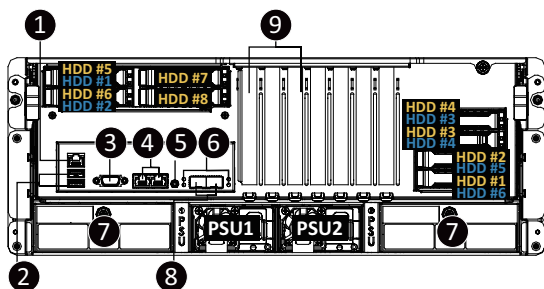


| No. | Description |
|-----|--------------------------|
| 1. | USB 2.0 Port |
| 2. | HDD Activity LED |
| 3. | Fan Failure Indicator |
| 4. | Reset Button |
| 5. | Power LED |
| 6. | Power Button |
| 7. | Global Failure Indicator |
| 8.. | UID Switch/LED |



- Refer to section **2-3 Front Panel LEDs and Buttons** for a detailed description of the function of the LEDs.

2-2 Rear View

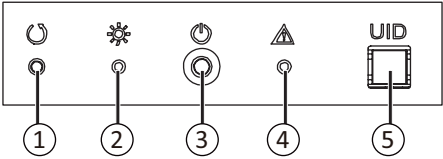


| No. | Description |
|-----|-----------------------------------|
| 1. | Server Management LAN Port |
| 2. | PCIe Card Slot x4 |
| 3. | VGA Port |
| 4. | 1GbE LAN Port x 2 |
| 5. | ID Button with LED |
| 6. | SFP+ LAN Active/Link LEDs |
| 7. | Slide Handles |
| 8. | SFP+ LAN (Left: LAN2/Right: LAN1) |
| 9. | PCIe Card Slot x3 |



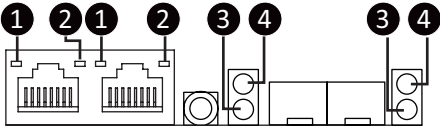
- For HDD Font Color, yellow indicates SATA, blue indicates NVMe.
- Refer to section **2-4 Rear System LAN LEDs** for a detailed description of the function of the LEDs.

2-3 Front Panel LEDs and Buttons



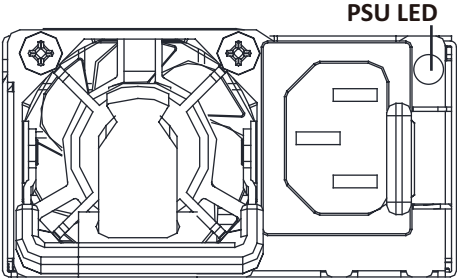
| No. | Name | Color | Status | Description |
|-----|------------------------------|-------|--------|--|
| 1. | Reset Button | -- | -- | Press this button to reset the system. |
| 2. | Power LED | Green | On | Indicates the system is powered on. |
| | | N/A | Off | - System is powered off. |
| 3. | Power Button | -- | -- | Press this button to power on/off the system. |
| 4. | Global Failure Indicator LED | Red | On | Indicates a critical condition, may include: -One PSU fault or missing -Fan error -High temperature |
| 5. | UID Switch/LED | -- | -- | Press this button to light up UID LED at both front pabel and motherboard UID LED at reat of system to identify the system location on rack. Push it twice will switch off LEDs. |

2-4 Rear System LAN LEDs



| No. | Name | Color | Status | Description |
|-----|--------------------------|--------|--------|--|
| 1. | 1GbE Speed LED | Yellow | On | 1 Gbps data rate |
| | | Green | On | 100 Mbps data rate |
| | | N/A | Off | 10 Mbps data rate |
| 2. | 1GbE Link/ Activity LED | Green | On | Link between system and network or no access |
| | | | Blink | Data transmission or receiving is occurring |
| | | N/A | Off | No data transmission or receiving is occurring |
| 3. | 10GbE Speed LED | Yellow | On | 1 Gbps data rate |
| | | Green | On | 10 Gbps data rate |
| | | N/A | Off | 1000Mbps data rate |
| 4. | 10GbE Link/ Activity LED | Green | On | Link between system and network or no access |
| | | | Blink | Data transmission or receiving is occurring |
| | | N/A | Off | No data transmission or receiving is occurring |

2-5 Power Supply Unit LED



| State | Description |
|--------------------|---|
| OFF | No AC power to all power supplies |
| 1Hz Green Blinking | AC present / only standby on / Cold redundant mode |
| 2Hz Green Blinking | Power supply firmware updateing mode |
| Amber | AC cord unplugged or AC power lost; with a second power supply in parallel still with AC input power |
| | Power supply critical event causing shut down: failure, OCP, OVP, fan failure and UVP |
| 1Hz Amber Blinking | Power supply warning events where the power supply continues to operate: high temp, high power, high current and slow fan |

Chapter 3 System Hardware Installation



Pre-installation Instructions

Computer components and electronic circuit boards can be damaged by discharges of static electricity. Working on computers that are still connected to a power supply can be extremely dangerous. Follow the simple guidelines below to avoid damage to your computer or injury to yourself.

- Always disconnect the computer from the power outlet whenever you are working inside the computer case.
- If possible, wear a grounded wrist strap when you are working inside the computer case. Alternatively, discharge any static electricity by touching the bare metal system of the computer case, or the bare metal body of any other grounded appliance.
- Hold electronic circuit boards by the edges only. Do not touch the components on the board unless it is necessary to do so. Do not flex or stress the circuit board.
- Leave all components inside the static-proof packaging until you are ready to use the component for the installation.

3-1 Removing and Installing the Chassis Cover

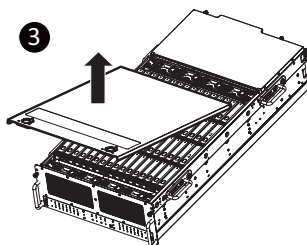
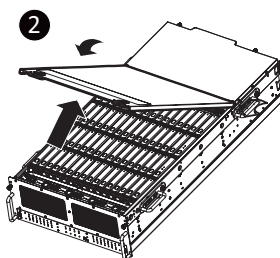
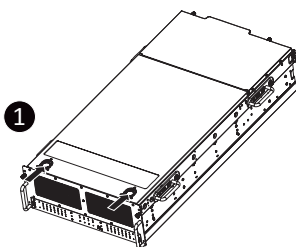


Before you remove or install the system cover

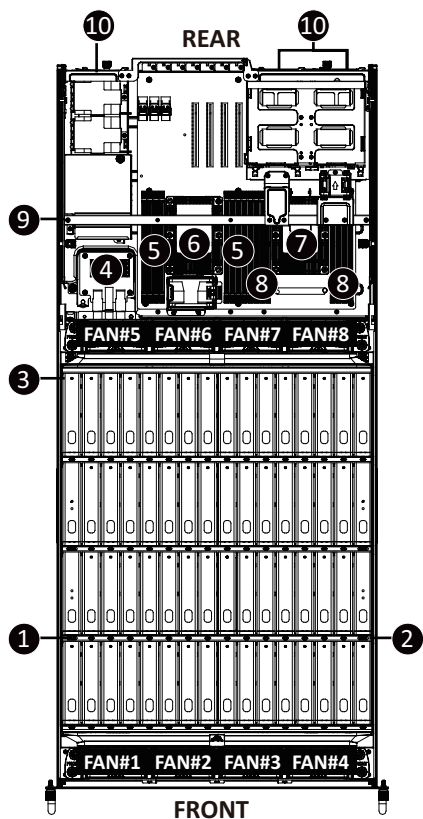
- Make sure the system is not turned on or connected to AC power.

Follow these instructions to remove the chassis front cover:

1. Push down on the indentations located on the side of the chassis cover.
2. Flip over the front cover.
3. Remove the cover in the direction of the arrow.
4. To reinstall the chassis cover follow steps 1-3 in reverse order.



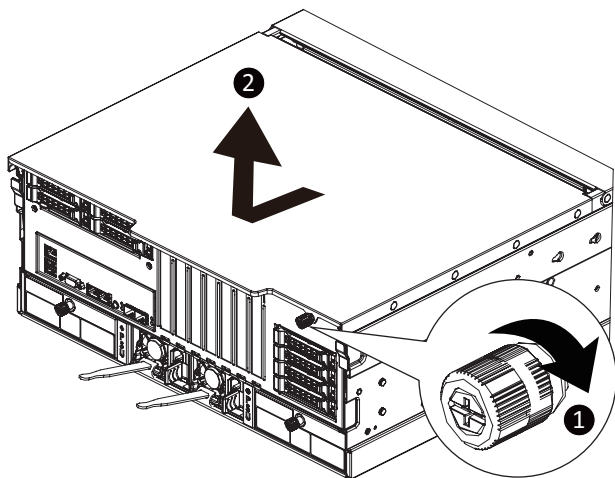
3-2 System Components



| No. | Description | No. | Description |
|-----|-------------------|-----|--------------------|
| 1. | Expander Card #SA | 6. | CPU0 and Heat Sink |
| 2. | Expander Card #SB | 7. | CPU1 and Heat Sink |
| 3. | 3.5" HDD Bays | 8. | CPU1 DDR4 Memory |
| 4. | Middle Board | 9. | System Bracket |
| 5. | CPU0 DDR4 Memory | 10. | 2.5" HDD Bays |

Follow these instructions to remove the chassis back cover:

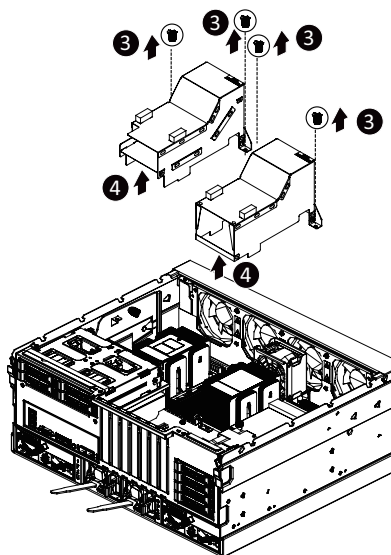
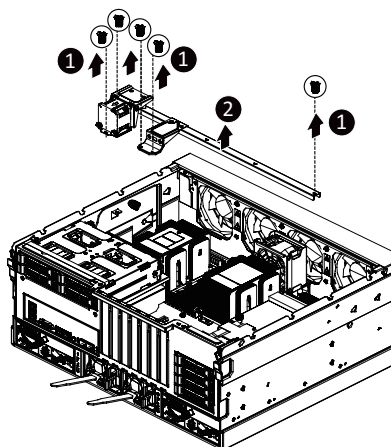
1. Loosen the thumbnail screw securing the chassis cover.
2. Slide the chassis cover to the rear of the system and then remove the cover in the direction of the arrow.
3. To reinstall the chassis cover follow steps 1-2 in reverse order.



3-3 Removing and Installing the Fan Duct

Follow these instructions to remove the fan duct:

1. Remove the five screws securing the system bracket.
2. Lift and remove the system bracket.
3. Remove the two screws securing the fan duct.
4. Lift and remove the fan duct.
5. To reinstall the fan duct, align the fan duct with the guiding groove. Push down the fan duct until it is firmly seated on the system.



3-4 Removing and Installing the Heat Sink



Read the following guidelines before you begin to install the heat sink:

- Always turn off the computer and unplug the power cord from the power outlet before installing the heat sink 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!

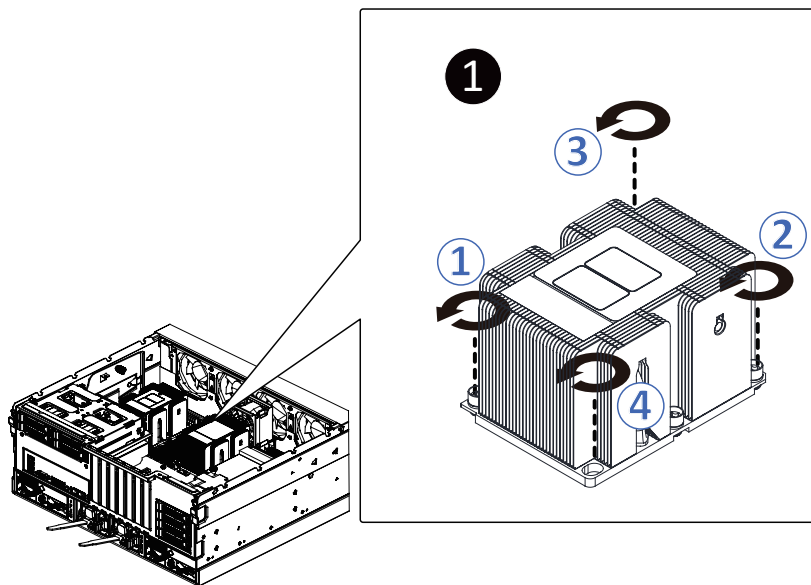
Failure to turn off the server before you start installing components may cause serious damage. Do not attempt the procedures described in the following sections unless you are a qualified service technician.



- When installing the heatsink to CPU, use PHILLIPS #2-Lobe driver to tighten 4 captive nuts in sequence as 1-4. The screw tightening torque: 14 ± 0.5 kgf-cm (30.0 ± 1.0 lbf-in).

Follow these instructions to install the heat sink:

1. Loosen the screws securing the heat sink in place in reverse order (4→3→2→1).
2. Lift and remove the heat sink from the system.
3. To install the heat sink, reverse steps 1-2 while ensuring that you tighten the captive screws in sequential order (1→2→3→4) as seen in the image below.



3-5 Removing and Installing 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. Align the processor to the carrier so that the gold triangle on the processor aligns with the triangle on the carrier, and then install the processor into the carrier.

NOTE: Apply thermal compound evenly on the top of the CPU.

2. Carefully flip the heatsink over. Align the carrier assembly so that the triangle on the carrier aligns with the triangle on the heatsink, and then install the carrier assembly onto the bottom of the heatsink.

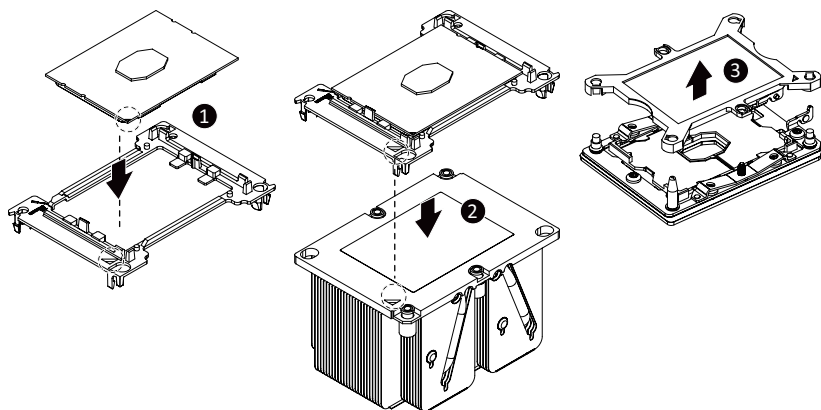
3. Remove the CPU socket cover.

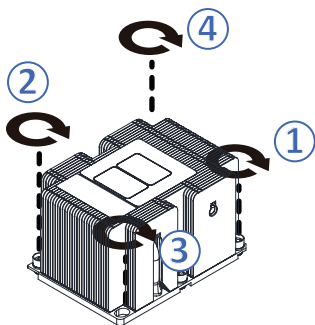
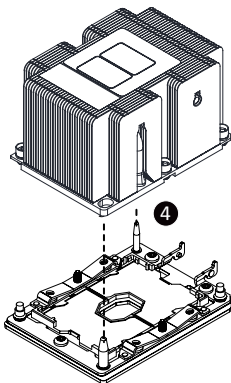
NOTE: Save and replace the CPU socket cover if the processor is removed from its socket.

4. Align the heatsink to the CPU socket using the guide pins and make sure the gold triangle is in the correct orientation. Then place the heatsink onto the top of the CPU socket.

5. Secure the heatsink by tightening the screws in sequential order (1→2→3→4).

NOTE: When removing the heatsink, loosen the screws in reverse order (4→3→2→1).





- When installing the heat sink over the CPU, use 30-Lobe driver to tighten the 4 captive nuts in sequential order (1→2→3→4).
- The screw tightening torque: $14 \pm 0.5 \text{ kgf-cm}$ ($30.0 \pm 1.0 \text{ lbf-in}$).

3-6 Removing and Installing Memory

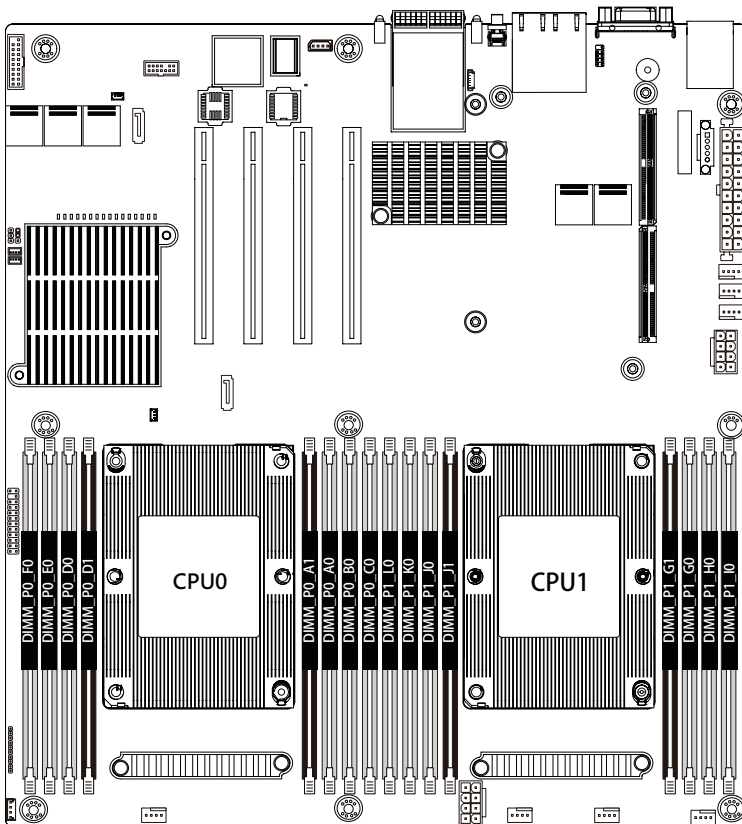


Read the following guidelines before you begin to install the memory:

- 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.

3-6-1 Six-Channel Memory Configuration

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



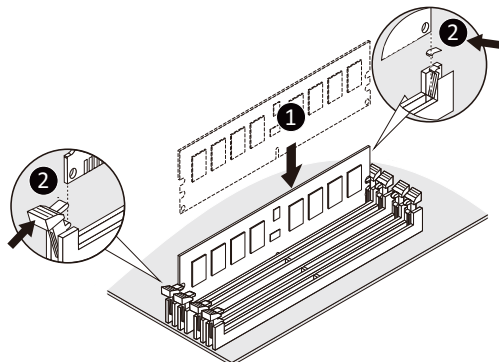
3-6-2 Removing and Installing a Memory Module



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. Insert the DIMM memory module vertically into the DIMM slot and push it down.
2. Close the plastic clip at both edges of the DIMM slots to lock the DIMM module.
3. Reverse the installation steps when you want to remove the DIMM module.



