



**GRAFENTHAL®**  
IT PRODUCTS • GERMANY

# Handbuch

## **GRAFENTHAL** **T2910 S2**

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## Notices

### Federal Communications Commission Statement

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

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### WARNING!

The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

## Safety Information

### Electrical Safety

- Before installing or removing signal cables, ensure that the power cables for the system unit and all attached devices are unplugged.
- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing any additional devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your dealer.

### Operation Safety

- Any mechanical operation on this server must be conducted by certified or experienced engineers.
- Before operating the server, carefully read all the manuals included with the server package.
- Before using the server, ensure all cables are correctly connected and the power cables are not damaged. If any damage is detected, contact your dealer as soon as possible.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Place the server on a stable surface.

This product is equipped with a three-wire power cable and plug for the user's safety. Use the power cable with a properly grounded electrical outlet to avoid electrical shock.

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

DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

## Product Introduction

### System Specifications

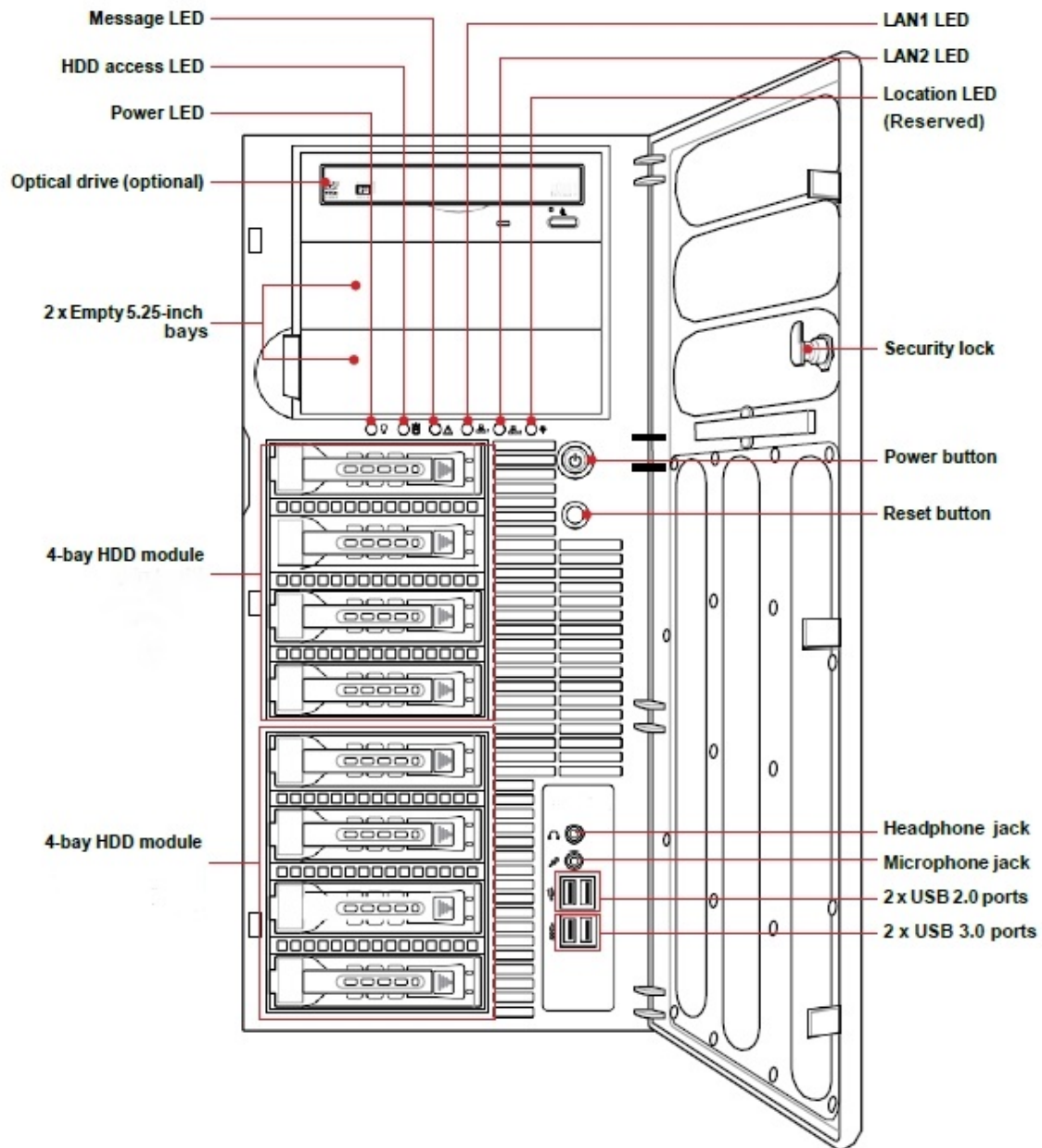
The GRAFENTHAL T2910 S2 is a Pedestal /5U Rackmount barebone server system. The server supports Intel® LGA2011-3 Intel®Xeon®E5-2600 Processor v3 plus other latest technologies through the chipsets onboard.

Model Name	T2910 S2	
Processor Support / System Bus	2 x Socket R3 LGA 2011-3 Intel® Xeon® Processor E5-2600 v3 / v4 Family QPI 6.4 / 8.0 / 9.6GT/s	
Core Logic	Intel® C612 PCH Chipset	
Memory	Total Slots	16 (4 Channels per CPU, 8 DIMMs per CPU)
Capacity	Maximum up to 1024 GB	
Memory Type	DDR4 2133 / 1866 / 1600 / 1333 RDIMM / LR-DIMM / NVDIMM	
Memory Size	32GB, 16GB, 8GB and 4GB (RDIMM) 64GB, 32GB (LRDIMM)	
Expansion Slots (follow SSI Location #)	Total PCI/PCI-E Slots	6
Slot Type	4xPCI-Ex16(Gen3 x16 link, Full-height/FL) 1 x PCI-Ex16 (Gen3 x8 link, Full-height/FL) 1 xPCI-Ex16(Gen3 x8link Full-height/HL)	
Storage	SATA Controller	Intel® C612 10 x SATA 6 Gbps ports or 9 x SATA 6 Gbps ports + 1 x discrete M.2 socket <b>Intel®RSTe (for Windows only; supports software RAID 0, 1, 10 and 5)</b> LSI® MegaRAID driver (supports RAID 0, 1 and 10) (for Linux and Windows)
SAS Controller	RAID card (optional):	
HDD Bays	Front: 8x Hot-swap 3.5-inch HDD Bays *Six hot-swap 3.5-inch HDDs are supported by default. Upgrade the optional PIKE card before using eight hot-swap 3.5-inch HDDs.  Rear: 2x Hot-swap 2.5-inch SSD Bays	

Networking	LAN	2 x Intel® I210T 1 x Management LAN
Graphic	VGA	Aspeed AST2400 32MB
Model Name	T2910 S2	
Auxiliary Storage Device Bay (Floppy / Optical Drive)	3 x 5.25" media bays (Options: DVD-RW)	
Onboard I/O Connectors/LED indicators	1x PS/2keyboard/mouse combo port 1x Q-Code Logger button with LED 1x BIOS Flash back button with LED 1x S/PDIF Out port 1x RJ-45 management port 2x RJ-45 GbE port 8-channel Audio I/O 4x USB 3.0 ports 2x USB 2.0 ports	
OS Support	Windows® Server 2012 R2 Windows® Server 2012 Windows® Server 2008 R2 RedHat® Enterprise Linux SuSE® Linux Enterprise Server CentOS Ubuntu VMWare Citrix XenServer *Support versions are subject to change without notice.	
Management Solution	ASWM Enterprise	
Out of Band Remote Management	ASMB8-iKVM for KVM-over-Internet	
Dimensions (HH x WW x DD)	455 mm x 217.50 mm x 545.00 mm	
Net Weight Kg (CPU, DRAM & HDD not included)	20 Kg	
Power Supply	800W 80PLUS Gold Optional Redundant Power Supply Module	
Power Rating	100-127 / 200-240V, 9.4A/4.72A, 47-63Hz, Class I	
Environment	Operating temperature: 10°C – 35°C Non operation temperature: -40°C – 70°C Non operation humidity: 20% – 90% (Non condensing)	

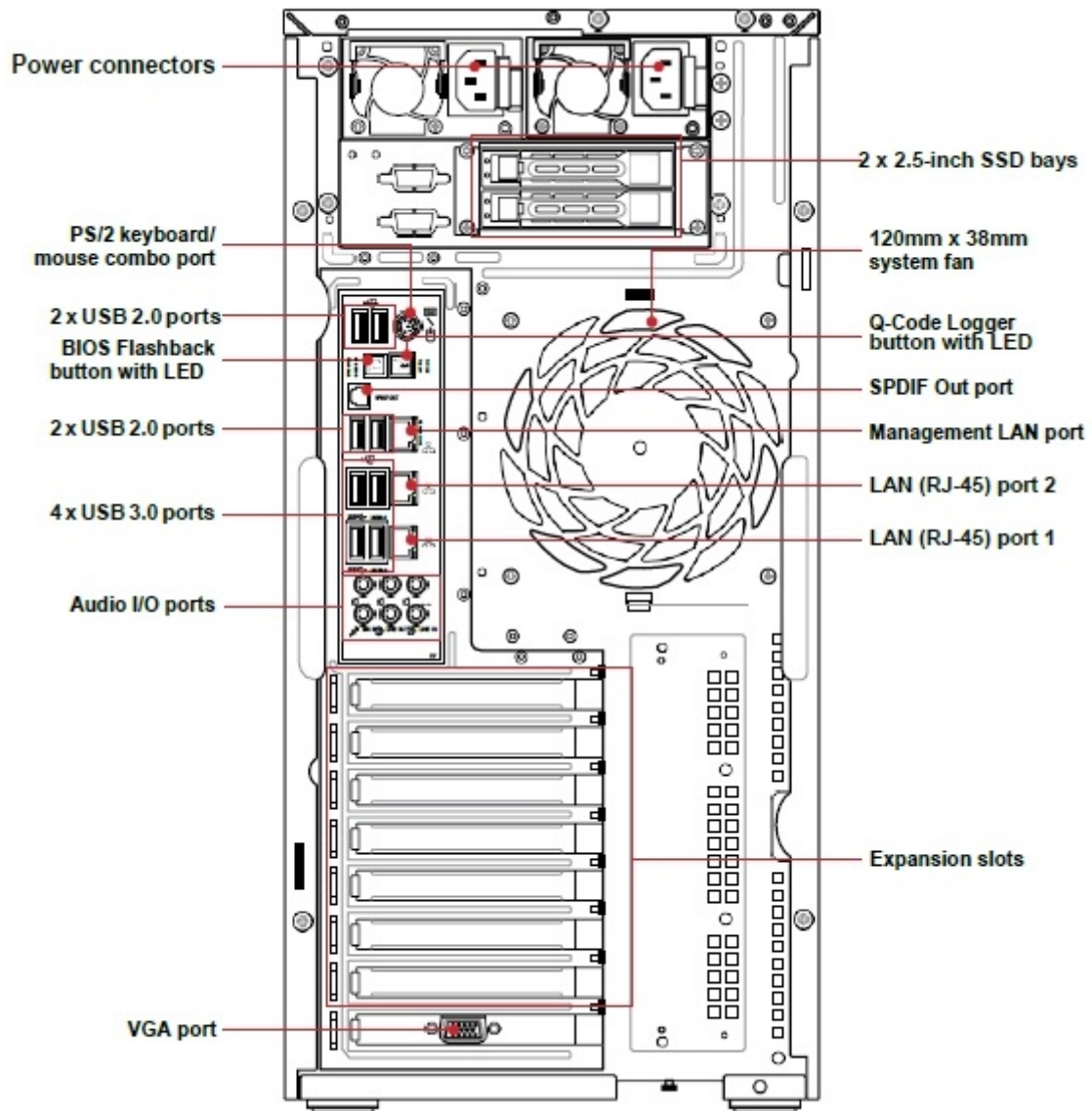


## Front Panel Features



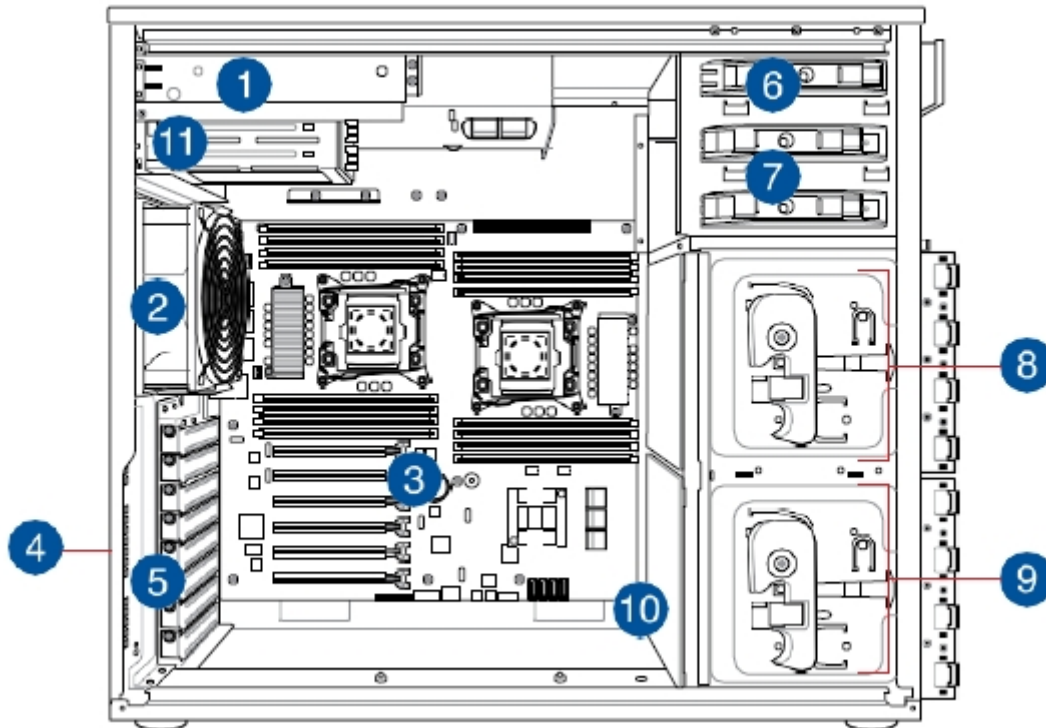


## Rear Panel Features



## Internal Features

The barebone server includes the basic components as shown.



1. 800W 80PLUS Gold 1+1 optional Redundant Power Supply Module
2. 120mm x 38mm System Fan
3. T2910 S2 Server Board
4. Chassis Intrusion Switch
5. Expansion Card Locks
6. Optical Drive (optional)
7. 2x 5.25-inch Drive Bays
8. 4-bay HDD Module (First set with backplane)
9. 4-bay HDD Module (Second set with backplane)
10. 2x 80mm x 38mm System Fans (hidden beside the backplane)
11. 2x 2.5-inch SSD bays

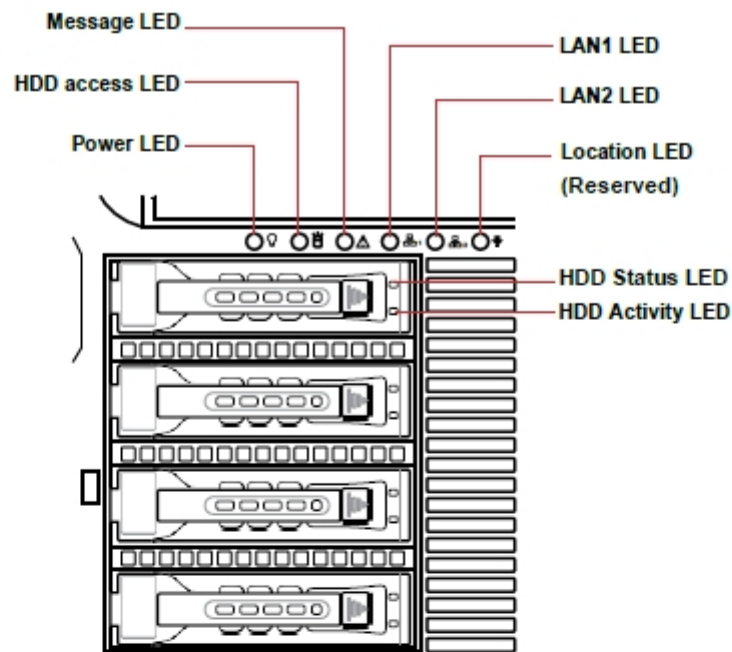
Turnoff the system power and detach the power supply before removing or replacing any system component.









The barebone server does not include a floppy disk drive. Connect a USB floppy disk drive to any of the USB ports on the front or rear panel if you need to use a floppy disk.

## LED Information

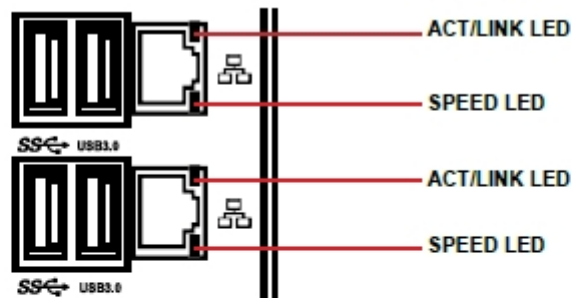
### Front Panel LEDs



LED	Icon	Display status	Description
Power LED		ON	System power ON
HDD Access LED		OFF	No activity
		Blinking	Read/write data into the HDD
Message LED		OFF	System is normal; no incoming event
		ON	A hardware temperature overheat is detected. Use ASWM to check the abnormal status.
HDD Status LED		Green	Bridge board connected to backplane; Installed HDD is in good condition
		Red	HDD failure
		Green/Red Blinking	HDD rebuilding using the RAID card
LAN LEDs	 	OFF	No LAN connection
		Blinking	LAN is transmitting or receiving data
		ON	LAN connection is present

The Power LED, HDD Status LED and Message LED are visible even if the system front bezel is closed.

### LAN (RJ-45) LEDs



ACT/LINK LED		SPEED LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
ORANGE	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

## Hardware Information

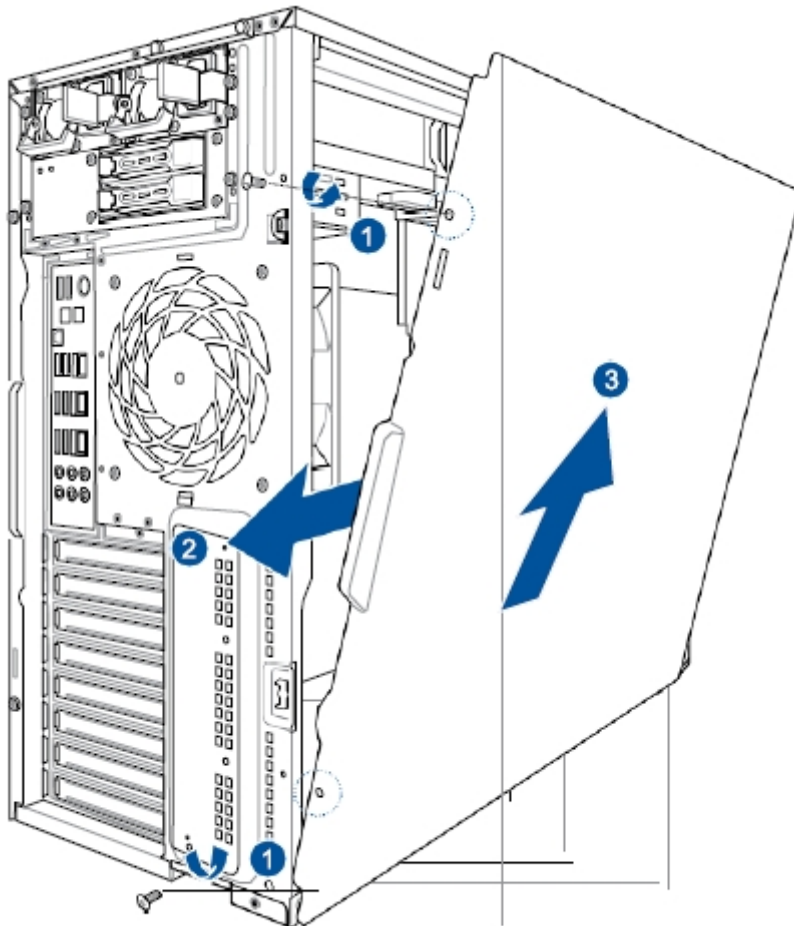
### Removing the side cover

Ensure that you unplug the power cord before removing the side cover.

• Take extra care when removing the side cover. Keep your fingers from components inside the chassis that can cause injury, such as the CPU fan, rear fan, and other sharp-edged parts.

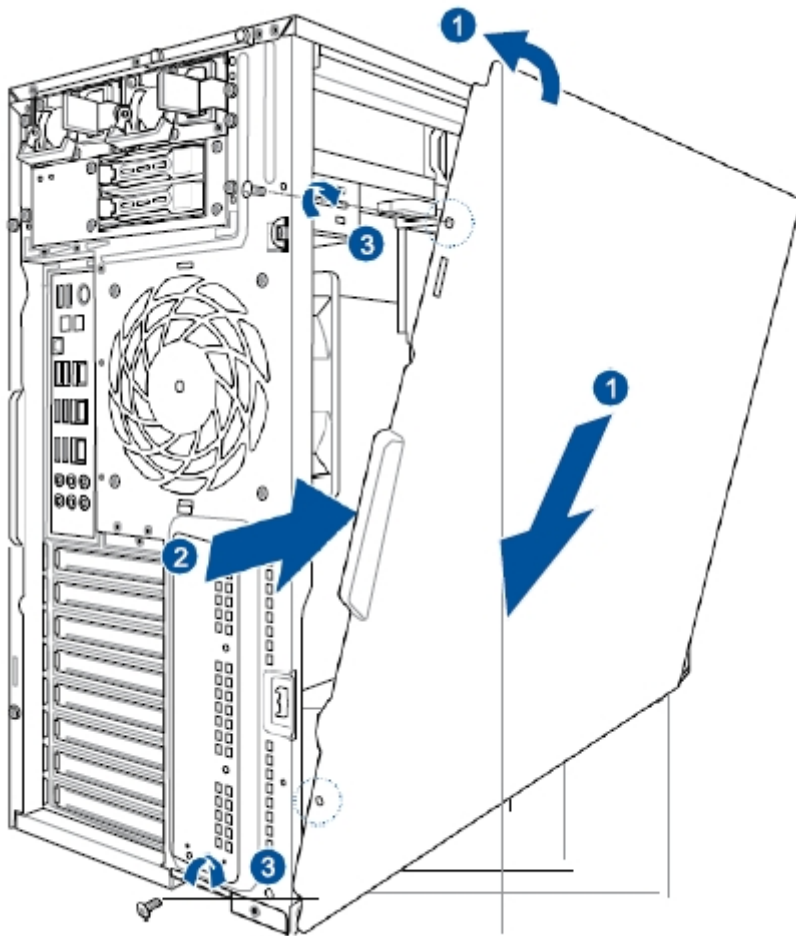
To remove the side cover:

1. Remove the two screws that secure the side cover.
2. Slide the side cover for about half an inch toward the rear until it is disengaged from the chassis.
3. Carefully lift the side cover and set it aside.



## To reinstall the side cover

1. Match and insert the lower sliding edge of the side cover to the corresponding chassis edge.
2. Slide the side cover toward the front panel until it snaps in place.
3. Drive in the two screws you removed earlier to secure the side cover.





## Central Processing Unit (CPU)

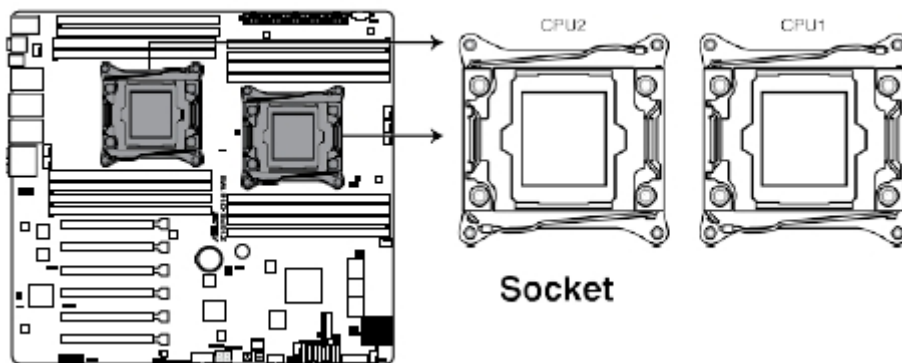
The motherboard comes with two surface mount LGA2011-3 sockets designed for the Intel® Xeon E5-2600 v3 family processor.

- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components.
- Keep the cap after installing the motherboard. GRAFENTHAL will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA 2011-3 socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

## Installing the CPU

To install a CPU:

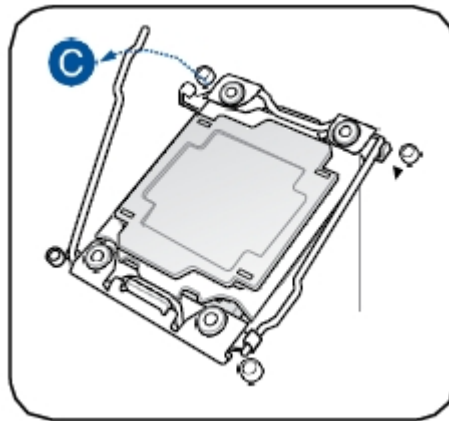
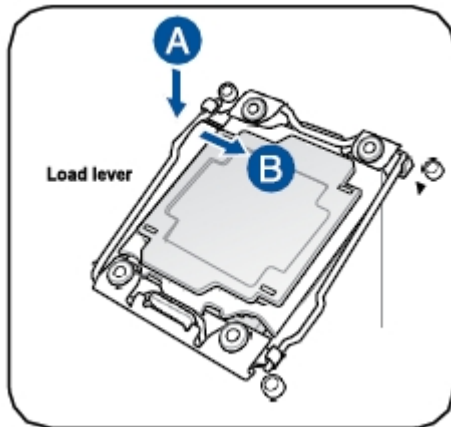
1. Locate the CPU socket on the motherboard.



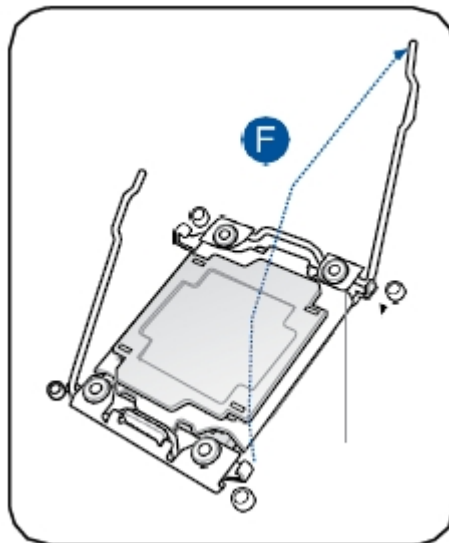
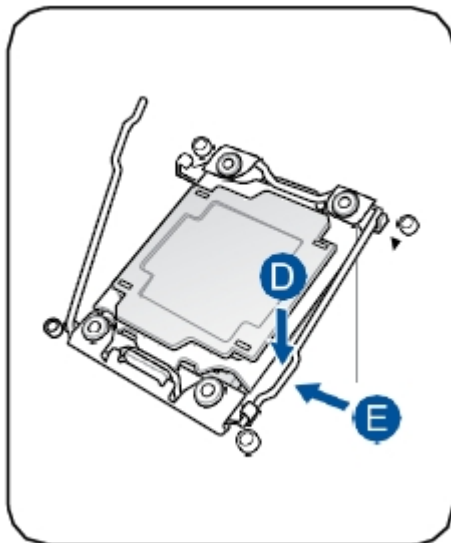
Before installing the CPU, ensure that the socket box is facing toward you and the triangle mark is on the top-right position.

2. Press the left load lever down with your thumb (A), move it to the right until it is released from the retention tab (B) then gently lift the load lever (C).

To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.

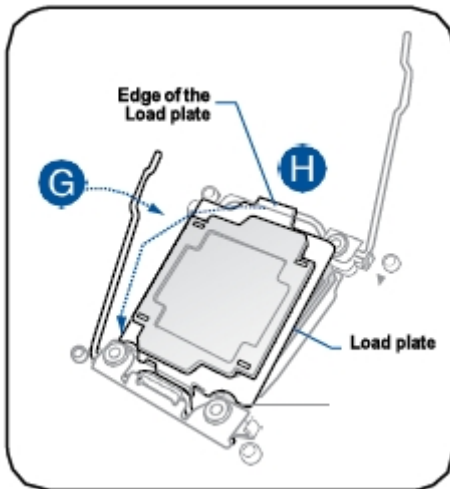


3. Press the right load lever with your thumb (D), move it to the left (E) until it is released from then gently lift the load lever (F).



4. Push the left load lever to slightly lift the load plate (G).  
**Do not insert the load lever into the retention tab.**

5. Hold the edge then gently lift the load plate (H).

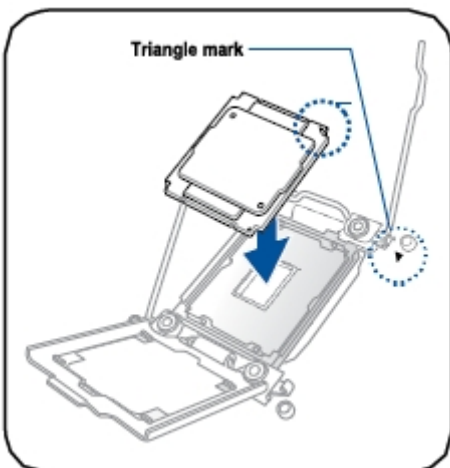


6. Get the CPU.

7. Align and position the CPU over the socket ensuring that the triangle mark on the CPU matches the triangle mark on the socket box.

8. Install the CPU into the slot.

The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the CPU pins on the socket.