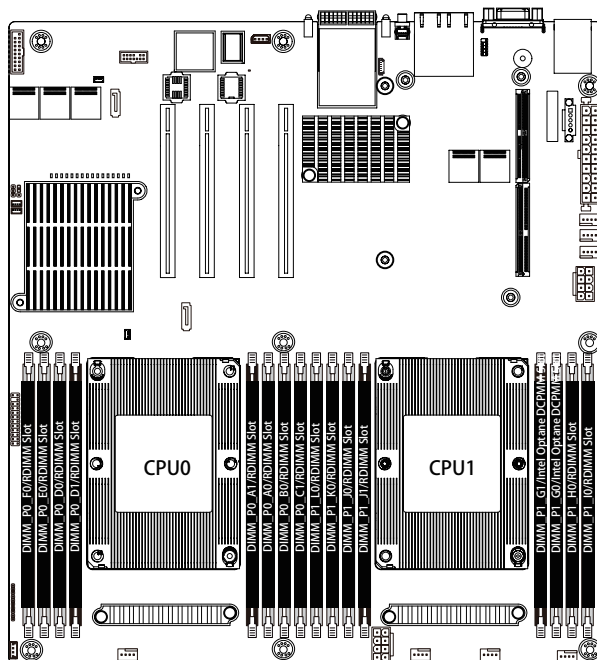
3-6-3 DIMM Population Table

| Type | Ranks Per DIMM and Data Width | DIMM Capacity (GB) | | | Speed (MT/s); Voltage (V) Slot Per Channel (SPC) DIMM Per Channel (DPC) | | |
|------------|-------------------------------|--------------------|----------|----------|---|--------------------|------|
| | | | | | 1 Slot per Channel | 2 Slot per Channel | |
| | | DRAM Density | | | 1DPC | 1DPC | 2DPC |
| | | 4Gb | 8Gb | 16Gb | 1.2V | 1.2V | 1.2V |
| RDIMM | SRx8 | 4GB | 8GB | 16GB | 2933 | 2933 | 2666 |
| RDIMM | SRx4 | 8GB | 16GB | 32GB | | | |
| RDIMM | DRx8 | 8GB | 16GB | 32GB | | | |
| RDIMM | DRx4 | 16GB | 32GB | 64GB | | | |
| RDIMM 3DS | QRx 4 | N/A | 2H-64GB | 2H-128GB | | | |
| | 8Rx 4 | N/A | 4H-128GB | 4H-256GB | | | |
| LRDIMM | QRx4 | 32GB | 2H-64GB | 2H-128GB | | | |
| LRDIMM 3DS | QRx4 | N/A | 4H-128GB | 4H-256GB | | | |
| | 8Rx4 | N/A | | | | | |

3-6-4 Intel Optane DCPMM DIMM Population Rule

Thermal conditions for DCPMM DIMM support:

- The ambient temperature must be at or below 35°C
 - The Cascade Lake CPU used must have a maximum TDP of 165W
 - A maximum of 3 pcs 256G DCPMM may be installed
-
- RDIMM / DCPMM must be installed into CPU0 memory first
 - You must install one RDIMM into any slot #0 of CPU0 before installing the DCPMM. (e.g. G0)
 - The DCPMM must be installed into the DIMM slot #1 next to the corresponding RDIMM in slot #0 (e.g. if RDIMM is installed into DIMM slot G0, the DCPMM must be installed into DIMM slot G1)



3-7 Removing and Installing the PCIe/Riser Card



- Voltages can be present within the server whenever an AC power source is connected. This voltage is present even when the main power switch is in the off position. Ensure that the system is powered off and all power sources have been disconnected from the server prior to installing a PCIe card.
- Failure to observe these warnings could result in personal injury or damage to equipment.



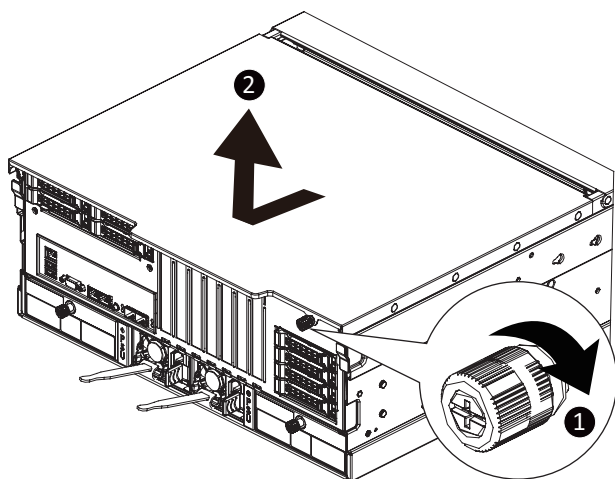
- The PCIe riser assembly does not include a riser card or any cabling as standard. To install a PCIe card, a riser card must be installed.

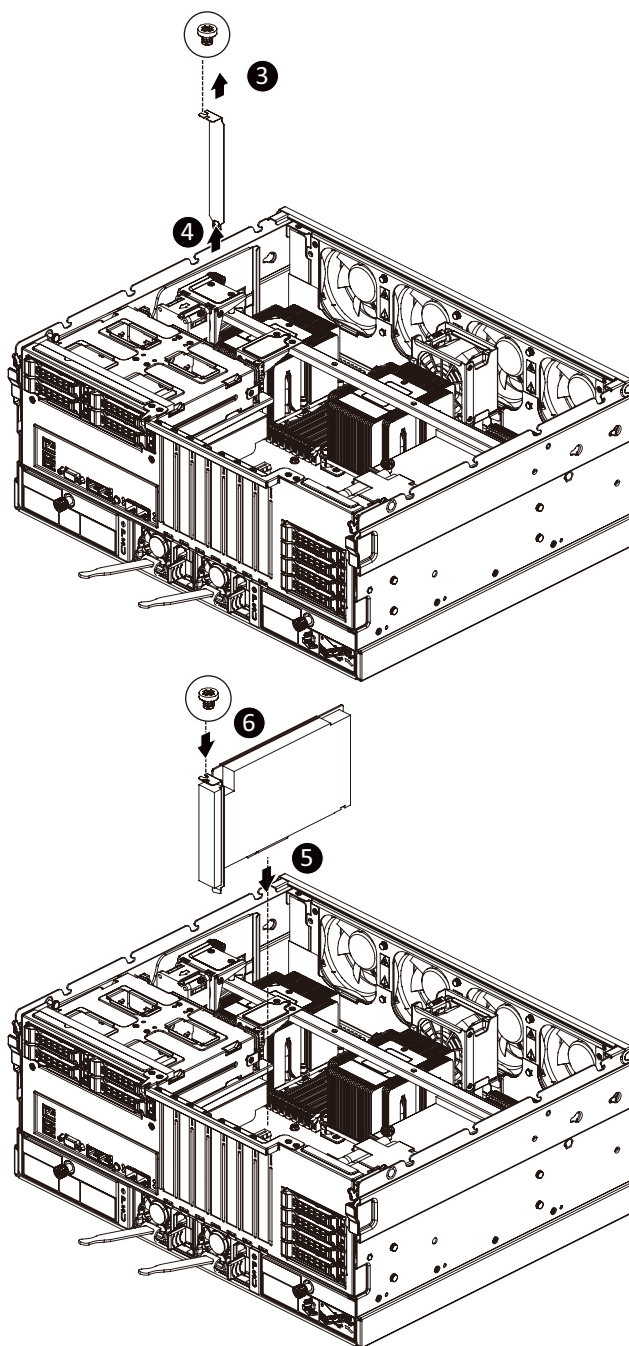
Follow these instructions to install a PCIe card:

1. Loosen the thumbnail screw securing the riser bracket from the rear side of the system.
2. Remove the screw securing the riser bracket. Lift up the riser bracket out of system.
3. Loosen and remove the screw securing the slot cover from riser bracket.
4. Orient the PCIe card with the riser guide slot and push in the direction of the arrow until the PCIe card sits in the PCIe card connector.

NOTE: Some riser brackets allow for single or multiple PCIe cards. Repeat steps 4-5 as necessary.

5. Secure the PCIe card with the screw.
6. Reverse steps 2-4 to install the riser bracket.





3-8 Removing and Installing the Hard Disk Drive

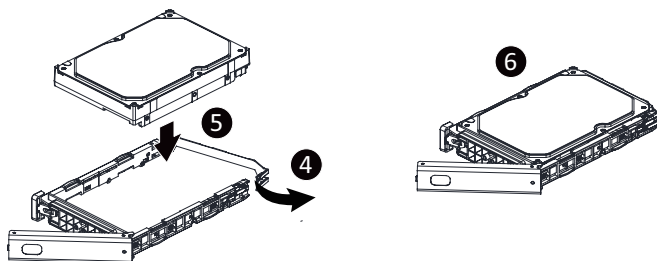
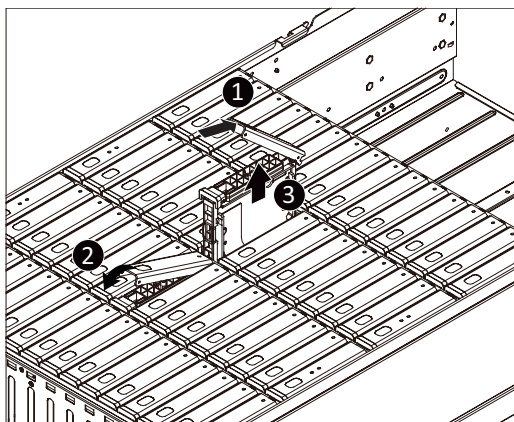


Read the following guidelines before you begin to install the hard disk drive:

- Take note of the HDD tray orientation before sliding it out.
- The tray will not fit back into the bay if it is inserted incorrectly.
- Make sure that the hard disk drive is connected to the connector on the backplane.

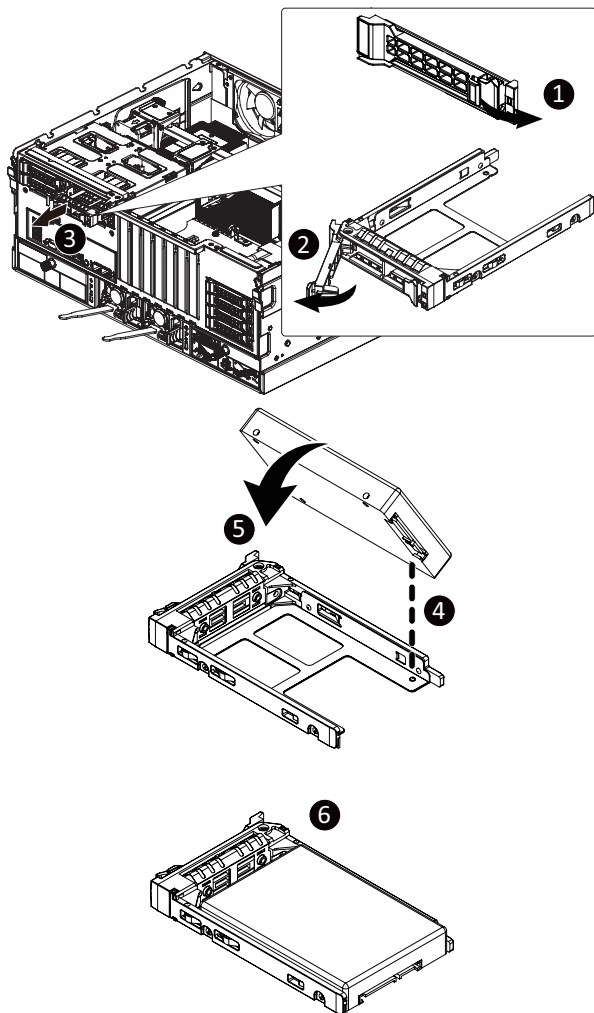
Follow these instructions to install a 3.5" hard disk drive:

1. Press the release button.
2. Extend the locking lever.
3. Pull the locking lever in the direction indicated to remove the 3.5" HDD tray.
4. Open the sides of the HDD tray in the direction indicated.
5. Install the hard disk drive into the HDD tray.
6. Push the sides of the HDD tray back in the direction indicated to secure the hard disk drive in place.
7. Reinsert the HDD tray into the slot and close the locking lever.



Follow these instructions to install a 2.5" hard disk drive:

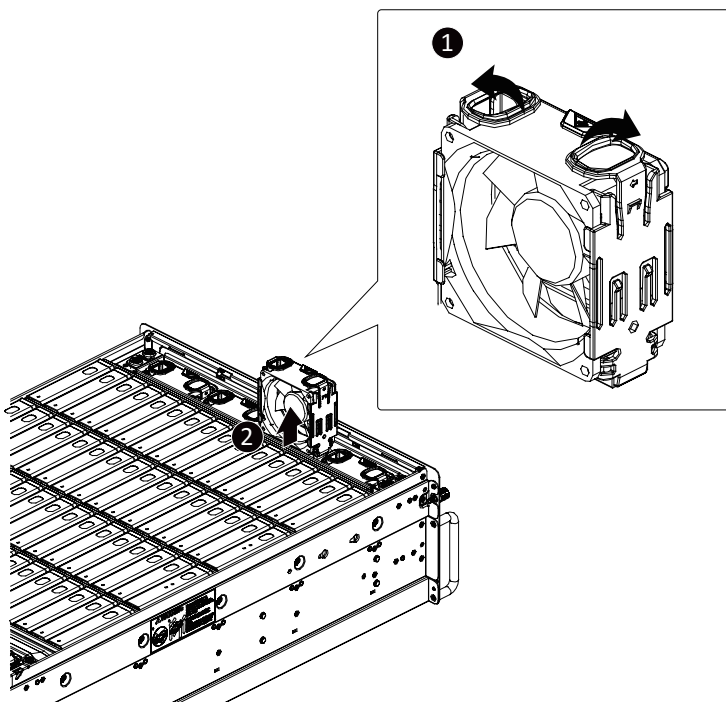
1. Press the release button.
2. Extend the locking lever.
3. Pull the locking lever in the direction indicated to remove the HDD tray.
4. Align the hard disk drive with the positioning stud on the HDD tray.
5. Slide the hard disk drive into the HDD tray.
6. Reinsert the HDD tray into the slot and close the locking lever.



3-9 Replacing the Fan Assembly

Follow these instructions to replace a fan assembly:

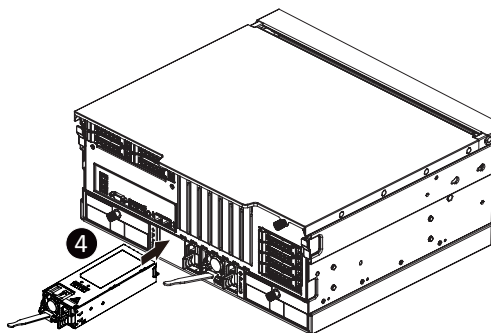
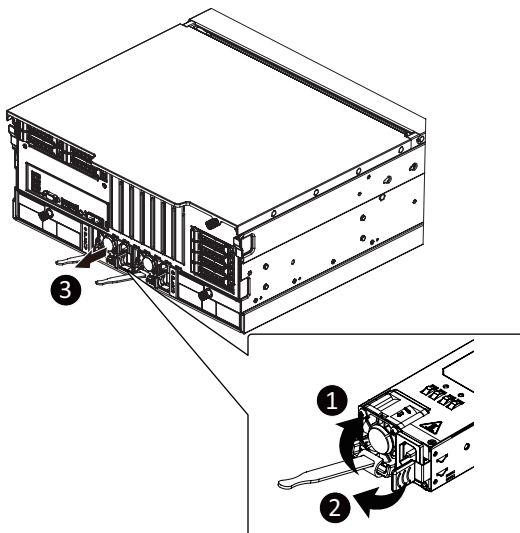
1. Flip the latches on the top of the fan outwards.
2. Using the latches, lift up the fan assembly from the chassis.
3. Reverse the previous steps to install the replacement fan assembly.



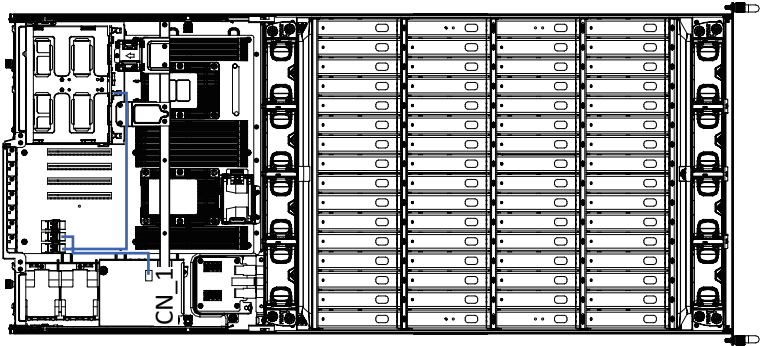
3-10 Removing and Installing the Power Supply

Follow these instructions to replace the power supply:

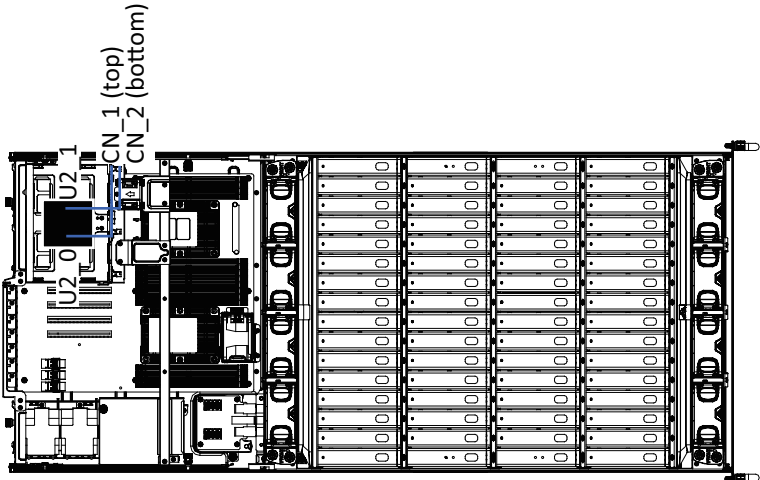
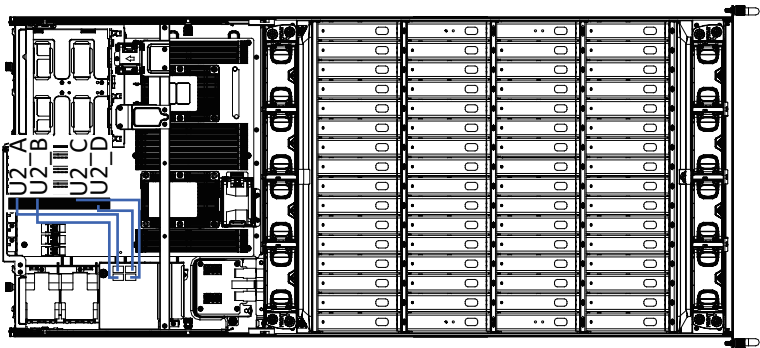
1. Flip up and then grasp the power supply handle.
2. Press the retaining clip on the right side of the power supply unit in the direction indicated.
3. Pull out the power supply unit using the handle.
4. Insert the replacement power supply unit firmly into the chassis. Connect the AC power cord to the replacement power supply.
5. Repeat steps 1-4 for replacement of the second power supply.



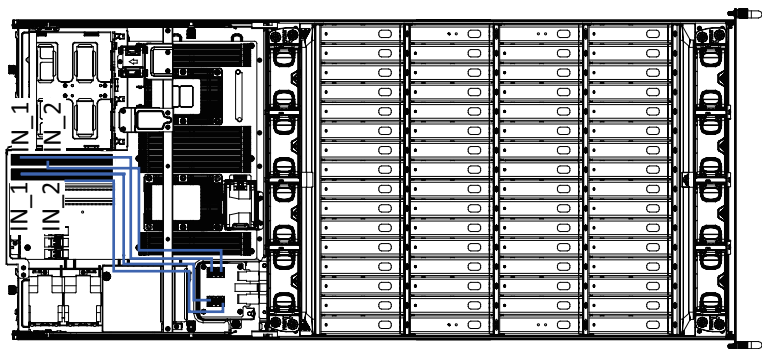
3-11 Cable Routing Onboard SATA



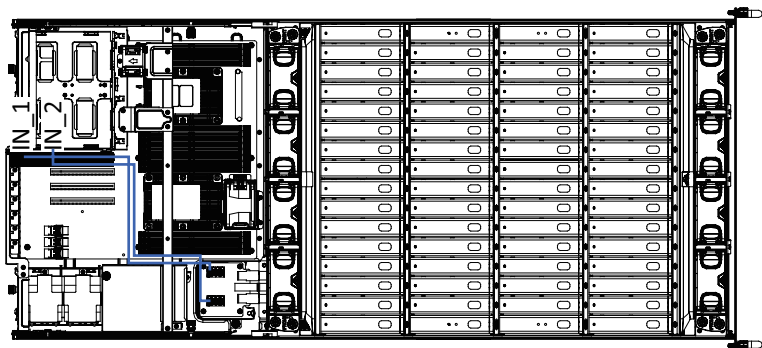
NMVe Card



RAID Card (CRA4448)



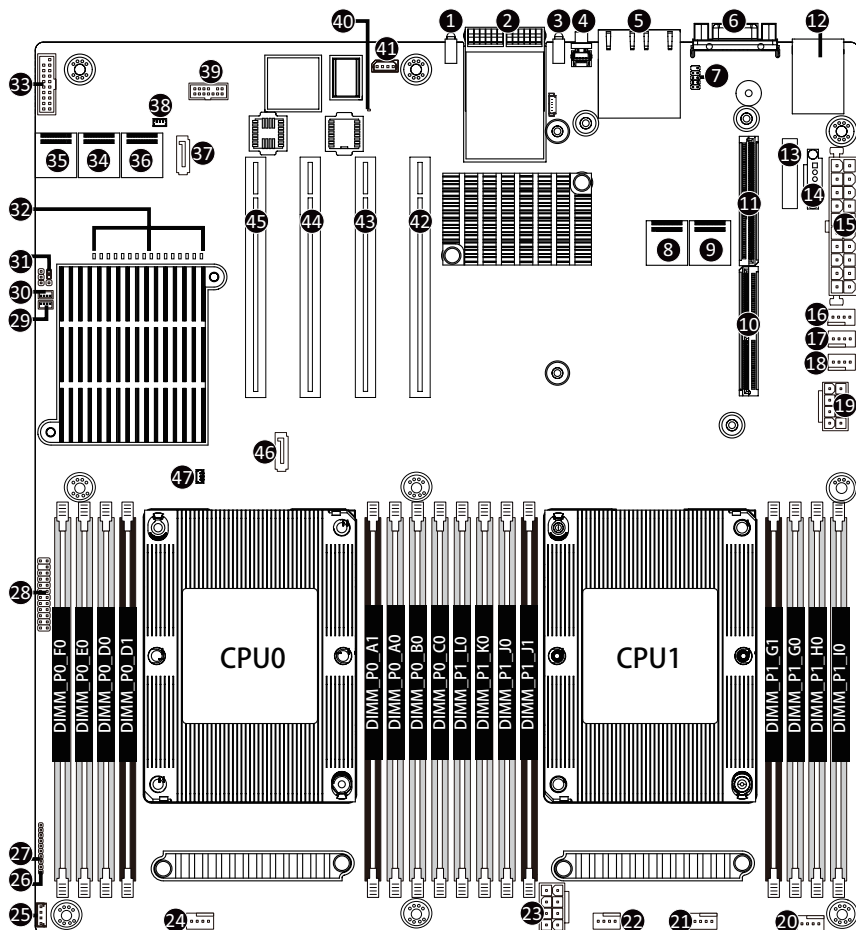
RAID Card (CRA4648)



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Chapter 4 Motherboard Components

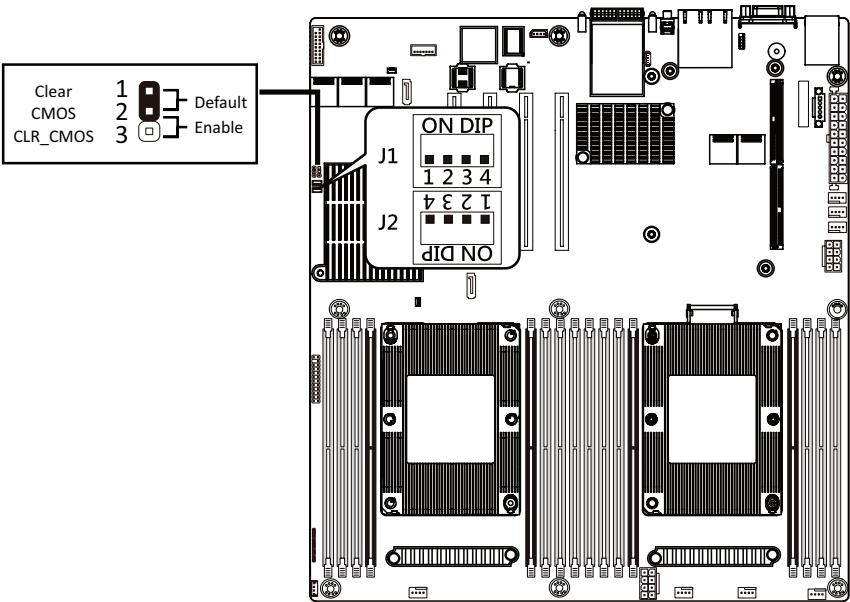
4-1 Motherboard Components



| Item | Description |
|------|--|
| 1 | SFP+ LAN port #1 Active LED |
| 2 | SFP+ LAN port #1 (Left) / SFP+ LAN port #2 (Right) |
| 3 | SFP+ LAN port #2 link / Active LED |
| 4 | ID Button with LED |
| 5 | GbE LAN port #1 (Left)/GbE LAN port #2 (Right) |
| 6 | VGA port |
| 7 | Serial port cable connector |

| | |
|----|---|
| 8 | Slimline connector #1 (PCIe x4 signal) |
| 9 | Slimline connector #2 (PCIe x4 signal) |
| 10 | PCIe x 8 slot (Proprietary/for mezzanine card) |
| 11 | PCIe x 8 slot (Proprietary/for mezzanine card) |
| 12 | Sever management LAN port (top) / USB 3.0 ports (bottom) |
| 13 | Battery socket |
| 14 | PMBus connector |
| 15 | 2x12 pin main power connector |
| 16 | System fan connector#5 |
| 17 | CPU fan connector (for secondary CPU) |
| 18 | CPU fan connector (for primary CPU) |
| 19 | 2x4 pin 12V power connector (for secondary CPU) |
| 20 | System fan connector #4 |
| 21 | System fan connector #3 |
| 22 | System fan connector #2 |
| 23 | 2x4 pin 12V power connector (for primary CPU) |
| 24 | System fan connector #1 |
| 25 | SATA RAID upgrade key |
| 26 | LAN #4 Active LED |
| 27 | LAN #3 Active LED |
| 28 | Front panel header |
| 29 | Function jumper switch #2 |
| 30 | Function jumper switch #1 |
| 31 | Clear CMOS jumper |
| 32 | Error LED for DIMM slots |
| 33 | USB 3.0 header |
| 34 | Slimline connector #1 (SATA 6Gb/s signal/for SATA #0 - #3) |
| 35 | Slimline connector #2 (SATA 6Gb/s signal/for SATA #4 - #7) |
| 36 | Slimline connector #3 (SATA 6Gb/s signal/for sSATA #0 - #3) |
| 37 | SATA 6Gb/s connector #5 |
| 38 | SSATA DOM support power connector for SSATA port #5 |
| 39 | TPM connector |
| 40 | BMC firmware readiness LED |
| 41 | IPMB connector |
| 42 | PCIe x16 slot #4 (Gen3 x16) |
| 43 | PCIe x16 slot #3 (Gen3 x16) |
| 44 | PCIe x16 slot #2 (Gen3 x16) |
| 45 | PCIe x16 slot #1 (Gen3 x16) |
| 46 | SATA 6Gb/s connector #4 |
| 47 | SATA DOM support power connector for SSATA port #4 |

4-2 Jumper Settings



| J1 | | ON | OFF |
|----|----------------|-----------------|------------------|
| 1 | HOST_SMBUS_SEL | BIOS defined | |
| 2 | PMBUS_SEL | BIOS defined | |
| 3 | S3_MASK | BIOS defined | |
| 4 | DB_PLD | CPLD debug mode | Normal [Default] |

| J2 | | ON | OFF |
|----|-----------|---------------------------|------------------|
| 1 | ME_UPDATE | Force ME update | Normal [Default] |
| 2 | BIOS_PWD | Clear supervisor password | Normal [Default] |
| 3 | BIOS_RCVR | BIOS recovery mode | Normal [Default] |
| 4 | ME_RCVR | ME recovery mode | Normal [Default] |

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Chapter 5 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 and loading operating system, etc. 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 key during the POST when the power is turned on.



- BIOS flashing is potentially risky, if you do not encounter problems of 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 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 in 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 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.)

5-1 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

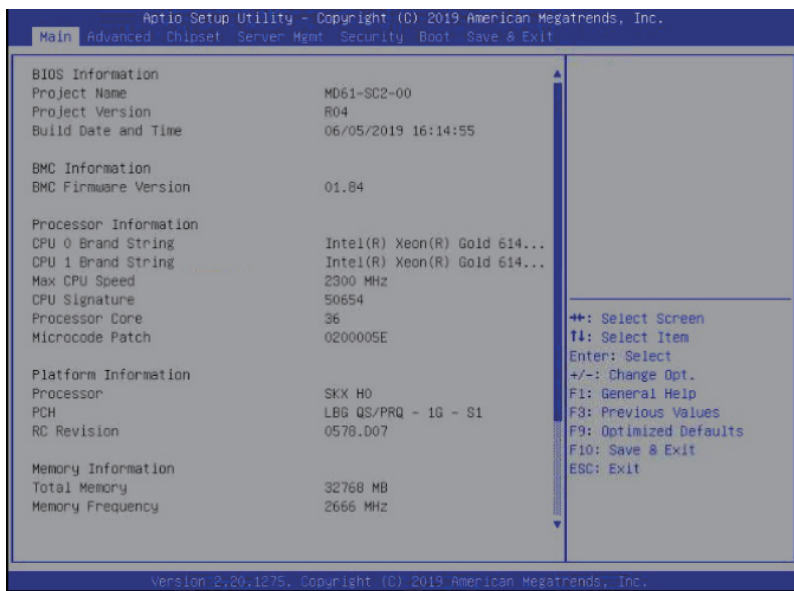
The on-screen description of a highlighted setup option is displayed on the bottom line of the Main Menu.

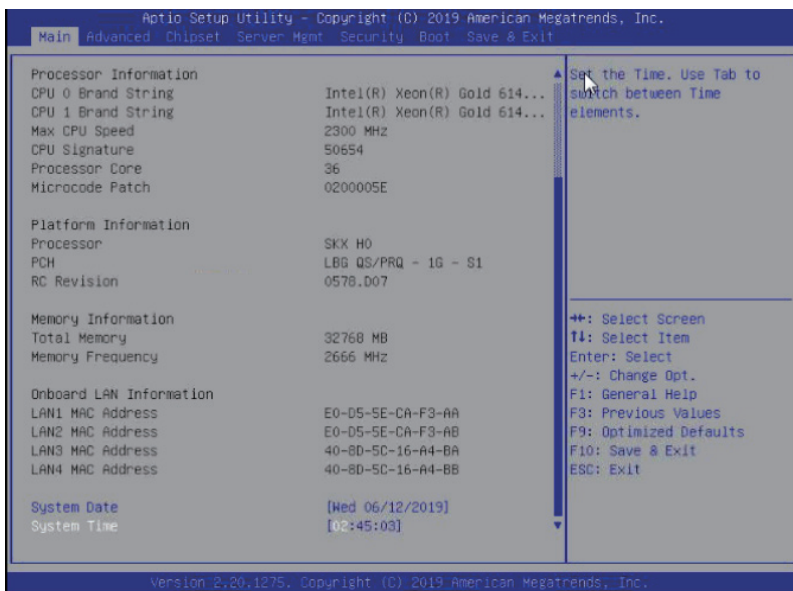
Submenu Help

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 | |
| Project Name | Displays the 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 ^(Note) | |
| BMC Firmware Version ^(Note) | Displays BMC firmware version information. |
| Processor Information | |
| CPU 0 Brand String / CPU 1 Brand String / Max CPU Speed / CPU Signature / Processor Core / Microcode Patch | Displays the technical specifications for the installed processor(s). |
| Platform Information | |
| Processor / PCH / RC Revision | Displays the information for the installed platform. |
| Memory Information | |
| Total Memory ^(Note) | Displays the total memory size of the installed memory. |
| Memory Frequency ^(Note) | Displays the frequency information of the installed memory. |

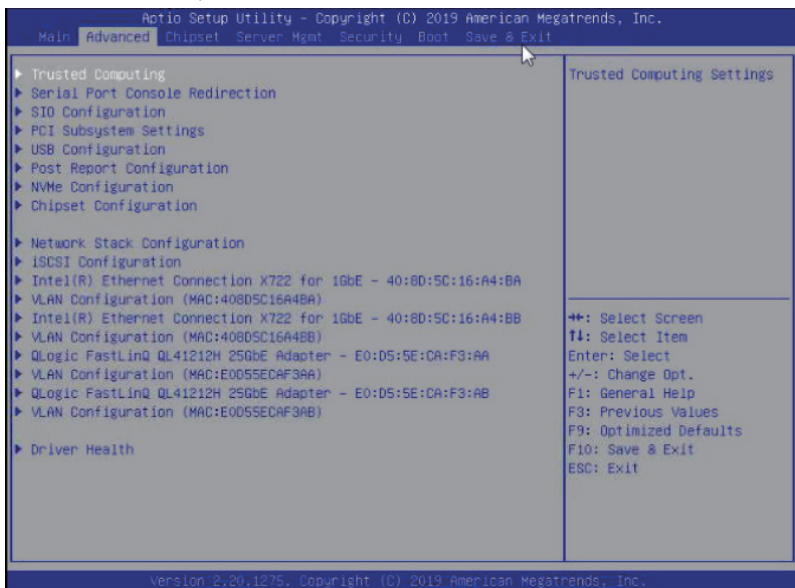
(Note) This section will display capacity and frequency information of the memory that the customer has installed.

| Parameter | Description |
|------------------------------------|---|
| Onboard LAN Information | |
| LAN1 MAC Address ^(Note) | Displays LAN MAC address information. |
| LAN2 MAC Address ^(Note) | Displays LAN MAC address information. |
| System Date | Sets the date following the weekday-month-day-year format. |
| System Time | Sets the system time following the hour-minute-second format. |

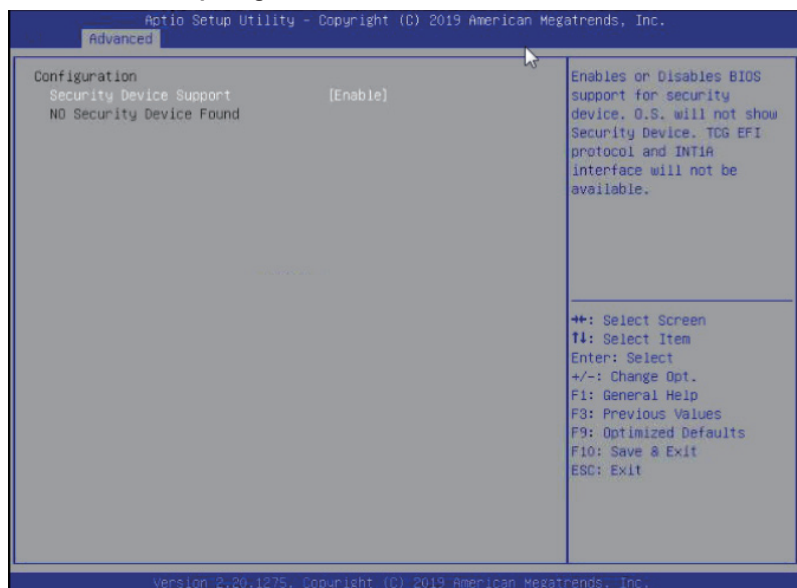
(Note) The number of LAN ports listed will depend on the motherboard / system model.

5-2 Advanced Menu

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

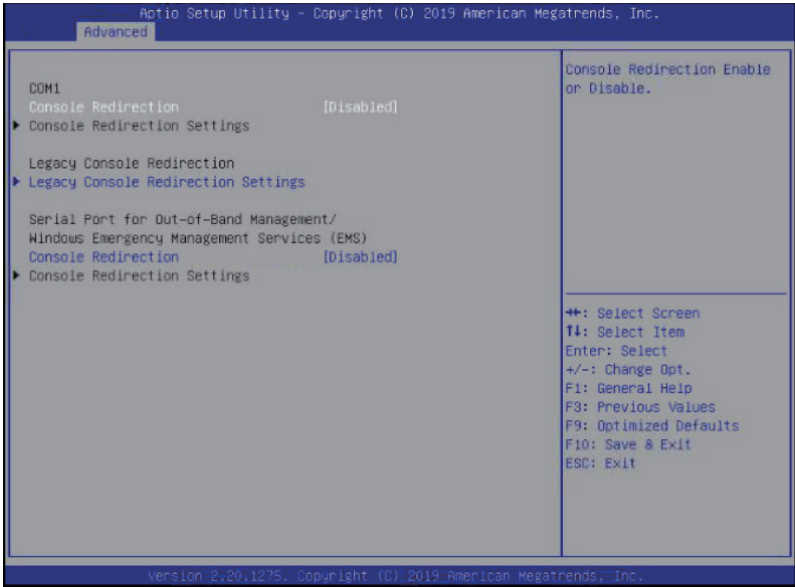


5-2-1 Trusted Computing



| Parameter | Description |
|-------------------------|--|
| Configuration | |
| Security Device Support | Select Enabled to activate TPM support feature. Options available: Enabled/Disabled. Default setting is Disabled . |

5-2-2 Serial Port Console Redirection



| Parameter | Description |
|--|---|
| COM1 Serial Over LAN Console Redirection ^(Note) | Select whether to enable console redirection for specified device. Console redirection enables the users to manage the system from a remote location. Options available: Enabled/Disabled. Default setting is Disabled . |
| Legacy Console Redirection | Selects a COM port for Legacy serial redirection. The options are dependent on the available COM ports. |
| Serial Port for Out-of-Band Management / Windows Emergency Management Services (EMS) Console Redirection ^(Note) | Selects a COM port for EMS console redirection. EMS console redirection allows the user to configure Console Redirection Settings to support Out-of-Band Serial Port management. Options available: Enabled/Disabled. Default setting is Disabled . |
| COM1 Serial LAN/Legacy/Serial Port for Out-of-Band EMS Console Redirection Settings | Press [Enter] to configure advanced items. Please note that this item is configurable when COM1 Serial Over LAN/Serial Port for Out-of-Band Management EMS Console Redirection is set to Enabled. <ul style="list-style-type: none">◆ Terminal Type<ul style="list-style-type: none">– Selects a terminal type to be used for console redirection.– Options available: VT100/VT100+/ANSI /VT-UTF8. Default setting is ANSI. |

(Note) Advanced items prompt when this item is defined.

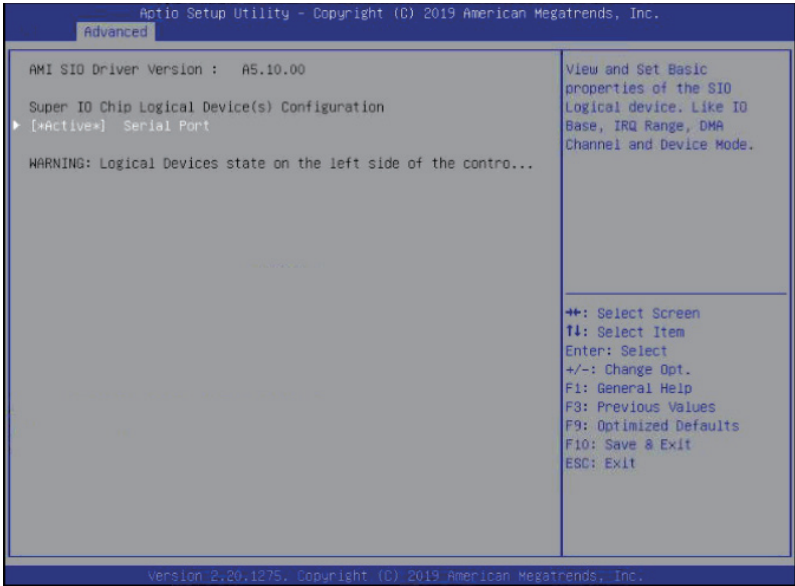
| Parameter | Description |
|---|---|
| COM1 Serial LAN/Legacy/ Serial Port for Out-of-Band EMS Console Redirection Settings (continued) | <ul style="list-style-type: none"> ◆ Bits per second <ul style="list-style-type: none"> – Selects the transfer rate for console redirection. – Options available: 9600/19200/38400/57600/115200. Default setting is 115200. ◆ Data Bits <ul style="list-style-type: none"> – Selects the number of data bits used for console redirection. – Options available: 7/8. Default setting is 8. ◆ Parity <ul style="list-style-type: none"> – A parity bit can be sent with the data bits to detect some transmission errors. – 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. – Mark and Space Parity do not allow for error detection. – Options available: None/Even/Odd/Mark/Space. Default setting is None. ◆ Stop Bits <ul style="list-style-type: none"> – Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit. – Options available: 1/2. Default setting is 1. ◆ Flow Control <ul style="list-style-type: none"> – Flow control can 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 re-start the flow. Hardware flow control uses two wires to send start/stop signals. – Options available: None/Hardware RTS/CTS. Default setting is None. ◆ VT-UTF8 Combo Key Support <ul style="list-style-type: none"> – Enable/Disable the VT-UTF8 Combo Key Support. – Options available: Enabled/Disabled. Default setting is Enabled. ◆ Recorder Mode^(Note) <ul style="list-style-type: none"> – When this mode enabled, only texts will be send. This is to capture Terminal data. – Options available: Enabled/Disabled. Default setting is Disabled. ◆ Resolution 100x31^(Note) <ul style="list-style-type: none"> – Enable/Disable extended terminal resolution. – Options available: Enabled/Disabled. Default setting is Enabled. |

(Note) Advanced items prompt when this item is defined.

| Parameter | Description |
|---|---|
| COM1/Serial LAN/Legacy/ Serial Port for Out-of-Band EMS Console Redirection Settings (continued) | <ul style="list-style-type: none"> ◆ Legacy OS Redirection Resolution^(Note) <ul style="list-style-type: none"> – Specifies the number of Rows and Columns supported for the Legacy OS redirection. – Options available: 80x24/80x25. Default setting is 80x24. ◆ Putty KeyPad^(Note) <ul style="list-style-type: none"> – Selects FunctionKey and KeyPad on Putty. – Options available: T100/LINUX/XTERM/R6/SCO/ESCN/VT400. Default setting is VT100. ◆ Redirection After BIOS POST^(Note) <ul style="list-style-type: none"> – This item allows user to enable console redirection after OS has loaded. – Options available: Always Enable/Boot Loader. Default setting is Always Enable. ◆ Legacy Console Redirection Settings <ul style="list-style-type: none"> – Selects a COM port to display redirection of Legacy OS and Legacy OPROM Messages. – Options available: COM1/Serial Over LAN. Default setting is COM1. ◆ Out-of-Band Mgmt Port <ul style="list-style-type: none"> – Microsoft Windows Emergency Management Service (EMS) allows for remote management of a Windows Server OS through a serial port. – Options available: COM1/COM2 Serial Over LAN. Default setting is COM1. |

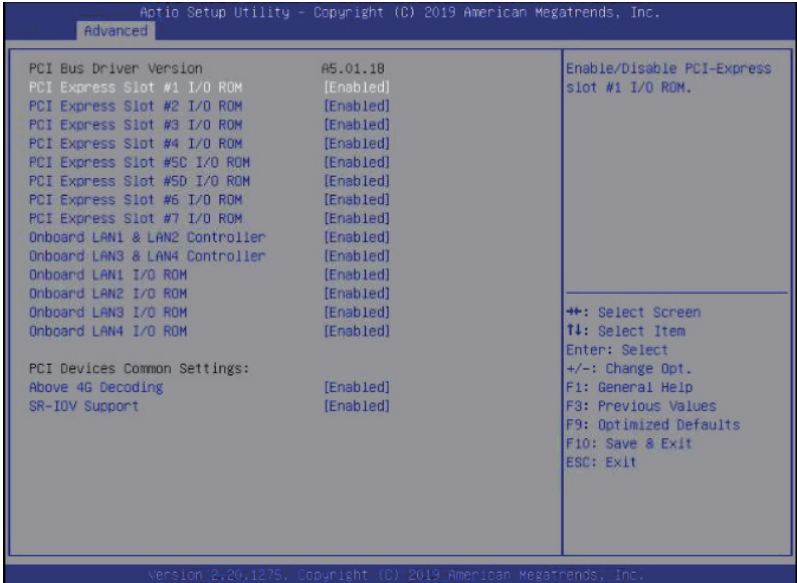
(Note) Advanced items prompt when this item is defined.