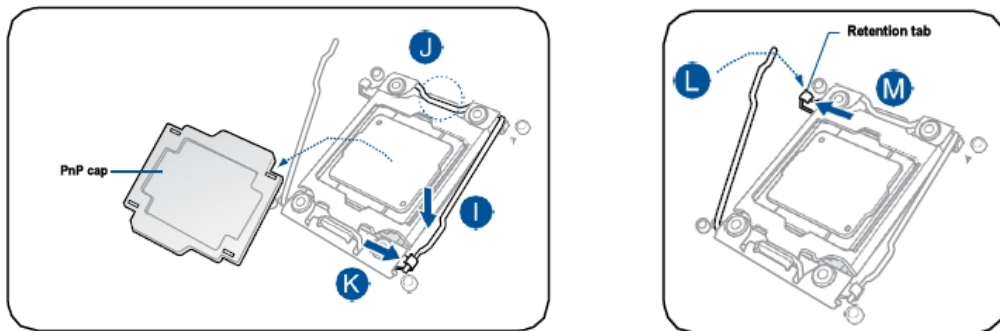
9. Gently push the load plate just enough to let it sit on top of the CPU.

Do not force to close the load plate as it may damage the CPU.

10. Pushdown the right load lever (I) ensuring that the edge of the load plate is fixed and tucked securely under the lever (J) then insert the right load lever under the retention tab(K).

The PnP cap pops out of the load plate when the right load lever is inserted into the retention tab.

Keep the PnP cap. GRAFENTHAL will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the PnP cap on the LGA2011 socket.



11. Push down the left load lever (L) then insert it under the retention tab (M).

12. Apply some Thermal Interface Material to the exposed area of the CPU that the heatsink will be in contact with.

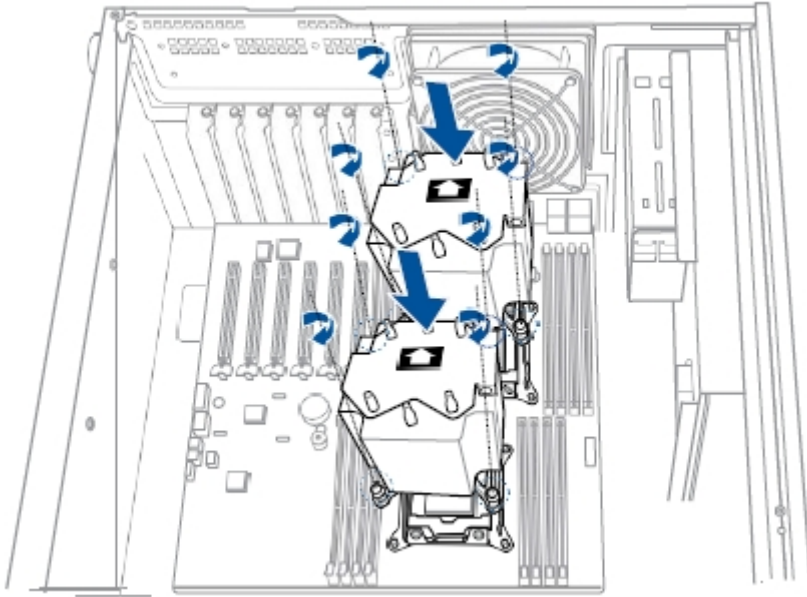
- Ensure that the Thermal Interface Material is spread in an even thin layer.
- Some heatsinks come with pre-applied Thermal Interface Material. If so, skip this step.

The Thermal Interface Material is toxic and inedible. DO NOT eat it. If it gets into your eyes or touches your skin, wash it off immediately, and seek professional medical help.

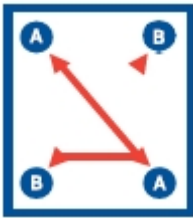
## Installing the CPU heatsink

To install the CPU heatsink:

1. Place the CPU heatsink and fan on top of the installed CPU, ensuring that the four screws match the holes on the support plate, and the arrow on the fan faces the rear panel of the server chassis.
2. Twist each of the four screws with a Philips (cross)screwdriver just enough to attach the CPU heatsink and fan to the motherboard. When the four screws are attached, tighten them one by one to completely secure the CPU heatsink and fan.



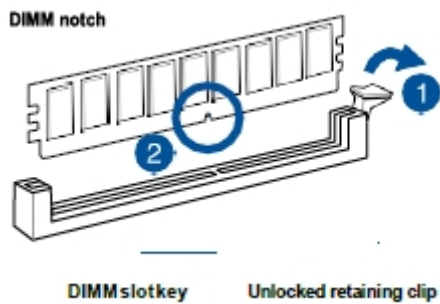
Tighten the four heatsink screws in a diagonal sequence.





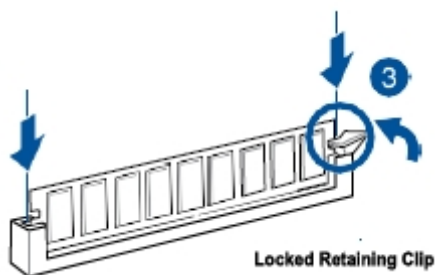
### Installing a DIMM on a single clip DIMM socket

1. Press the retaining clip outward to unlock the DIMM socket.
2. Align a DIMM on the socket such that the notch on the DIMM matches the DIMM slot key on the socket.



A DIMM is keyed with a notch so that it fits in only one direction. **DO NOT** force a DIMM into a socket in the wrong direction to avoid damaging the DIMM.

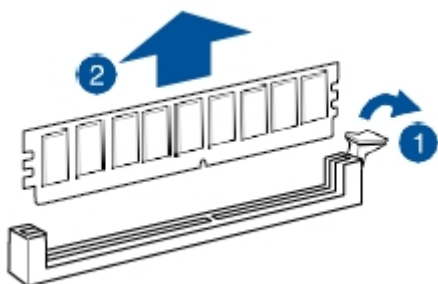
3. Hold the DIMM at both ends then insert the DIMM into the socket. Apply force to both ends of the DIMM simultaneously until the retaining clip clicks into place and the DIMM is seated securely in place.



Always insert the DIMM into the socket **VERTICALLY** to prevent DIMM notch damage.

### Removing a DIMM from a single clip DIMM socket

1. Press the retaining clip outward to unlock the DIMM.
2. Remove the DIMM from the socket.



Support the DIMM lightly with your fingers when pressing the retaining clips. The DIMM might get damaged when it flips out with extra force.



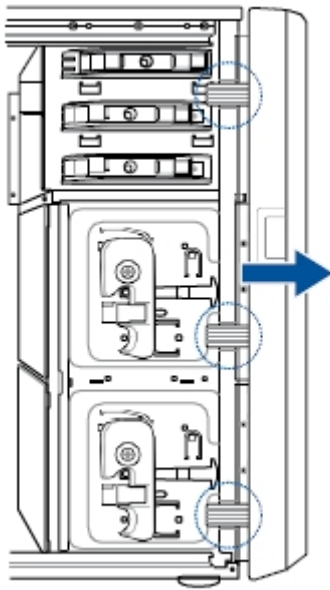
## Front Panel Assembly

Before you can install a 5.25-inch drive, you should first remove the front panel assembly (front bezel and front panel cover).

### Removing the Front Panel Assembly

To remove the front panel assembly

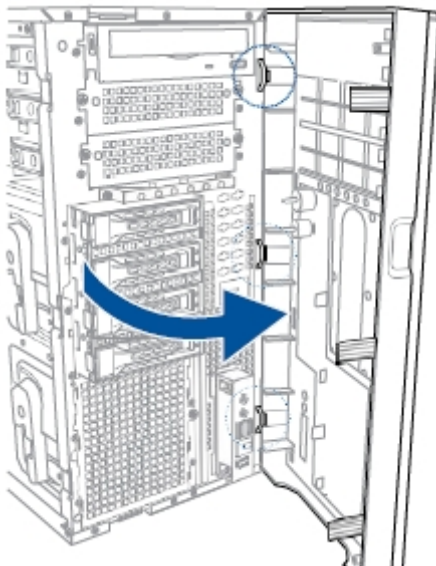
1. Locate the three hooked tabs on the chassis side rail.
2. Shift the hooked tabs and take off the front bezel.



### Reinstalling the Front Panel Assembly

To reinstall the front panel assembly:

1. Hook the other side of the front panel assembly to the chassis.
2. Swing the front panel assembly and snap it back into place.



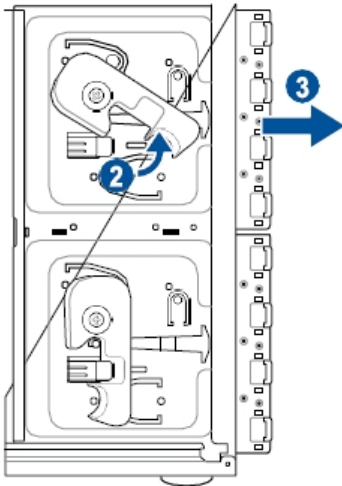
## SATA/SAS hard disk drives

Each hard disk drive module, including externally removable trays for mounting four hot-swap SATA/SAS hard disk drives, allows you to access the drive trays by simply opening the front bezel.

An HDD module cage comes with a SATA or SAS backplane. Take note of the type of HDD module cage you purchase before buying hard disks.

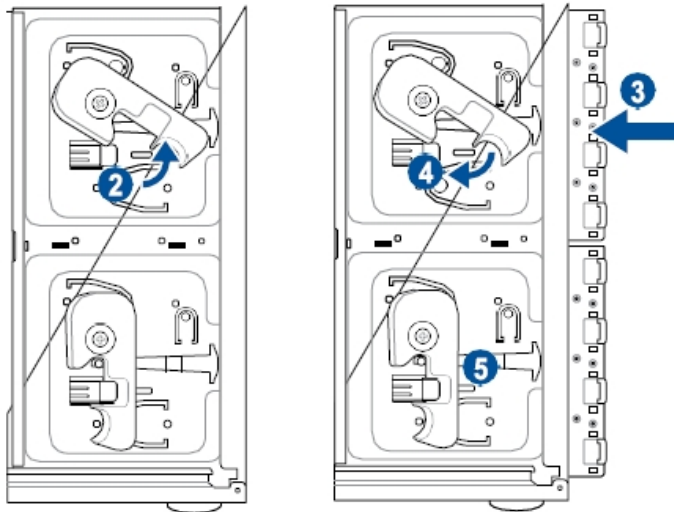
## Removing the HDD module cage

1. Disconnect all the cables from the SATA/SAS backplane on the HDD module cage.
2. Level the HDD module cage latch counterclockwise. The HDD module cage will be pushed out of the chassis.
3. Remove the HDD module cage.



## Installing the HDD module cage

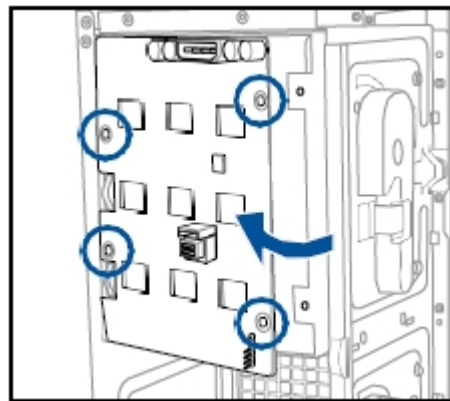
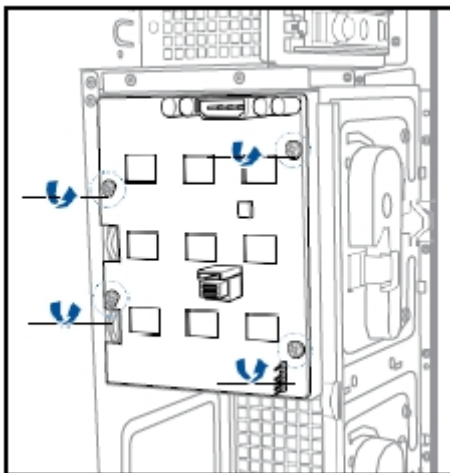
1. Find a HDD tray. Locate an empty bay and insert the HDD tray into the bay.
2. Level the HDD module cage latch counterclockwise.
3. Insert the HDD module cage into the bay.
4. When the HDD module cage is completely inserted, the cage latch will be pushed back clockwise.
5. Lock the cage latch properly.
6. Connect the appropriate cables to the SATA/SAS backplane on the HDD module cage.



### Removing the backplane

**DO NOT** remove the backplane unless necessary!

1. Remove all hot-swap HDD trays from the chassis.
2. Disconnect all cables from the SATA/SAS backplane.
3. Loosen the four screws on the backplane.

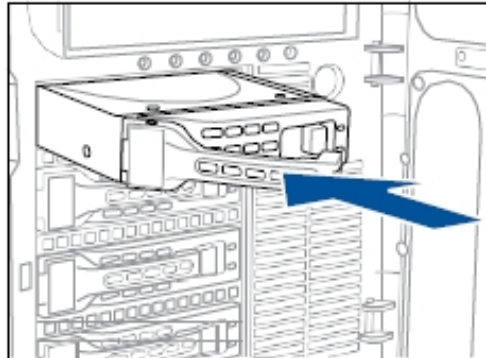
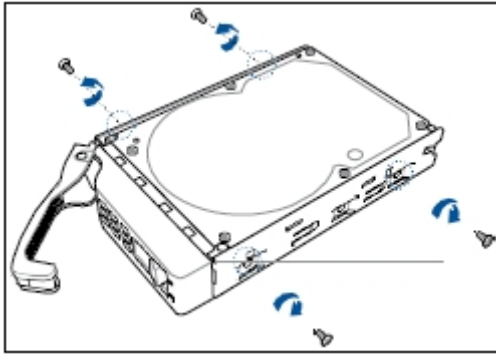


4. Firmly hold the backplane, and turn it in the direction of the arrow.
5. Remove the backplane from the module.

### Installing a hot-swap SATA/SAS hard disk drive

1. Release a drive tray by pushing the spring lock to the right, and then pulling the tray lever outward. The drive tray ejects slightly after you pull out the lever.
2. Firmly hold the tray lever and pull the drive tray out of the bay.
3. Take note of the drive tray holes. Each side has three holes to fit different types of hard disk drives. Use two screws on each side to secure the hard disk drive.
4. Place a SATA/SAS hard disk drive on the tray, and then secure it with four screws.

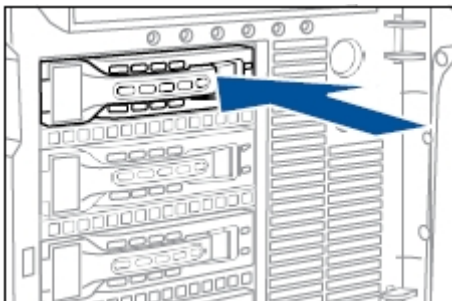
5. Carefully insert the drive tray and push it all the way to the depth of the bay until just a small fraction of the tray edge protrudes.



When installed, the SATA/SAS connector on the drive connects to the SATA/SAS interface on the backplane.

6. Push the tray lever until it clicks, and secures the drive tray in place. The drive tray is correctly placed when its front edge aligns with the bay edge.

7. Repeat steps 1 to 6 if you wish to install a second SATA/SAS drive.

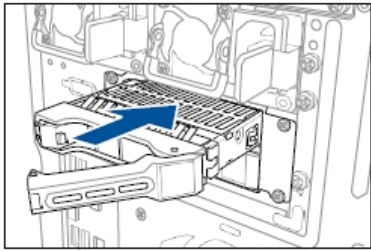


### Installing a 2.5-inch hard disk drive

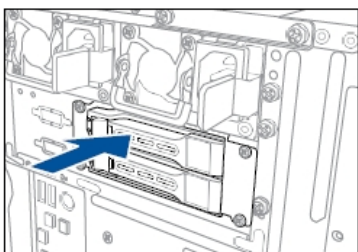
The system comes with two hot-swap 2.5-inch hard disk drives on the rear panel for mounting SATA/SAS or SSD hard disk drives.

To install a 2.5-inch hard disk drive:

1. Release a drive tray by pushing the spring lock to the right, and then pulling the tray lever outward. The drive tray ejects slightly after you pull out the lever.
2. Firmly hold the tray lever and pull the drive tray out of the bay.
3. Place the drive tray on a flat surface.
4. Release the screws on each side of the drive tray to release the drive tray metal beam.
5. Find the hard disk drive you want to install and its bundled screws.
6. Orient and place the SSD into the tray. Ensure that the SSD is fitted firmly inside the drive tray and that the four screws of the SSD matches the four screws holes of the drive tray.
7. Carefully insert the drive tray with its case facing downwards and push it all the way to the drive bay.



8. Lock the secure tab to secure the drive tray in place.
9. Repeat steps 1 to 8 to install other 2.5-inch hard disk drives.



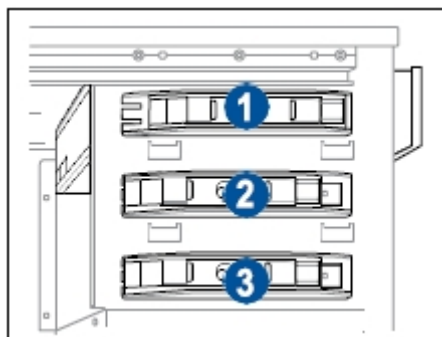
### 5.25-inch or 3.5-inch drives

Ensure to unplug the power cable before installing or removing any system components. Failure to do so may cause damage to the motherboard and other system components!

The system comes with three 5.25-inch drive bays located on the upper front part of the chassis. An optical drive that comes standard with the system package occupies the upper most bay (labeled 1). The lower bays (labeled 2 and 3) are available for additional 5.25-inch drives or 5.25-inch to 3.5-inch hard drive adapter for installing 3.5-inch zip or floppy disk drives.

### Installing a 5.25-inch drive

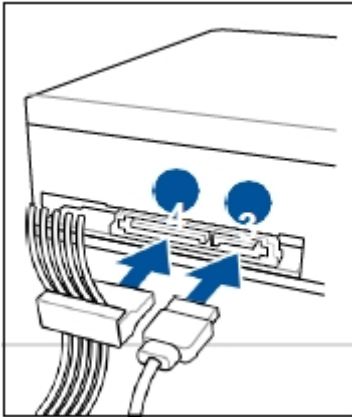
1. Unscrew and remove the metal cover of the bay where you want to install the 5.25-inch drive.
2. Insert the drive into the bay and slide the bay lock to the right until it clicks in place.



3. Connect the SATA cable to the SATA connector on the back of the drive.
4. Connect the 4-pin power connector from the power supply to the power connector on the back of the drive.



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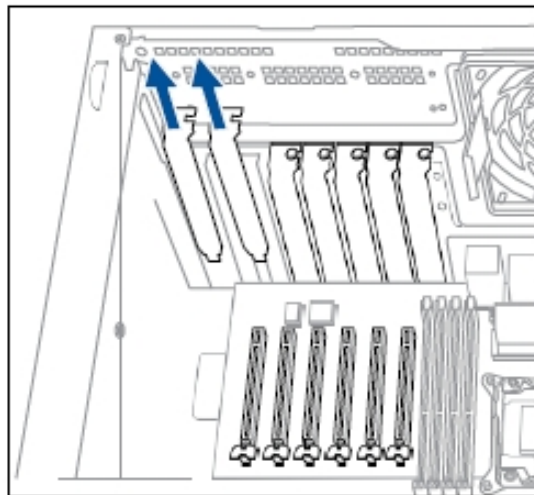
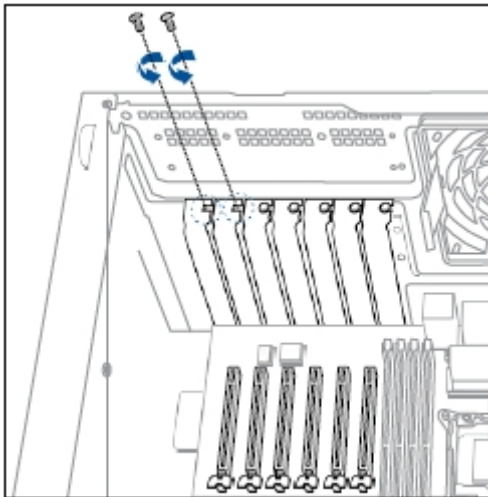
## Expansion slots

Remove the metal slot cover before installing an expansion card.

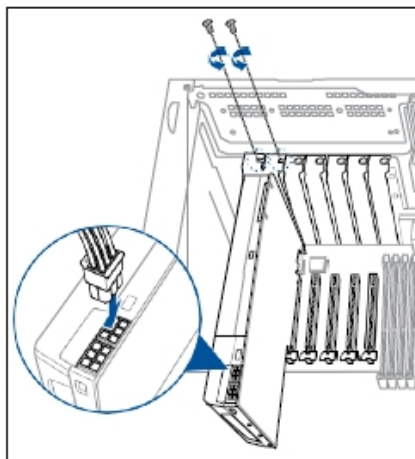
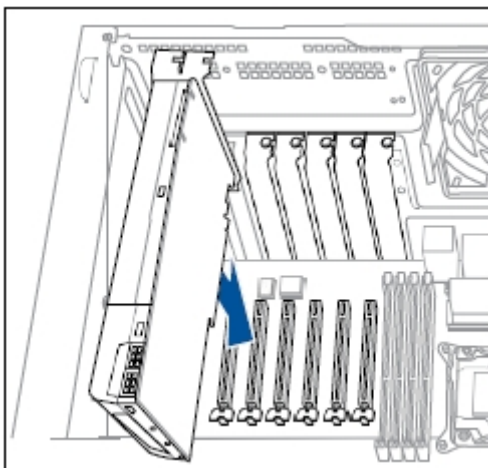
Ensure to unplug the power cord before installing or removing expansion cards. Failure to do so may cause severe damage to the motherboard and other system components!

### Installing an expansion card

1. Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.
2. Remove the side chassis cover. Lay the system on its side on a flat, stable surface.
3. Release the screws on the metal slot cover where you wish to install the expansion card.
4. Remove the metal slot cover.



5. Align the card's golden fingers with the slot, and then press firmly until the card is completely seated on the slot.



6. Secure the expansion card with the screws that you removed earlier in step 3.
7. When installing a PCIe x16 graphics card that requires external power supply, connect the 6+2 pin connector of the bundled power cable to the graphics card.

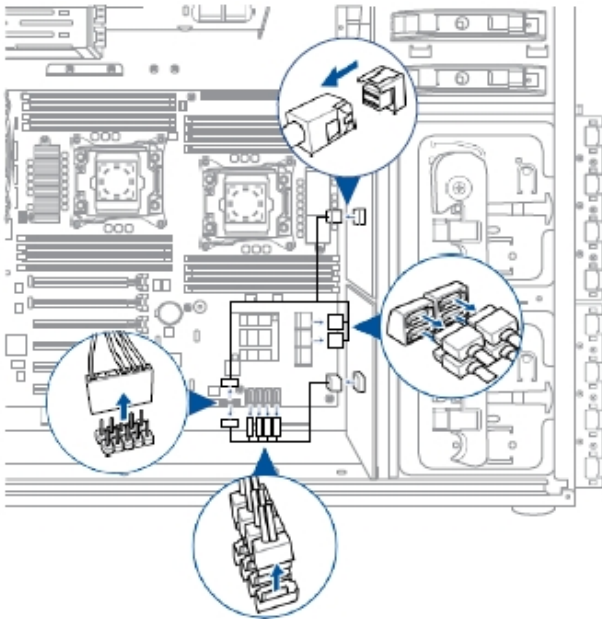
The 6+2 pin power is an option

8. Connect the 8-pin ATX power connector of the power cable to the power supply module to get external power supply.

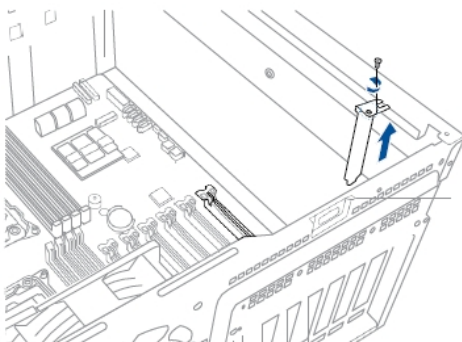
### Installing a RAID controller card

You can install a RAID controller card on the provided PCI-E slot onboard. To install a RAID controller card:

1. Remove the default cable from the motherboard and the backplane.



2. Remove the screw on the metal cover and then remove the metal cover, put them a side for future use.



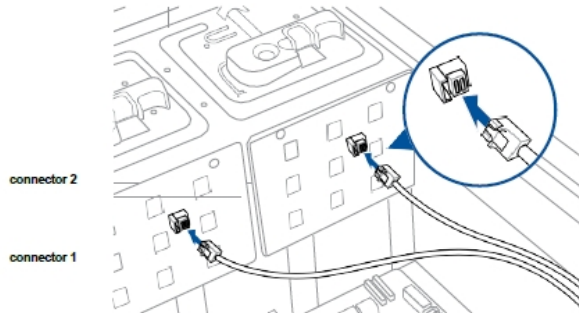
3. Prepare your RAID controller card.

4. Insert the expansion card into the PCI-E slot. Ensure that the golden fingers are totally inserted into the slot.

5. Connect the two mini-SAS HD cables to the RAID controller card.



6. Connect connector 1 on the RAID controller card to connector 1 on the backplane and connector 2 on the RAID controller card to connector 2 on the backplane using two mini- SAS

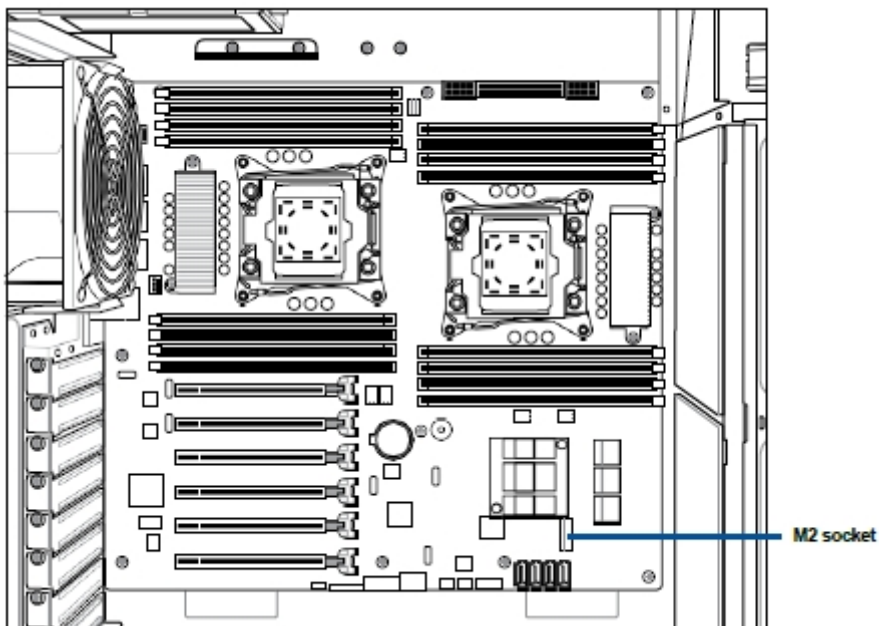


HD cables.

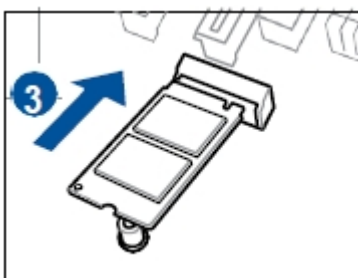
### Installing an M.2 expansion card

You can install an M.2 expansion card on the provided M.2 socket (labeled M2) onboard. To install an M.2 expansion card:

1. Remove the screw on the M.2 socket and set it aside.
2. Find your M.2 expansion card.



3. Align and insert the M.2 card into the M.2 slot onboard as shown.
4. Secure the M.2 card with a screw that you removed earlier in step 1.

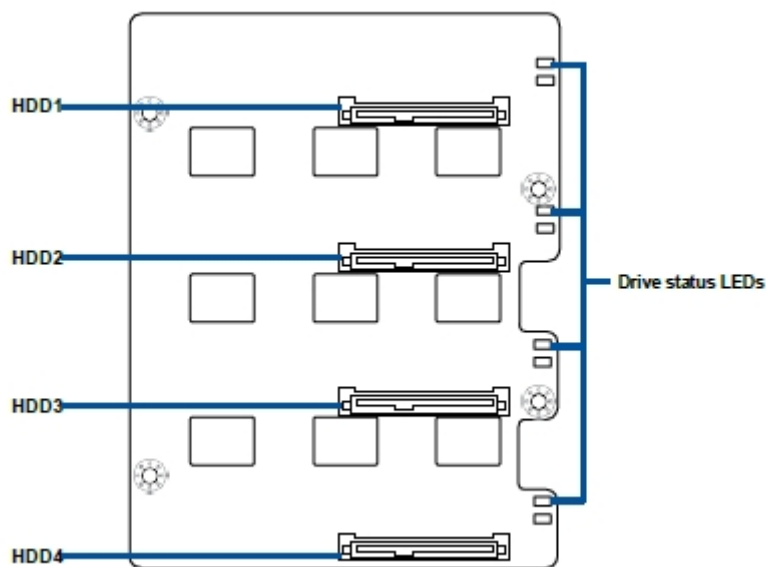


### SATA/SAS backplane cabling

The system comes with a pre-installed SATA/SAS backplane. The SATA/SAS backplane has four 22-pin SATA/SAS connectors to support Serial ATA hard disk drives and SAS hard disk drives. The backplane design incorporates a hot-swap feature to allow easy connection or removal of SATA/SAS hard disks. The LEDs on the backplane connect to the front panel LEDs to indicate HDD status.

### Front side

The front side of the SATA/SAS backplane faces the front panel when installed. This side includes four SATA/SAS connectors for the hot-swap drive trays.