5-2-3 SIO Configuration



| Parameter | Description |
|--|--|
| AMI SIO Driver Version | Displays the AMI SIO driver version information. |
| Super IO Chip Logical Device(s) Configuration | |
| Press [Enter] to configure advanced items. | |
| [*Active*] Serial Port | <ul style="list-style-type: none">◆ Use This Device<ul style="list-style-type: none">– When set to Enabled allows you to configure the serial port settings. When set to Disabled, displays no configuration for the serial port.– Options available: Enabled/Disabled. Default setting is Enabled.◆ Current:<ul style="list-style-type: none">– Displays the serial port base I/O address and IRQ.◆ Possible:<ul style="list-style-type: none">– Configures the serial port base I/O address and IRQ. |
| | Use Automatic Settings |
| | IO=3F8h; IRQ=4; DMA; |
| | IO=3F8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA; |
| IO=2F8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA; | |
| IO=3E8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA; | |
| IO=2E8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA; | |
| Default setting is Use Automatic Settings . | |

5-2-4 PCI Subsystem Settings



| Parameter | Description |
|---|---|
| PCI Bus Driver Version | Displays the PCI Bus Driver version information. |
| PCI Express Slot # I/O ROM ^(Note1) | When enabled, this setting will initialize the device expansion ROM for the related PCI-E slot. Options available: Enabled/Disabled. Default setting is Enabled . |
| Onboard LAN1 / LAN2 / LAN3 / LAN4 Controller ^(Note2) | Enable/Disable the onboard LAN1 / LAN2 / LAN3 / LAN4 devices. Options available: Enabled/Disabled. Default setting is Enabled . |
| Onboard LAN1 / LAN2 / LAN3 / LAN4 I/O ROM ^(Note2) | Enable/Disable the onboard LAN1 / LAN2 / LAN3 / LAN4 devices, and initializes device expansion ROM. Options available: Enabled/Disabled. Default setting is Enabled . |
| PCI Devices Common Settings | |
| Above 4G Decoding | Enable/Disable memory mapped I/O to 4GB or greater address space (Above 4G Decoding). Options available: Enabled/Disabled. Default setting is Enabled . |

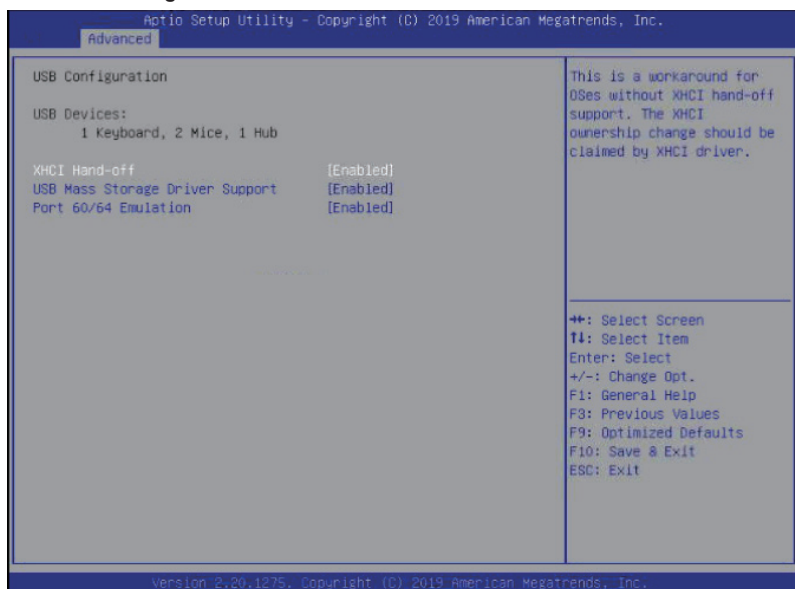
(Note1) This section is dependent on the available PCIe Slot.

(Note2) This section is dependent on the available LAN controller.

SR-IOV Support

If the system has SR-IOV capable PCIe devices, this item
Enable/Disable Single Root IO Virtualization Support.
Options available: Enabled/Disabled. Default setting is **Enabled**.

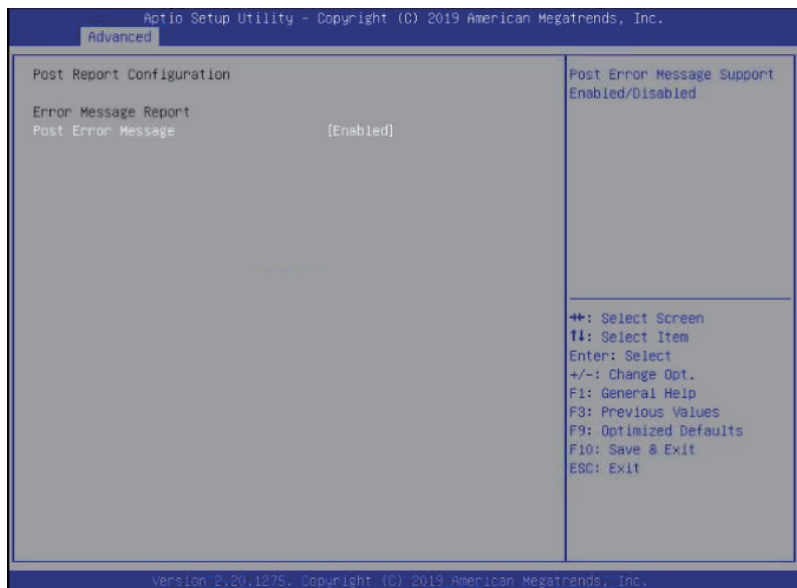
5-2-5 USB Configuration



| Parameter | Description |
|---|---|
| USB Configuration | |
| USB Devices: | Displays the USB devices connected to the system. |
| XHCI Hand-off | Enable/Disable the XHCI (USB 3.0) Hand-off support. Options available: Enabled/Disabled. Default setting is Enabled . |
| USB Mass Storage Driver Support ^(Note) | Enable/Disable the USB Mass Storage Driver Support. Options available: Enabled/Disabled. Default setting is Enabled . |
| Port 60/64 Emulation | Enables the I/O port 60h/64h emulation support. This should be enabled for the complete USB Keyboard Legacy support for non-USB aware OS. Options available: Enabled/Disabled. Default setting is Enabled . |

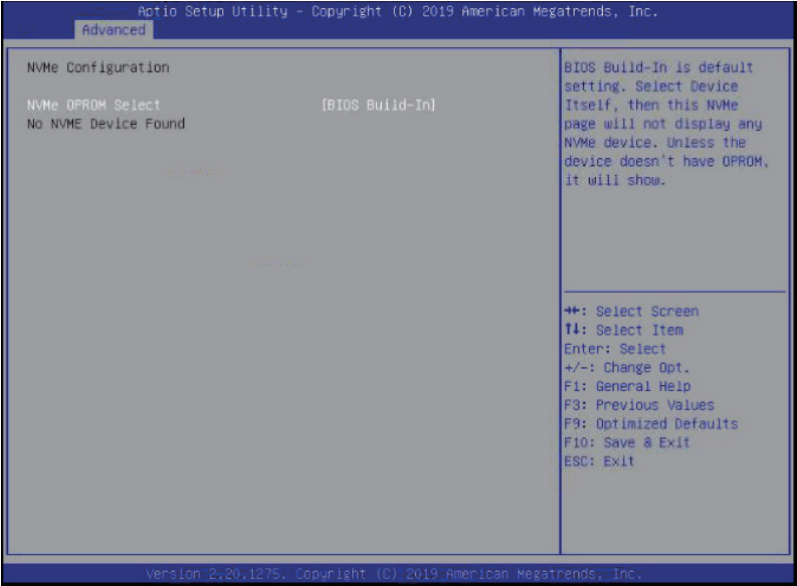
(Note) This item is present only if you attach USB devices.

5-2-6 Post Report Configuration



| Parameter | Description |
|---------------------------|--|
| Post Report Configuration | |
| Error Message Report | |
| Post Error Message | Enable/Disable the POST Error Message support. Options available: Enabled/Disabled. Default setting is Enabled . |

5-2-7 NVMe Configuration



| Parameter | Description |
|--------------------|---|
| NVMe Configuration | Displays the NVMe devices connected to the system. |
| NVMe OPROM Select | Options available: BIOS Build-In/NVMe Device. Default setting is BIOS Build-In . |

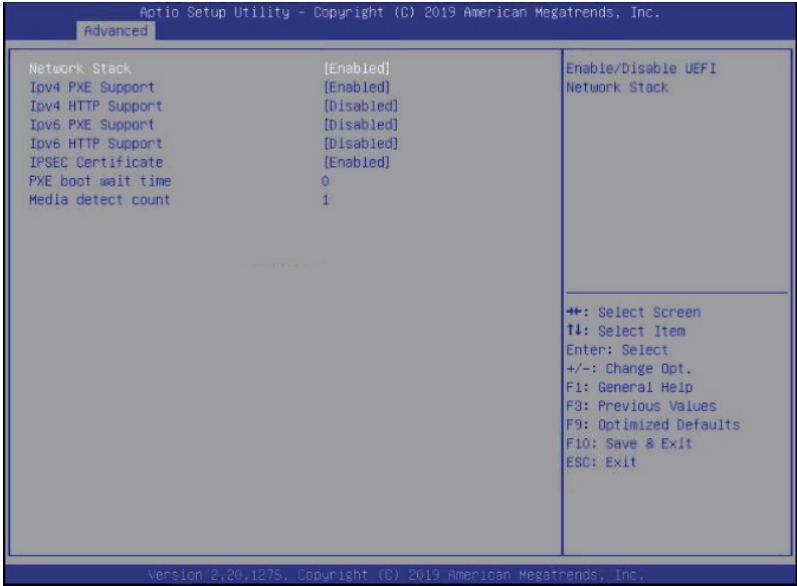
5-2-8 Chipset Configuration



| Parameter | Description |
|---|---|
| Restore AC Power Loss ^(Note) | Defines the power state to resume to after a system shutdown that is due to an interruption in AC power. When set to Last State, the system will return to the active power state prior to shutdown. When set to Power Off, the system remains off after power shutdown. Options available: Last State/Power Off/Power On. The default setting depends on the BMC setting. |
| Skip Above 4G Decoding for VGA | Enable/Disable 64bit capable devices to be decoded in Skip Above 4G Address VGA Space. Options available: Enabled/Disabled. Default setting is Disabled . |
| P2P Bridge IO Size | Sets P2P Bridge IO aligned to the size. Options available: 0x100/0x150/0x1000. Default setting is 0x1000 . |
| Chassis Opened Warning | Enable/Disable the chassis intrusion alter function. Options available: Enabled/Disabled/Clear. Default setting is Disabled . |

(Note) When the power policy is controlled by BMC, please wait for 15-20 seconds for BMC to save the last power state.

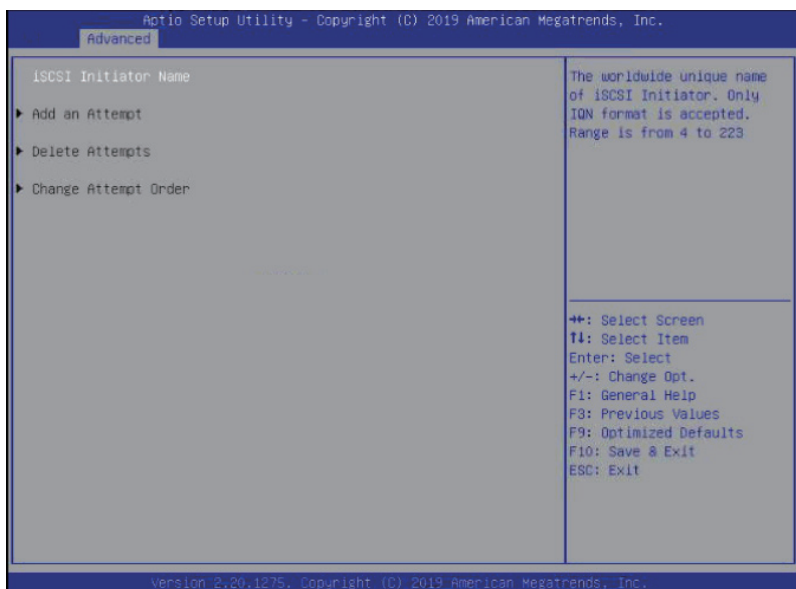
5-2-9 Network Stack Configuration



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

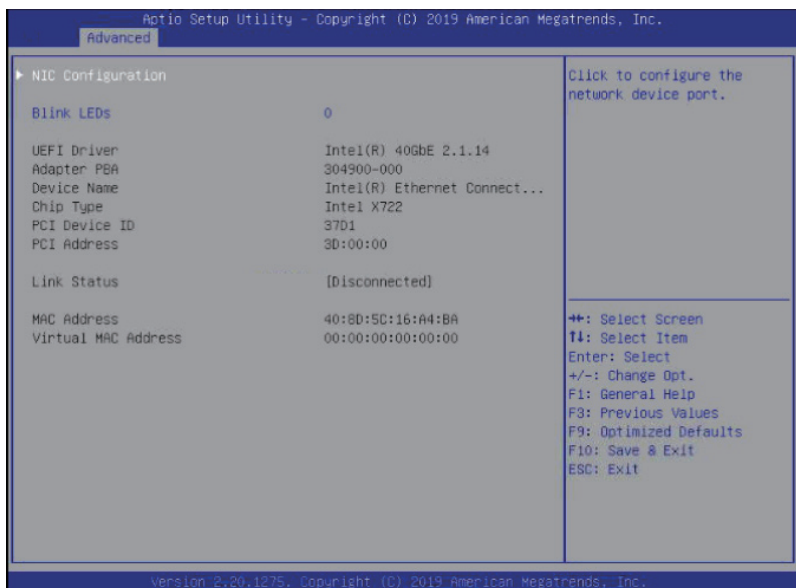
(Note) This item appears when **Network Stack** is set to **Enabled**.

5-2-10 iSCSI Configuration



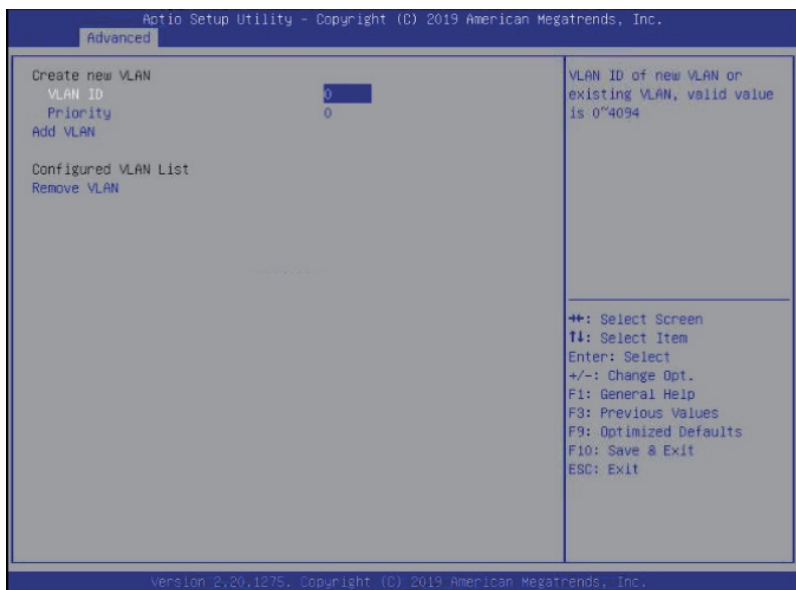
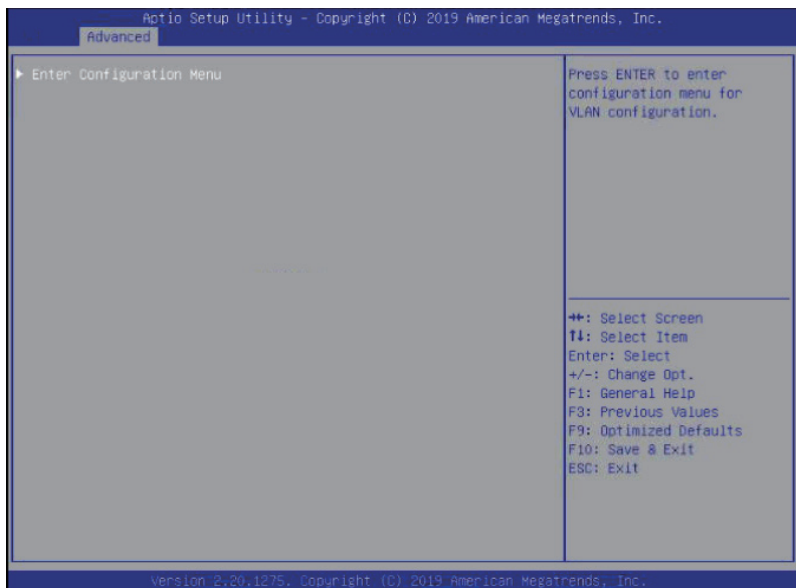
| Parameter | Description |
|----------------------|--|
| iSCSI Initiator Name | |
| Add an Attempt | Press [Enter] to configure advanced items. |
| Delete Attempts | Press [Enter] to configure advanced items. |
| Change Attempt Order | Press [Enter] to configure advanced items. |