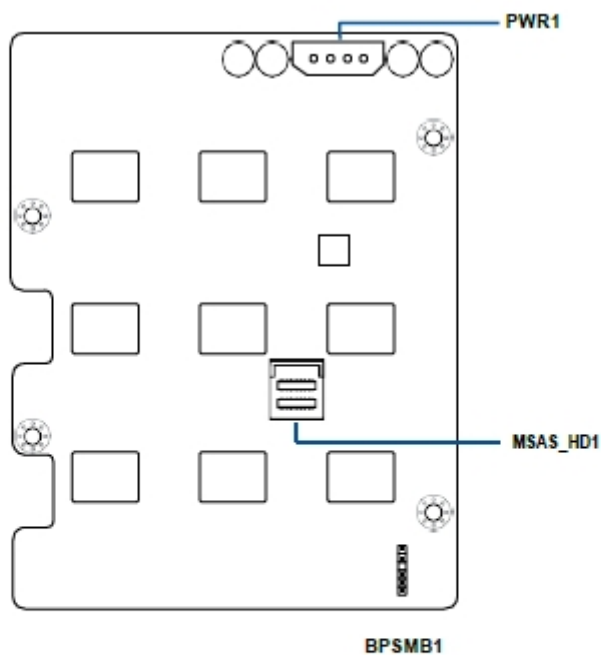


Each SATA/SAS connector is labeled (HDD1, HDD2, HDD3, HDD4) so you can easily determine their counterpart connectors at the backside of the backplane. Refer to the table for reference.

HDD Device	Front side connector	Back side connector
HDD 1	HDD1	CON1
HDD 2	HDD2	CON2
HDD 3	HDD3	CON3
HDD 4	HDD4	CON4

## Back side

The back side of the SATA/SAS backplane faces the rear panel when installed. This side includes the power connectors and SATA/SAS interfaces for the motherboard Serial ATA connectors or the SAS card.



Connectors	Description
MSAS_HD1	Connects to SATA SGPIO1 connector on the motherboard or connects to SATA/SAS connectors on the ASUIS PIKE II card
BPSMB1	Connects to AUX_PANEL1 connector on the motherboard
PWR1	Connects to 4-pin plug of the power supply

## Removable components

You may need to remove previously installed system components when installing or removing system devices, or when you need to replace defective components. This section tells how to remove the following components:

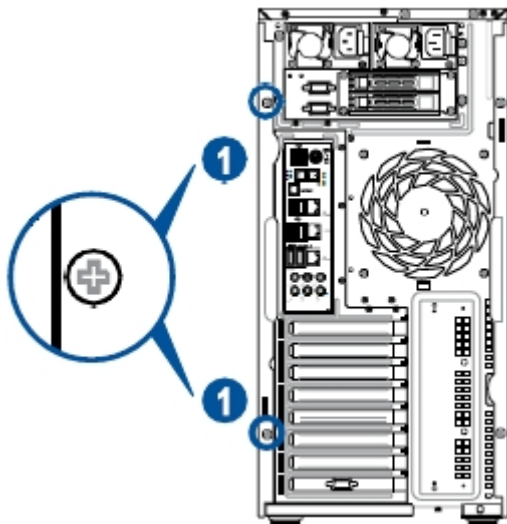
1. System fans (front and rear)
2. Redundant power supplymodule
3. Chassis footpads

### System fans

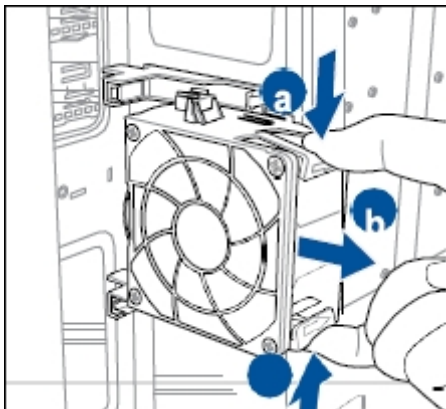
#### Removing the front system fan

To remove the front system fan:

1. Remove the two screws that secure the right side cover. Then remove the side cover.



2. Locate the front system fan near the 5.25-inch drive bays.
3. Squeeze the front system fan latches (step a) and pull out the front system fan (step b), as shown in the right figure.
4. Follow the previous instructions in reverse to reinstall the front system fan.



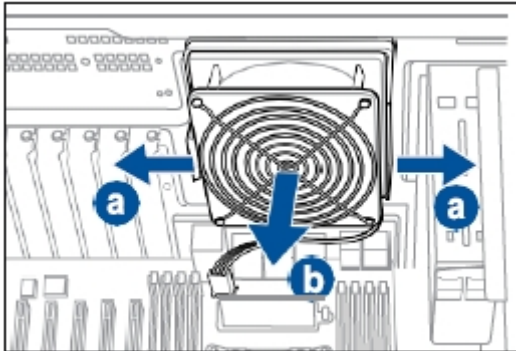


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## Removing the rear system fan

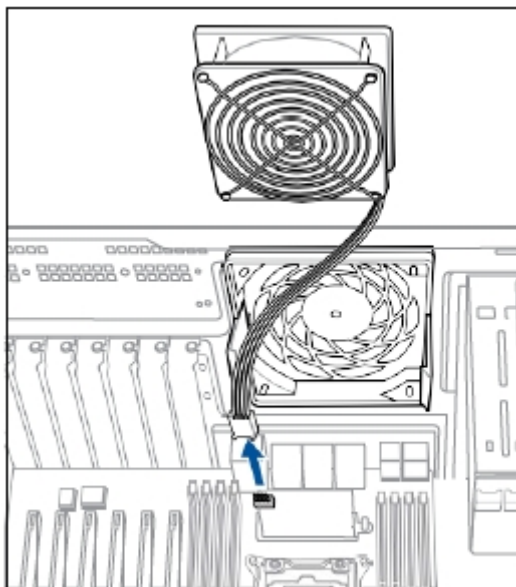
To remove the rear system fan:

1. Squeeze the front system fan latches (step a) and pull out the front system fan (step b), as shown in the figure below.



2. Unplug the system fan cable from the REAR\_FAN1 connector on the motherboard.

3. Carefully remove the system fan.

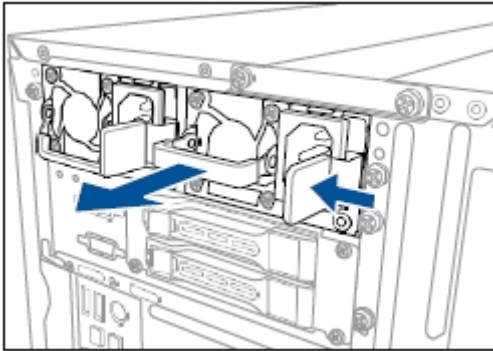


Follow the previous instructions in reverse to reinstall the rear system fan.

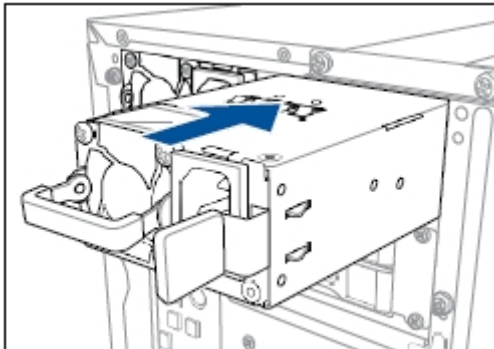
## Redundant power supply module

To install the redundant power supply module:

1. Locate the redundant power supply you want to remove on the rear panel of your chassis. Move the handle on it upward.
2. Press the latch to the left and pull the power supply module out of the system chassis.



3. Insert the replacement power supply module into the chassis. You will hear a sound when the power supply module is secured in place.

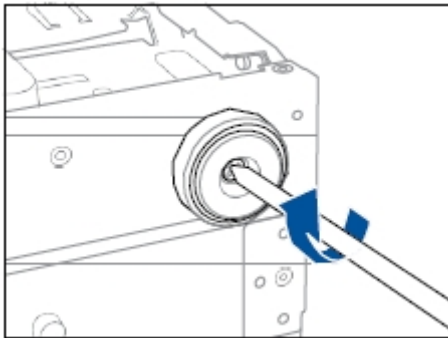


## Chassis footpads

The barebone server system is shipped with four footpads attached to the bottom of the chassis for stability. You need to remove these footpads if you wish to install the system to a rack.

To remove the footpads:

1. Lay the system chassis on its side.
2. Remove the footpad by rotating it counterclockwise with a Philips (cross) screwdriver.
3. Repeat steps 1 and 2 to remove the other three footpads.





## Installation Options

This chapter describes how to install the optional components and devices into the barebone server.

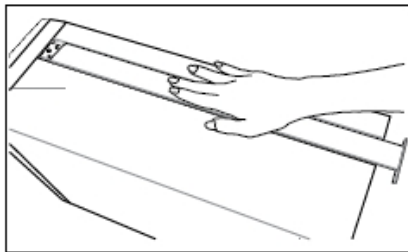
### Preparing the system for rack mounting

- The items required for the optional configurations described in this chapter are not included in the standard GRAFENTHAL system package. These items are purchased separately.
- We recommend that you allot at least 1U space above the server system to ensure optimal thermal performance.

### Removing the footpads

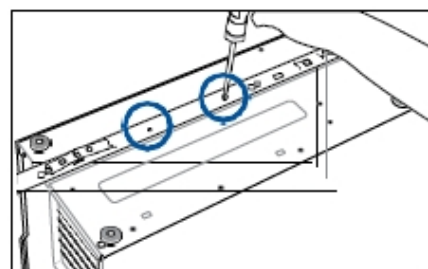
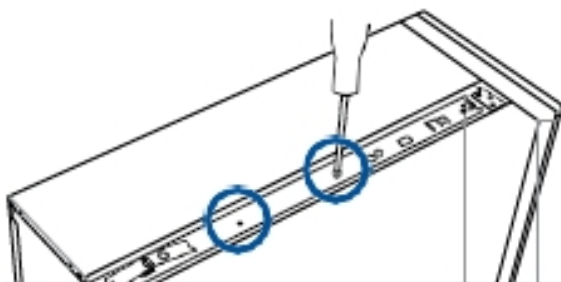
#### Removing the top cover

Unscrew and slide the top cover toward the rear panel, and then lift it up from the chassis.

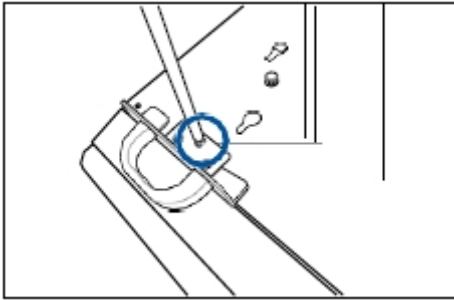


### Attaching the inner rail to the server

1. Press the lock on side of the rail and slide the inner rail out from the rackmount rail kit.
2. Slide the inner rail into the rail on top of the chassis.
3. Align the screw holes on the inner rail and the chassis top, and then secure the inner rail to the chassis top with screws.



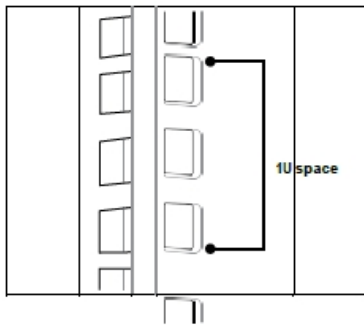
4. Repeat the previous steps to secure the other inner rail to the bottom of the chassis with screws.
5. Use three screws to secure the side hooks to both rails.



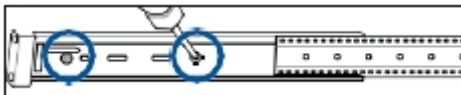
### Attaching the rails to the rack

To attach the rails to the rack:

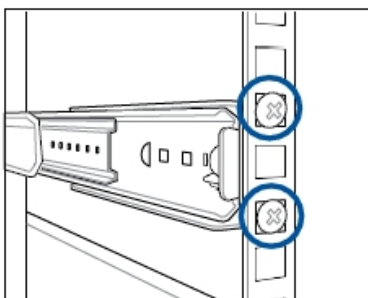
1. Select one unit of space(1U) on the GRAFENTHAL rack where you wish to install the server.



2. Drive in two screws on the rack rails.



3. Align the front end holes of a rack rail pair to the 1U space.
4. Drive in two screws on the outer holes to secure the frontend.

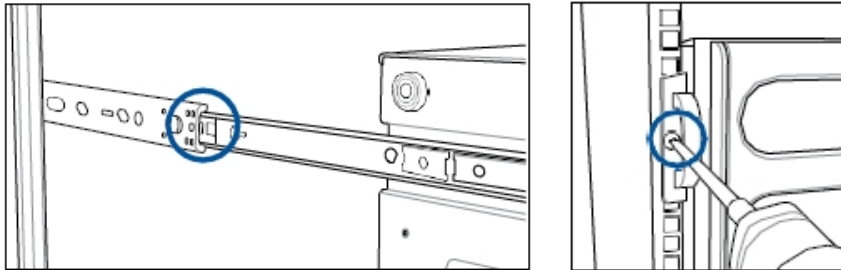


5. Find the rear 1U space that corresponds to the front 1U space where you attached the rail. Drive in two screws on the outer holes to secure the rear end.
6. From the rack front, find the corresponding 1U space for the second rail pair.
7. Repeat steps 3–6 to attach the second rail pair.

### Mounting the server to the rack

To mount the server to the rack:

1. Align the server rails with the rack rails.
2. Press the lock on side of the rail and slide the server into the rack.



3. When the server is fully slide into the rack, secure both sides using screws.

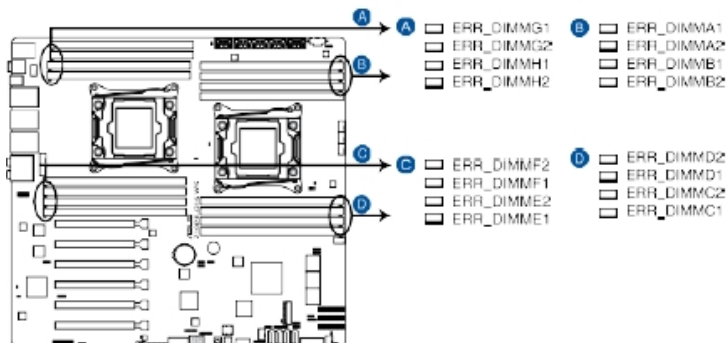
## Motherboard Info

This chapter includes the motherboard layout and brief descriptions of the jumpers and internal connectors.

### Onboard LEDs

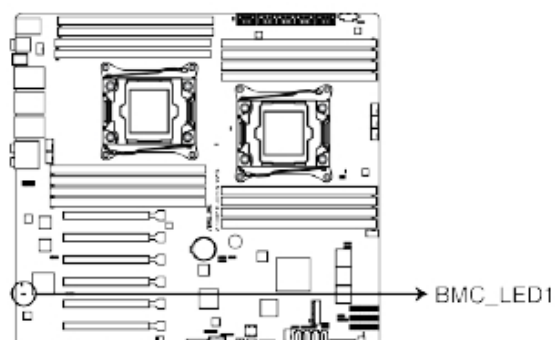
**Memory Error LED** (ERR\_DIMMA1, ERR\_DIMMB1, ERR\_DIMMC1, ERR\_DIMMD1, ERR\_DIMME1, ERR\_DIMMF1, ERR\_DIMMG1, ERR\_DIMMH1)

These LEDs light up to indicate an error in its nearby DIMM.



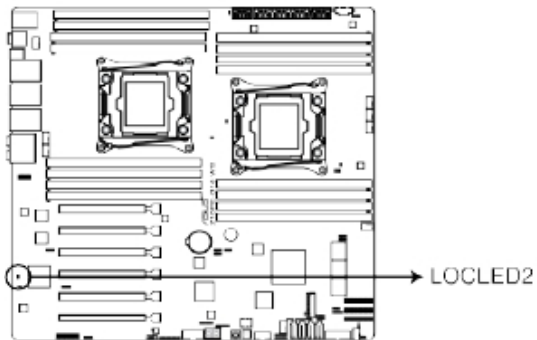
### Baseboard Management Controller LED (BMC\_LED1)

The BMC LED works with the management device and indicates its initiation status. When the PSU is plugged and the system is OFF, management device starts system initiation for about one (1) minute. The BMC LED blinks after system initiation finishes.



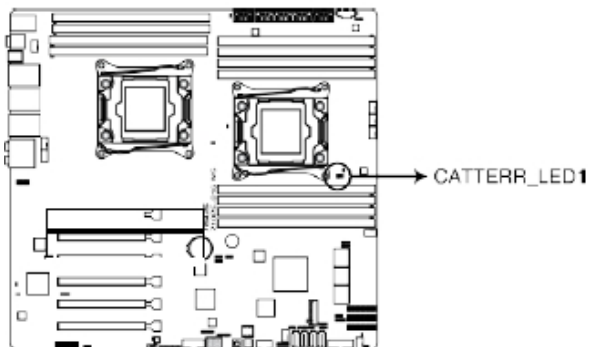
### Location LED (LOCLED2)

This onboard LED lights up when the Location button on the server is pressed or when triggered by a system management software. The Location LED helps visually locate and quickly identify the server in error on a server rack.



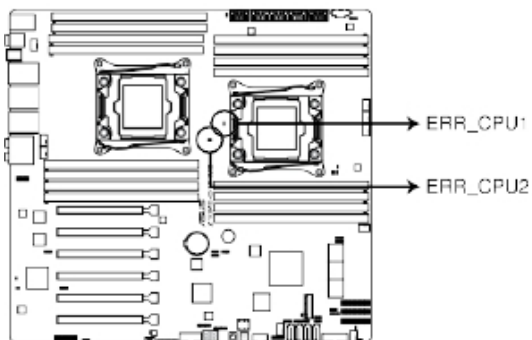
### CATT LED (CATTERR\_LED1)

The CATTLED indicates that the system has experienced a fatal or catastrophic error and cannot continue to operate.



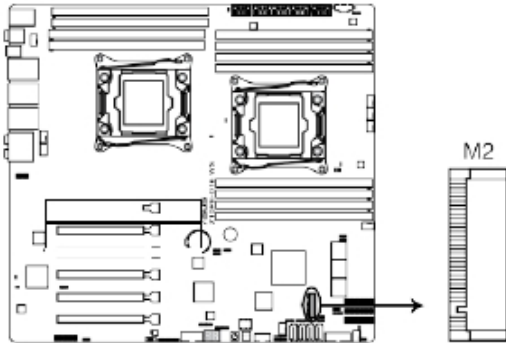
### CPU Warning LED (ERR\_CPU1, ERR\_CPU2)

The CPU warning LEDs light up to indicate failure on either CPU1, CPU2, or both.



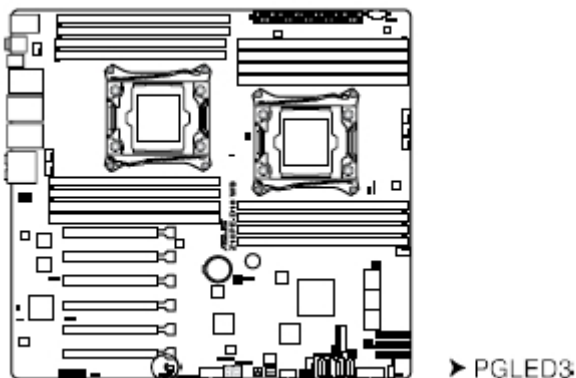
### M2 LED (M2\_LED)

This LED lights up to indicate that the installed M.2 (NGFF) card is being accessed.



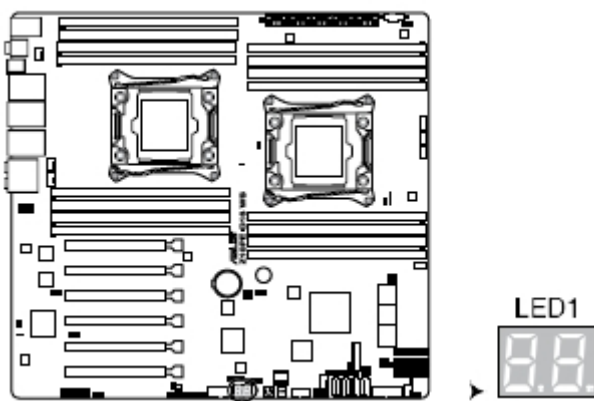
### Dr. Power LED (PGLED3)

This LED near the Dr. Power switch lights up when the Dr. Power switch is on Enable.



### Q-Code LED (LED1)

The Q-Code LED design provides you the 2-digit display, allowing you to know the system status. Refer to the Q-code table below for details.



## Q-Code table

Code	Description
00	Not used
01	Power on. Reset type detection (soft/hard).
02	AP initialization before microcode loading
03	System Agent initialization before microcode loading
04	PCH initialization before microcode loading
06	Microcode loading
07	AP initialization after microcode loading
08	System Agent initialization after microcode loading
09	PCH initialization after microcode loading
0A	Initialization after microcode loading
0B	Cache initialization
0C – 0D	Reserved for future AMI SEC error codes
0E	Microcode not found
0F	Microcode not loaded
10	PEI Core is started
11 – 14	Pre-memory CPU initialization is started
15 – 18	Pre-memory System Agent initialization is started
19 – 1C	Pre-memory PCH initialization is started
2B – 2F	Memory initialization
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32 – 36	CPU post-memory initialization
37 – 3A	Post-Memory System Agent initialization is started Post-Memory PCH initialization is started
3B – 3E	
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
54	Unspecified memory initialization error
55	Memory not installed
56	Invalid CPU type or Speed
57	CPU mismatch
58	CPU self test failed or possible CPU cache error
59	CPU micro-code is not found or micro-code update is failed
5A	Internal CPU error
5B	Reset PPI is not available
5C – 5F	Reserved for future AMI error codes
E0	S3 Resume is started (S3 Resume PPI is called by the DXE IPL)

<b>E1</b>	S3 Boot Script execution
<b>E2</b>	Video repost
<b>E3</b>	OS S3 wake vector call
<b>E4 – E7</b>	Reserved for future AMI progress codes
<b>E8</b>	S3 Resume Failed
<b>E9</b>	S3 Resume PPI not Found
<b>EA</b>	S3 Resume Boot Script Error
<b>EB</b>	S3 OS Wake Error
<b>EC – EF</b>	Reserved for future AMI error codes
<b>F0</b>	Recovery condition triggered by firmware (Auto recovery)
<b>F1</b>	Recovery condition triggered by user (Forced recovery)
<b>F2</b>	Recovery process started
<b>F3</b>	Recovery firmware image is found
<b>F4</b>	Recovery firmware image is loaded
<b>F5 – F7</b>	Reserved for future AMI progress codes
<b>F8</b>	Recovery PPI is not available
<b>F9</b>	Recovery capsule is not found
<b>FA</b>	Invalid recovery capsule
<b>FB – FF</b>	Reserved for future AMI error codes
<b>60</b>	DXE Core is started
<b>61</b>	NVRAM initialization
<b>62</b>	Installation of the PCH Runtime Services
<b>63 – 67</b>	CPU DXE initialization is started
<b>68</b>	PCI host bridge initialization
<b>69</b>	System Agent DXE initialization is started
<b>6A</b>	System Agent DXE SMM initialization is started
<b>6B – 6F</b>	System Agent DXE initialization (System Agent module specific)
<b>70</b>	PCH DXE initialization is started
<b>71</b>	PCH DXE SMM initialization is started
<b>72</b>	PCH devices initialization
<b>73 – 77</b>	PCH DXE Initialization (PCH module specific)
<b>78</b>	ACPI module initialization
<b>79</b>	CSM initialization
<b>7A – 7F</b>	Reserved for future AMI DXE codes
<b>90</b>	Boot Device Selection (BDS) phase is started
<b>91</b>	Driver connecting is started
<b>92</b>	PCI Bus initialization is started
<b>93</b>	PCI Bus Hot Plug Controller Initialization
<b>94</b>	PCI Bus Enumeration
<b>95</b>	PCI Bus Request Resources
<b>96</b>	PCI Bus Assign Resources
<b>97</b>	Console Output devices connect
<b>98</b>	Console input devices connect
<b>99</b>	Super IO Initialization
<b>9A</b>	USB initialization is started

9B	USB Reset
9C	USB Detect
9D	USB Enable
9E – 9F	Reserved for future AMI codes
A0	IDE initialization is started
A1	IDE Reset
A2	IDE Detect
A3	IDE Enable
A4	SCSI initialization is started
A5	SCSI Reset
A6	SCSI Detect
A7	SCSI Enable
A8	Setup Verifying Password
A9	Start of Setup
AA	Reserved for ASL (see ASL Status Codes section below)
AB	Setup Input Wait
AC	Reserved for ASL (see ASL Status Codes section below)
AD	Ready To Boot event
AE	Legacy Boot event
AF	Exit Boot Services event
B0	Runtime Set Virtual Address MAP Begin
B1	Runtime Set Virtual Address MAP End
B2	Legacy Option ROM Initialization
B3	System Reset
B4	USB hot plug
B5	PCI bus hot plug
B6	Clean-up of NVRAM
B7	Configuration Reset (reset of NVRAM settings)
B8– BF	Reserved for future AMI codes
D0	CPU initialization error
D1	System Agent initialization error
D2	PCH initialization error
D3	Some of the Architectural Protocols are not available
D4	PCI resource allocation error. Out of Resources
D5	No Space for Legacy Option ROM
D6	No Console Output Devices are found
D7	No Console Input Devices are found
D8	Invalid password
D9	Error loading Boot Option (LoadImage returned error)
DA	Boot Option is failed (StartImage returned error)
DB	Flash update is failed
DC	Reset protocol is not available

## ACPI/ASL Checkpoints

Code	Description
0x01	System is entering S1 sleep state



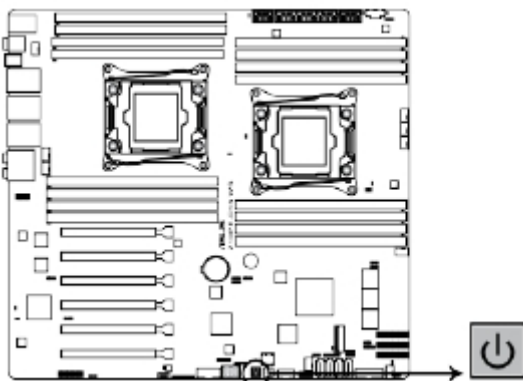
<b>0x02</b>	System is entering S2 sleep state
<b>0x03</b>	System is entering S3 sleep state
<b>0x04</b>	System is entering S4 sleep state
<b>0x05</b>	System is entering S5 sleep state
<b>0x10</b>	System is waking up from the S1 sleep state
<b>0x20</b>	System is waking up from the S2 sleep state
<b>0x30</b>	System is waking up from the S3 sleep state
<b>0x40</b>	System is waking up from the S4 sleep state
<b>0xAC</b>	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
<b>0xAA</b>	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

## Onboard buttons, switches and jumpers

Onboard switches allow you to fine-tune performance when working on a bare or open- case system.

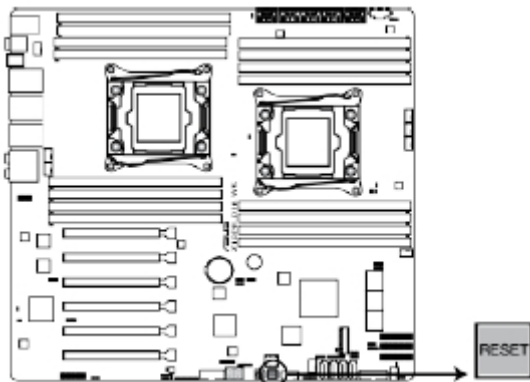
### Power-on

The motherboard comes with a power-on switch that allows you to power up or wake up the system. The switch also lights up when the system is plugged to a power source indicating that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard power-on switch.



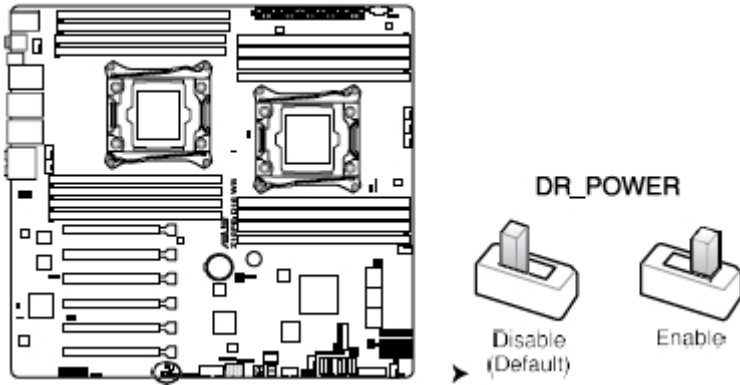
### Reset button (RESET)

Press the reset switch to reboot the system.



### Dr. Power switch (DR\_POWER)

Toggle this switch to enable or disable the Dr. Power feature of the system.



## Jumpers

### Clear RTC RAM (CLRRTC1)

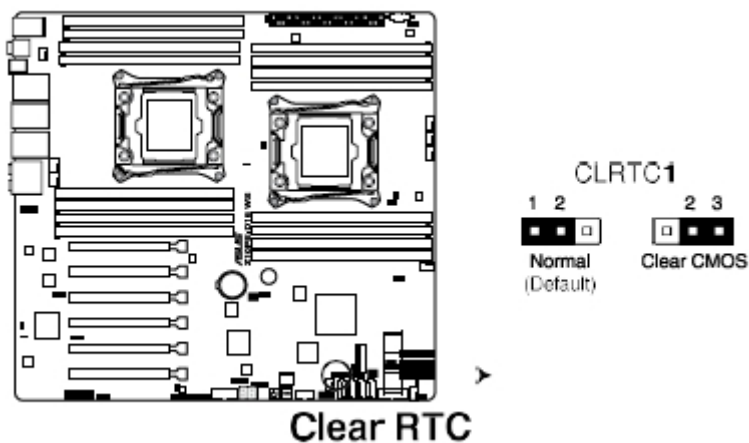
This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from pins 1-2 (default) to pins 2-3. Keep the cap on pins 2-3 for about 5-10 seconds, then move the cap back to pins 1-2.
3. Plug the power cord and turn ON the computer.
4. Hold down the <Del> key during the boot process and enter BIOS setup to re- enter data.