5-2-11 Intel(R) I210 Gigabit Network Connection



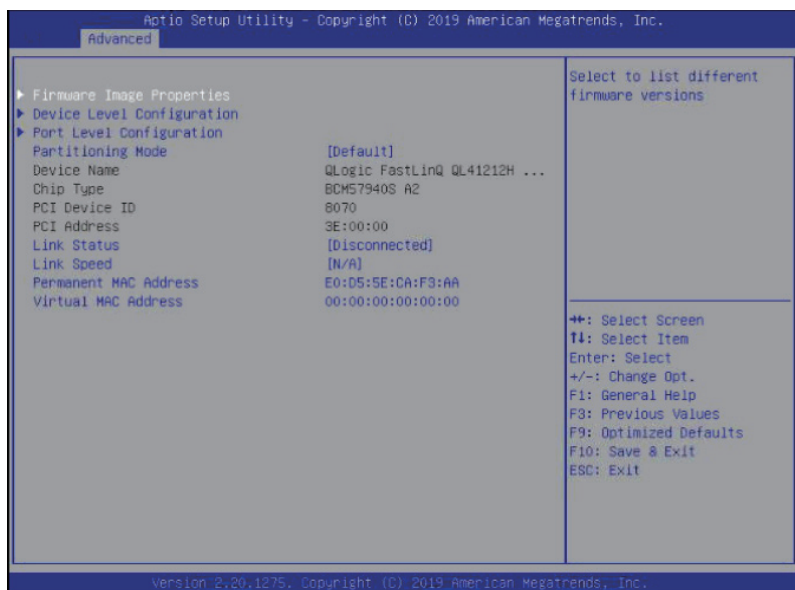
| Parameter | Description |
|---------------------|--|
| NIC Configuration | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ Link Speed <ul style="list-style-type: none"> – Allows for automatic link speed adjustment. – Options available: Auto Negotiated/10 Mbps Half/10 Mbps Full/100 Mbps Half/100 Mbps Full. Default setting is Auto Negotiated. ◆ Wake On LAN <ul style="list-style-type: none"> – Enables power on of the system via LAN. Note that configuring Wake on LAN in the operating system does not change the value of this setting, but does override the behavior of Wake on LAN in OS controlled power states. – Options available: Enabled/Disabled. Default setting is Enabled. |
| Blink LEDs | Identifies the physical network port by blinking the associated LED. Press the numeric keys to adjust desired values. |
| UEFI Driver | Displays the technical specifications for the Network Interface Controller. |
| Adapter PBA | Displays the technical specifications for the Network Interface Controller. |
| Device Name | 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. |
| PCI Address | Displays the technical specifications for the Network Interface Controller. |
| Link Status | Displays the technical specifications for the Network Interface Controller. |
| MAC Address | Displays the technical specifications for the Network Interface Controller. |
| Virtual MAC Address | Displays the technical specifications for the Network Interface Controller. |

5-2-12 VLAN Configuration



| Parameter | Description |
|--------------------------|--|
| Enter Configuration Menu | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ Create new VLAN ◆ VLAN ID <ul style="list-style-type: none"> – Sets VLAN ID for a new VLAN or an existing VLAN. – Press the <+> / <-> keys to increase or decrease the desired values. – The valid range is from 0 to 4094. ◆ Priority <ul style="list-style-type: none"> – Sets 802.1Q Priority for a new VLAN or an existing VLAN. – Press the <+> / <-> keys to increase or decrease the desired values. – The valid range is from 0 to 7. ◆ Add VLAN <ul style="list-style-type: none"> – Press [Enter] to create a new VLAN or update an existing VLAN. ◆ Configured VLAN List <ul style="list-style-type: none"> – Enable/Disable the VLAN. – Options available: Enable/Disable. Default setting is Disable. ◆ Remove VLAN <ul style="list-style-type: none"> – Press [Enter] to remove an existing VLAN. |

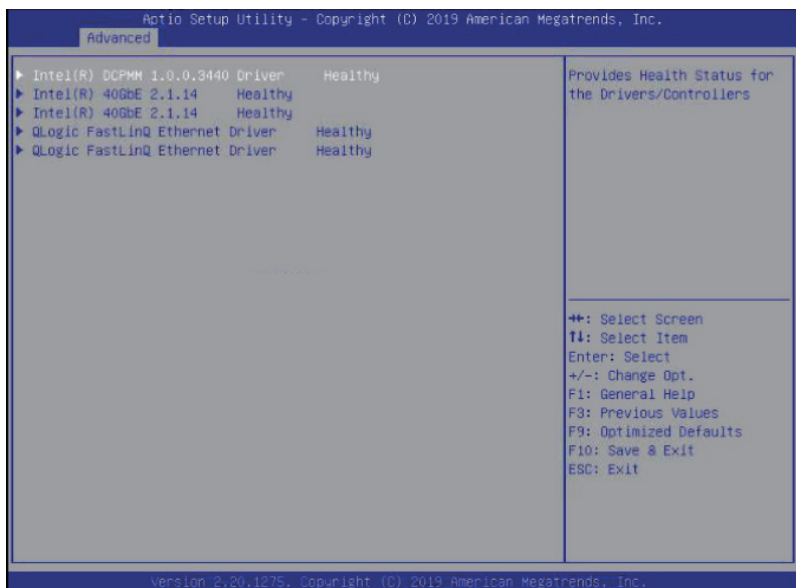
5-2-13 QLogic FastLinQ



| Parameter | Description |
|----------------------------|--|
| Firmware Image Properties | <p>Press [Enter] to view detailed version information for the firmware.</p> <ul style="list-style-type: none"> Family Firmware Version MFW Version UEFI Driver Version |
| Device Level Configuration | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> SR-IOV <ul style="list-style-type: none"> Enable/Disable SRIOV. Options available: Enabled/Disabled. Default setting is Disabled. MFW Crash Dump Feature <ul style="list-style-type: none"> Enable to allow MFW to collect critical device and system information during unanticipated system crash. Options available: Enabled/Disabled. Default setting is Enabled. UEFI Driver Debug Level <ul style="list-style-type: none"> Enables UEFI Driver Debug logging, per configured hexadecimal values e.g. 0xF, enabled ERROR, WARNING, and INFO logging. Please consult technicians for more information. |

| | |
|--------------------------|--|
| Port Level Configuration | Press [Enter] to configure advanced items. |
| | <ul style="list-style-type: none"> ♦ Link Speed <ul style="list-style-type: none"> – Allows for automatic link speed adjustment. – Options available: Auto Negotiated/1 Gbps/10 Gbps/SmartAN. Default setting is Auto Negotiated. ♦ Boot Mode <ul style="list-style-type: none"> – Select the preferred boot protocol or disable. – Options available: PXE/Disabled. Default setting is PXE. ♦ DCBX Protocol <ul style="list-style-type: none"> – Enables/Disables DCB Protocol. – Options available: Disabled/IEEE/CEE/Dynamic. Default setting is Dynamic. ♦ RoCE Priority <ul style="list-style-type: none"> – Enter desired RoCE Priority within a range of 0 to 7 ♦ PXE VLAN Mode <ul style="list-style-type: none"> – Configure virtual LAN mode. – Options available: Enabled/Disabled. Default setting is: Disabled. ♦ Link Up Delay <ul style="list-style-type: none"> – Maximum amount of time in seconds UEFI or Legacy driver will wait for Management FW to bring-up the link. ♦ RDMA Protocol Support <ul style="list-style-type: none"> – Specify which Remote Direct Memory Access Protocol is to be used. – Options available: None/RoCE/IWARP. Default setting is: RoCE |
| | Partition Mode |
| | Select the desired port partitioning mode. Options available: Default/NPAR. Default setting is: Default |
| | Device Name |
| | 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. |
| | PCI Address |
| | Displays the technical specifications for the Network Interface Controller. |
| | Link Status |
| | Displays the technical specifications for the Network Interface Controller. |
| | Link Speed |
| | Displays the technical specifications for the Network Interface Controller. |
| | Permanent MAC Address |
| | Displays the technical specifications for the Network Interface Controller. |
| | Virtual MAC Address |
| | Displays the technical specifications for the Network Interface Controller. |

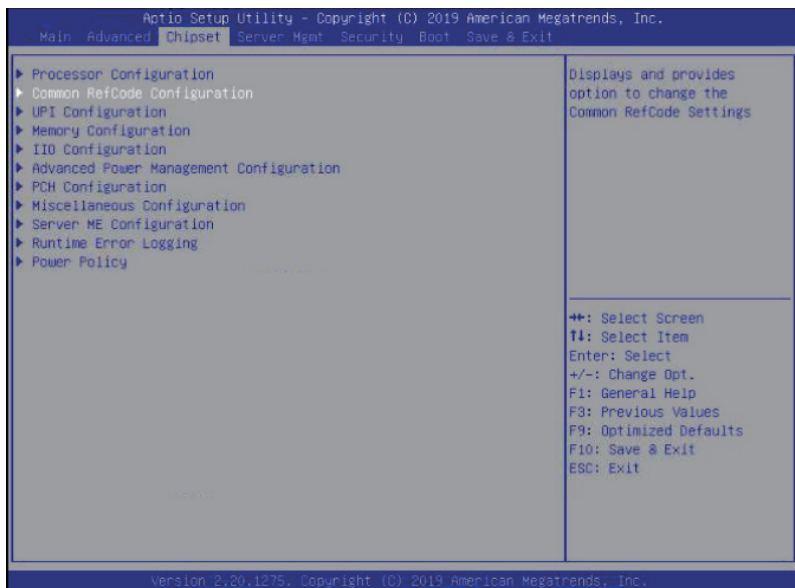
5-2-14 Driver Health



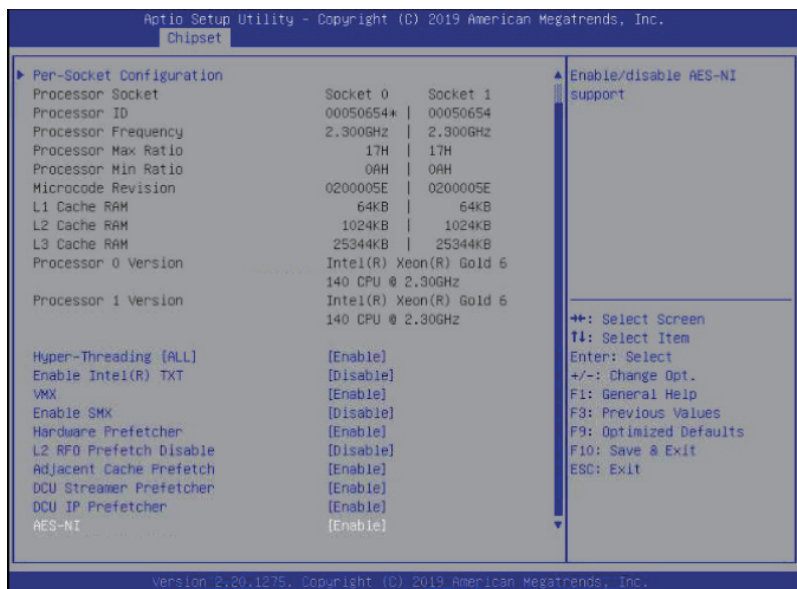
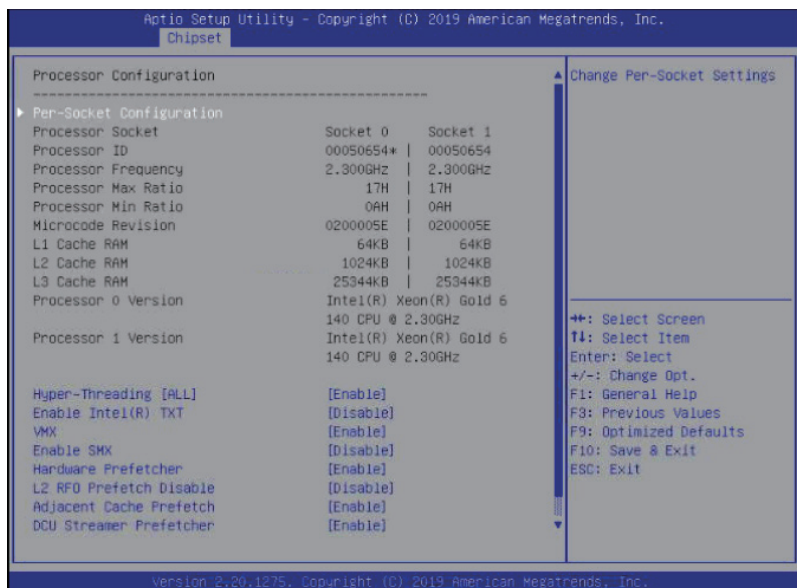
| Parameter | Description |
|---------------|---|
| Driver Health | Press [Enter] to view the specified driver health status information. |

5-3 Chipset Setup Menu

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



5-3-1 Processor Configuration



| Parameter | Description |
|---|---|
| Processor Configuration | |
| Per-Socket Configuration | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ CPU Socket 0/1 Configuration <ul style="list-style-type: none"> – Press [Enter] to configure advanced items. ◆ Core Disable Bitmap(Hex) (for CPU socket 0/1) <ul style="list-style-type: none"> – Number of Cores to enable. 0 means all cores. FFFFFFFF means to disable all cores. The maximum value depends on the number of CPUs available. Press the numeric keys to adjust desired values. |
| Processor Socket / Processor ID / Processor Frequency / Processor Max Ratio / Processor Min Ratio / Microcode Revision / L1 Cache RAM / L2 Cache RAM / L3 Cache RAM / Processor 0 Version / Processor 1 Version | Displays the technical specifications for the installed processor(s). |
| Hyper-Threading [All] | <p>The Hyper Threading Technology allows a single processor to execute two or more separate threads concurrently. When hyper-threading is enabled, multi-threaded software applications can execute their threads, thereby improving performance.</p> <p>Options available: Enable/Disable. Default setting is Enable.</p> |
| Enable Intel(R) TXT | <p>Enables or disables the Intel Trusted Execution Technology support function.</p> <p>Options available: Enable/Disable. Default setting is Disable.</p> |
| VMX (Vanderpool Technology) | <p>Enable/Disable the Vanderpool Technology. This will take effect after rebooting the system.</p> <p>Options available: Enable/Disable. Default setting is Enable.</p> |
| Enable SMX | <p>Enable/Disable the Secure Mode Extensions (SMX) support function.</p> <p>Options available: Enable/Disable. Default setting is Disable.</p> |
| Hardware Prefetcher | <p>Select whether to enable the speculative prefetch unit of the processor.</p> <p>Options available: Enable/Disable. Default setting is Disable.</p> |
| L2 RF0 Prefetcher | Options available: Enable/Disable. Default setting is Disable . |
| Adjacent Cache Prefetch | <p>When enabled, cache lines are fetched in pairs. When disabled, only the required cache line is fetched.</p> <p>Options available: Enable/Disable. Default setting is Enable.</p> |

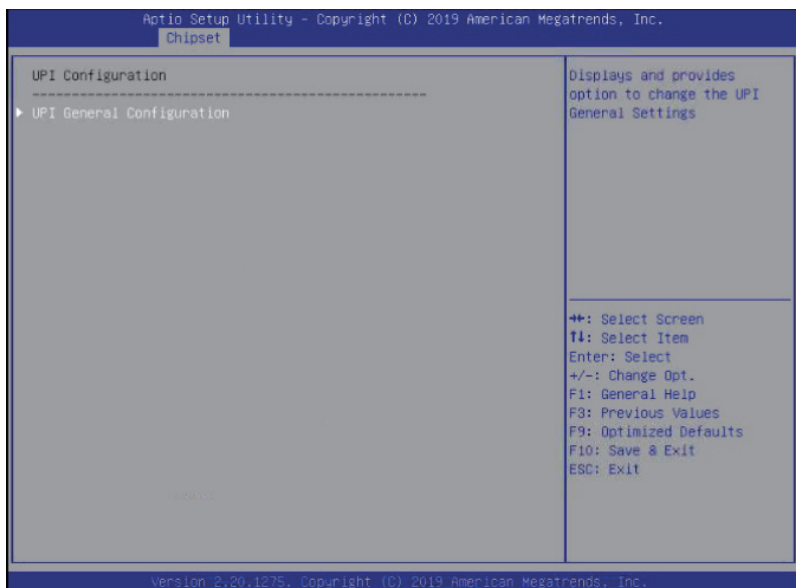
| | |
|-------------------------|--|
| DCU Streamer Prefetcher | Prefetches the next L1 data line based upon multiple loads in same cache line. Options available: Enable/Disable. Default setting is Enable . |
| DCU IP Prefetcher | Prefetches the next L1 Data line based upon sequential load history. Options available: Enable/Disable. Default setting is Enable . |
| AES-NI | Enable/Disable the AES-NI (Intel Advanced Encryption Standard New Instructions) support function. Options available: Enable/Disable. Default setting is Enable . |

5-3-2 Common RefCode Configuration



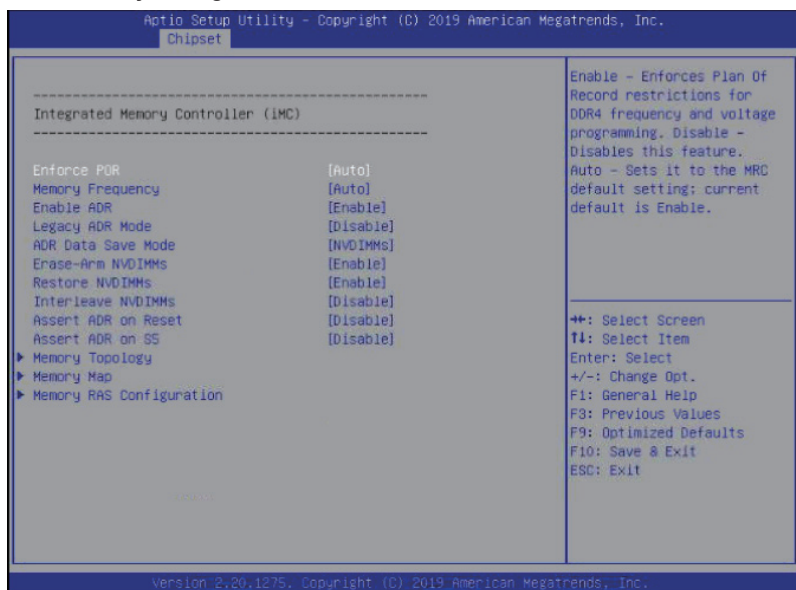
| Parameter | Description |
|----------------------------------|--|
| Common RefCode Configuration | |
| MMIO High Base | Selects the MMIO High Base setting. Options available: 56T/40T/24T/16T/4T/1T. Default setting is 56T . |
| MMIO High Granularity Size | Selects the allocation size used to assign mmioh resources. Total mmioh space can be up to 32xgranularity. Per stack mmioh resource assignments are multiples of the granularity where 1 unit per stack is the default allocation. Options available: 1G/4G/16G/64G/256G/1024G. Default setting is 256G . |
| Isoc Mode | Options available: Auto/Enable/Disable. Default setting is Auto . |
| Numa (Non-Uniform Memory Access) | Enable/Disable Non-uniform Memory Access (NUMA). Options available: Enable/Disable. Default setting is Enable . |

5-3-3 UPI Configuration



| Parameter | Description |
|---------------------------|--|
| UPI Configuration | |
| UPI General Configuration | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none">◆ UPI Status<ul style="list-style-type: none">– Press [Enter] to view the UPI status.◆ Link Frequency Select<ul style="list-style-type: none">– Selects the UPI link frequency.– Options available: 9.6GB/10.4GB/Auto. Default setting is Auto.◆ SNC<ul style="list-style-type: none">– Enable/Disable SNC.– Options available: Disable/Enable/Auto. Default setting is Disable.◆ Stale AtoS<ul style="list-style-type: none">– Enable/Disable Stale A to S Dir optimization.– Options available: Disable/Enable/Auto. Default setting is Disable.◆ LLC dead line alloc<ul style="list-style-type: none">– Enable/Disable LLC dead line alloc.– Options available: Disable/Enable/Auto. Default setting is Auto. |