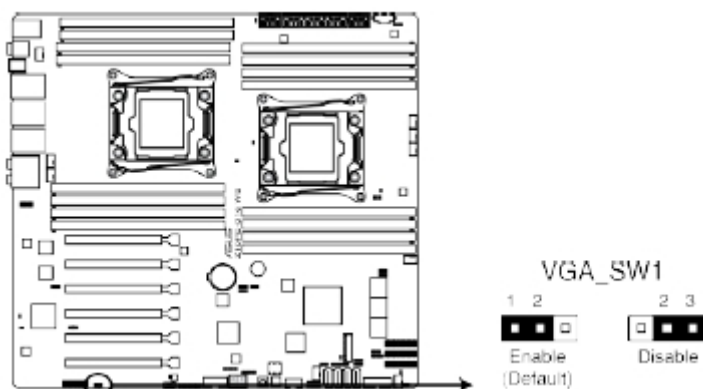
**Except when clearing the RTC RAM, never remove the cap on CLRRTC jumper default position. Removing the cap will cause system boot failure!**

**If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.**



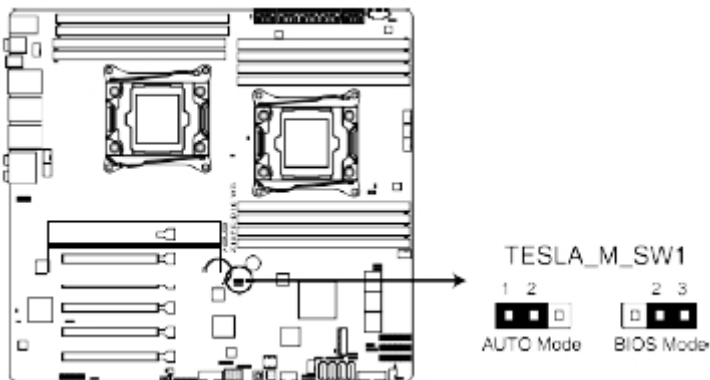
### VGA controller setting (VGA\_SW1)

This jumper allows you to enable to disable the onboard VGA controller. Set to pins 1-2 to activate the VGA feature.



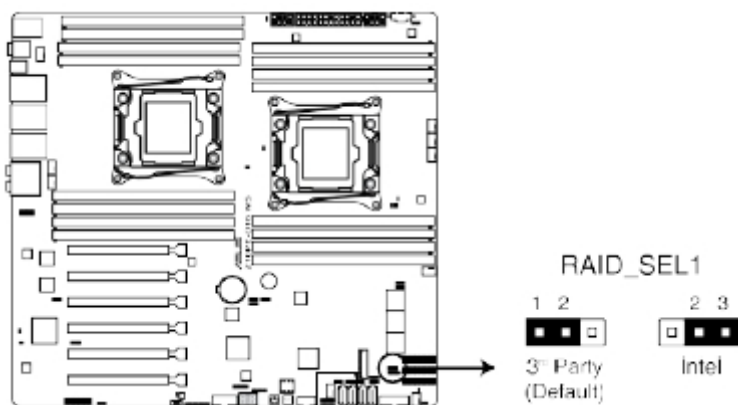
### SMBUS connection setting (TESLA\_M\_SW)

This jumper allows you to select the connection to BMC or PHC for PCIE 1/3/5/7 SMBUS.



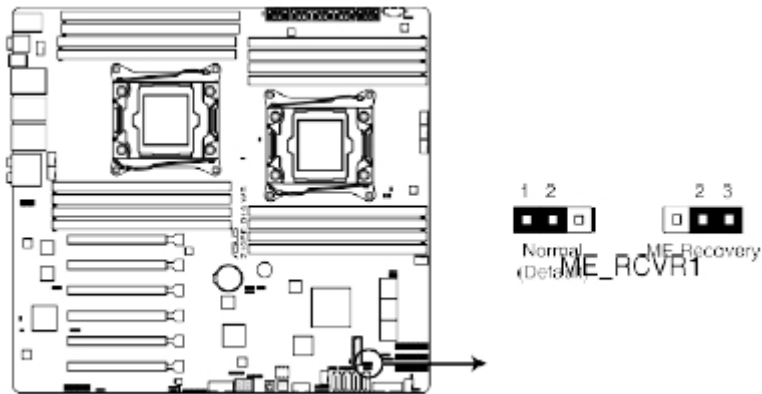
### RAID selection jumper setting (3-pin RAID\_SEL1)

This jumper allows you to select the PCH SATA RAID mode to use LSI MegaRAID software or Intel® Rapid Storage Technology enterprise 3.0 RAID. Place the jumper caps over pins 1-2 if you want to use the LSI MegaRAID software RAID Utility (default); otherwise, place the jumper caps to pins 2-3 to use the Intel® Rapid Storage Technology Enterprise Option ROM Utility.



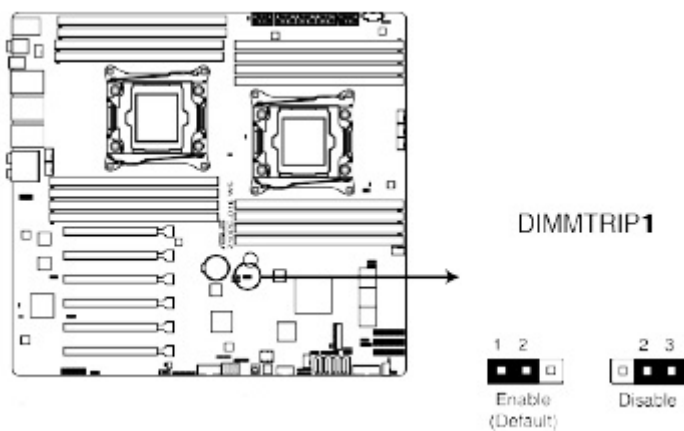
### ME firmware force recovery setting (3-pin ME\_RCVR1)

This jumper allows you to force Intel Management Engine (ME) boot from recovery mode when ME become corrupted.



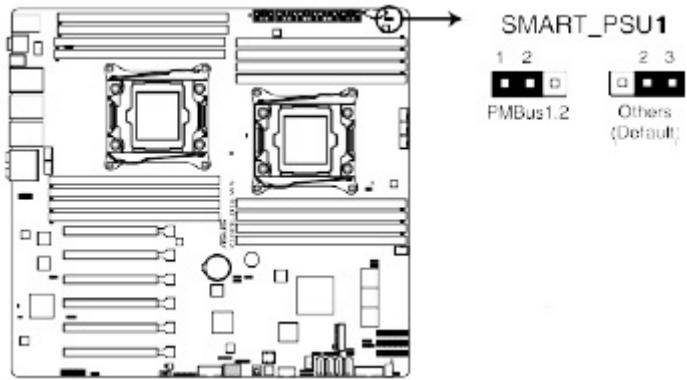
### DDR4 thermal event setting (3-pin DIMMTRIP1)

This jumper allows you to enable or disable DDR4 DIMM thermal sensing event pin.



### PMBus 1.2 PSU select jumper (3-pin SMART\_PSU1)

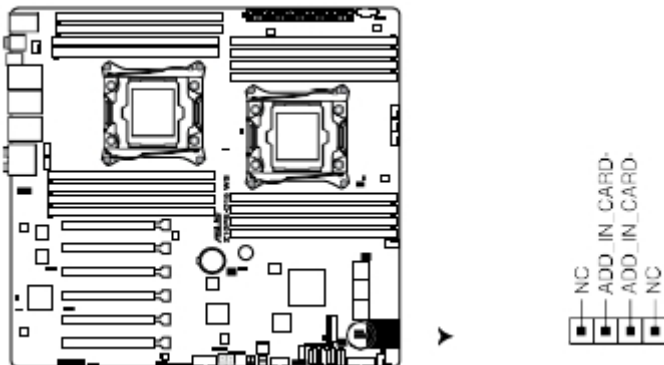
This jumper allows you to select PSU PMBus version. Set to pins 1-2 for PMBus, set to pins 2-3 for others.



## Internal connectors

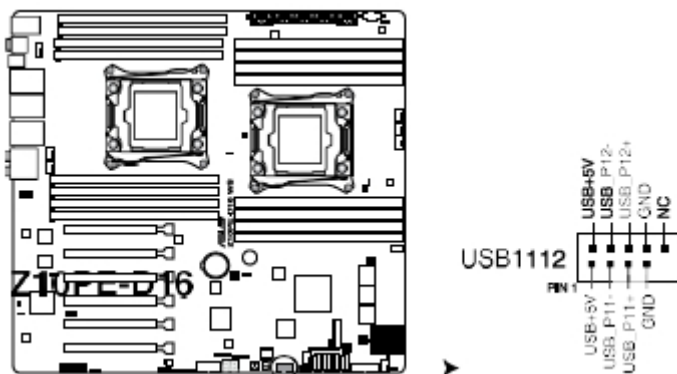
### Hard disk activity LED connector (4-pin HDLED1)

This LED connector is for the storage add-on card cable connected to the SATA or SAS add oncard. The read or write activities of any device connected to the SATA or SAS add-oncard causes the front panel LED to light up.



### USB 2.0 connectors (10-1 pin USB1112)

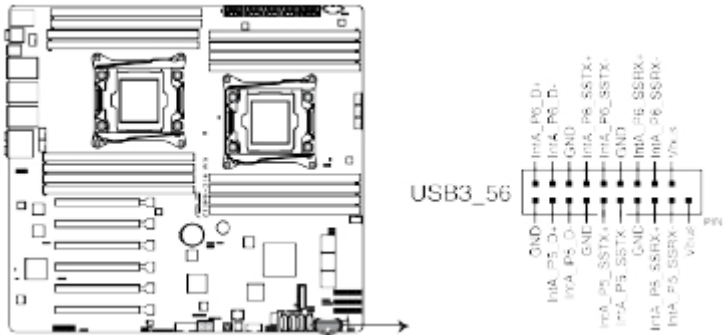
These connectors are for USB 2.0 ports. Connect the USB module cables to connectors USB78 and USB910, then install the modules to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.



### USB 3.0 connector (20-1 pin USB3\_56)

This connector allows you to connect a USB 3.0 module for additional USB 3.0 front or rear panel ports. With an installed USB 3.0 module, you can enjoy all the benefits of USB 3.0 including faster data transfer speeds of up to 5Gbps, faster charging time for USB-chargeable devices, optimized power efficiency, and backward compatibility with USB 2.0.

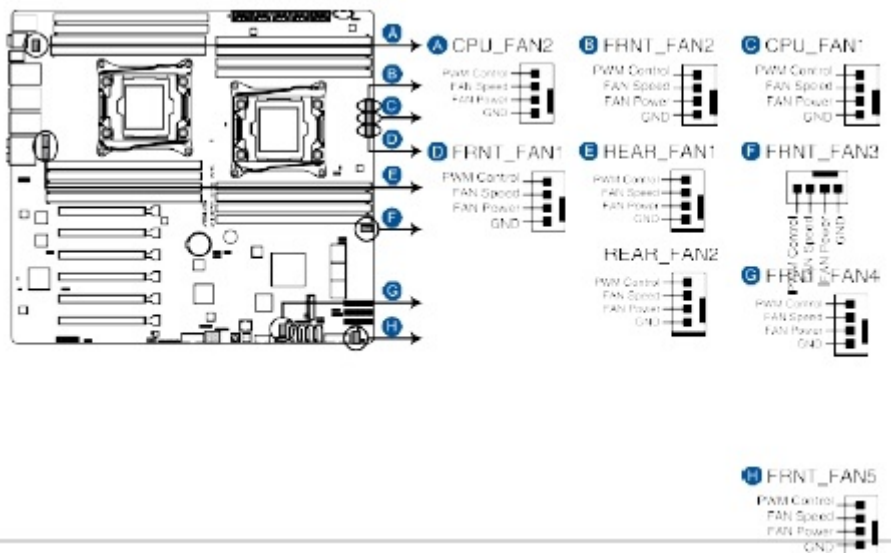




### CPU, front and rear fan connectors (4-pin CPU\_FAN1-2, FRNT\_FAN1-5, REAR\_FAN1-2)

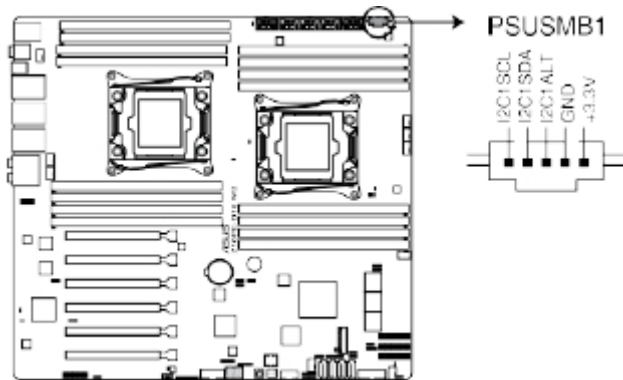
The fan connectors support cooling fans. Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.

- DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components.
- These are not jumpers! DO NOT place jumper caps on the fan connectors!



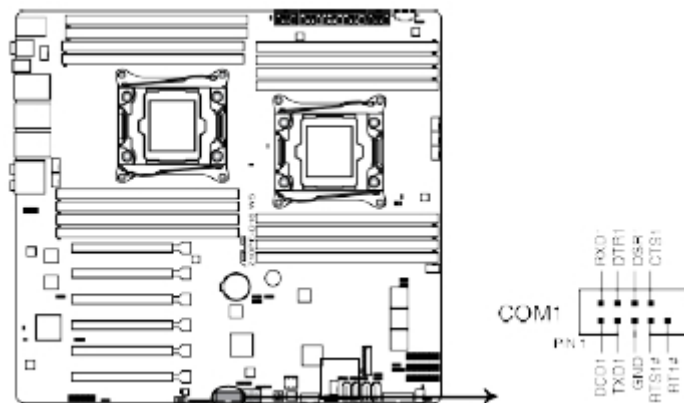
### Power supply SMBus connector (PSUSMB1)

This connector supplies power for low-speed system management communications.



### Serial port connectors (10-1 pin COM1)

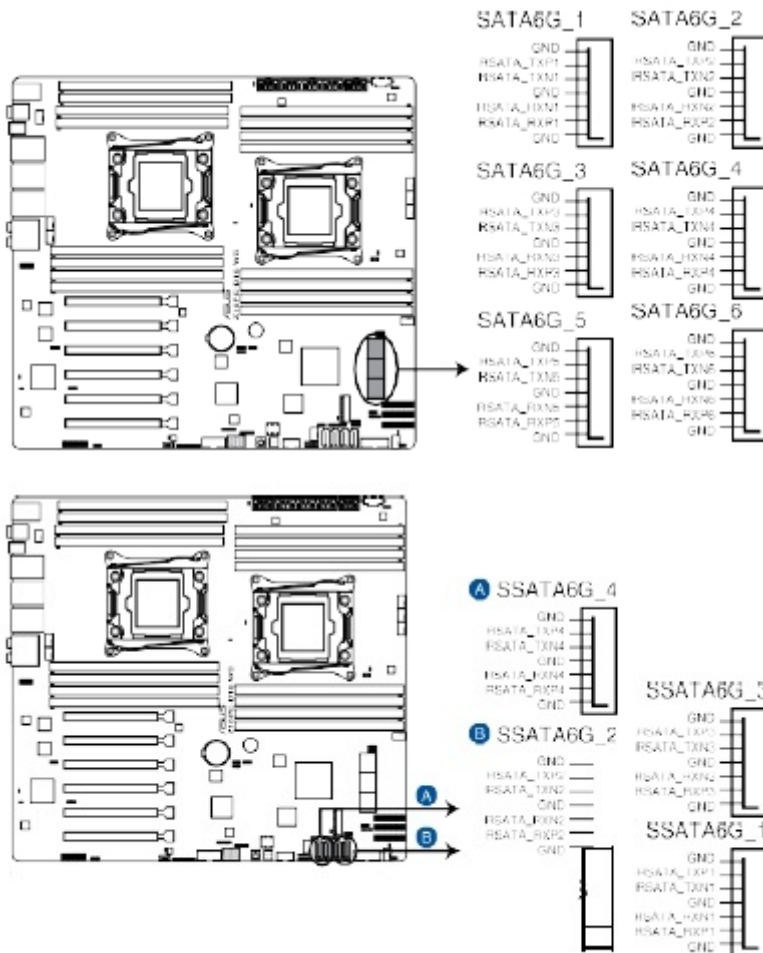
These connectors are for the serial (COM) port. Connect the serial port module cable to one of these connectors, then install the module to a slot opening at the back of the system chassis.



### Serial ATA 6.0/3.0 Gb/s connectors (7-pin SATA\_1-6 [gray], SSATA\_1-4 [gray])

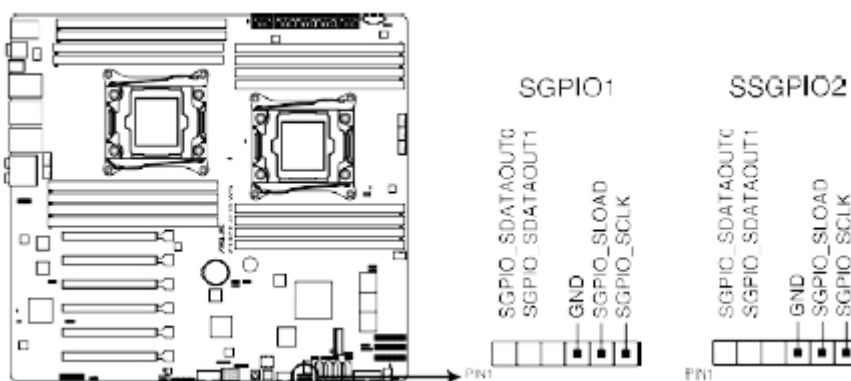
These connectors are for the Serial ATA signal cables for Serial ATA hard disk drives that allows up to 6 Gbps of data transfer rate.

If you installed Serial ATA hard disk drives, you can use a software RAID solution to create a RAID0, RAID1, RAID5, or a RAID10 configuration. For more information on the SATA RAID solutions supported on this motherboard, refer to the RAID Configuration chapter of this user guide.



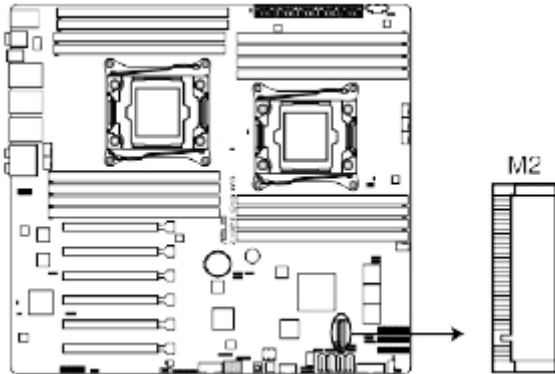
## Serial General Purpose Input/Output connector (6-1 pin SGPIO1, SSGPIO1)

The SGPIO1 and SSGPIO1 connectors are used for the Intel Rapid Storage Technology Enterprise SGPIO interface that controls the LED pattern generation, device information, and general purpose data. SGPIO1 is the jumper for SATA 1-4. SSGPIO1 is the jumper for SSATA1-4.



## M.2 (NGFF) connector (NGFF1)

This connector allows you to install an M.2 device.

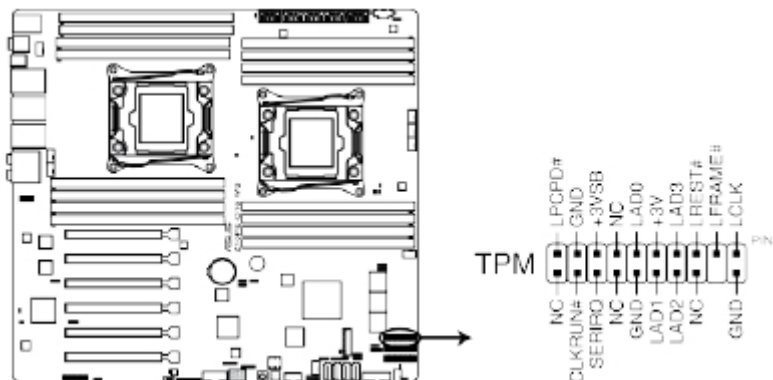


This connector supports type 2260 / 2280 / 22110 devices on both PCI-E and SATA interface.

The M.2 (NGFF) device is purchased separately

## Trusted Platform Module connector (20-1 pin TPM1)

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

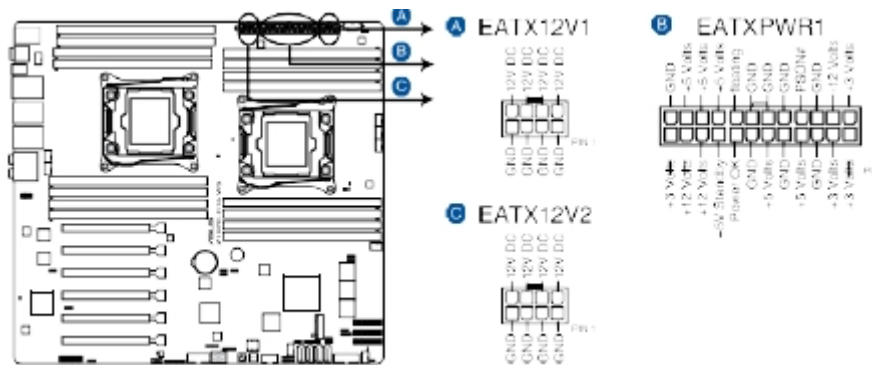


## EATX power connectors (24-pin EATXPWR1; 8-pin EATX12V1/EATX12V2)

These connectors are for an EATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.

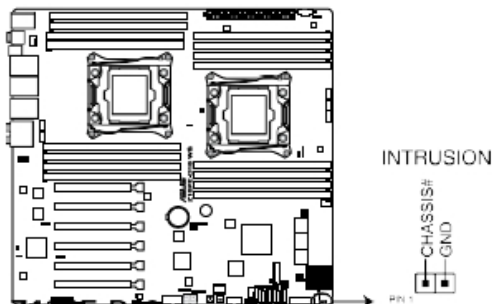
**DO NOT** forget to connect the 24+8+8-pin power plugs; otherwise, the system will not boot up.

- Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- This motherboard supports EATX2.0 PSU or later version.
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system.



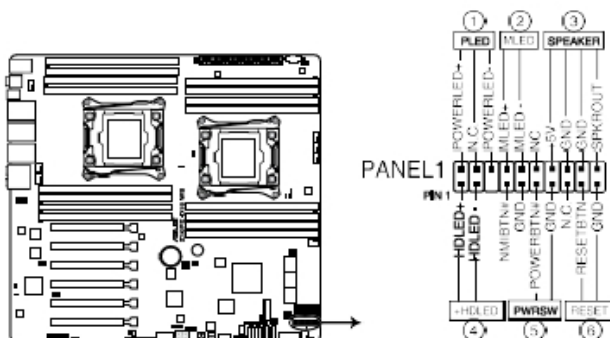
## Chassis Intrusion (2-pin INTRUSION)

These leads are for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high level signal to these leads to record a chassis intrusion event. The default setting is short CHASSIS# and GND pin by jumper cap to disable the function.



## System panel connector (20-pin PANEL1)

This connector supports several chassis-mounted functions.



### (1) System power LED (3-pin PLED)

This 3-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

### (2) Message LED (3-pin PLED)

This 2-pin connector is for the message LED cable that connects to the front message LED. The message LED is controlled by Hardware monitor to indicate an abnormal event occurrence.

### (3) System warning speaker (4-pin SPEAKER)

This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

### (4) Hard disk drive activity LED (2-pin+HDLED)

This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The HDD LED lights up or flashes when data is read from or written to the HDD.

### (5) Power button/soft-off button (2-pin PWRSW)

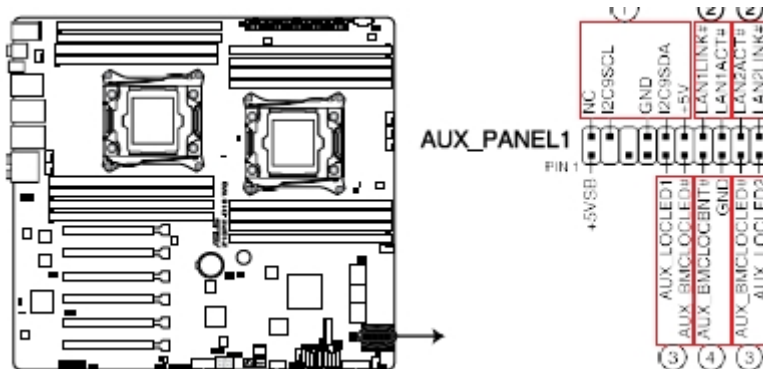
This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

### (6) Reset button (2-pin RESET)

This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

### Auxiliary panel connector (20-2 pin AUX\_PANEL1)

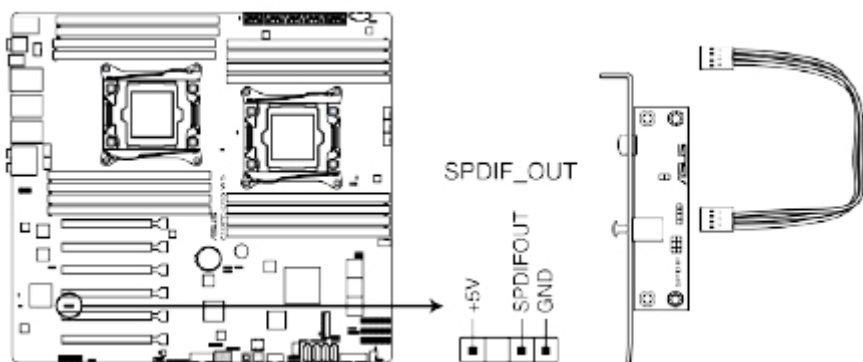
This connector is for additional front panel features including front panel SMB, locator LED and switch, and LAN LEDs.



- (1) Front panel SMB (6-1pin FPSMB)  
These leads connect the front panel SMBus cable.
- (2) LAN activity LED (2-pin LAN12\_LED)  
These leads are for Gigabit LAN activity LEDs on the front panel.
- (3) Locator LED (2-pin LOCATORLED1 and 2-pin LOCATORLED2)  
These leads are for the locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connector. The LEDs will light up when the Locator button is pressed.
- (4) Locator Button/Switch (2-pin LOCATORBTN)  
These leads are for the locator button on the front panel. This button queries the state of the system locator.

### Digital audio connector (4-1 pin SPDIF\_OUT)

This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port(s). Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.



The S/PDIF module is purchased separately.

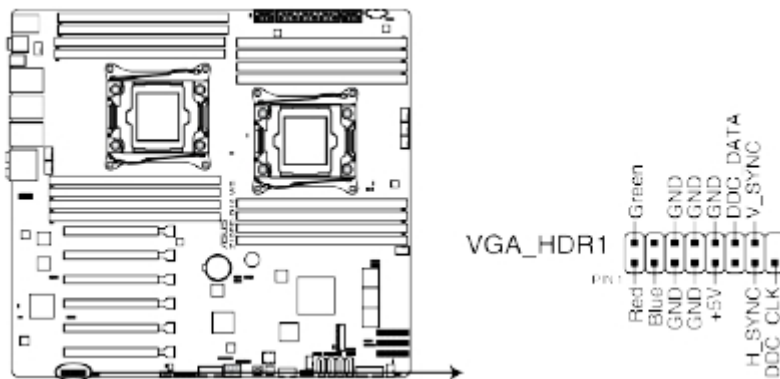


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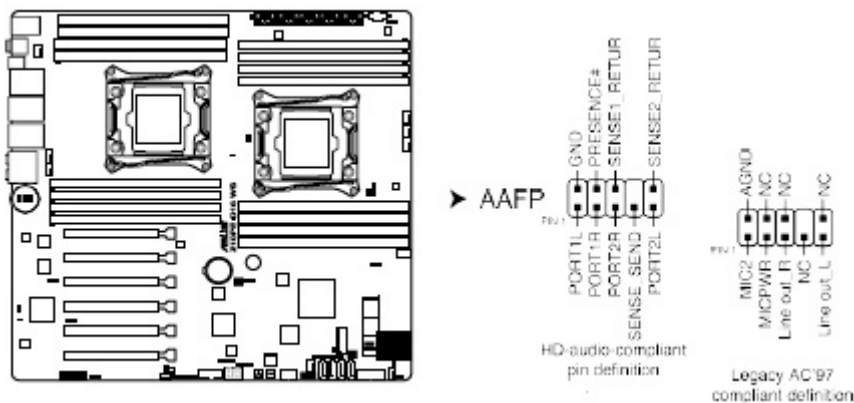
### VGA connector (VGA\_HDR1)

This connector supports the VGA High Dynamic-Range interface.



### Front panel audio connector (10-pin AAFP)

This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC`97 audio standard. Connect one end of the front panel audio I/O module cable to this connector.



- We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.
- If you want to connect a high-definition front panel audio module to this connector, set the Front Panel Type item in the BIOS setup to [HD]; if you want to connect an AC'97 front panel audio module to this connector, set the item to [AC97]. By default, this connector is set to [HD].

## BIOS Setup

This chapter tells how to change the system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

## Managing and updating your BIOS

The following utilities allow you to manage and update the motherboard Basic Input/Output System (BIOS) setup:

1. CrashFree BIOS 3  
To recover the BIOS using a bootable USB flash disk drive when the BIOS file fails or gets corrupted.
  2. EzFlash  
Updates the BIOS using a USB flash disk.
  3. BUPDATER  
Updates the BIOS in DOS mode using a bootable USB flash disk drive.
- Refer to the corresponding sections for details on these utilities.

Save a copy of the original motherboard BIOS file to a bootable USB flash disk drive in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the BUPDATER utility.

### CrashFree BIOS 3 utility

The CrashFree BIOS 3 is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can update a corrupted BIOS file using a USB flash drive that contains the updated BIOS file.

Prepare a USB flash drive containing the updated motherboard BIOS before using this utility.

### Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

1. Insert the USB flash drive with the original or updated BIOS file to one USB port on the system.
2. The utility will automatically recover the BIOS. It resets the system when the BIOS recovery finished.

**DO NOT shut down or reset the system while recovering the BIOS! Doing so would cause system boot failure!**

The recovered BIOS may not be the latest BIOS version for this motherboard. Visit the GRAFENTHAL website at [www.grafentahl.de](http://www.grafentahl.de) to download the latest BIOS file.

## EZ Flash Utility

The EZ Flash Utility feature allows you to update the BIOS without having to use a DOS-based utility.