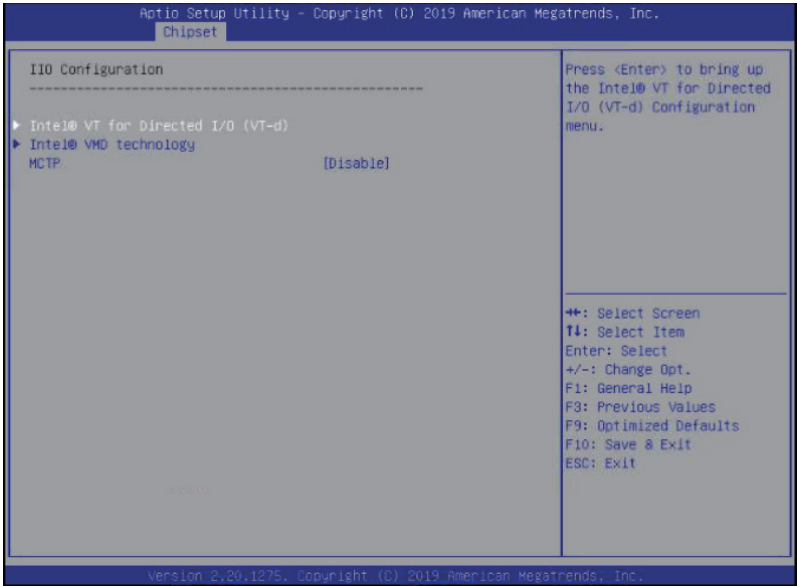
5-3-4 Memory Configuration



| Parameter | Description |
|------------------------------------|---|
| Integrated Memory Controller (IMC) | |
| Enforce POR | When set to Enable, the system enforces Plan Of Record restrictions for DDR4 frequency and voltage programming. When set to Auto, the system sets it to the MRC default settings. Options available: Auto/POR/Disable. Default setting is Enable . |
| Memory Frequency | Configures the memory frequency. Options available: Auto/2133/2400/2666. Default setting is Auto . |
| Enable ADR | Enables the detecting and enabling of ADR. Options available: Enable/Disable. Default setting is Enable . |
| Legacy ADR Mode | Enable/Disable the Legacy ADR Mode. Options available: Enable/Disable. Default setting is Disable . |
| ADR Data Save Mode | Data Save Mode for ADR, Batterybacked or Type 01 NVDIMM. Options available: Disable/Batterybacked DIMMs/NVDIMMs. Default setting is NVDIMMs . |
| Erase-ARM NVDIMMs | Enable/Disable Erasing and Arming NVDIMMs. Options available: Enable/Disable. Default setting is Enable . |
| Restore NVDIMMs | Enable/Disable Automatic restoring of NVDIMMs. Options available: Enable/Disable. Default setting is Enable . |

| Parameter | Description |
|--------------------------|---|
| Interleave NVDIMMs | Controls if NVDIMMs are interleaved together or not. Options available: Enable/Disable. Default setting is Disable . |
| Assert ADR on Reset | Enable/Disable Assert ADR on Reset. Options available: Enable/Disable. Default setting is Disable . |
| Assert ADR on S5 | Enable/Disable Assert ADR on S5. Options available: Enable/Disable. Default setting is Disable . |
| Memory Topology | Press [Enter] to view memory configurations. |
| Memory Map | Press [Enter] to configure advanced items. <ul style="list-style-type: none"> ♦ IMC Interleaving <ul style="list-style-type: none"> – Select to configure IMC Interleaving. – Options available: Auto/1-way Interleave/2-way Interlave. Default setting is Auto. |
| Memory RAS Configuration | Press [Enter] to configure advanced items. <ul style="list-style-type: none"> ♦ RAS Type <ul style="list-style-type: none"> – Displays the RAS type. ♦ Static Virtual Lockstep Mode <ul style="list-style-type: none"> – Enable/Disable the Static Virtual Lockstep mode. – Options available: Disable/Enable. Default setting is Disable. ♦ Mirror Mode <ul style="list-style-type: none"> – Mirror Mode will set entire 1LM/2LM memory in system to be mirrored, consequently reducing the memory capacity by half. Enables the Mirror Mode will disable the XPT Prefetch. – Options available: Disable/Mirror Mode 1LM/Mirror Mode 2LM. Default setting is Disable. ♦ Memory Rank Sparing <ul style="list-style-type: none"> – Enable/Disable Memory Rank Sparing. – Options available: Disable/Enable. Default setting is Disable. ♦ Correctable Error Threshold <ul style="list-style-type: none"> – Correctable Error Threshold (1-32767) used for sparing, tagging, and leaky bucket. – Press the <+> / <-> keys to increase or decrease the desired values. ♦ SDDC Plus One <ul style="list-style-type: none"> – Enable/Disable SDDC Plus One. – Options available: Disable/Enable. Default setting is Disable. |

5-3-5 I/O Configuration



| Parameter | Description |
|-----------------------------------|--|
| I/O Configuration | |
| Intel® VT for Directed I/O (VT-d) | Press [Enter] to configure advanced items. |
| | <ul style="list-style-type: none">◆ Intel® VT for Directed I/O (VT-d)<ul style="list-style-type: none">– Enable/Disable the Intel VT for Directed I/O (VT-d) support function by reporting the I/O device assignment to VMM through DMAR ACPI Tables.– Options available: Enable/Disable. Default setting is Enable.◆ ACS Control<ul style="list-style-type: none">– Enable: Programs ACS only to Chipset PCIe Root Ports Bridges.– Disable: Programs ACS to all PCIe bridges.– Default setting is Enable.◆ Interrupt Remapping<ul style="list-style-type: none">– Enable/Disable the interrupt remapping support function.– Options available: Enable/Disable. Default setting is Enable.◆ PassThrough DMA<ul style="list-style-type: none">– Enable/Disable the Non-Isch VT_D Engine PassThrough DMA support function.– Options available: Enable/Disable. Default setting is Enable.◆ ATS<ul style="list-style-type: none">– Enable/Disable Non-Isch VT_D Engine ATS support.– Options available: Enable/Disable. Default setting is Enable. |

| Parameter | Description |
|--|---|
| Intel® VT for Directed I/O (VT-d) (continued) | <ul style="list-style-type: none"> ◆ Posted Interrupt <ul style="list-style-type: none"> – Enable/Disable VT_D posted interrupt. – Options available: Enable/Disable. Default setting is Enable. ◆ Coherency Support (Non-Isoch) <ul style="list-style-type: none"> – Enable/Disable Non-Isoch VT_D Engine Coherency support. – Options available: Enable/Disable. Default setting is Enable. |
| Intel® VMD technology | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ Intel® VMD technology ◆ Intel® VMD Configuration <ul style="list-style-type: none"> – Enable/Disable the Intel VMD support function. – Options available: Enable/Disable. Default setting is Disable. |
| MCTP | <p>Enable/Disable MCTP (Management Component Transport Protocol). Options available: Enable/Disable. Default setting is Disable.</p> |

5-3-6 Advanced Power Management Configuration



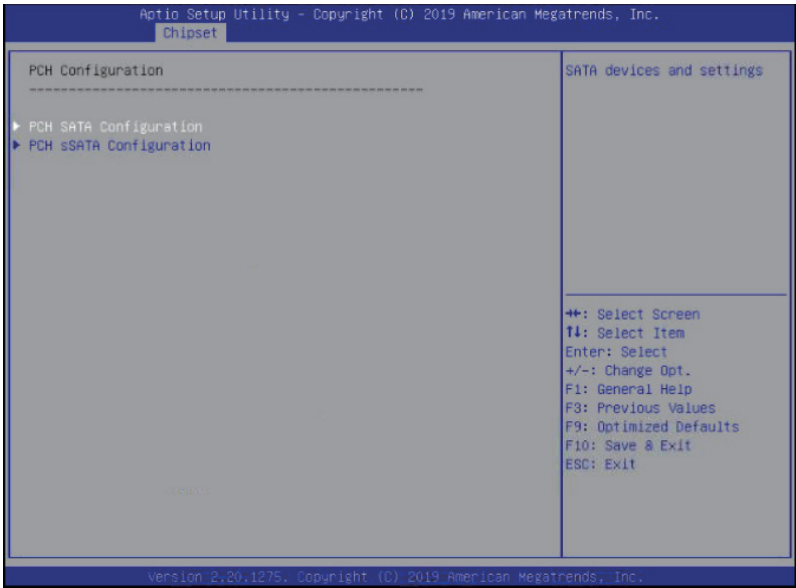
| Parameter | Description |
|---|--|
| Advanced Power Management Configuration | |
| CPU P State Control | Press [Enter] to configure advanced items. |
| | <ul style="list-style-type: none">SpeedStep (Pstates)<ul style="list-style-type: none">Conventional Intel SpeedStep Technology switches both voltage and frequency in tandem between high and low levels in response to processor load.Options available: Enable/Disable. Default setting is Enable.Turbo Mode<ul style="list-style-type: none">When this item is enabled, the processor will automatically ramp up the clock speed of 1-2 of its processing cores to improve its performance. When this item is disabled, the processor will not overclock any of its core.Options available: Enable/Disable. Default setting is Enable. |

| Parameter | Description |
|---------------------------|---|
| Hardware PM State Control | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ Hardware P-States <ul style="list-style-type: none"> – When this item is disabled, the processor hardware chooses a P-state based on OS Request (Legacy P-States). – In Native mode, the processor hardware chooses a P-state based on OS guidance. – In Out of Band mode, the processor hardware autonomously chooses a P-state (with no OS guidance). – Options available: Disable/Native Mode/Out of Band Mode/Native Mode with No Legacy Support. Default setting is Native Mode. |
| CPU C State Control | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ Autonomous Core C-State <ul style="list-style-type: none"> – Enable/Disable the Autonomous Core C-State Control. – Options available: Enable/Disable. Default setting is Disable. ◆ CPU C6 Report <ul style="list-style-type: none"> – Allows you to determine whether to let the CPU enter C6 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C6 state is a more enhanced power-saving state than C1. – Options available: Disable/Enable/Auto. Default setting is Auto. ◆ Enhanced Halt State (C1E)^(Note) <ul style="list-style-type: none"> – Core C1E auto promotion control. Takes effect after reboot. – Options available: Enable/Disable. Default setting is Enable. |
| Package C State Control | <p>Configures the state for the C-State package limit.</p> <p>Options available: C0/C1 state/C2 state/C6 (non Retention) state/C6 (Retention) state/No Limit/Auto.</p> <p>Default setting is Auto.</p> |

| Parameter | Description |
|--------------------------|---|
| CPU - Advanced PM Tuning | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ Energy Perf BIAS <ul style="list-style-type: none"> – Enters the Energy Perf BIAS submenu. ◆ Power Performance Tuning^(Note) <ul style="list-style-type: none"> – Tunes the Power Performance Configuration mode. When enabled, uses IA32_ENERGY_PERF_BIAS input from the core. When disabled, uses alternate performance BIAS input from ENERGY_PERF_BIAS_CONFIG. – Options available: OS Controls EPB/BIOS Controls EPB. Default setting is OS Controls EPB. ◆ Energy_PERF_BIAS_CFG mode <ul style="list-style-type: none"> – Selects the Energy Performance Bias Configuration Mode. – Options available: Performance/Balanced Performance/Balanced Power/Power. Default setting is Balanced Performance. – Please note that this item is configurable when Power Performance Tuning is set to BIOS Controls EPB. |

(Note) Advanced items prompt when this item is defined.

5-3-7 PCH Configuration



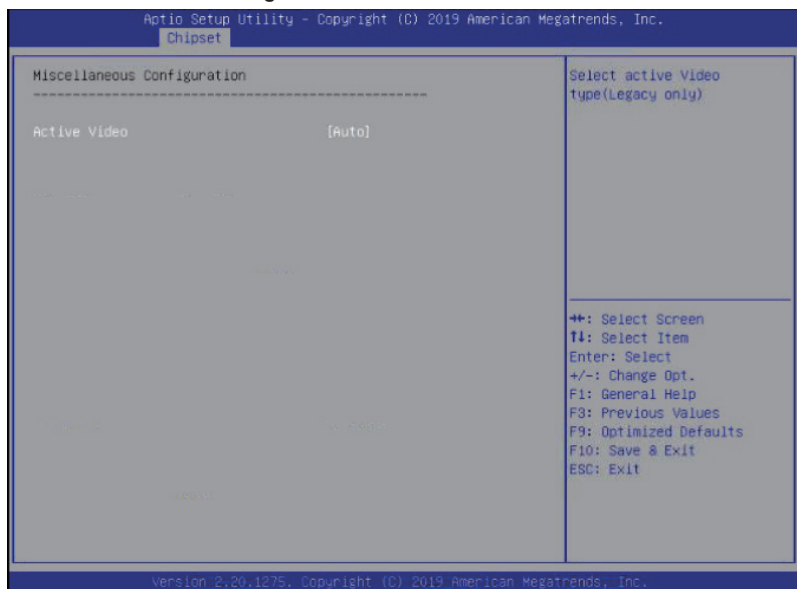
| Parameter | Description |
|------------------------|---|
| PCH Configuration | |
| PCH SATA Configuration | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none">◆ SATA Controller<ul style="list-style-type: none">– Enable/Disable SATA controller.– Options available: Enable/Disable. Default setting is Enable.◆ Configure SATA as<ul style="list-style-type: none">– Configures on chip SATA type.– AHCI Mode: When set to AHCI, the SATA controller enables its AHCI functionality. Then the RAID function is disabled and cannot be access the RAID setup utility at boot time.– RAID Mode: When set to RAID, the SATA controller enables both its RAID and AHCI functions. You will be allowed to access the RAID setup utility at boot time.– Options available: AHCI/RAID. Default setting is AHCI.◆ Alternate Device ID on RAID^(Note 1)<ul style="list-style-type: none">– Enable/Disable Alternate Device ID on RAID mode.– Options available: Enable/Disable. Default setting is Disabled– Please note that this option appears when HDD is in RAID Mode.◆ SATA Port 0/1/2/3/4/5/6/7<ul style="list-style-type: none">– The category identifies SATA hard drives that are installed in the computer. System will automatically detect HDD type. |

| Parameter | Description |
|---------------------------------------|---|
| PCH SATA Configuration (continued) | <ul style="list-style-type: none"> Port 0/1/2/3/4/5/6/7 <ul style="list-style-type: none"> Enable/Disable Port 0/1/2/3/4/5/6/7 device. Options available: Enable/Disable. Default setting is Enable. Hot Plug (for Port 0/1/2/3/4/5/6/7)^(Note 2) <ul style="list-style-type: none"> Enable/Disable HDD Hot-Plug function. Options available: Enable/Disable. Default setting is Disable. Spin Up Device (for Port 0/1/2/3/4/5/6/7)^(Note 2) <ul style="list-style-type: none"> On an edge detect from 0 to 1, the PCH starts a COM reset initialization to the device. Options available: Enable/Disable. Default setting is Disable. |
| PCH sSATA Configuration | <ul style="list-style-type: none"> sSATA Controller <ul style="list-style-type: none"> Enable/Disable sSATA controller. Options available: Enable/Disable. Default setting is Enable. Configure sSATA as <ul style="list-style-type: none"> Configures on chip SATA type. AHCI Mode: When set to AHCI, the SATA controller enables its AHCI functionality. Then the RAID function is disabled and cannot be access the RAID setup utility at boot time. RAID Mode: When set to RAID, the SATA controller enables both its RAID and AHCI functions. You will be allowed to access the RAID setup utility at boot time. Options available: AHCI/RAID. Default setting is AHCI. Alternate Device ID on RAID^(Note 1) <ul style="list-style-type: none"> Enable/Disable Alternate Device ID on RAID mode. Options available: Enable/Disable. Default setting is Disabled. Please note that this option appears when HDD is in RAID Mode. sSATA Port 0/1/2/3/4/5 <ul style="list-style-type: none"> The category identifies sSATA hard drives that are installed in the computer. System will automatically detect HDD type. Port 0/1/2/3/4/5 <ul style="list-style-type: none"> Enable/Disable Port 0/1/2/3/4/5 device. Options available: Enable/Disable. Default setting is Enable. Hot Plug (for Port 0/1/2/3/4/5)^(Note 2) <ul style="list-style-type: none"> Enable/Disable HDD Hot-Plug function. Options available: Enable/Disable. Default setting is Disable. Spin Up Device (for Port 0/1/2/3/4/5)^(Note 2) <ul style="list-style-type: none"> On an edge detect from 0 to 1, the PCH starts a COM reset initialization to the device. Options available: Enable/Disable. Default setting is Disabled. |

(Note 1) Only appears when HDD sets to **RAID Mode**.

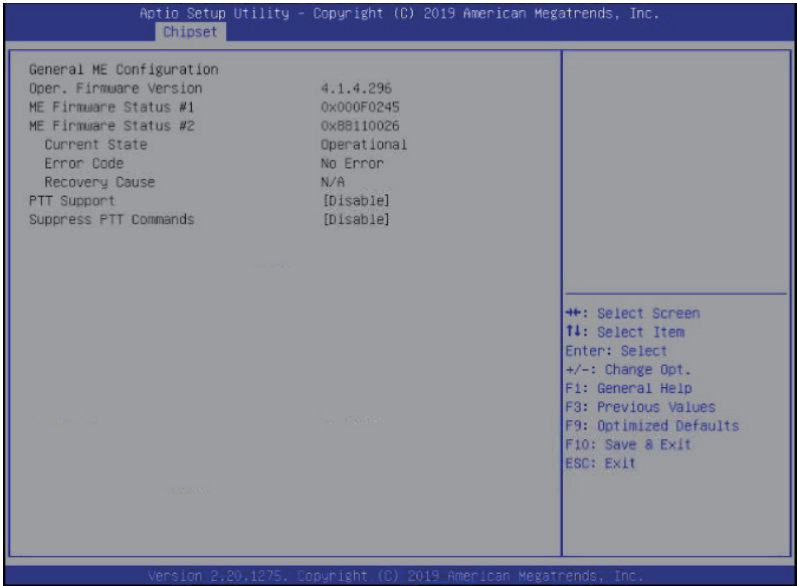
(Note 2) Only Supported when HDD is in **AHCI** or **RAID Mode**.

5-3-8 Miscellaneous Configuration



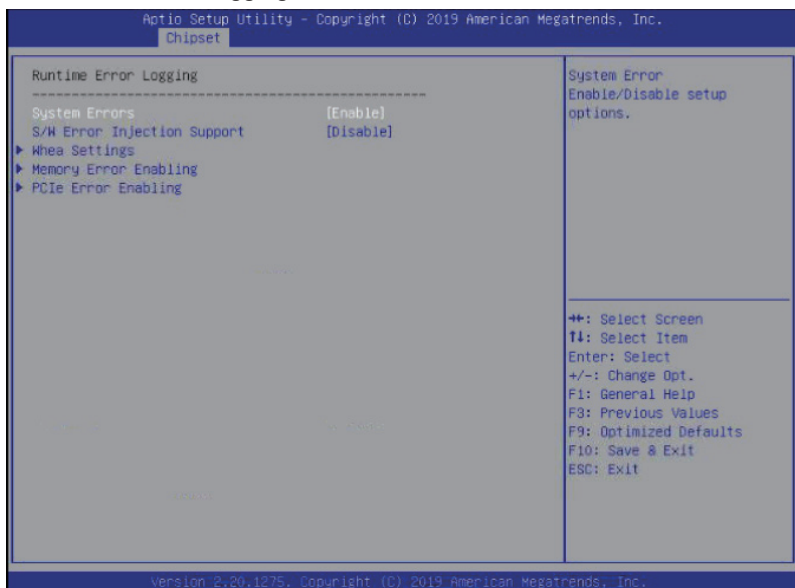
| Parameter | Description |
|-----------------------------|--|
| Miscellaneous Configuration | |
| Active Video | Selects the active video type. Options available: Auto/Onboard Device/PCIE Device. Default setting is Auto . |

5-3-9 Server ME Configuration



| Parameter | Description |
|----------------------------------|--|
| General ME Configuration | |
| Operational Firmware Version | Selects the active video type. Options available: Auto/Onboard Device/PCIE Device. Default setting is Auto . |
| ME Firmware Status #1/#2 | Displays ME Firmware status information. |
| Current State (for ME Firmware) | Displays ME Firmware current status information. |
| Error Code (for ME Firmware) | Displays ME Firmware status error code. |
| Recovery Cause (for ME Firmware) | Displays ME Firmware recovery cause. |
| PTT Support | Displays if the system supports the Intel® Platform Trust Technology. |
| Suppress PTT Commands | Displays if the system has suppressed Intel® Platform Trust Technology commands. |

5-3-10 Runtime Error Logging

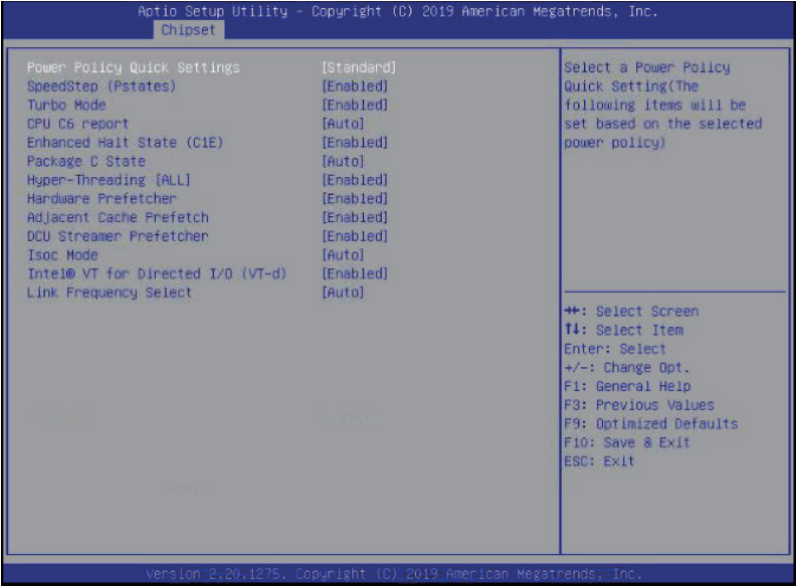


| Parameter | Description |
|-----------------------------|--|
| Runtime Error Logging | |
| System Errors | Enable/Disable system error logging function. Options available: Enable/Disable. Default setting is Enable . |
| S/W Error Injection Support | Enable/Disable software injection error logging function. Options available: Enable/Disable. Default setting is Disable . |
| Whea Settings | Press [Enter] to configure advanced items. <ul style="list-style-type: none"> WHEA (Windows Hardware Error Architecture) Support <ul style="list-style-type: none"> Enable/Disable WHEA Support. Options available: Enable/Disable. Default setting is Enable. |
| Memory Error Enabling | Press [Enter] to configure advanced items. <ul style="list-style-type: none"> Memory Error <ul style="list-style-type: none"> Enable/Disable Memory Error. Options available: Enable/Disable. Default setting is Enable. Memory Corrected Error <ul style="list-style-type: none"> Enable/Disable Memory Corrected Error. Options available: Enable/Disable. Default setting is Enable. Uncorrected Error disable Memory <ul style="list-style-type: none"> Enable/Disable the Memory that triggers Uncorrected Error. Options available: Enable/Disable. Default setting is Disable. |

| Parameter | Description |
|---------------------|--|
| PCIe Error Enabling | <p>Press [Enter] to configure advanced items.</p> <ul style="list-style-type: none"> ◆ PCIe Error <ul style="list-style-type: none"> – Enables and escalates Correctable Errors to error pins. – Options available: Enable/Disable. Default setting is Enable. ◆ Uncorrected Error^(Note) <ul style="list-style-type: none"> – Enables and escalates Uncorrectable/Recoverable Errors to error pins. – Options available: Enable/Disable. Default setting is Enable. ◆ Fatal Error Enable^(Note) <ul style="list-style-type: none"> – Enables and escalates Fatal Errors to error pins. – Options available: Enable/Disable. Default setting is Enable. ◆ SERR Propagation^(Note) <ul style="list-style-type: none"> – Enable/Disable SERR propagation. – Options available: Enable/Disable. Default setting is Enable. ◆ PERR Propagation^(Note) <ul style="list-style-type: none"> – Enable/Disable PERR propagation. – Options available: Enable/Disable. Default setting is Enable. |

(Note) Only appears when PCIe Error is set to **Enable**.

5-3-11 Power Policy

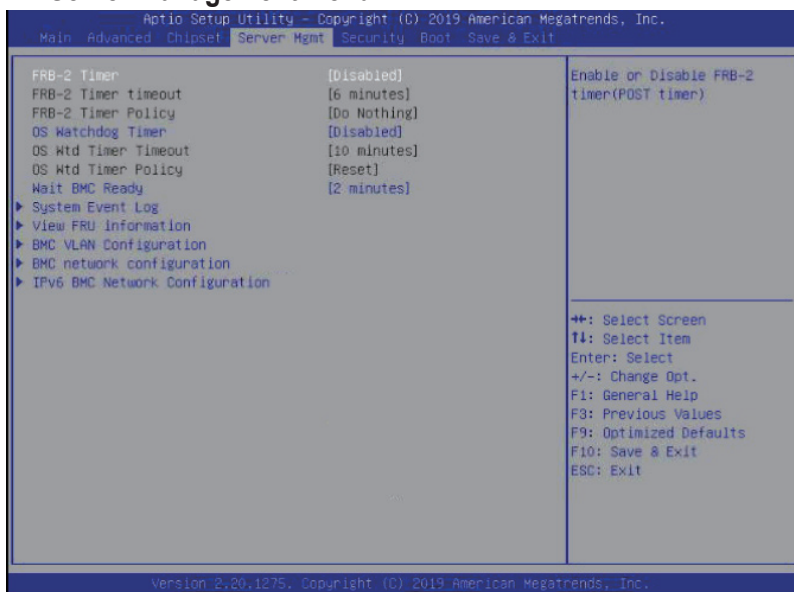


| Parameter | Description |
|---|---|
| Power Policy Quick Settings | Selects a Power Policy Quick Setting. Options available: Standard/Best Performance/Energy Efficient |
| SpeedStep (Pstates) | Conventional Intel SpeedStep Technology switches both voltage and frequency in tandem between high and low levels in response to processor load. Options available: Enabled/Disabled. Default setting is Enabled . |
| Turbo Mode | When this item is Enabledd, the processor will automatically ramp up the clock speed of 1-2 of its processing cores to improve its performance. When this item is Disabledd, the processor will not overclock any of its core. Options available: Enabled/Disabled. Default setting is Enabled . |
| CPU C6 report | Allows you to determine whether to let the CPU enter C6 mode in system halt state. When Enabledd, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C6 state is a more enhanced powersaving state than C1. Options available: Disabled/Enabled/Auto. Default setting is Auto . |
| Enhanced Halt State (C1E) ^(Note) | Core C1E auto promotion control. Takes effect after reboot. Options available: Enabled/Disabled. Default setting is Enabled . |

(Note) Advanced items prompt when this item is defined.

| Parameter | Description |
|-----------------------------------|---|
| Package C State | Configures the state for the C-State package limit. Options available: C0/C1 state/C2 state/C6 (non Retention) state/C6 (Retention) state/No Limit/Auto. Default setting is Auto . |
| Hyper-Threading [ALL] | The Hyper Threading Technology allows a single processor to execute two or more separate threads concurrently. When hyper-threading is enabled, multi-threaded software applications can execute their threads, thereby improving performance. Options available: Enable/Disable. Default setting is Enable . |
| Hardware Prefetcher | Select whether to enable the speculative prefetch unit of the processor. Options available: Enable/Disable. Default setting is Disable . |
| Adjacent Cache Prefetch | When enabled, cache lines are fetched in pairs. When disabled, only the required cache line is fetched. Options available: Enable/Disable. Default setting is Enable . |
| DCU Streamer Prefetcher | Prefetches the next L1 data line based upon multiple loads in same cache line. Options available: Enable/Disable. Default setting is Enable . |
| Isoc Mode | Options available: Auto/Enable/Disable. Default setting is Auto . |
| Intel® VT for Directed I/O (VT-d) | Enable/Disable the Intel VT for Directed I/O (VT-d) support function by reporting the I/O device assignment to VMM through DMAR ACPI Tables. Options available: Enable/Disable. Default setting is Enable . |
| Link Frequency Select | Selects the UPI link frequency. Options available: 9.6GB/10.4GB/Auto. Default setting is Auto . |

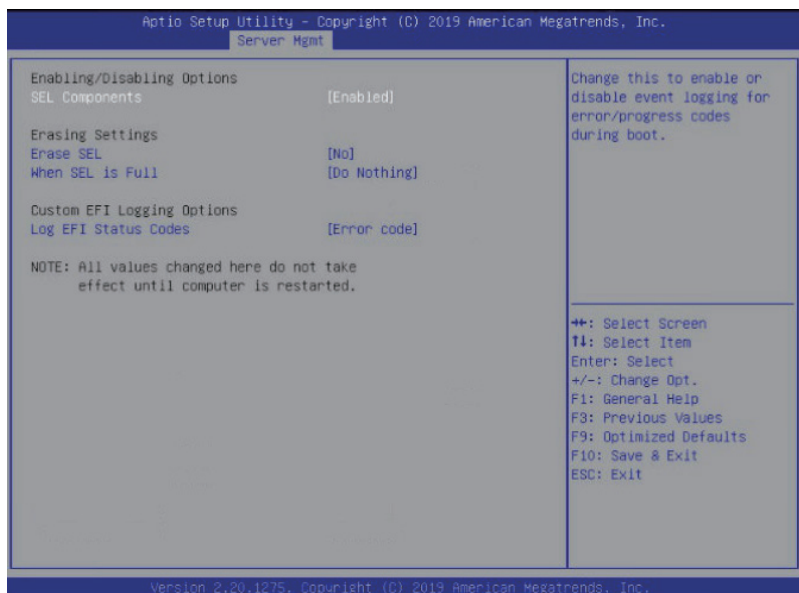
5-4 Server Management Menu



| Parameter | Description |
|----------------------|--|
| FRB-2 Timer | Enable/Disable FRB-2 timer (POST timer). Options available: Enabled/Disabled. Default setting is Disabled . |
| FRB-2 Timer timeout | Configure the FRB2 Timer timeout. Options available: 3 minutes/4 minutes/5 minutes/6 minutes. Default setting is 6 minutes . Please note that this item is configurable when FRB-2 Timer is set to Enabled. |
| FRB-2 Timer Policy | Configure the FRB2 Timer policy. Options available: Do Nothing/Reset/Power Down. Default setting is Do Nothing . Please note that this item is configurable when FRB-2 Timer is set to Enabled. |
| OS Watchdog Timer | Enable/Disable OS Watchdog Timer function. Options available: Enabled/Disabled. Default setting is Disabled . |
| OS Wtd Timer Timeout | Configure OS Watchdog Timer. Options available: 5 minutes/10 minutes/15 minutes/20 minutes. Default setting is 10 minutes . Please note that this item is configurable when OS Watchdog Timer is set to Enabled. |
| OS Wtd Timer Policy | Configure OS Watchdog Timer Policy. Options available: Reset/Do Nothing/Power Down. Default setting is Reset . Please note that this item is configurable when OS Watchdog Timer is set to Enabled. |

| Parameter | Description |
|--------------------------------|--|
| System Event Log | Press [Enter] to configure advanced items. |
| View FRU Information | Press [Enter] to view the advanced items. |
| BMC network configuration | Press [Enter] to configure advanced items. |
| IPv6 BMC Network Configuration | Press [Enter] to configure advanced items. |

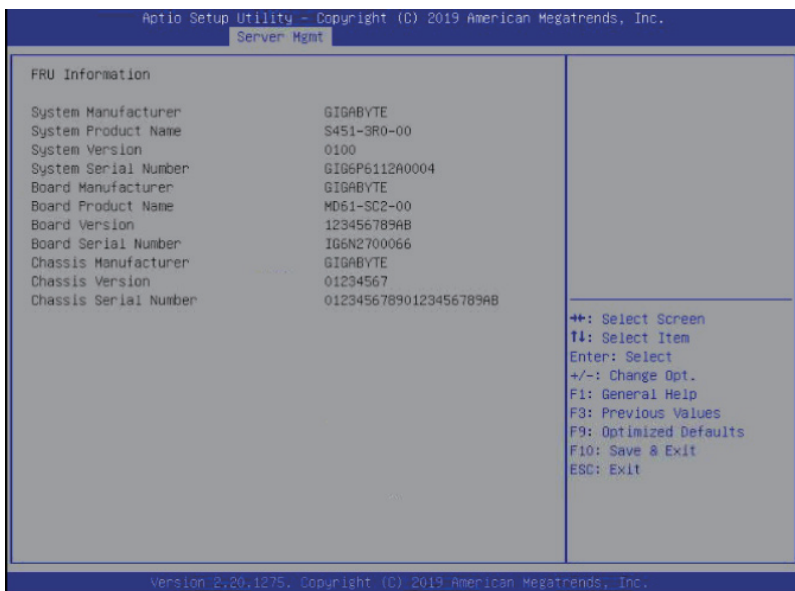
5-4-1 System Event Log



| Parameter | Description |
|------------------------------|---|
| Enabling / Disabling Options | |
| SEL Components | Change this item to enable or disable all features of System Event Logging during boot. Options available: Enabled/Disabled. Default setting is Enabled . |
| Erasing Settings | |
| Erasing SEL | Choose options for erasing SEL. 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. Options available: Do Nothing/Erase Immediately. 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). Options available: Disabled/Both/Error code/Progress code. Default setting is Error code . |

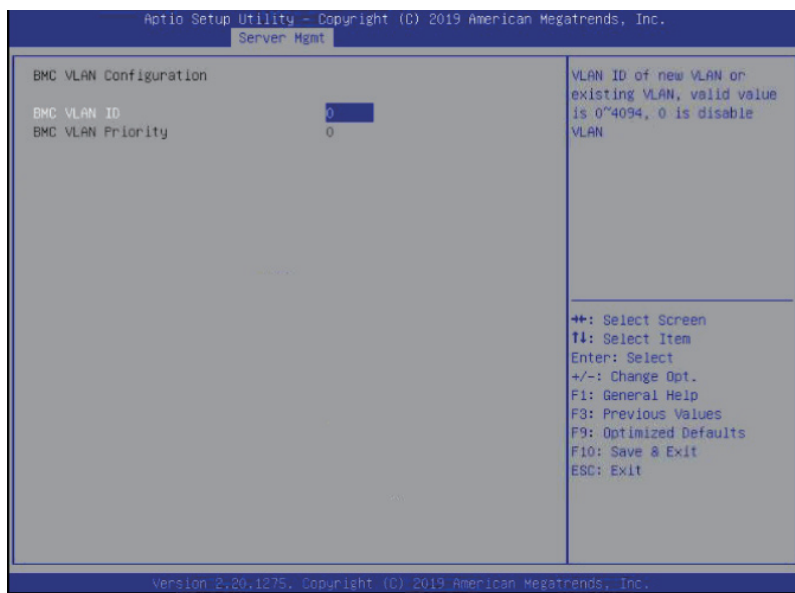
5-4-2 View FRU Information

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.



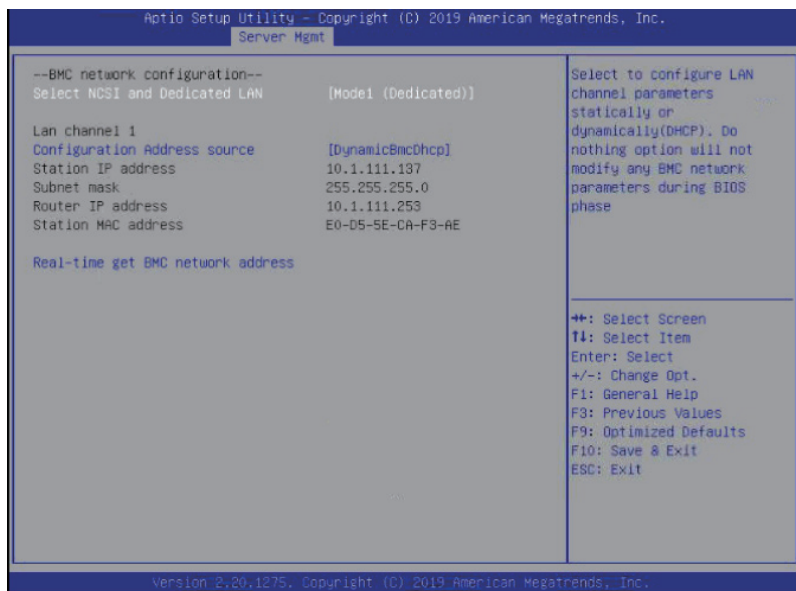
(Note) The model name will vary depends on the product you purchased.

5-4-3 BMC VLAN Configuration



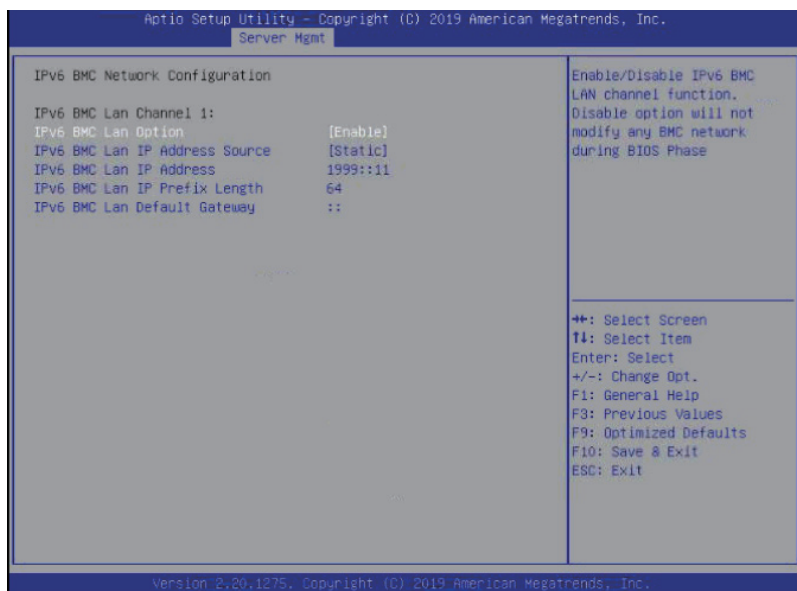
| Parameter | Description |
|------------------------|--|
| BMC VLAN Configuration | |
| BMC VLAN ID | Select to configure BMC VLAN ID. The valid range is from 0 to 4094. When set to 0, BMC VLAN ID will be disabled. |
| BMC VLAN Priority | Select to configure BMC VLAN Priority. The valid range is from 0 to 7. When BMC VLAN ID is set to 0, BMC VLAN Priority will not be selected. |

5-4-4 BMC Network Configuration



| Parameter | Description |
|--|--|
| BMC network configuration | |
| Select NCSI and Dedicated LAN | Switch NCSI and dedicated LAN and send KCS command. Options available: Do Nothing/Mode1 (Dedicated)/Mode2(NSCI)/Mode3 (Failover). Default setting is Mode1 (Dedicated) . |
| Lan Channel 1 | |
| Configuration Address source | Select to configure LAN channel parameters statically or dynamically (DHCP). Do nothing option will not modify any BMC network parameters during BIOS phase. Options available: Unspecified/Static/DynamicBmcDhcp. Default setting is DynamicBmcDhcp . |
| Station IP address | Displays IP Address information. |
| Subnet mask | Displays Subnet Mask information. 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 synchronize BMC network parameter values | Press [Enter] to synchronize the BMC network parameter values. |

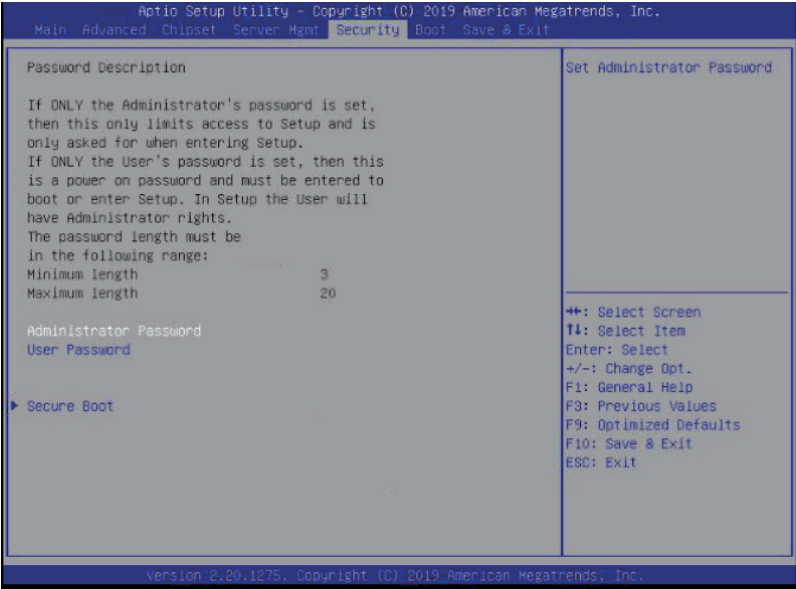
5-4-5 IPv6 BMC Network Configuration



| Parameter | Description |
|---------------------------------------|---|
| IPv6 BMC Network Configuration | |
| IPv6 BMC Lan Channel 1 | |
| IPv6 BMC Lan Option | Enable/Disable IPv6 BMC LAN channel function. When this item is disabled, the system will not modify any BMC network during BIOS phase. Options available: Enable/Disable. Default setting is Enable . |
| IPv6 BMC Lan IP Address Source | Select to configure LAN channel parameters statically or dynamically (by BIOS or BMC). Options available: Unspecified/Static/Dynamic-Obtained by BMC running DHCP. Default setting is Dynamic-Obtained by BMC running DHCP . |
| IPv6 BMC Lan IP Address/Prefix Length | Check if the IPv6 BMC LAN IP address matches those displayed on the screen. |
| IPv6 BMC Lan Default Gateway | Enter the IPv6 BMC LAN default gateway. |

5-5 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. |

5-5-1 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 the system is in User mode or Setup mode. |
| Secure Boot | Enables/Disables Secure Boot. The mode change requires a platform reset. 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 the files being loaded before Windows loads and gets to the login screen have not been tampered with. When set to Standard, it will automatically load the Secure Boot keys from the BIOS databases. When set to Custom, you can customize the Secure Boot settings and manually load its keys from the BIOS database. 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. |
| Key Management | Press [Enter] to configure advanced items. |

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

| Parameter | Description |
|------------------------|--|
| Key Management (cont.) | <p>Please note that this item is configurable when Secure Boot Mode is set to Custom.</p> <ul style="list-style-type: none"> ◆ Factory Key Provision <ul style="list-style-type: none"> – Installs factory default Secure Boot keys after the platform resets and the system is in Setup Mode. – Options available: Enabled/Disabled. Default setting is Disabled. ◆ Restore Factory Keys <ul style="list-style-type: none"> – Installs factory default Secure Boot key databases. It will force the system in User Mode. – Options available: Yes/No. ◆ Enroll Efi Image <ul style="list-style-type: none"> – Press [Enter] to enroll SHA256 hash of the binary into Authorized Signature Database (db). ◆ Restore DB defaults <ul style="list-style-type: none"> – Press [Enter] to restore DB variable to factory defaults. – Options available: Yes/No. ◆ Secure Boot variable <ul style="list-style-type: none"> – Displays the current status of the variables used for secure boot. ◆ Platform Key (PK) <ul style="list-style-type: none"> – Displays the current status of the Platform Key (PK). – Press [Enter] to configure a new PK. – Options available: Set New. ◆ Key Exchange Keys (KEK) <ul style="list-style-type: none"> – Displays the current status of the Key Exchange Key Database (KEK). – Press [Enter] to configure a new KEK or load additional KEK from storage devices. – Options available: Set New/Append. ◆ Authorized Signatures (DB) <ul style="list-style-type: none"> – Displays the current status of the Authorized Signature Database. – Press [Enter] to configure a new DB or load additional DB from storage devices. – Options available: Set New/Append. ◆ Forbidden Signatures (DBX) <ul style="list-style-type: none"> – Displays the current status of the Forbidden Signature Database. – Press [Enter] to configure a new dbx or load additional dbx from storage devices. – Options available: Set New/Append. ◆ Authorized TimeStamps (DBT) <ul style="list-style-type: none"> – Displays the current status of the Authorized TimeStamps Database. – Press [Enter] to configure a new DBT or load additional DBT from storage devices. – Options available: Set New/Append. ◆ OsRecovery Signatures <ul style="list-style-type: none"> – Displays the current status of the OsRecovery Signature Database. – Press [Enter] to configure a new OsRecovery Signature or load additional OsRecovery Signature from storage devices. – Options available: Set New/Append. |
| | |

5-6 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.