Before you start using this utility, download the latest BIOS from the GRAFENTHAL website at [www.grafenthal.de](http://www.grafenthal.de)

To update the BIOS using EZ Flash Utility:

1. Insert the USB flash disk that contains the latest BIOS file into the USB port.
2. Enter the BIOS setup program. Go to the Tool menu then select GRAFENTHAL EZ Flash Utility. Press <Enter>.
3. Press<Tab>to switch to the Drive field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, then press <Enter>.
5. Press<Tab>to switch to the Folder Info field.
6. Press the Up/Down arrow keys to find the BIOS file, and then press<Enter> to perform the BIOS update process. Reboot the system when the update process is done.

- This function can support devices such as a USB flash disk with FAT32/16 format and single partition only.
- DO NOT shutdown or reset the system while updating the BIOS to prevent system boot failure!

Ensure to load the BIOS default settings to ensure system compatibility and stability. Press <F5> and select Yes to load the BIOS default settings.

## BIOS setup program

This motherboard supports a programmable firmware chip that you can update using the provided utility described in section 5.1 Managing and updating your BIOS.

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to "RunSetup." This section explains how to configure your system using this utility.

Even if you are not prompted to use the Setup program, you can change the configuration of your computer in the future. For example, you can enable the security password feature or change the power management settings. This requires you to reconfigure your system using the BIOS Setup program so that the computer can recognize these changes and record them in the CMOS RAM of the firmware chip.

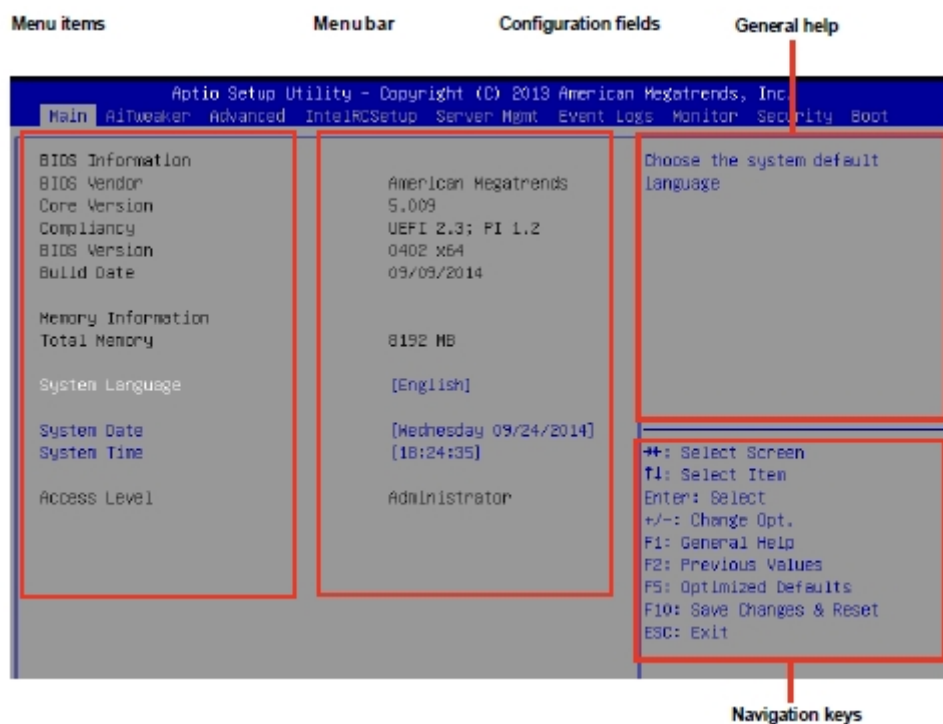
The firmware chip on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press<Del> during the Power-On Self-Test (POST) to enter the Setup utility ;otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, restart the system by pressing <Ctrl>+<Alt>+<Del>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

The Setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various sub-menus and make your selections from the available options using the navigation keys.

- The default BIOS settings for this motherboard apply for most conditions to ensure optimum performance. If the system becomes unstable after changing any BIOS settings, load the default settings to ensure system compatibility and stability. Press <F5> and select Yes to load the BIOS default settings.
- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
- Visit the GRAFENTHAL website ([www.grafenthal.de](http://www.grafenthal.de)) to download the latest BIOS file for this server.

## BIOS menu screen



## BIOS Menu bar

The BIOS menu bar on top of the screen has the following main items:

- Main**                      For changing the basic system configuration
- AiTweaker**                      For overclocking and advanced tuning of system settings
- Advanced**                      For changing the advanced system settings
- Intel RC Setup**                      For changing the Intel RC settings
- ServerMgmt**                      For changing the ServerMgmt settings
- EventLogs**                      For changing the event log settings
- Monitor**                      For displaying the system temperature, power status, and changing the fan settings
- Security**                      For changing the security settings

<b>Boot</b>	For changing the system boot configuration
<b>Tool</b>	For configuring options for special functions
<b>Exit</b>	For selecting the exit options

To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

Press the key on the upper right section of the menu screen to display the Tool and Exit menus.

### Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting Main shows the Main menu items.

The other items (Event Logs, Advanced, Monitor, Boot, Tool, and Exit) on the menu bar have their respective menu items.

### Submenu items

A solid triangle before each item on any menu screen means that the item has a submenu. To display the submenu, select the item then press <Enter>.

### Navigation keys

At the bottom right corner of a menu screen are the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

### General help

At the top right corner of the menu screen is a brief description of the selected item.

### Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

A configurable field is enclosed in brackets, and is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

### Pop-up window

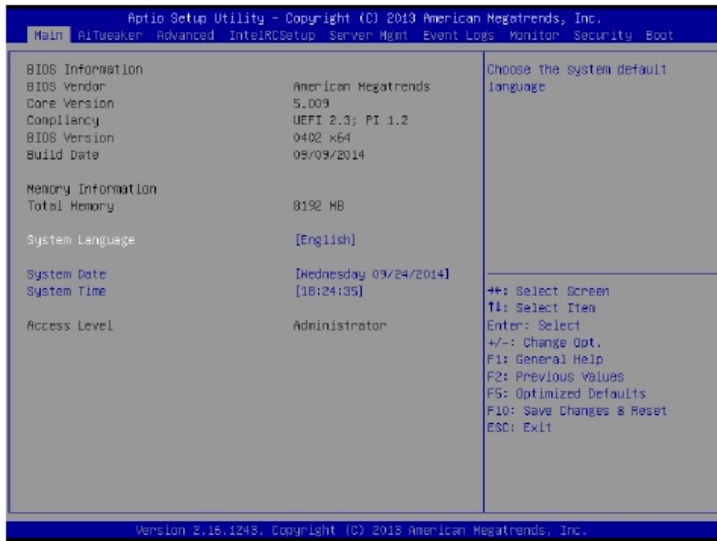
Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

### Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up>/<Page Down> keys to display the other items on the screen.

### Main menu

When you enter the BIOS Setup program, the Main menu screen appears. The Main menu provides you an overview of the basic system information, and allows you to set the system date, time settings.



### System Date [Day xx/xx/xxxx]

Allows you to set the system date.

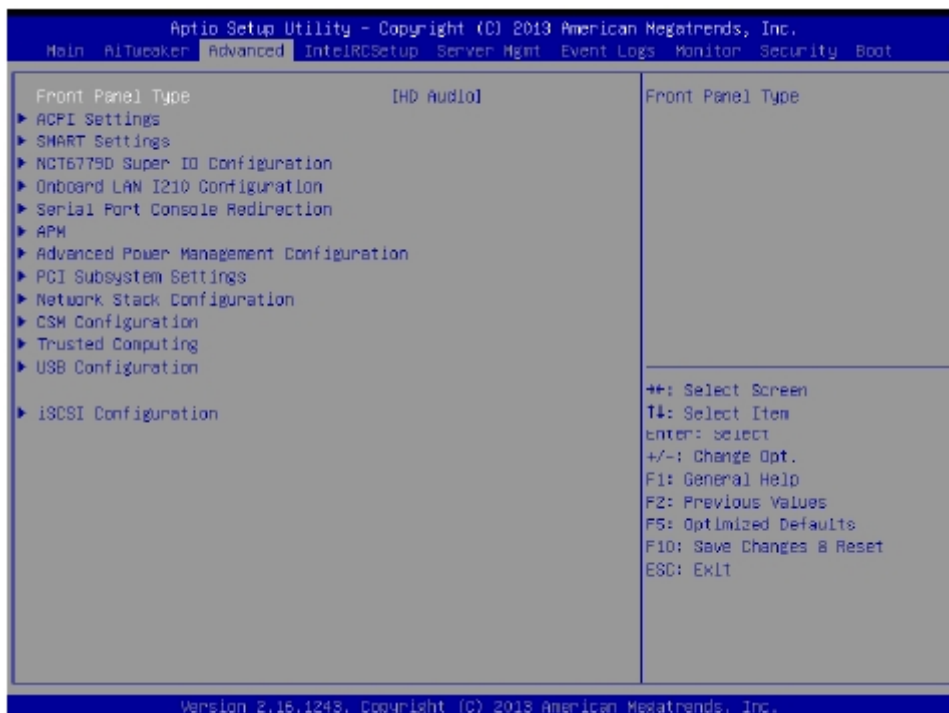
### System Time [xx:xx:xx]

Allows you to set the system time.

### Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

Take caution when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



### **Front Panel Type [HD Audio]**

Allows you to select the Front Panel Type audio.  
Configuration options: [HD Audio] [AC97]

## ACPI Settings

### **Enable ACPI Auto Configuration [Disabled]**

Allows you to enable or disable the BIOS ACPI Auto Configuration.  
Configuration options: [Disabled] [Enabled]

### **Enable Hibernation [Enabled]**

Allows you to enable or disable the ability of the system to hibernate (OS/Sleep State).  
Configuration options: [Disabled] [Enabled]

This option may be not effective with some OS.

### **ACPI Sleep State [S3 (Suspend to RAM)]**

This item allows you to select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.  
Configuration options: [S3 (Suspend to RAM)] [Suspend Disabled]

## Smart Settings

### **SMART Self Test [Enabled]**

Allows you to run SMART Self Test on all HDDs during POST.  
Configuration options: [Disabled] [Enabled]

## NCT6779D Super IO Configuration

### **Serial Port 1 / Serial Port 2 Configuration**

Allows you to set the parameters of Serial Port 1/ Serial Port 2.

#### **Serial Port [Enabled]**

Allows you to enable or disable Serial Port.  
Configuration options: [Disabled] [Enabled]

#### **Change Settings [Auto]**

Allows you to choose the setting for Super IO device.  
Configuration options: [Auto]  
[IO=3F8h; IRQ=4;]  
[IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]  
[IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]  
[IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]  
[IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]

## Onboard LAN I210 Configuration

### **Intel LAN1/LAN2 Enable [Enabled]**

Allows you to enable or disable the Intel LAN.  
Configuration options: [Disabled] [Enabled]

### Intel LAN ROM Type [PXE]

Allows you to select the Intel LAN ROM type.  
Configuration options: [Disabled] [PXE] [iSCSI]

### Serial Port Console Redirection COM1/COM2

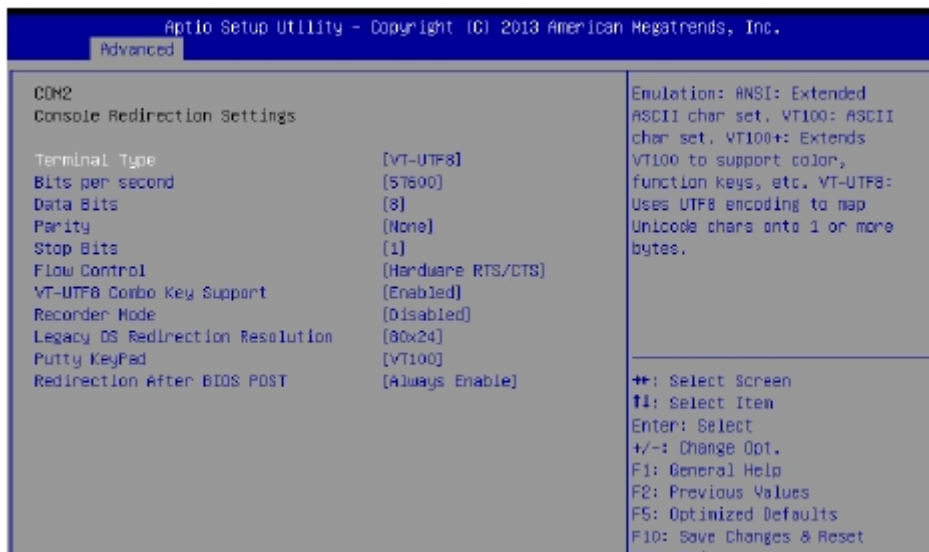
Allows you to enable or disable the console redirection feature.

Configuration options: [Disabled] [Enabled]

The following item appears only when you set Console Redirection to [Enabled].

### Console Redirection Settings

This item becomes configurable only when you enable the Console Redirection item. The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.



### Terminal Type [VT-UTF8]

Allows you to set the terminal type.

[VT100] ASCII charset.

[VT100+] Extends VT100 to support color, functionkeys, et.

[VT-UTF8] Uses UTF8 encoding to map Unicode chars on to 1 or more bytes

[ANSI] Extended ASCII char set

### Bits per second [57600]

Selects serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.



Configuration options: [9600] [19200] [38400] [57600] [115200]

### **Data Bits [8]**

Configuration options: [7] [8]

### **Parity [None]**

A parity bit can be sent with the data bits to detect some transmission errors. [Mark] and [Space] parity do not allow for error detection.

[None] None

[Even] parity bit is 0 if the num of 1's in the data bits is even

[Odd] parity bit is 0 if num of 1's in the data bits is odd

[Mark] parity bit is always 1

[Space] parity bit is always 0

### **Stop Bits [1]**

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. Configuration options: [1] [2]

### **Flow Control [Hardware RTS/CTS]**

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 start the flow. Hardware flow control uses two wires to send start/stop signals.

Configuration options: [None] [Hardware RTS/CTS]

### **VT -UTF8 Combo Key Support [Enabled]**

This allows you to enable the VT-UTF8 Combination Key Support for ANSI/VT100 terminals.

Configuration options: [Disabled] [Enabled]

### **Recorder Mode [Disabled]**

With this mode enabled only text will be sent. This is to capture Terminal data.

Configuration options: [Disabled] [Enabled]

### **Legacy OS Redirection Resolution [80x24]**

This allows you to set the number of rows and columns supported on the Legacy OS.

Configuration options: [80x24] [80x25]

### **Putty Keypad [VT100]**

This allows you to select the Function Key and Keypad on Putty.

Configuration options: [VT100] [LINUX] [XTERMR6] [SCO] [ESCN] [VT400]

## Redirection After BIOS POST [Always Enable]

This setting allows you to specify if Bootloader is selected than Legacy console redirection.

Configuration options: [Always Enable] [Bootloader]

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

### Console Redirection [Disabled]

Allows you to enable or disable the console redirection feature.

Configuration options: [Disabled] [Enabled]

The following item appears only when you set Console Redirection to [Enabled].

### Console Redirection Settings



### Out-of-Band Mgmt Port [COM1]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.

Configuration options: [COM1] [COM2]

### Terminal Type [VT-UTF8]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.

Configuration options: [VT100] [VT100+] [VT-UTF8] [ANSI]

### Bits per second [115200]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.

Configuration options: [9600] [19200] [57600] [115200]

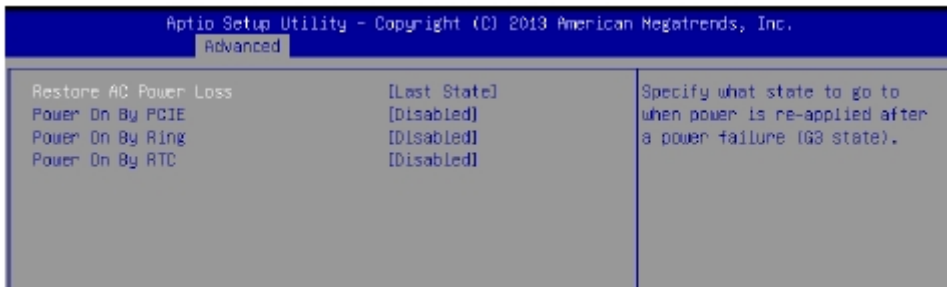
### Flow Control [None]

Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.

Configuration options: [None] [Hardware RTS/CTS] [Software Xon/Xoff]

## APM

Allows you to configure the Advance Power Management (APM) settings.



### Restore AC Power Loss [Last State]

When set to [Power Off], the system goes into off state after an AC power loss. When set to [Power On], the system will reboot after an AC power loss. When set to [Last State], the system goes into either off or on state, whatever the system state was before the AC power loss.

Configuration options: [Power Off] [Power On] [Last State]

### Power On By PCIE [Disabled]

[Disabled] Disables the PCIE devices to generate awake event.

[Enabled] Enables the PCIE devices to generate awake event.

### Power On By Ring [Disabled]

[Disabled] Disables the PCIE devices to generate awake event.

[Enabled] Enables the PCIE devices to generate awake event.

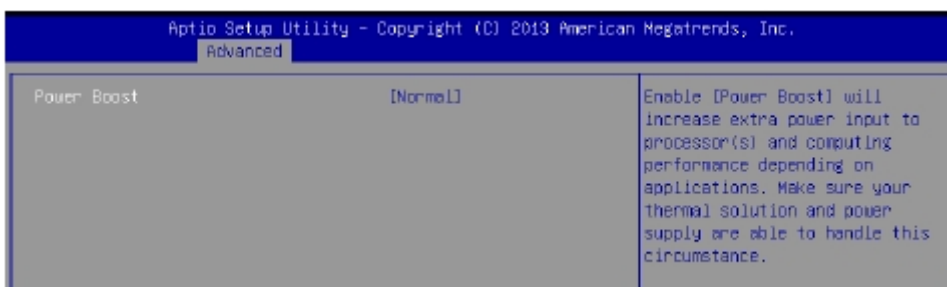
### Power On By RTC [Disabled]

[Disabled] Disables RTC to generate awake event.

[Enabled] When set to [Enabled], the items RTC Alarm Date (Days) and Hour/Minute/Second will become user-configurable with set values.

## Advance Power Management Configuration

Allows you to configure the Advance Power Management settings.



### Power Boost [Normal]

Enabling this item allows you to increase extra power input to the processor(s) and computing performance depending on the applications.

Configuration Options: [Normal] [High] [Extreme]

Ensure that your thermal solution and power supply are available to handle this circumstance.

## PCI Subsystem Settings

Allows you to configure PCI, PCI-X, and PCI Express Settings.



Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.		
Advanced		
PCI Bus Driver Version	A5.01.05	Enables or Disables RT32 Image Loading.
PCI Devices Common Settings:		
Load RT32 Image	[Enabled]	
Above 4G Decoding	[Disabled]	
SR-IOV Support	[Disabled]	

### Load RT32 Image [Enabled]

Allows you to enable or disable RT32 Image Loading.

Configuration options: [Disabled] [Enabled]

### Above 4G Decoding [Disabled]

Allows you to enable or disable 64-bit capable devices to be decoded in above 4G address space. It only works if the system supports 64-bit PCI decoding.

Configuration options: [Disabled] [Enabled]

### SR-IOV Support [Disabled]

This option enables or disables Single Root IO Virtualization Support if the system has SR-IOV capable PCIe devices.

Configuration options: [Disabled] [Enabled]

## Network Stack Configuration

### Network stack [Disabled]

Enables or disables the network stack feature.

Configuration options: [Disable] [Enable]

The following item appears only when Network stack is set to [Enabled].

### Ipv4 PXE Support [Enabled]

Enables or disables the Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created. Configuration options: [Disabled] [Enabled].

### Ipv6 PXE Support [Enabled]

Enables or disables the Ipv6 PXE Boot Support. If disabled, Ipv6 PXE boot option will not be created. Configuration options: [Disabled] [Enabled].

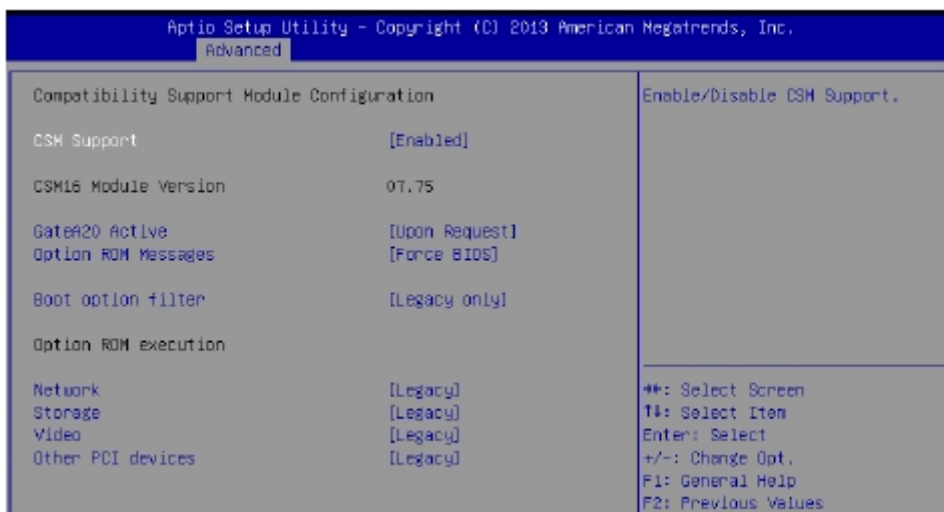
### **PXE boot wait time [0]**

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

### **Media detect time [0]**

Wait time (in seconds) to detect media.

## CSM Configuration



### **CSM Support [Enabled]**

This option allows you to enable or disable CSM Support.

Configuration options: [Disabled] [Enabled]

### **GateA20 Active [Upon Request]**

This allows you to set the GA20 option.

Configuration options: [Upon Request] [Always]

### **Option ROM Messages [Force BIOS]**

This allows you to set the display mode for option ROM.

Configuration options: [Force BIOS] [Keep Current]

### **Boot Option filter [Legacy only]**

This option allows you to control the Legacy/UEFI ROMs priority.

Configuration options: [UEFI and Legacy] [Legacy only] [UEFI only]

### **Network / Storage / Video [Legacy]**

This option allows you to control the execution of UEFI and Legacy PXE/Storage/Video OpROM.

Configuration options: [UEFI] [Legacy]

### **Other PCI devices [Legacy]**

This item determines the OpROM execution policy for devices other than Network, Storage, or Video.

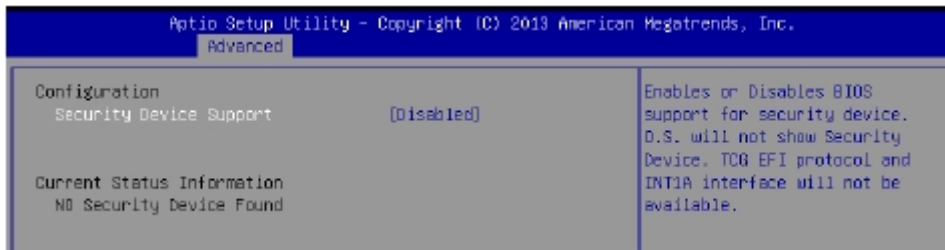
Configuration options: [UEFI] [Legacy]

## Trusted Computing Configuration

### **Security Device Support [Disabled]**

Allows you to enable or disable the BIOS support for security device.

Configuration options: [Disabled] [Enabled]



## USB Configuration

### **Legacy USB Support [Enabled]**

Allows you to enable or disable Legacy USB device support.

Configuration options: [Enabled] [Disabled] [Auto]

### **XHCI Hand-off [Enabled]**

This is a work around for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

Configuration options: [Disabled] [Enabled]

### **EHCI Hand-off [Disabled]**

This is a work around for OSes without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.

Configuration options: [Disabled] [Enabled]

### **USB Mass Storage Driver Support [Enabled]**

Allows you to enable or disable the USB Mass Storage driver support.

Configuration options: [Disabled] [Enabled]

### **Port 60/64 Emulation [Enabled]**

This allows you to enable the I/O port 60h/64h emulation support. This should be enabled for

The complete USB keyboard legacy support for non-USB aware OSes.

Configuration options: [Disabled] [Enabled]

### **USB hardware delays and time-outs**

#### **USB transfer time-out [20 sec]**

The time-out value for control, bulk, and interrupt transfer.

Configuration options: [1 sec] [5sec] [10sec] [20sec]

#### **Device reset time-out [20 sec]**

USB mass storage device start unit command time-out.

Configuration options: [10 sec] [20 sec] [30 sec] [40 sec]

#### **Device power-up delay [Auto]**

This is the maximum time the device will take before it properly reports itself to the host controller.

Configuration options: [Auto] [Manual]

### **Mass Storage Devices**

#### **AMI Virtual CDROM0 / Floppy0 / HDisk0 1.00 [Auto]**

Allows you to select the mass storage device emulation type.

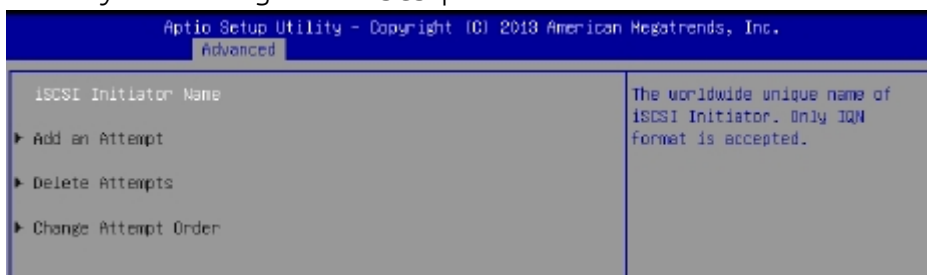
Configuration options: [Auto] [Floppy] [Forced FDD] [Hard Disk] [CD-ROM]  
**AMI Virtual CDROM1/ Floppy1 1.00 [Auto]**

Allows you to select the mass storage device emulation type.

Configuration options: [Auto] [Floppy] [Forced FDD] [Hard Disk] [CD-ROM]

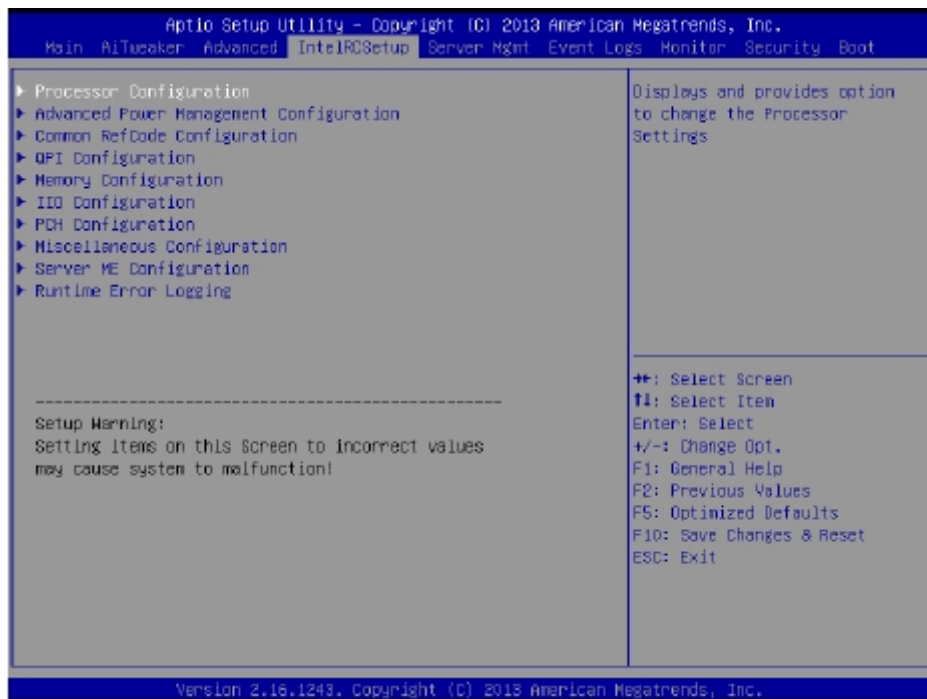
## iSCSI Configuration

Allows you to configure the iSCSI parameters.

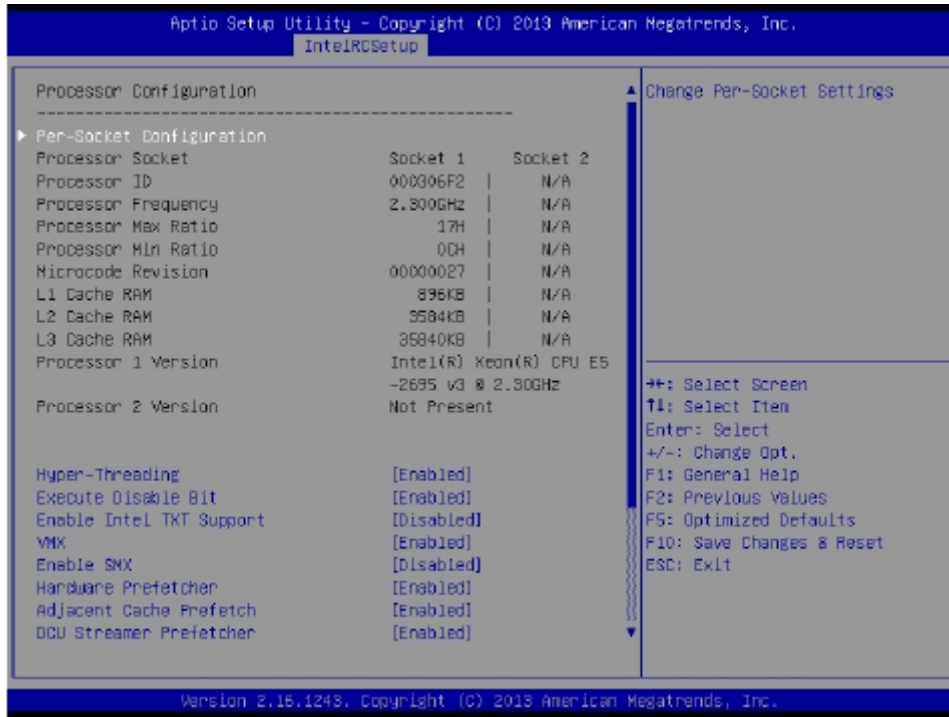


## IntelRCSetup menu

The IntelRCSetup menu items allow you to change the processor and chipset settings.



## Processor Configuration



### Per Socket Configuration

Allows you to set the number of cores to enable. 0 means all cores.

### Hyper Threading [Enabled]

Allows you to enable or disable the Intel® Hyper-Threading Technology function. When disabled, only one thread per activated core is enabled.

Configuration options: [Disabled] [Enabled]

### Execute Disable Bit [Enabled]

When disabled, forces the XD feature flag to always return 0.

Configuration options: [Disabled] [Enabled]

### Enable Intel TXT Support [Disabled]

This item enables Intel Trusted Execution Technology Configuration.

Configuration options: [Disabled] [Enabled]  
Disable EV/DFS Features when TXT is enabled.

### VMX [Enabled]

Enables the Vanderpool Technology. Takes effect after reboot.

Configuration options: [Disabled] [Enabled]

### Enable SMX [Disabled]

Enables the Safer Mode Extensions

Configuration options: [Disabled] [Enabled]

### Hardware Prefetcher [Enabled]

This item allows you to turn on/off the mid level cache(L2) streamer prefetcher.

Configuration options: [Disabled] [Enabled]



### **Adjacent Cache Prefetch [Enabled]**

This Item allows you to turn on/off prefetching of adjacent cache lines.  
Configuration options: [Disabled] [Enabled]

### **DCU Streamer Prefetcher [Enabled]**

This Item allows you to enable or disable prefetcher of next L1 data line.  
Configuration options: [Disabled] [Enabled]

### **DCU IP Prefetcher [Enabled]**

This Item allows you to enable or disable prefetch of next L1 line based upon sequential load history.

Configuration options: [Disabled] [Enabled]

### **DCU Mode [32K 8Way Without ECC]**

Configuration options: [32K 8Way Without ECC] [16K 4Way With ECC]

### **Direct Cache Access (DCA) [Auto]**

This Item allows you to enable or disable Direct Cache Access.

Configuration options: [Auto] [Disabled] [Enabled]

### **DCA Prefetch Delay [32]**

This Item allows you to set the time for the DCA Prefetch delay Help.

Configuration options: [Disabled] [8] [16] [24] [32] [40] [48] [56] [64] [72] [80] [88] [96] [104] [112]

### **X2APIC [Disabled]**

This Item allows you to enable or disable the extended APIC support.

Configuration options: [Disabled] [Enabled]

### **AES-NI [Enabled]**

This Item allows you to enable or disable the AES-NI support.

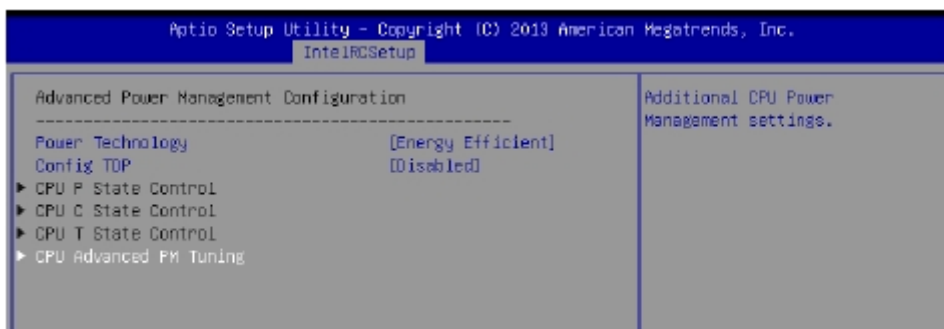
Configuration options: [Disabled] [Enabled]

### **Down Stream PECI [Disabled]**

This Item allows you to enable the PCIe Down Stream PECI writer.

Configuration options: [Disabled] [Enabled]

## Advanced Power Management Configuration



### **Power Technology [Energy Efficient]**

This item allows you to enable power management features.

Configuration options: [Disabled] [Energy Efficient] [Custom]

### **Config TDP [Disabled]**

This item allows you to enable/disable the Config TDP.

Configuration options: [Disabled] [Enabled]

### **CPU Advanced PM Turning**

This item allows you to set additional CPU Power Management settings.

## **Energy Perf BIAS**

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.	
IntelRCSetup	
Energy Perf BIAS	Selects whether BIOS or Operating System chooses energy performance bias tuning.
Energy Performance Tuning	[Disabled]
Energy Performance BIAS setting.	[Balanced Performance]
Power/Performance Switch	[Enabled]
Workload Configuration	[Balanced]
Averaging Time Window	23
PO TotalTimeThreshold Low	35
PO TotalTimeThreshold High	58

### **Energy Performance Tuning [Disabled]**

Allows your system to select from BIOS or operating system to choose enable energy performance bias tuning.

Configuration options: [Disabled] [Enabled]

### **Energy Performance BIAS setting. [Balanced Performance]**

Allows you to set the Energy Performance Bias which overrides the OS setting.

Configuration options: [Performance] [Balanced Performance] [Balanced Power] [Power]

### **Power/Performance Switch [Enabled]**

Allows you to switch between Power or performance.

Configuration options: [Disabled] [Enabled]

### **Workload Configuration [Balanced]**

Optimization for the workload characterization.

Configuration options: [Balanced] [I/O sensitive]

### **Averaging Time Window [23]**

This is used to control the effective window of the average for CO and PO time.

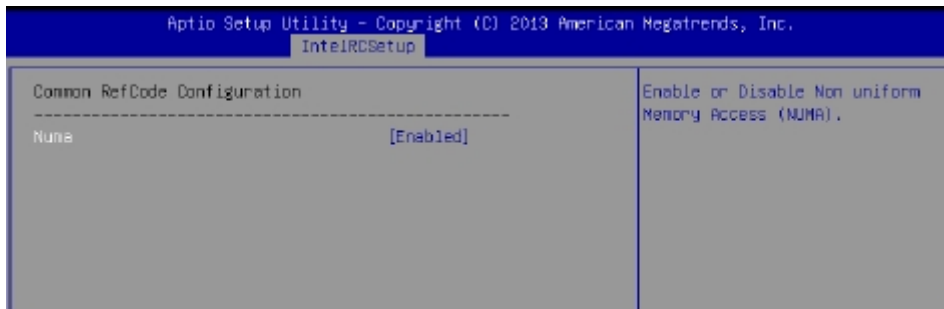
### **PO TotalTimeThreshold Low [35]**

The HW switching mechanism disables the performance setting (0) when the total PO time is less than this threshold.

### **PO TotalTimeThreshold High [58]**

The HW switching mechanism enables the performance setting (0) when the total PO time is greater than this threshold.

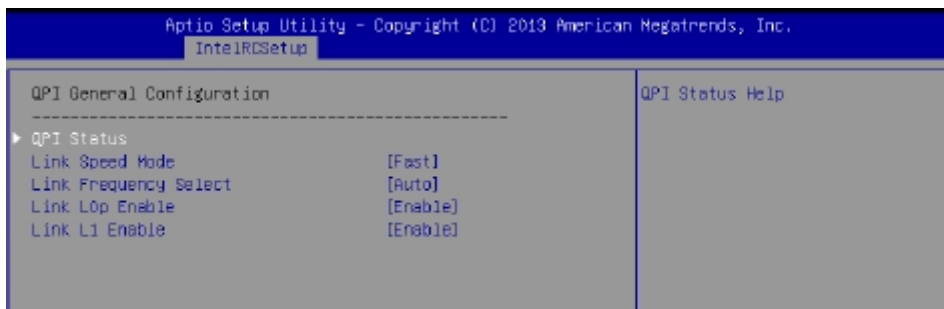
## **Common RefCode Configuration**



### Numa [Enabled]

This item enables or disables the Non uniform Memory Access (NUMA).  
Configuration options: [Disabled] [Enabled]

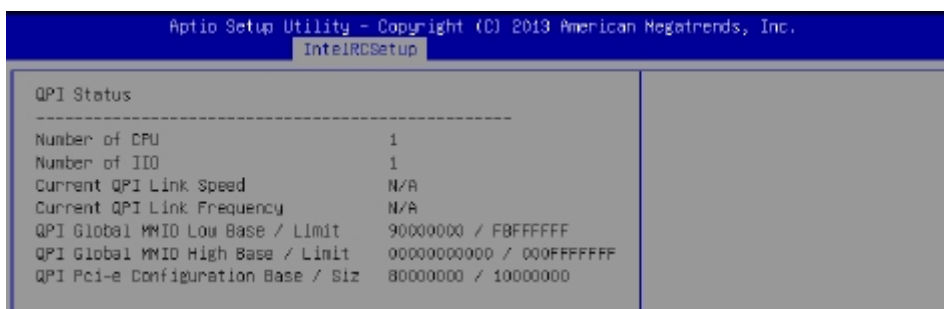
## QPI Configuration



### QPI General Configuration

#### QPI Status

This item displays information about the QPI status.



#### Link Speed Mode [Fast]

This item allows you to select the QPI link speed as either the fast mode or slow mode.

Configuration options: [Slow] [Fast]

#### Link Frequency Select [Auto]

This item allows for selecting the QPI link frequency

Configuration options: [Auto][6.4GT/s][8.0GT/s][9.6GT/s]

#### Link L0p/L1 Enable [Enable]

This item allows you to disable or enable Link L0p or Link L1.

Configuration options: [Disable] [Enable]

**COD Enable [Auto]**

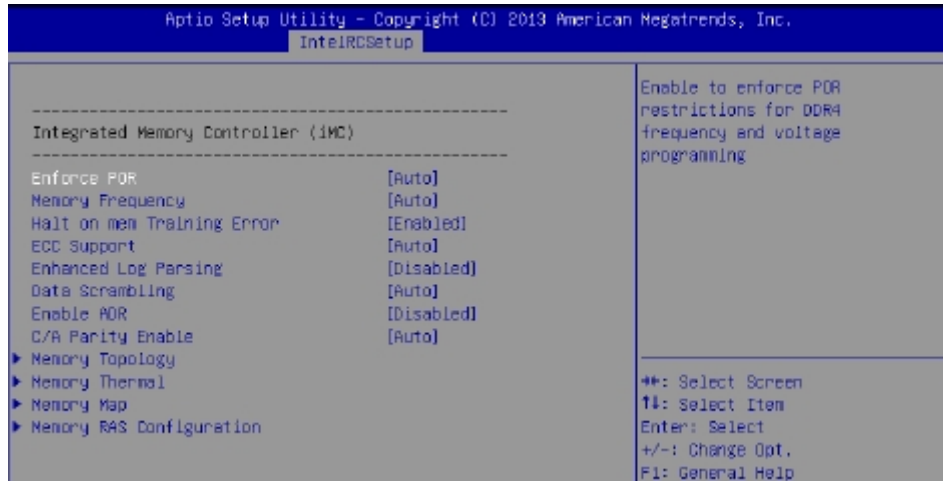
This item allows you to disable or enable cluster on Die.

Configuration options: [Auto] [Disable] [Enable]

**Early Snoop [Auto]**

Configuration options: [Disabled] [Enabled] [Auto]

## Memory Configuration



### **Enforce POR [Auto]**

Allows you to enforce POR restrictions for DDR4 frequency and voltage programming.  
Configuration options: [Auto] [Enforce POR] [Disabled] [Enforce Stretch Goals]

### **Memory Frequency [Auto]**

Allows you to select the memory frequency setting.  
Configuration options: [Auto] [1333] [1600] [1866] [2133]

### **Halt on mem Training Error [Enabled]**

Allows you to enable or disable halt on mem Training Error.  
Configuration options: [Disabled] [Enabled]

### **ECC Support [Auto]**

Allows you to enable or disable the ECC support.  
Configuration options: [Auto] [Disabled] [Enabled]

### **Enhanced Log Parsing [Disabled]**

Allows you to enable or disable the Enhanced Log Parsing.  
Configuration options: [Disabled] [Enabled]

### **Data Scrambling [Auto]**

Allows you to enable/disable data scrambling.  
Configuration options: [Auto] [Disabled] [Enabled]

### **Enable ADR [Disabled]**

Allows you to set the detecting and enabling of ADR.  
Configuration options: [Disabled] [Enabled]

### **C/A Parity Enable [Auto]**

Allows you to enable or disable the DDR4's command address parity.  
Configuration options: [Auto] [Disabled] [Enabled]

### **Memory Topology**

Displays memory topology with DIMM population information.

## Memory Thermal

Allows you to configure thermal settings.



### Set Throttling Mode [Disabled]

Configuration options: [Disabled] [OLLT] [CLTT]

### OLLT Peak BW % [50]

Allows you to set the peak allowed bandwidth for OLLT. This is in percentage and valid offset values is from 25-100.

### DIMM Temp Stat [92]

Allows you to select DIMMTEMPSTAT as temp\_mid or temp\_hi.

### Memory Power Savings Mode [Auto]

Allows you to configure the CKE and other related Memory Power Savings features.

Configuration options: [Auto] [Disabled] [APDOn] [UserDefined] [Reserved]

### Memory Power Savings Advanced Options

#### CK in SR [Auto]

Configuration options: [Auto] [Driven] [Tri-State] [Pulled Low] [Pulled High]

### MDLL Off [Auto]

Allows you to shut down MDLL during SR when enabled.

Configuration options: [Auto] [Disabled] [Enabled]

### MEMHOT Throttling Mode [Input-only]

Allows you to shutdown MDLL during SR when enabled.

Configuration options: [Disabled] [Input-only] [Output-only]

### Mem Electrical Throttling [Disabled]

Allows you to configure Memory Electrical throttling.

Configuration options: [Disabled] [Enabled] [Auto]

### Memory Map

#### Channel Interleaving [Auto]

Select different channel interleaving setting.

Configuration options: [Auto] [1-way Interleave] [2-way Interleave] [3-way Interleave] [4-way Interleave]

#### Rank Interleaving [Auto]

Select different rank interleaving setting.

Configuration options: [Auto] [1-way Interleave] [2-way Interleave] [4-way Interleave] [8-way Interleave]

### Memory RAS Configuration

#### RAS Mode [Disabled]

Allows you to enable or disable RAS Modes. Enabling Sparing and Mirroring is not supported. In case enabled, Sparing will be selected.

Configuration options: [Disabled] [Mirror] [Lockstep Mode]

### **Memory Rank Sparing [Disabled]**

Allows you to enable or disable Memory Rank Sparing.

Configuration options: [Disabled] [Enabled]

### **Correctable Error Threshold [32767]**

Allows you to set the Correctable Error Threshold used for sparing, tagging, and leaky bucket. The range is from 1 to 32767.

### **Patrol Scrub [Enabled]**

Allows you to enable or disable Patrol Scrub.

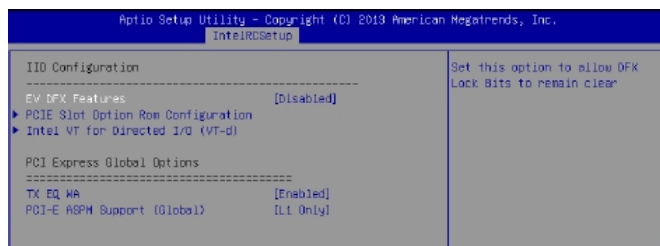
Configuration options: [Disabled] [Enabled]

### **Demand Scrub [Enabled]**

Allows you to enable or disable Demand Scrub.

Configuration options: [Disabled] [Enabled]

## I/O Configuration



### **EV DFX Features [Disabled]**

Set this option to allow DFX Lock Bits to remain clear.

Configuration options: [Disabled] [Enabled]

### **PCI Slot Option ROM Configuration**

#### **PCI-E1-PCI-E6 Option ROM [Enabled]**

Allows you to enable or disable the PCI-E1-6 Option ROM.

Configuration options: [Disabled] [Enabled]

### **Intel VT for Directed I/O (VT-d)**

#### **Intel VT for Directed I/O (VT-d) [Enabled]**

Allows you to enable or disable the Intel Virtualization Technology for Directed I/O.

Configuration options: [Disabled] [Enabled]

### **PCI Express Global Options**

#### **TX EQ WA [Enabled]**

Use special table for TX\_EQ and vendor specific cards.

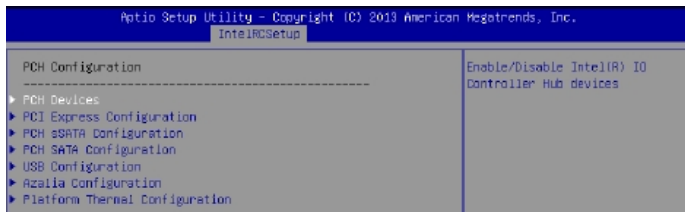
Configuration options: [Disabled] [Enabled]

#### **PCI-E ASPM Support (Global) [L1 Only]**

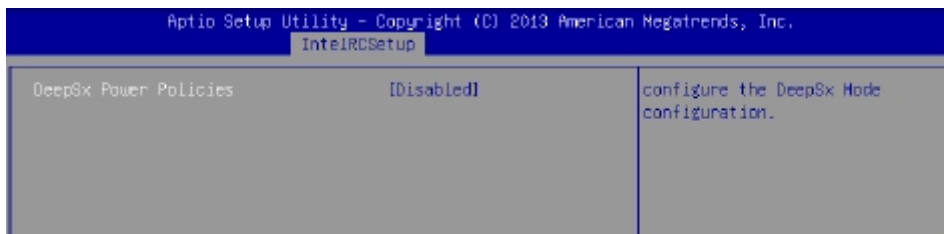
This option enables or disables the ASPM support for all downstream devices.

Configuration options: [Disabled] [L1 Only]

## PCH Configuration



### PCH Devices

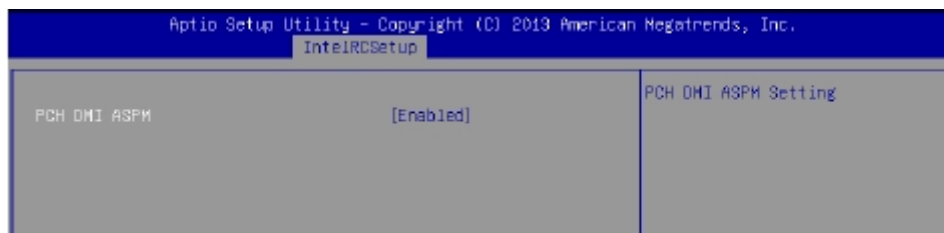


### DeepSx Power Policies [Disabled]

Allows you to configure the DeepSx Mode configuration.

Configuration options: [Disabled] [Enabled in S5] [Enabled in S4 and S5]

### PCI Express Configuration



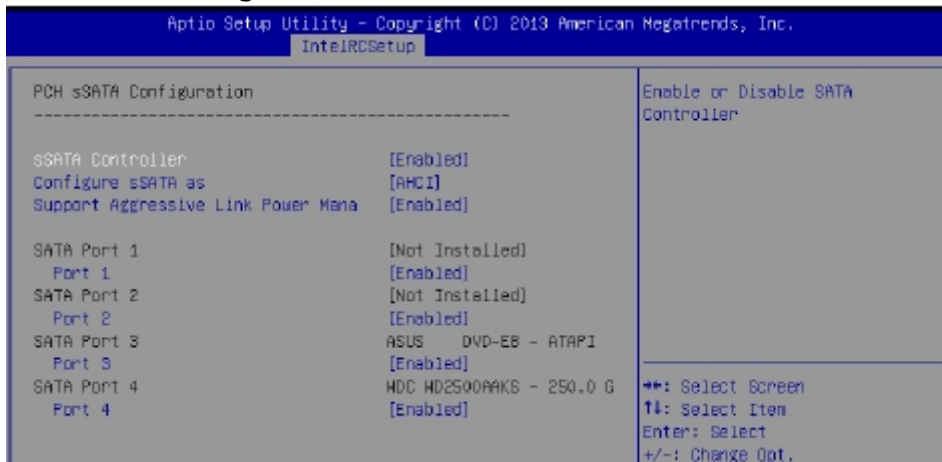
### PCH DMI ASPM [Enabled]

Allows you to configure the PCH DMI ASPM.

Configuration options: [Disabled] [Enabled]



## PCH sSATA Configuration



### sSATA Controller [Enabled]

Allows you to enable or disable the sSATA Controller.

Configuration options: [Disabled] [Enabled]

### Configure sSATA as [AHCI]

Allows you to identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

Configuration options: [IDE] [AHCI] [RAID]

### Support Aggressive Link Power Management [Enabled]

Allows you to enable or disable the Support Aggressive Link Power (SALP) Management.

Configuration options: [Disabled] [Enabled]

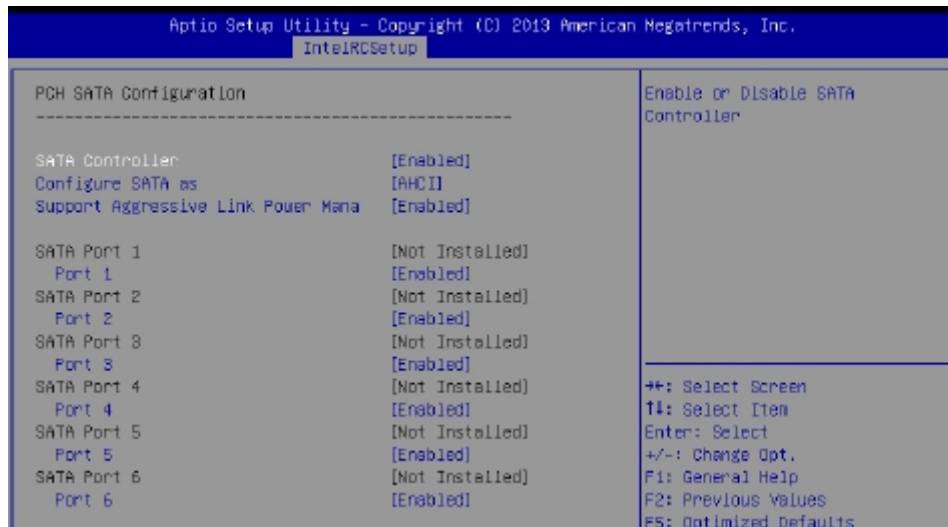
### SATA Port 1/ SATA Port 2/ SATA Port 3/ SATA Port 4

#### Port 1/ Port 2/ Port 3/ Port 4

Allows you to enable or disable the SATA port

Configuration options: [Disabled] [Enabled]

### PCH SATA Configuration



### **SATA Controller [Enabled]**

Allows you to enable or disable the SATA Controller.

Configuration options: [Disabled] [Enabled]

### **Configure SATA as [AHCI]**

Allows you to identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

Configuration options: [IDE] [AHCI] [RAID]

### **Support Aggressive Link Power Management [Enabled]**

Allows you to enable or disable the Support Aggressive Link Power (SALP) Management.

Configuration options: [Disabled] [Enabled]

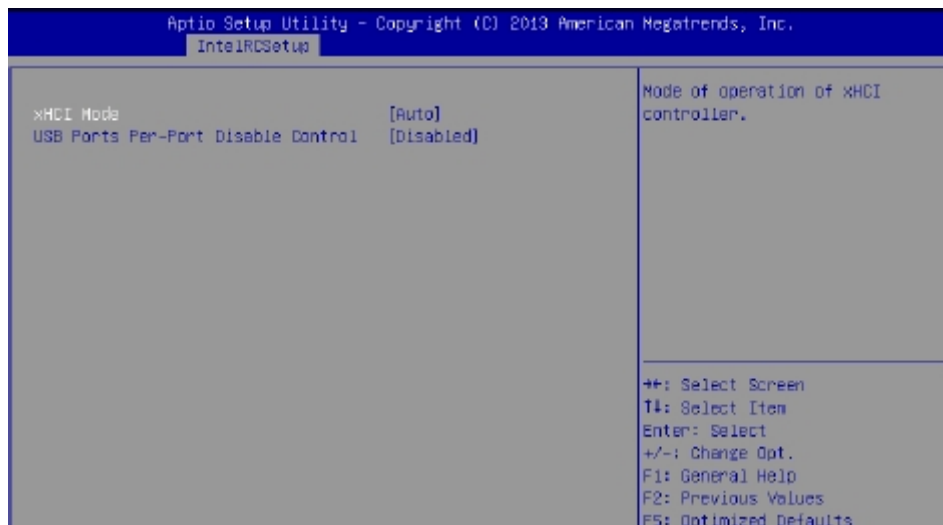
### **SATA Port 1-6**

#### **Port 1/ Port 2/ Port 3/ Port 4/ Port 5/ Port 6 [Enabled]**

Allows you to enable or disable the SATA port

Configuration options: [Disabled] [Enabled]

## USB Configuration



### **xHCI Mode [Auto]**

Allows you to enable or disable the mode of operation of xHCI controller.  
Configuration options: [Auto] [Disabled] [Enabled]

### **USB Ports Per-Port Disable Control [Disabled]**

Allows you to control each of the USB ports 1 to 8 disabling.  
Configuration options: [Disabled] [Enabled]

*The following items appears only when the USB Ports Per-Port Disable Control is set to [Enabled].*

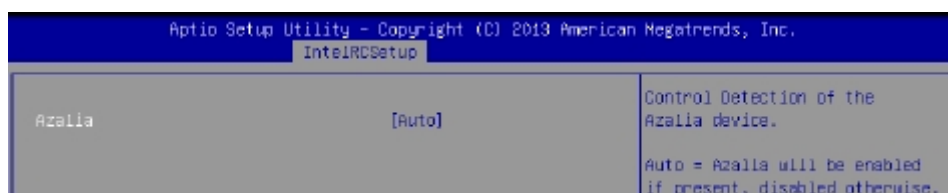
### **USB Port #1/ #2/ #3/ #4/ #5/ #6 [Enabled]**

Configuration options: [Disabled] [Enabled]

### **USB 3.0 Port #1/ #2/ #3/ #4/ #5/ #6 [Enabled]**

Configuration options: [Disabled] [Enabled]

## Azalia Configuration



### **Azalia [Auto]**

Allows you to enable or disable the control detection of the Azalia device.  
Configuration options: [Auto] [Disabled] [Enabled]

## Platform Thermal Configuration

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.		
IntelRCSetup		
PCH Thermal Device	[Auto]	Enable/Disable PCH Thermal Device(D31:F6)
Alert Enable Lock	[Disabled]	

### PCH Thermal Device [Auto]

Allows you to enable or disable the PCH Thermal Device (D31:F6).

Configuration options: [Auto] [Disabled] [Enabled]

### Alert Enable Lock [Disabled]

Allows you to lock all Alert Enable settings.

Configuration options: [Disabled] [Enabled]

## Miscellaneous Configuration

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.	
IntelRCSetup	
Miscellaneous Configuration	Select active Video type
-----	
Active Video	[Offboard Device]

### Active Video [Offboard Device]

Allows you to select the video type.

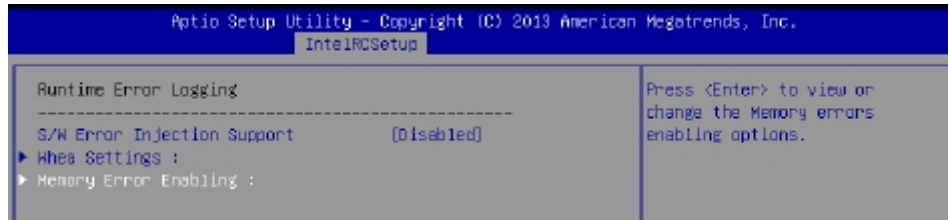
Configuration options: [Onboard Device] [Offboard Device]

## Server ME Configuration

Displays the Server ME Technology parameters on your system.

Aptio Setup Utility - Copyright (C) 2013 American Megatrends, Inc.		
IntelRCSetup		
General ME Configuration		
Operational Firmware Version	3.0.6.278	
Recovery Firmware Version	3.0.6.278	
ME Firmware Features	S1En+NM+PECIProwy+ICC+PM	
ME Firmware Status #1	0x000F0345	
ME Firmware Status #2	0x3800E000	
Current State	Operational	
Error Code	No Error	

## Runtime Error Logging Support



### Runtime Error Logging

#### **S/W Error Injection Support [Disabled]**

This item allows you to enable or disable the S/W Error Injection support.  
Configuration options: [Disabled] [Enabled]

#### **Whea Settings**

##### **Whea Support [Enabled]**

This item allows you to enable or disable the WHEA support.  
Configuration options: [Disabled] [Enabled]

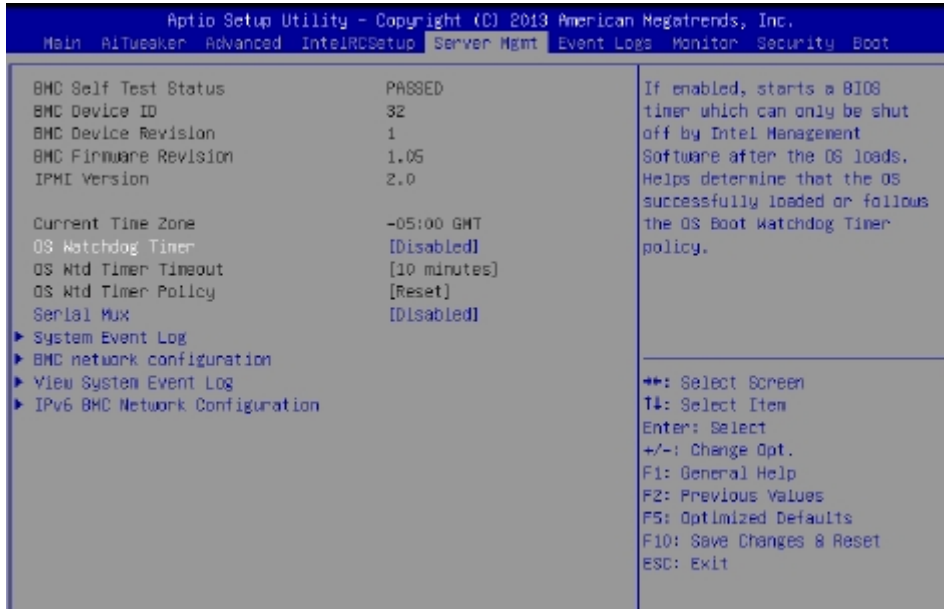
#### **Memory Error Enabling**

##### **Memory corrected Error enabling [Disabled]**

This item allows you to enable or disable Memory corrected Errors.  
Configuration options: [Disabled] [Enabled]

## Server Mgmt menu

The Server Management menu displays the server management status and allows you to change the settings.



### OS Watchdog Timer [Disabled]

This item allows you to start a BIOS timer which can only be shut off by Intel Management Software after the OS loads.