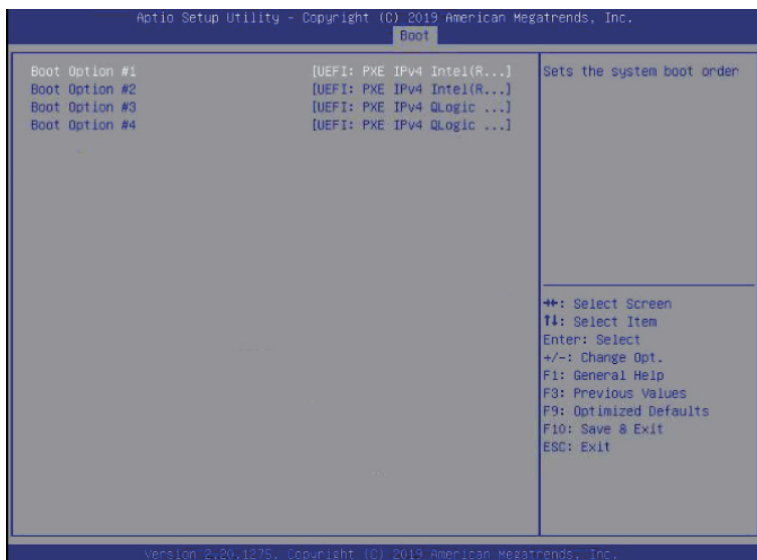


| Parameter | Description |
|----------------------|---|
| Boot Configuration | |
| Setup Prompt Timeout | Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting. Press the numeric keys to input the desired values. |
| Bootup NumLock State | Enable/Disable the Bootup NumLock function. Options available: On/Off. Default setting is On . |
| Quiet Boot | Enable/Disable showing the logo during POST. Options available: Enabled/Disabled. Default setting is Enabled . |
| Boot mode select | Selects the boot mode. Options available: LEGACY/UEFI. Default setting is UEFI . |

| Parameter | Description |
|------------------------------------|--|
| FIXED BOOT ORDER Priorities | |
| Boot Option #1 / #2 / #3 / #4 / #5 | <p>Press [Enter] to configure the boot priority. By default, the server searches for boot devices in the following sequence:</p> <ol style="list-style-type: none"> 1. Hard drive. 2. CD-COM/DVD drive. 3. USB device. 4. Network. 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. |

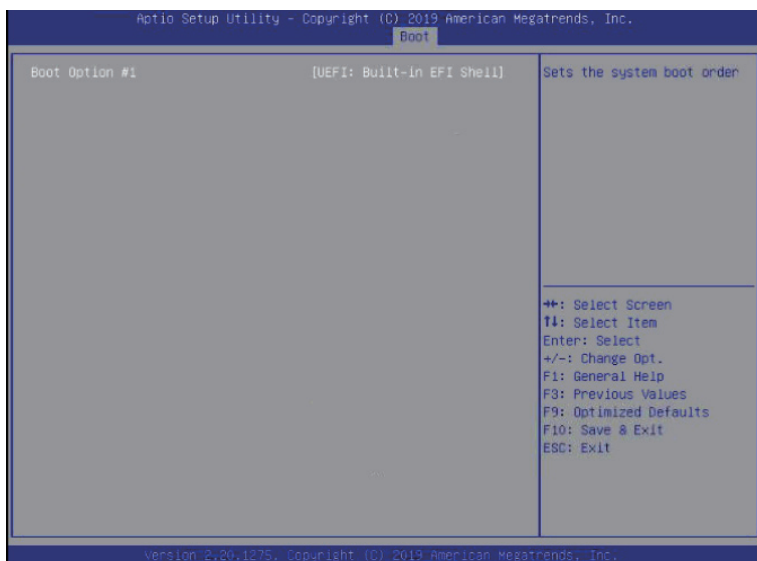
5-6-1 UEFI NETWORK Drive BBS Priorities

The UEFI network drive BBS priorities submenu allows you to specify the boot device priority from the available UEFI network drives during system boot-up. BIOS setup will display an error message if the legacy drive(s) specified is not bootable.



5-6-2 UEFI Application Boot Priorities

The UEFI application boot priorities submenu allows you to specify the boot device priority from the available UEFI applications during system boot-up. BIOS setup will display an error message if the legacy drive(s) specified is not bootable.



5-7 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. Options available: Yes/No. |
| Discard Changes and Exit | Discards changes made and exits the BIOS setup. Options available: Yes/No. |
| Save Changes and Reset | Restarts the system after saving the changes made. Options available: Yes/No. |
| Discard Changes and Reset | Restarts the system without saving any changes. Options available: Yes/No. |
| Save Changes | Saves changes made in the BIOS setup. Options available: Yes/No. |
| Discard Changes | Discards changes made and closes the BIOS setup. Options available: Yes/No. |

| Parameter | Description |
|-----------------------|--|
| Default Options | |
| Restore Defaults | <p>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.</p> <p>Options available: Yes/No.</p> |
| Save as User Defaults | <p>Saves the changes made as the user default settings.</p> <p>Options available: Yes/No.</p> |
| Restore User Defaults | <p>Loads the user default settings for all BIOS setup parameters.</p> <p>Options available: Yes/No.</p> |
| Boot Override | Press [Enter] to configure the device as the boot-up drive. |

5-8 BIOS POST Codes

5-8-1 AMI Standard - PEI

| | |
|-----------------------------|------|
| PEI_CORE_STARTED | 0x10 |
| PEI_CAR_CPU_INIT | 0x11 |
| PEI_CAR_NB_INIT | 0x15 |
| PEI_CAR_SB_INIT | 0x19 |
| PEI_MEMORY_SPD_READ | 0x2B |
| PEI_MEMORY_PRESENCE_DETECT | 0x2C |
| PEI_MEMORY_TIMING | 0x2D |
| PEI_MEMORY_CONFIGURING | 0x2E |
| PEI_MEMORY_INIT | 0x2F |
| PEI_MEMORY_INSTALLED | 0x31 |
| PEI_CPU_INIT | 0x32 |
| PEI_CPU_CACHE_INIT | 0x33 |
| PEI_CPU_AP_INIT | 0x34 |
| PEI_CPU_BSP_SELECT | 0x35 |
| PEI_CPU_SMM_INIT | 0x36 |
| PEI_MEM_NB_INIT | 0x37 |
| PEI_MEM_SB_INIT | 0x3B |
| PEI_DXE_IPL_STARTED | 0x4F |
| DXE_CORE_STARTED | 0x60 |
| //Recovery | |
| PEI_RECOVERY_AUTO | 0xF0 |
| PEI_RECOVERY_USER | 0xF1 |
| PEI_RECOVERY_STARTED | 0xF2 |
| PEI_RECOVERY_CAPSULE_FOUND | 0xF3 |
| PEI_RECOVERY_CAPSULE_LOADED | 0xF4 |
| //S3 | |
| PEI_S3_STARTED | 0xE0 |
| PEI_S3_BOOT_SCRIPT | 0xE1 |
| PEI_S3_VIDEO_REPOST | 0xE2 |
| PEI_S3_OS_WAKE | 0xE3 |
| DXE_CORE_STARTED | 0x60 |
| DXE_NVRAM_INIT | 0x61 |
| DXE_SBRUN_INIT | 0x62 |

5-8-2 AMI Standard - DXE

| | |
|---------------------|------|
| DXE_CPU_INIT | 0x63 |
| DXE_NB_HB_INIT | 0x68 |
| DXE_NB_INIT | 0x69 |
| DXE_NB_SMM_INIT | 0x6A |
| DXE_SB_INIT | 0x70 |
| DXE_SB_SMM_INIT | 0x71 |
| DXE_SB_DEVICES_INIT | 0x72 |

| | |
|----------------------------------|------|
| DXE_ACPI_INIT | 0x78 |
| DXE_CSM_INIT | 0x79 |
| DXE_BDS_STARTED | 0x90 |
| DXE_BDS_CONNECT_DRIVERS | 0x91 |
| DXE_PCI_BUS_BEGIN | 0x92 |
| DXE_PCI_BUS_HPC_INIT | 0x93 |
| DXE_PCI_BUS_ENUM | 0x94 |
| DXE_PCI_BUS_REQUEST_RESOURCES | 0x95 |
| DXE_PCI_BUS_ASSIGN_RESOURCES | 0x96 |
| DXE_CON_OUT_CONNECT | 0x97 |
| DXE_CON_IN_CONNECT | 0x98 |
| DXE_SIO_INIT | 0x99 |
| DXE_USB_BEGIN | 0x9A |
| DXE_USB_RESET | 0x9B |
| DXE_USB_DETECT | 0x9C |
| DXE_USB_ENABLE | 0x9D |
| DXE_IDE_BEGIN | 0xA0 |
| DXE_IDE_RESET | 0xA1 |
| DXE_IDE_DETECT | 0xA2 |
| DXE_IDE_ENABLE | 0xA3 |
| DXE_SCSI_BEGIN | 0xA4 |
| DXE_SCSI_RESET | 0xA5 |
| DXE_SCSI_DETECT | 0xA6 |
| DXE_SCSI_ENABLE | 0xA7 |
| DXE_SETUP_VERIFYING_PASSWORD | 0xA8 |
| DXE_SETUP_START | 0xA9 |
| DXE_SETUP_INPUT_WAIT | 0xAB |
| DXE_READY_TO_BOOT | 0xAD |
| DXE_LEGACY_BOOT | 0xAE |
| DXE_EXIT_BOOT_SERVICES | 0xAF |
| RT_SET_VIRTUAL_ADDRESS_MAP_BEGIN | 0xB0 |
| RT_SET_VIRTUAL_ADDRESS_MAP_END | 0xB1 |
| DXE_LEGACY_OPROM_INIT | 0xB2 |
| DXE_RESET_SYSTEM | 0xB3 |
| DXE_USB_HOTPLUG | 0xB4 |
| DXE_PCI_BUS_HOTPLUG | 0xB5 |
| DXE_NVRAM_CLEANUP | 0xB6 |
| DXE_CONFIGURATION_RESET | 0xB7 |

5-8-3 AMI Standard - ERROR

| | |
|---------------------------------|------|
| PEI_MEMORY_INVALID_TYPE | 0x50 |
| PEI_MEMORY_INVALID_SPEED | 0x50 |
| PEI_MEMORY_SPD_FAIL | 0x51 |
| PEI_MEMORY_INVALID_SIZE | 0x52 |
| PEI_MEMORY_MISMATCH | 0x52 |
| PEI_MEMORY_NOT_DETECTED | 0x53 |
| PEI_MEMORY_NONE_USEFUL | 0x53 |
| PEI_MEMORY_ERROR | 0x54 |
| PEI_MEMORY_NOT_INSTALLED | 0x55 |
| PEI_CPU_INVALID_TYPE | 0x56 |
| PEI_CPU_INVALID_SPEED | 0x56 |
| PEI_CPU_MISMATCH | 0x57 |
| PEI_CPU_SELF_TEST_FAILED | 0x58 |
| PEI_CPU_CACHE_ERROR | 0x58 |
| PEI_CPU_MICROCODE_UPDATE_FAILED | 0x59 |
| PEI_CPU_NO_MICROCODE | 0x59 |
| PEI_CPU_INTERNAL_ERROR | 0x5A |
| PEI_CPU_ERROR | 0x5A |
| PEI_RESET_NOT_AVAILABLE | 0x5B |
| //Recovery | |
| PEI_RECOVERY_PPI_NOT_FOUND | 0xF8 |
| PEI_RECOVERY_NO_CAPSULE | 0xF9 |
| PEI_RECOVERY_INVALID_CAPSULE | 0xFA |
| //S3 Resume | |
| PEI_MEMORY_S3_RESUME_FAILED | 0xE8 |
| PEI_S3_RESUME_PPI_NOT_FOUND | 0xE9 |
| PEI_S3_BOOT_SCRIPT_ERROR | 0xEA |
| PEI_S3_OS_WAKE_ERROR | 0xEB |
| DXE_CPU_ERROR | 0xD0 |
| DXE_NB_ERROR | 0xD1 |
| DXE_SB_ERROR | 0xD2 |
| DXE_ARCH_PROTOCOL_NOT_AVAILABLE | 0xD3 |
| DXE_PCI_BUS_OUT_OF_RESOURCES | 0xD4 |
| DXE_LEGACY_OPROM_NO_SPACE | 0xD5 |
| DXE_NO_CON_OUT | 0xD6 |
| DXE_NO_CON_IN | 0xD7 |
| DXE_INVALID_PASSWORD | 0xD8 |
| DXE_BOOT_OPTION_LOAD_ERROR | 0xD9 |
| DXE_BOOT_OPTION_FAILED | 0xDA |
| DXE_FLASH_UPDATE_FAILED | 0xDB |
| DXE_RESET_NOT_AVAILABLE | 0xDC |

5-8-4 Intel UPI POST Codes

| | |
|--|------|
| Initialize KTIRC input structure default values | 0xA0 |
| Collect info such as SBSP, Boot Mode, Reset type etc | 0xA1 |
| Setup IO SADs in SBSP to access the config space | 0xA2 |
| Setup up minimum path between SBSP & other sockets Add the node to the tree Parse the LEP of the discovered socket Check if the system has the supported topology Setup the boot path for the parent which is not directly connected to Legacy CPU Setup path from SBSP to the new found node | 0xA3 |
| Setup IO SADs in PBSP to access the config space | 0xA4 |
| System configurations that require some kind of reset | 0xA5 |
| Sync up with PBSPs | 0xA6 |
| Topology discovery and route calculation | 0xA7 |
| Program final route | 0xA8 |
| Program final IO SAD setting | 0xA9 |
| Protocol layer and other Uncore settings | 0xAA |
| Transition links to full speed operation | 0xAB |
| Phy layer settings | 0xAC |
| Link layer settings | 0xAD |
| Coherency Settings | 0xAE |
| KTIRC is done | 0xAF |

5-8-5 Intel UPI Error Codes

| | |
|---|------|
| When system BSP tries to setup path for remote sockets or sends a Boot_Go command to remote socket in SetupSbspPathToAllSockets() or SyncUpPbspForReset(). If the remote socket(s) hasn't checked-in, assert; it is a fatal condition, this error will be logged. No retry. <i>RC Behavior: System Halt</i> | 0xD8 |
| When SBSP tries to add this remote socket into system topology tree in SetupSbspPathToAllSockets(), there are some errors occur in the data structure. No retry. <i>RC Behavior: The current Socket is not added to the tree.</i> When SBSP setups the boot path for the parent which is not directly connected to Legacy CPU in SetupSbspPathToAllSockets(). The Child is not an immediate neighbor of Parent. No retry. | 0xDA |

| | |
|--|------|
| SAD setup error <i>RC Behavior: System Halt</i> | 0xDB |
| Unsupported topology <i>RC Behavior: System Halt</i> | 0xDC |
| SBSP cannot find KPIRC TXEQ Parameters for this link in GetSocketLinkEparams(). No retry. <i>RC Behavior: System Halt</i> | 0xDD |

5-8-6 Intel MRC POST Codes

| | |
|--|------|
| Detect DIMM population | 0xB0 |
| Set DDR frequency | 0xB1 |
| Gather remaining SPD data | 0xB2 |
| Program registers on the memory controller level | 0xB3 |
| Evaluate RAS modes and save rank information | 0xB4 |
| Program registers on the channel level | 0xB5 |
| DDRIO Initialization | 0xB6 |
| Train DDR | 0xB7 |
| Initialize CLTT/OLTT | 0xB8 |
| Hardware memory test and init | 0xB9 |
| Execute memory init | 0xBA |
| Program memory map and interleaving | 0xBB |
| Program RAS configuration | 0xBC |
| Rank margin tool | 0xBD |
| MRC is done | 0xBF |

5-8-7 Intel MRC Error Codes

| | |
|--|------|
| No memory was detected | 0xE8 |
| Memory test failure | 0xEB |
| Different dimm types are detected installed in the system | 0xED |
| Number of HAs found in system greater than MAX_HA defined in MRC build | 0xEE |
| Indicates a CLTT table structure error | 0xEF |
| Invalid VR mode, unable to set DRAM VDD | 0xF0 |
| Failure occurred reserving memory for IOT | 0xF1 |
| Reference code assert | 0xF2 |
| Unsupported MC frequency set | 0xF3 |
| Unable to get current MC frequency | 0xF4 |

5-8-8 Intel PM POST Codes

| | |
|---------------------------------------|------|
| Start of PPM structure initialization | 0xD0 |
| PPM CSR programming | 0xD1 |
| PPM MSR programming | 0xD2 |
| Start of PState transition init | 0xD3 |
| PPM exit | 0xD4 |
| PPM On ready to boot event | 0xD5 |

5-8-9 Intel PM POST Codes

| | |
|-----------------------------------|------|
| Start of IIO early Initialization | 0xE0 |
| Pre Link training | 0xE1 |
| Start of Gen3 EQ training | 0xE2 |
| Start of PState transition init | 0xE3 |
| Gen3 parameters override | 0xE4 |
| End of IIO Early Initialization | 0xE5 |
| Start of IIO Late initialization | 0xE6 |
| PCIE port initialization | 0xE7 |
| IOAPIC initialization | 0xE8 |
| VTD initialization | 0xE9 |
| IOAT initialization | 0xEA |
| DFX initialization | 0xEB |
| NTB initialization | 0xEC |
| Security Initialization | 0xED |
| IIO late initialization | 0xEE |
| IIO On ready to boot event | 0xEF |

5-9 BIOS POST Beep code (AMI standard)

5-9-1 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 | DXE IPL was not found |
| 3 | DXE Core Firmware Volume was not found |
| 4 | Recovery failed |
| 4 | S3 Resume failed |
| 7 | Reset PPI is not available |

5-9-2 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 |