Configuration options: [Disabled] [Enabled]

*The following items is configurable only when the OS Watchdog Timer is set to [Enabled].*

### OS Wtd Timer Timeout [10 minutes]

Allows you to configure the length of the OS Boot Watchdog Timer.

Configuration options: [5 minutes] [10 minutes] [15 minutes] [20 minutes]

### OS Wtd Timer Policy [Reset]

This item allows you to configure the how the system should respond if the OS Boot Watchdog Timer expires.

Configuration options: [Do Nothing] [Reset] [Power Down]

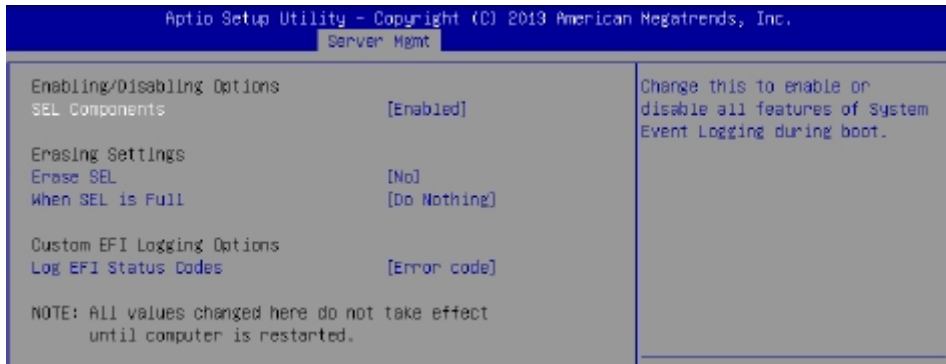
### Serial Mux [Disabled]

This item allows you to enable or disable Serial Mux configuration.

Configuration options: [Disabled] [Enabled]

## System Event Log

Allows you to change the SEL event log configuration.



### **SEL Components [Enabled]**

Allows you to enable or disable all features of system Event Logging during boot.  
Configuration options: [Disabled] [Enabled]

- *The following items appears only when you set SEL Components to [Enabled].*
- *All values changed here do not take effect until computer is restarted.*

### **Erase SEL [No]**

Allows you to choose options for erasing SEL.

Configuration options: [No] [Yes, On next reset] [Yes, On every reset]

### **When SEL is Full [Do Nothing]**

Allows you to choose options for reactions to a full SEL.  
Configuration options: [Do Nothing] [Erase Immediately]

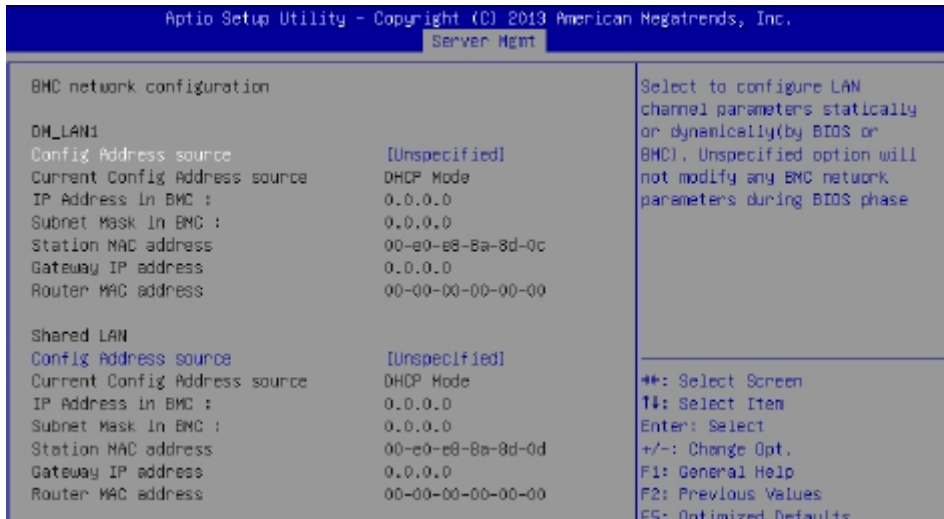
### **Log EFI Status Codes [Errorcode]**

Disable the logging of EFI Status Codes, or log only error code, or only progress code or, both.

Configuration options: [Disabled] [Both] [Error code] [Progress code]

## BMC network configuration

The sub-items in this configuration allow you to configure the BMC network parameters.



### BMC network configuration

The sub-items in this configuration allow you to configure the BMC network parameters.

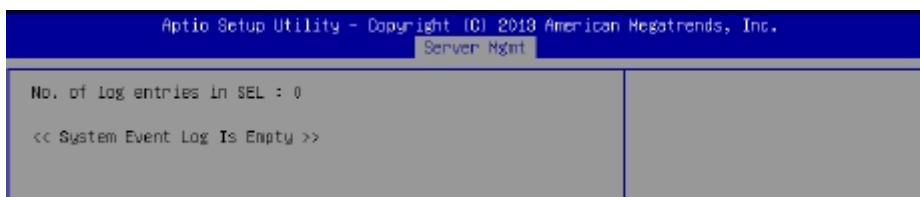
#### Configuration Address source DM\_LAN1/Shared LAN [Unspecified]

This item allows you to configure LAN channel parameters statically or dynamically (by BIOS or BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.

Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

### View System Event Log

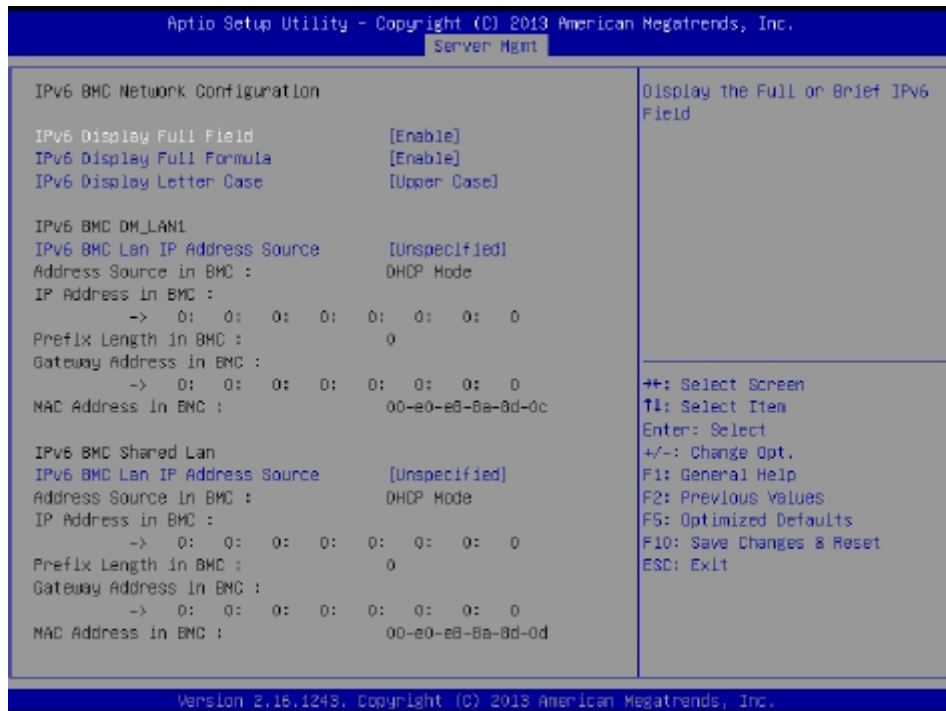
This item allows you to view the system event log records.





## IPv6 BMC Network Configuration

This item allows you to configure the parameter settings of IPv6 BMC network.



### IPv6 BMC Network Configuration

This item allows you to configure the parameter settings of IPv6 BMC network.

#### IPv6 Display Full Field [Enable]

Displays the full or brief IPv6 Field.

Configuration options: [Disable] [Enable]

#### IPv6 Display Full Formula [Enable]

Displays the full or brief IPv6 Formula.

Configuration options: [Disable] [Enable]

#### IPv6 Display Letter Case [Upper Case]

Displays the uppercase or lowercase letters of the alphabet.

Configuration options: [Lower Case] [Upper Case]

### IPv6 BMC DM\_LAN1/Shared LAN

#### IPv6 BMC LAN IP Address source [Unspecified]

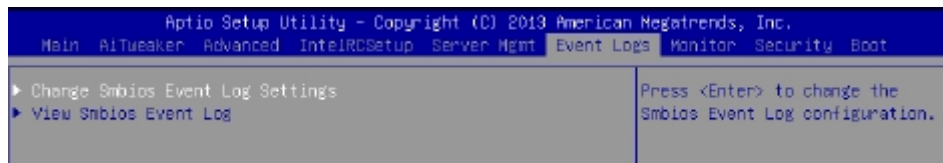
Select to configure LAN channel parameters statically or dynamically (by BIOS or

BMC).

Configuration options: [Unspecified] [Static] [Dynamic-Obtained by BMC running DHCP]

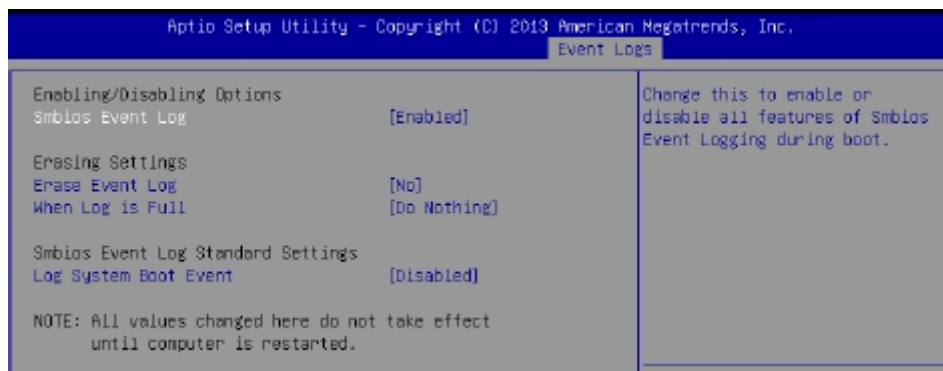
## Event Logs menu

The Event Logs menu items allow you to change the event log settings and view the system event logs.



## Change Smbios Event Log Settings

Press <Enter> to change the Smbios Event Log configuration.



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

### Enabling/Disabling Options

#### Smbios Event Log [Enabled]

Change this to enable or disable all features of Smbios Event Logging during boot.

Configuration options: [Disabled] [Enabled]

### Erasing Settings

#### Erase Event Log [No]

Choose options for erasing Smbios Event Log. Erasing is done prior to any logging activation during reset.

Configuration options: [No] [Yes, Next reset] [Yes, Every reset]

#### When Log is Full [Do Nothing]

Allows you to choose options for reactions to a Full Smbios Event Log.

Configuration options: [Do Nothing] [Erase Immediately]

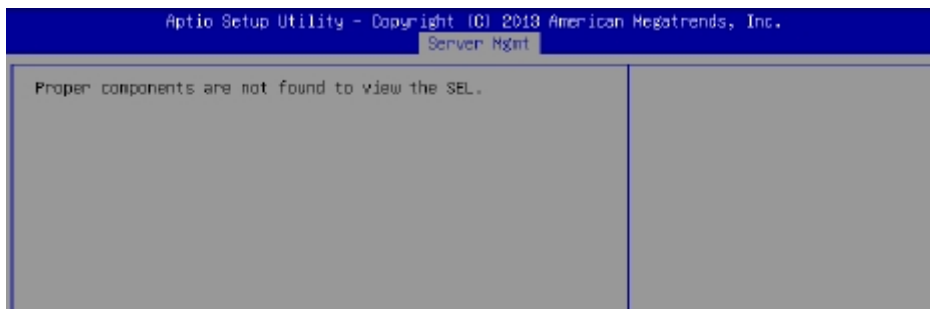
#### Log System Boot Event [Disabled]

Allows you to choose options to enable/disable logging of System boot event.

Configuration options: [Enabled] [Disabled]

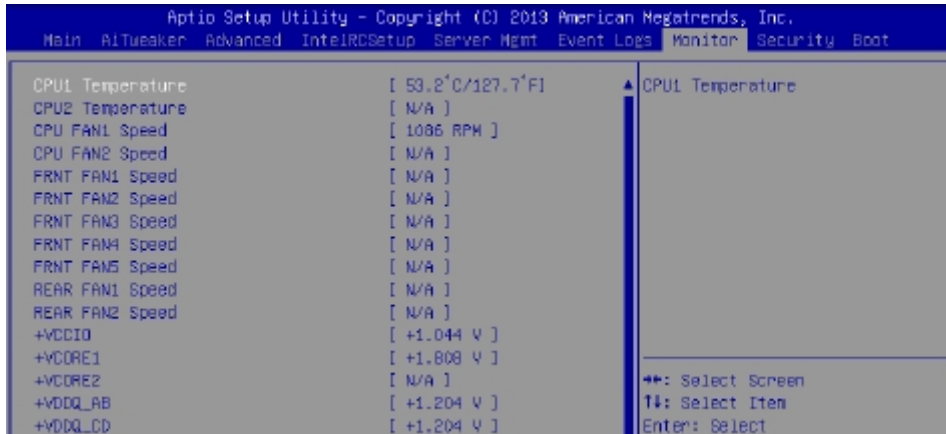
## View Smbios Event Log

Press <Enter> to view all smbios event logs.



## Monitor menu

The Monitor menu displays the system temperature/powerstatus, and allows you to change the fan settings.



Scroll down to view the other items

### **CPU1/2 Temperature [xx.x°C/xx.x°F]**

The onboard hardware monitor automatically detects and displays the CPU temperatures.

### **CPU FAN1/2 Speed; FRNT FAN1–5 Speed; REAR FAN1/2 Speed [xxxx RPM] or [N/A]**

The onboard hardware monitor automatically detects and displays the speed of CPU fans, front fans, and rear fan in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows N/A.

### **+VCCIO, VCORE1/2 Voltage, +VDDQ\_AB Voltage, +VDDQ\_CD Voltage, +VDDQ\_EF Voltage, +VDDQ\_GH Voltage, +5VSB Voltage, +5V Voltage, +12V Voltage, +3.3V Voltage, VBAT Voltage, +3.3VSB Voltage**

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators.

### **CPU FAN1&2 FRNT FAN1 mode [Generic Speed]**

Allows you to configure the GRAFENTHAL Smart Fan feature that smartly adjusts the fan speeds for more efficient system operation.

Configuration options: [Generic Speed] [High Speed] [Full Speed] [Manual Mode] [Energy Efficiency]

Duty % [50]

This item appears only when CPU FAN1 & 2 FRNTFAN1 mode is set to [ManualMode].

This item allows you to configure the fan duty setting from 10% to 100%.

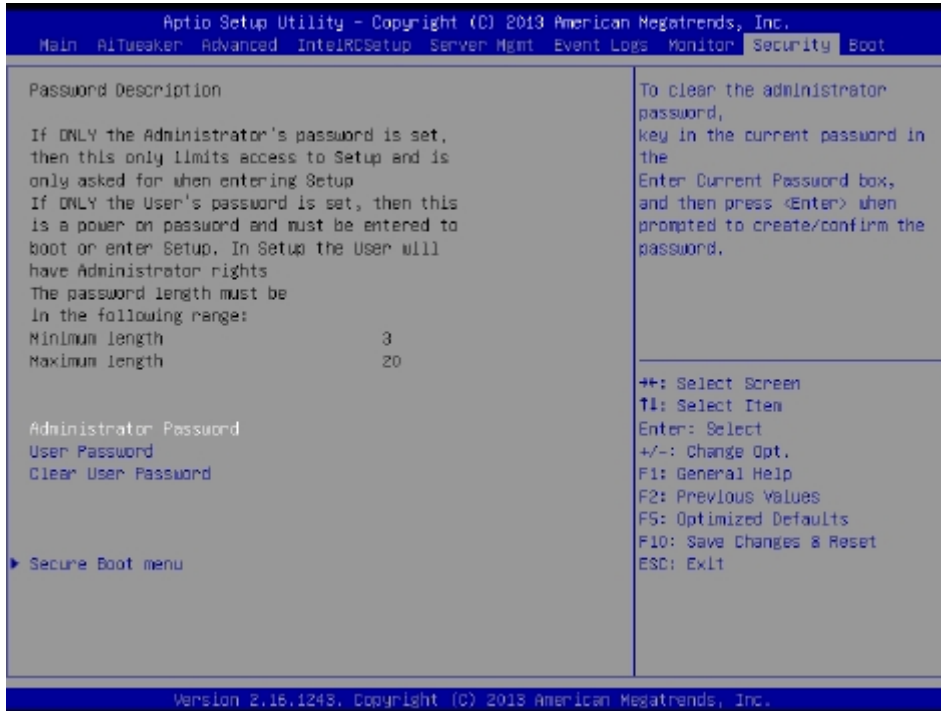
### **FRNT FAN2&3/4&5 mode; REAR FAN1&2 mode [Generic Speed]**

Allows you to configure the GRAFENTHAL Smart Fan feature that smartly adjusts the fan speeds for more efficient system operation.

Configuration options: [Generic Speed] [High Speed] [Full Speed] [Manual Mode] [Energy Efficiency]

## Security menu

This menu allows a new password to be created or a current password to be changed. The menu also enables or disables the Secure Boot state and lets the user configure the System



### Administrator Password

To set an administrator password:

1. Select the Administrator Password item and press <Enter>.
2. From the Create New Password box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change an administrator password:

1. Select the Administrator Password item and press <Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.
3. From the Create New Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

*To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password.*

## User Password

To set a user password:

1. Select the User Password item and press<Enter>.
2. From the Create New Password box, key in a password, then press<Enter>.
3. Confirm the password when prompted.

To change a user password:

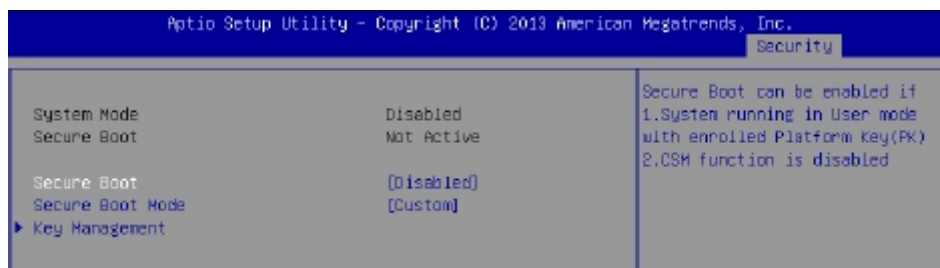
1. Select the User Password item and press<Enter>.
2. From the Enter Current Password box, key in the current password, then press <Enter>.
3. From the Create New Password box, key in a new password, then press<Enter>.
4. Confirm the password when prompted.

To clear a user password:

1. Select the Clear User Password item and press<Enter>.
2. Select Yes from the Warning message window then press<Enter>.

## Secure Boot Menu

This item allows you to customize the Secure Boot settings.



### Secure Boot [Disabled]

Secure Boot can be enabled if the system is running in User mode with enrolled Platform Key (EPK) or if the CSM function is disabled.

Configuration options: [Disabled] [Enabled]

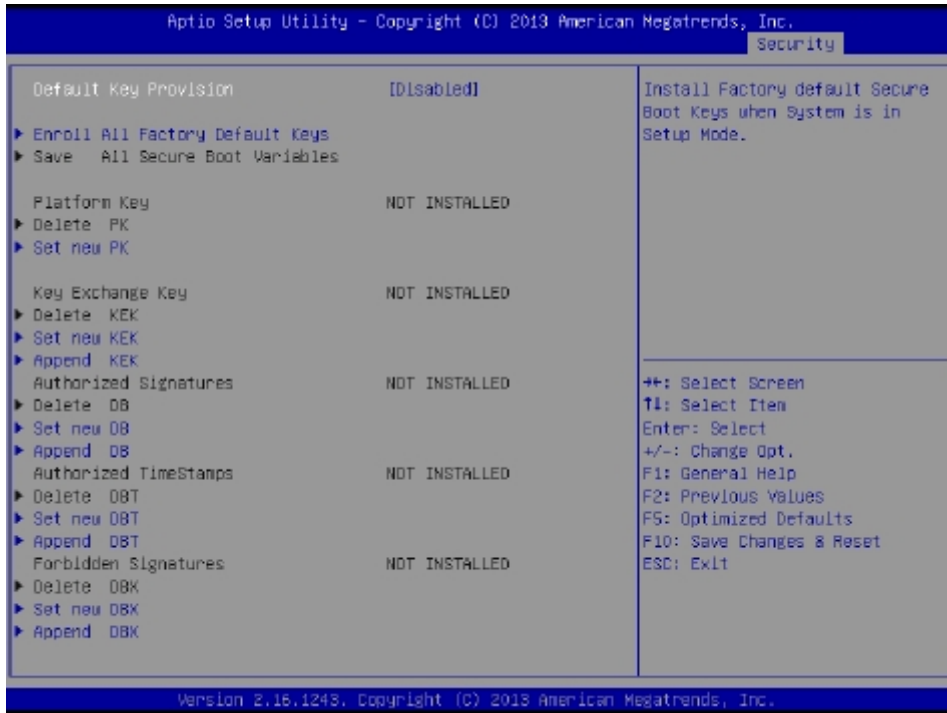
### Secure Boot Mode [Custom]

Allows you to set the Secure Boot selector.

Configuration options: [Custom] [Standard]

## Key Management

This item only appears when the item Secure Boot Mode is set to [Custom]. The Key Management item allows you to modify Secure Boot variables and set Key Management page.



### Default Key Provision [Disabled]

Configuration options: [Disabled] [Enabled]

### Enroll All Factory Default Keys

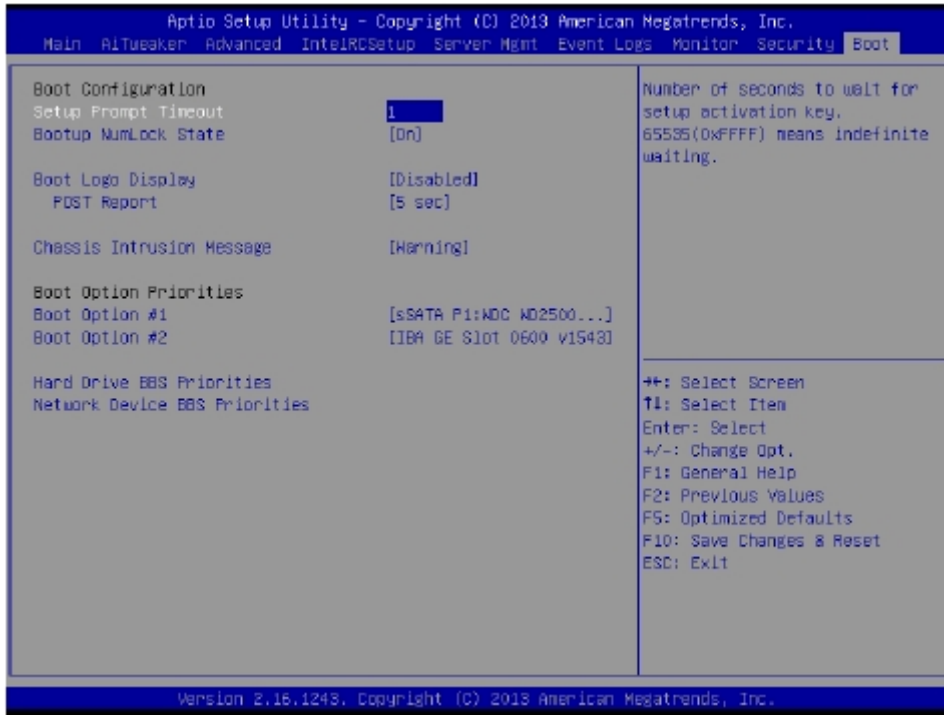
This item will ask you if you want to Install Factory Default secure keys. Select Yes if you want to load the default secure keys, otherwise select No.

### Save All Secure Boot Variables

This item will ask you if you want to save all secure boot variables. Select Yes if you want to save all secure boot variables, otherwise select No.

## Boot menu

The Boot menu items allow you to change the system boot options.



### Setup Prompt Timeout [xx]

Use the <+> and <-> keys to adjust the number of seconds to wait for setup activation key.

### Bootup NumLock State [On]

Allows you to select the power-on state for the NumLock. Configuration options: [Off] [On]

### Boot Logo Display [Disabled]

Allows you to enable or disable the full screen logo display feature.

Configuration options: [Auto] [Full Screen] [Disabled]

### POST Report [5 sec]

Allows you to set the desired POST Report waiting time from 1 to 10 seconds.

Configuration options: [1 sec] - [10 sec] [Until Press ESC]

### Chassis Intrusion Message [Warning]

Allows you to set an action when chassis intrusion has occurred.

Configuration options: [Warning] [Halt]

### Boot Option Priorities

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.



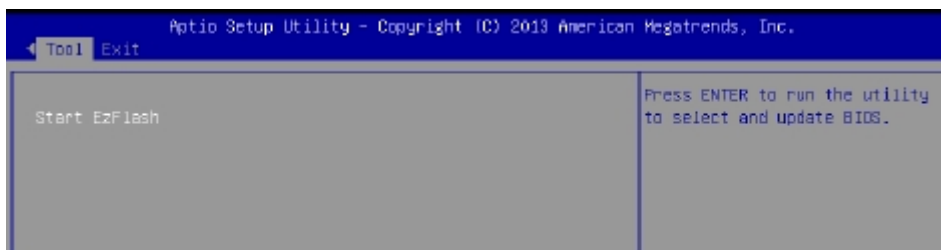
- To select the boot device during system startup, press <F8> when GRAFENTHAL Logo appears.
- To access Windows OS in Safe Mode, please press <F8> after POST.

### Hard Drive BBS Priorities / Network Device BBS Priorities

These items appear only when you connect SATA ODD or hard drive to the SATA ports and allow you to set the booting order of the SATA devices.

## Tool menu

The Tool menu items allow you to configure options for special functions. Select an item then press <Enter> to display the submenu.

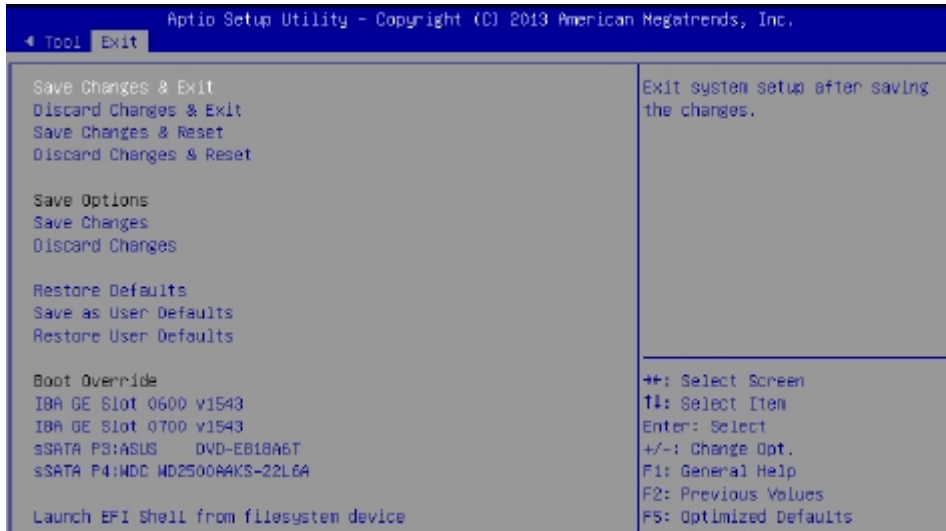


### EZ Flash

Allows you to run EZ Flash BIOS ROM Utility when you press <Enter>. Refer to the EZ Flash Utility section for details.

## Exit menu

The Exit menu items allow you to save or discard your changes to the BIOS items.



*Pressing <Esc> does not immediately exit this menu. Select one of the options from this menu or <F10> from the legend bar to exit.*

### **Save Changes & Exit**

Exit System setup after saving the changes.

### **Discard Changes & Exit**

Exit System setup without saving any changes.

### **Save Changes & Reset**

Reset the system setup after saving the changes.

### **Discard Changes & Reset**

Reset system setup without saving any changes.

### **Save Options**

#### **Save Changes**

Save changes done so far to any of the setup options.

#### **Discard Changes**

Discard changes done so far to any of the setup options.

#### **Restore Defaults**

Restore/load default values for all the setup options.

#### **Save as User Defaults**

Save the changes done so far as User Defaults.

#### **Restore User Defaults**

Restore the User Defaults to all the setup options.

### **Boot Override**

This items displays the available devices. The items that appears on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

### **Launch EFI Shell from filesystem device**

Attempts to launch EFI Shell application (shell.efi) from one of the available filesystem devices.

## RAID Configuration

This chapter provides instructions for setting up, creating, and configuring RAID sets using the available utilities.

### Setting up RAID

The motherboard supports the following SATA RAID solutions:

- LSI MegaRAID software RAID Configuration Utility with RAID0, RAID1, and RAID 10 support (for both Linux and Windows OS).
- Intel® Rapid Storage Technology Enterprise Option ROM Utility with RAID0, RAID 1, RAID 10, and RAID 5 support (for Windows OS only).

### RAID Definitions

**RAID 0** (Data striping) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

**RAID 1** (Data mirroring) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

**RAID 10** is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

**RAID 5** stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational data base applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

- *If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support DVD to a floppy disk before you install an operating system to the selected hard disk drive.*
- *Please refer to chapter 2 for how to select the RAID configuration utility. Move the Jumper to choose between LSI MegaRAID and Intel® Rapid RAID.*

## Installing hard disk drives,

The motherboard supports Serial ATA for RAID set configuration. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SATA hard disks for RAID configuration:

1. Install the SATA hard disks into the drive bays following the instructions in the system user guide.
2. Connect a SATA signal cable to the signal connector at the back of each drive and to the SATA connector on the motherboard.
3. Connect a SATA power cable to the power connector on each drive.

## Setting the RAID item in BIOS

You must set the RAID item in the BIOS Setup before you can create a RAID set from SATA hard disk drives attached to the SATA connectors supported by Intel® C612 chipset.

To do this:

1. Enter the BIOS Setup during POST.
2. Go to the Advanced Menu>PCH SATA Configuration, then press <Enter>.
3. Set SATA Mode to [RAID Mode]
4. Press<F10>to save your changes and exit the BIOS Setup.

## RAID configuration utilities

Depending on the RAID connectors that you use, you can create a RAID set using the utilities embedded in each RAID controller. For example, use the LSI MegaRAID Software Configuration Utility or the Intel® Rapid Storage Technology if you installed Serial ATA hard disk drives on the Serial ATA connectors supported by the Intel® C612 chipset.

Refer to the succeeding section for details on how to use the RAID configuration utility.

## LSI Software RAID Configuration Utility

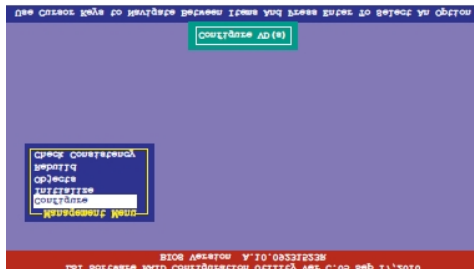
The LSI MegaRAID software RAID configuration utility allows you to create RAID 0, RAID 1, or RAID 10 set(s) from SATA hard disk drives connected to the SATA connectors supported by the motherboard southbridge chip.

- The LSI MegaRAID software RAID configuration utility automatically configures to RAID 1 when the SATA to RAID Mode is enabled.
- The RAID setup screens shown in this section are for reference only and may not exactly match the items on your screen due to the controller version difference.
- When you create RAID sets with the LSI MegaRAID software RAID configuration utility, the boot priority of the SATA optical drive has to be manually adjusted. Otherwise, the system will not boot from the connected SATA ODD.

To enter the LSI MegaRAID software RAID configuration utility:

1. Turn on the system after installing all the SATA hard disk drives.
2. During POST, the LSI MegaRAID software RAID configuration utility automatically detects the installed SATA hard disk drives and displays any existing RAID set(s). Press <Ctrl>+<M> to enter the utility.
3. The utility main window appears. Use the arrow keys to select an option from the Management Menu and then press <Enter>. Refer to the Management Menu descriptions on the next page.

At the bottom of the screen is the legend box. The keys on the legend box allow you to navigate through the setup menu options or execute commands. The keys on the legend box vary according to the menu level.



Menu	Description
Configure	Allows you to create RAID 0, RAID 1 or RAID 10 set using the Easy Configuration or the New Configuration command. This menu also allows you to view, add, or clear RAID configurations or select the boot drive
Initialize	Allows you to initialize the virtual drives of a created RAID set
Objects	Allows you to initialize virtual drives or change the virtual drive parameters
Rebuild	Allows you to rebuild failed drives

Check Consistency

Allows you to check the data consistency of the virtual drives of a created RAID set

## Creating a RAID set

The LSI Software RAID Configuration Utility allows you to create a RAID 0, RAID 1, or RAID 10 set using two types of configurations: Easy and New.

In **Easy Configuration**, the virtual drive parameters are set automatically.

In **New Configuration**, you manually set the virtual drive parameters.

### Using Easy Configuration

To create a RAID set using the Easy Configuration option:

1. From the Management Menu, select Configure> Easy Configuration, and then press <Enter>.
2. The ARRAY SELECTION MENU displays the available drives connected to the SATA ports. Use the up/down arrow keys to select the drives you want to include in the RAID set, and then press <Space>. When selected, the drive indicator changes from READY to ONLIN A [X]-[Y], where X is the array number, and Y is the drive number.

- *The information of the selected hard disk drive displays at the bottom of the screen.*
- *You need at least two identical hard disk drives when creating a RAID 1 set.*
- *You need at least four identical hard disk drives when creating a RAID 10 set.*

3. Select all the drives required for the RAID set, and then press <F10> to configure array setting.
4. Press <Space> to select the configurable array.
5. Press <F10> again, the virtual drive information appears including a Virtual Drive menu that allows you to change the virtual drive parameters.
6. Select RAID from the Virtual Drive sub-menu, and then press <Enter>.
7. Select the RAID level from the menu, and then press <Enter>.
8. Select Units from the Virtual Drive sub-menu, and then press <Enter>.
9. Select the units for virtual drive size from the menu, and then press <Enter>.
10. When creating a RAID 1 or a RAID 10 set, select DWC from the Virtual Drive menu, and then press <Enter>.  
When creating a RAID 0 set, proceed to step 12.
11. Select On to enable the Disk Write Cache setting, and then press <Enter>.

*Enabling DWC can improve the performance, but with the risk of data loss.*

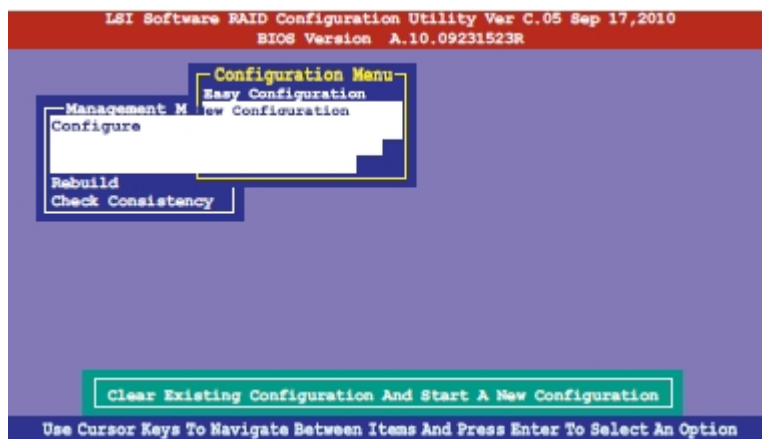
12. When finished setting the selected virtual drive configuration, select Accept from the menu, and then press <Enter>.
13. Follow step 2 to 12 to configure additional virtual drives.
14. Press <Esc> to finish RAID configuration. When prompted to save configuration, select Yes from the menu, and then press <Enter>.

## Using New Configuration

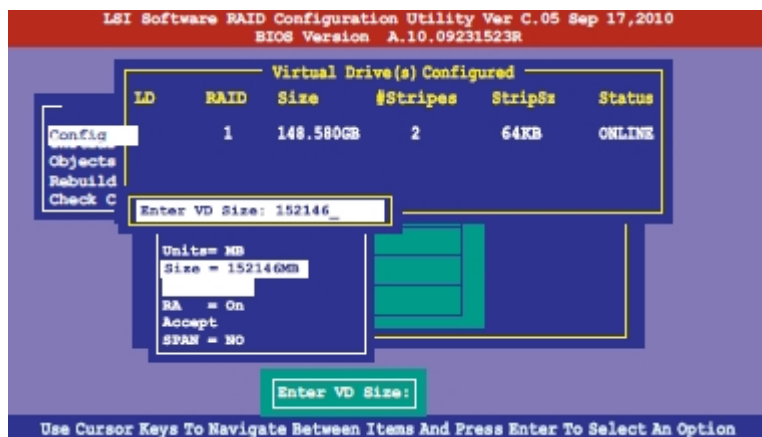
When a RAID set already exists, using the New Configuration command erases the existing RAID configuration data. If you do not want to delete the existing RAID set, use the View/Add Configuration command to view or create another RAID configuration.

To create a RAID set using the New Configuration option

1. From the Management Menu, select Configure > New Configuration, and then press <Enter>.



2. Follow step 2 to 9 of the previous section: Using Easy Configuration.
3. Select Size from the Virtual Drive menu, and then press <Enter>.
4. Key-in the desired virtual drive size, and then press <Enter>.
5. Follow step 10 to 14 of the previous section: Using Easy Configuration to create the RAID set.



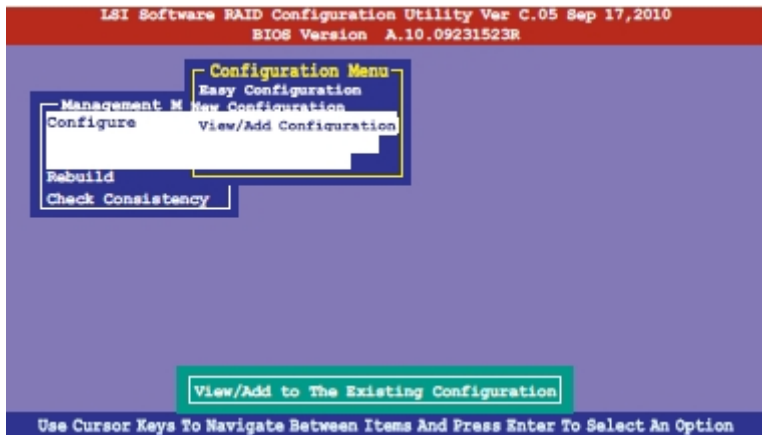


## Adding or viewing a RAID configuration

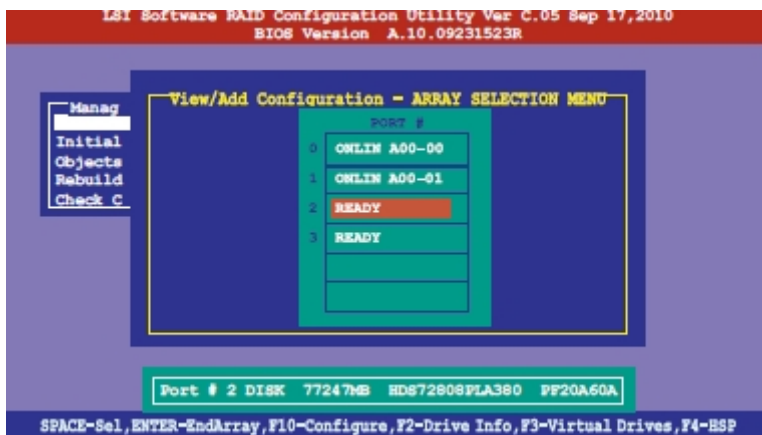
You can add a new RAID configuration or view an existing configuration using the View/Add Configuration command.

### Adding a new RAID configuration

To add a new RAID configuration:



1. From the Management Menu, select Configure > View/Add Configuration, and then press <Enter>.
2. The ARRAY SELECTION MENU displays the available drives connected to the SATA ports. Select the drive(s) you want to include in the RAID set, then press <Space>. When selected, the drive indicator changes from READY to ONLIN A [X]-[Y], where X is the array number, and Y is the drive number.
3. Follow step 3 to 12 of section Creating a RAID set: Using Easy Configuration to add a new RAID set.



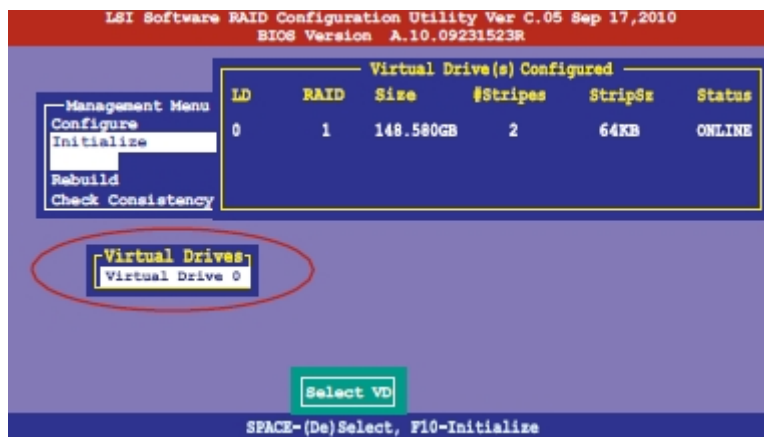
## Initializing the virtual drives

After creating the RAID set(s), you must initialize the virtual drives. You may initialize the virtual drives of a RAID set(s) using the Initialize or Objects command on the Management Menu.

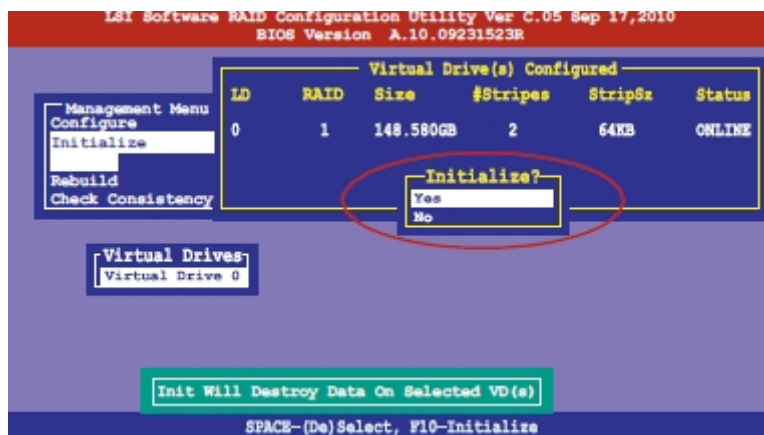
### Using the Initialize command

To initialize the virtual drive using the Initialize command

1. From the Management Menu, select Initialize, and then press <Enter>.
2. The screen displays the available RAID set(s) and prompts you to select the virtual drive to initialize. Use the arrow keys to select the virtual drive from the Virtual Drive selection, and then press <Space>.



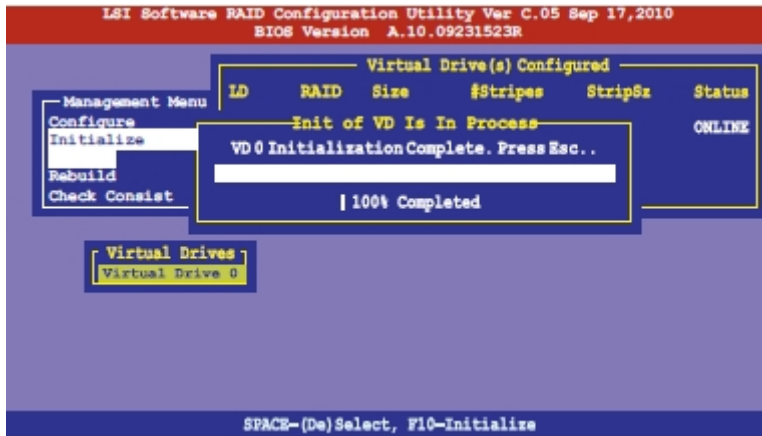
3. Press <F10> to start initialization. When prompted, select Yes from the Initialize? dialog box, and then press <Enter>.



*Initializing a virtual drive erases all data on the drive.*



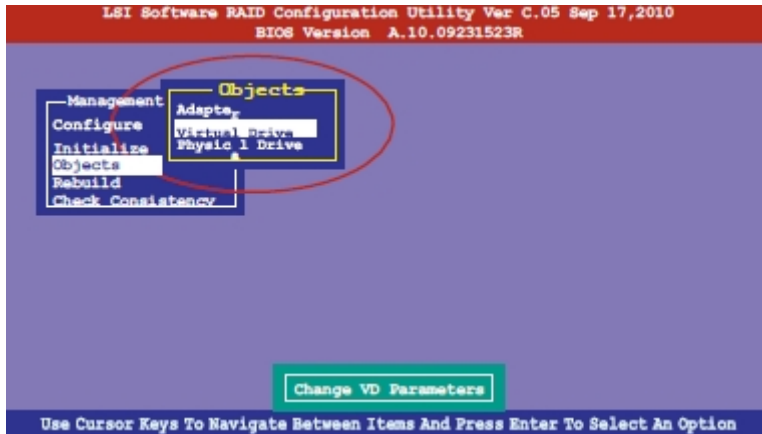
4. A progress bar appears on screen. If desired, press <Esc> to abort initialization. When initialization is completed, press <Esc>.



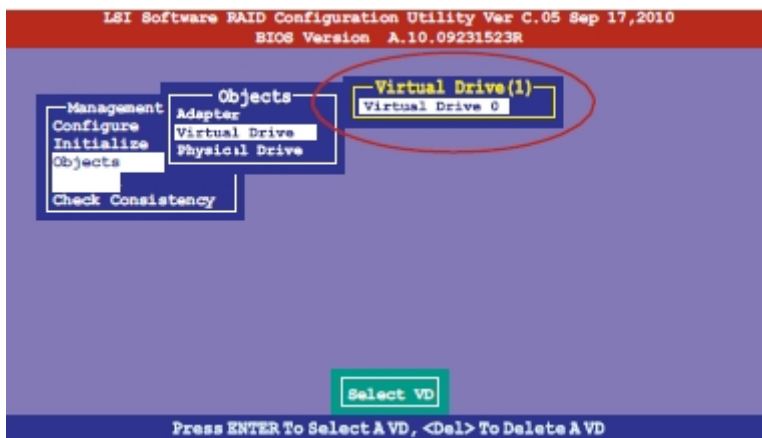
## Using the Objects command

To initialize the virtual drives using the Objects command

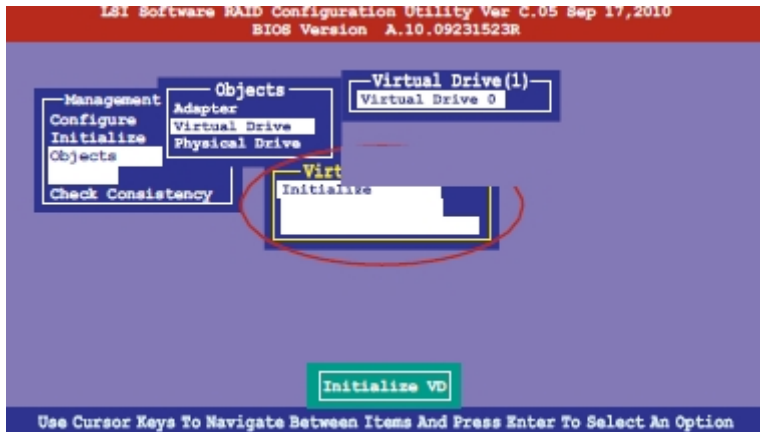
1. From the Management Menu, select Objects>Virtual Drive, and then press <Enter>.



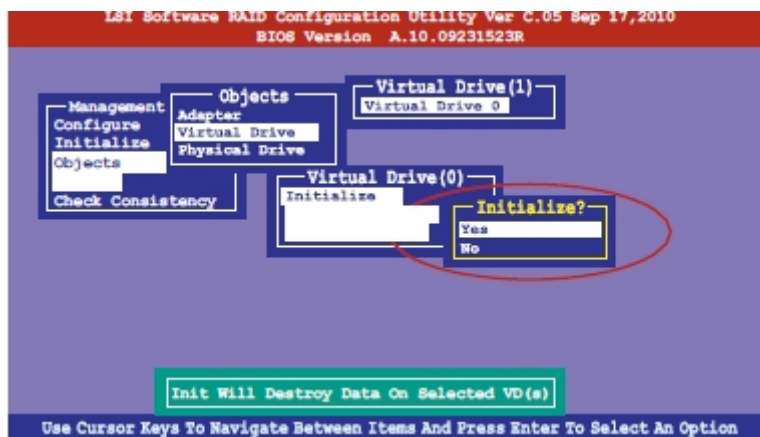
2. Select the virtual drive to initialize from the Virtual Drives sub-menu, and then press <Enter>.



3. Select Initialize from the pop-up menu, and then press <Enter> to start initialization.



4. When prompted, press the <Space> to select Yes from the Initialize? Dialog box, and then press <Enter>.



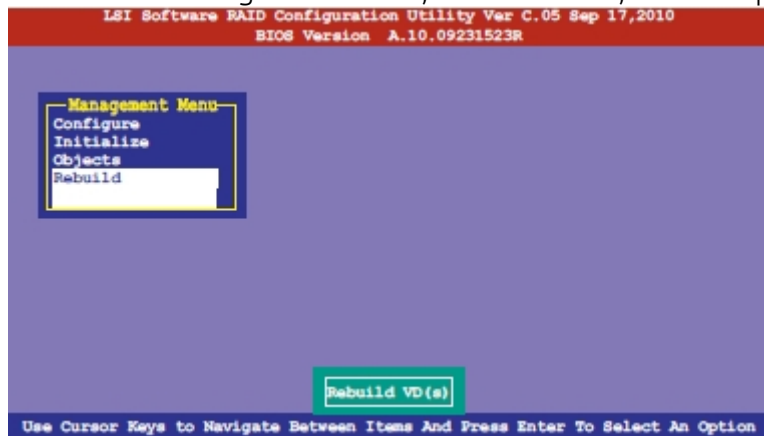
5. A progress bar appears on screen. If desired, press <Esc> to abort initialization. When initialization is completed, press <Esc>.

## Rebuilding failed drives

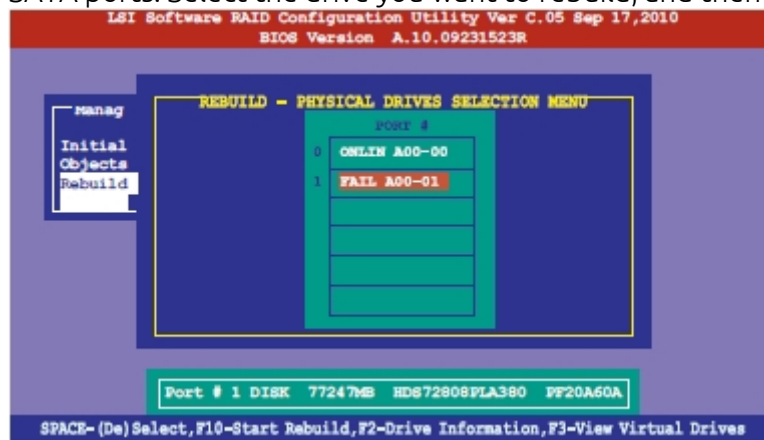
You can manually rebuild failed hard disk drives using the Rebuild command in the Management Menu.

To rebuild a failed hard disk drive

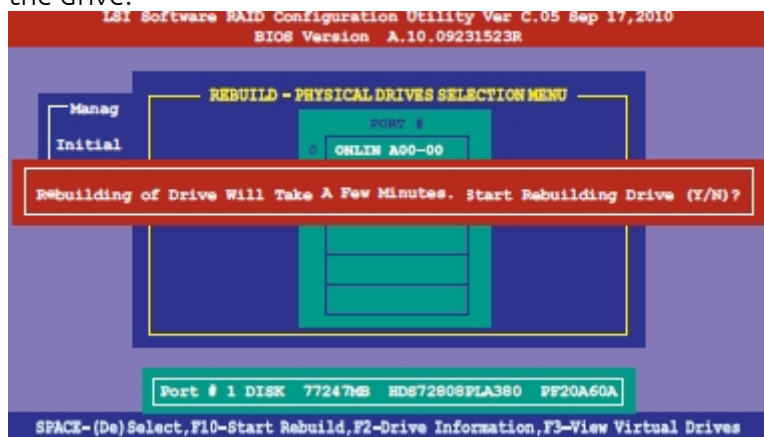
1. From the Management Menu, select Rebuild, and then press <Enter>.



2. The *PHYSICAL DRIVES SELECTION MENU* displays the available drives connected to the SATA ports. Select the drive you want to rebuild, and then press <Space>.



3. After selecting the drive to rebuild, press <F10>. When prompted, press <Y> to rebuild the drive.



4. When rebuild is complete, press any key to continue.

### Checking the drives for data consistency

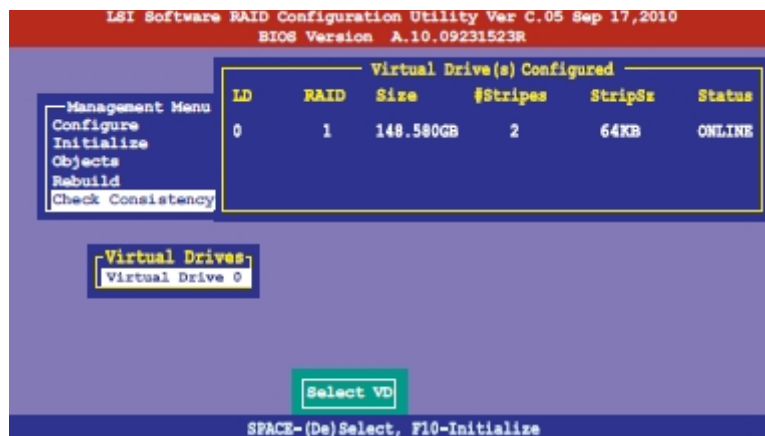
You can check and verify the accuracy of data redundancy in the selected virtual drive. The utility can automatically detect and/or detect and correct any differences in data redundancy depending on the selected option in the Objects> Adapter menu.

*The Check Consistency command is available only for virtual drives included in a RAID 1 or RAID 10 set.*

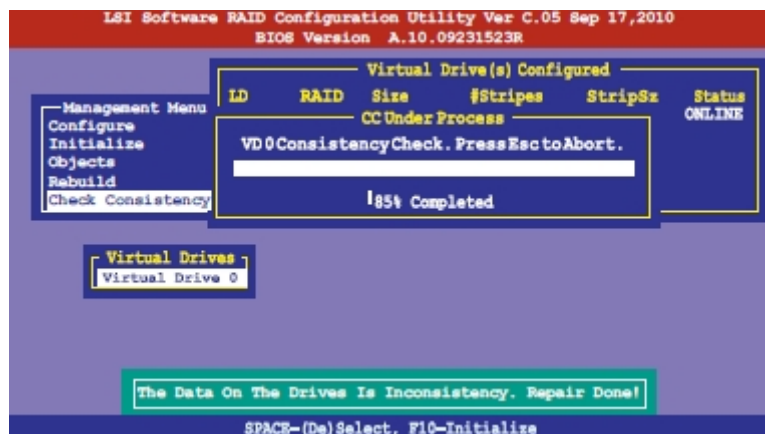
### Using the Check Consistency Command

To check data consistency using the Check Consistency command

1. From the Management Menu, select Check Consistency, and then press <Enter>.
2. The screen displays the available RAID set(s) and prompts you to select the virtual drive to check. Press <Space> to select the virtual drive from the Virtual Drive sub- menu, and then press <F10>.



3. When prompted, use the arrow keys to select Yes from the Consistency Check? dialog box, and then press <Enter>.



4. While checking the disk consistency, press <Esc> to display the following options.



- Stop - Stops the consistency check. The utility stores the percentage of disk checked, and when you restart checking, it continues from the last percentage completed rather than from zero percent.
- Continue - Continues the consistency check.
- Abort - Aborts the consistency check. When you restart checking, it continues from zero percent.

5. When checking is complete, press any key to continue.

### Using the Objects command

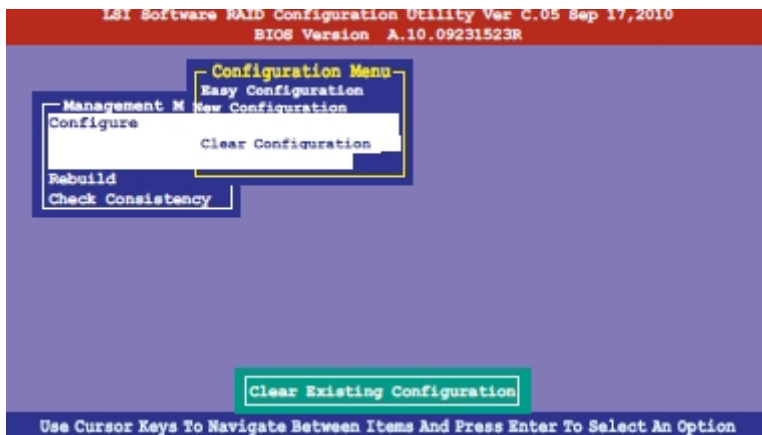
To check data consistency using the Objects command

1. From the Management Menu, select Objects, and then select Virtual Drive from the sub-menu.
2. Use the arrow keys to select the virtual drive you want to check, and then press <Enter>.
3. Select Check Consistency from the pop-up menu, and then press <Enter>.
4. When prompted, use the arrow keys to select Yes from the dialog box to check the drive.
5. When checking is complete, press any key to continue.

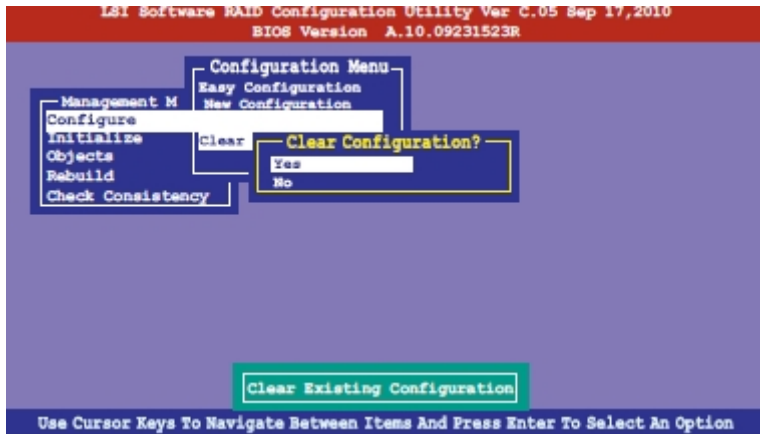
## Deleting a RAID configuration

### To delete a RAID configuration

1. From the Management Menu, select Configure > Clear Configuration, and then press <Enter>.



2. When prompted, use the arrow keys to select Yes from the Clear Configuration? dialog box, and then press <Enter>.



The utility clears all the current array(s).

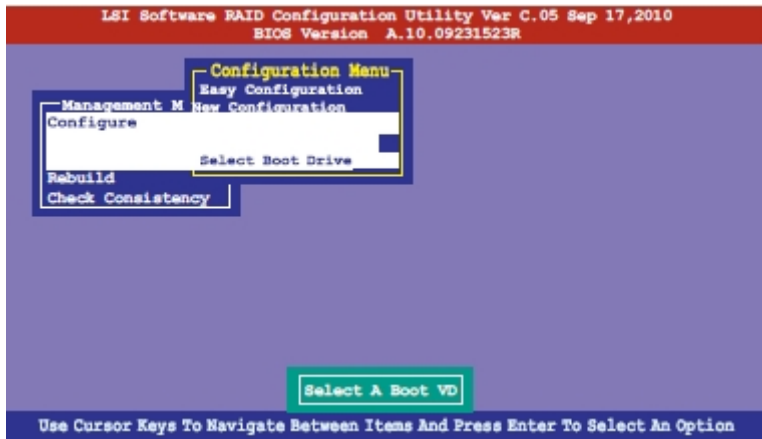
3. Press any key to continue.

## Selecting the boot drive from a RAID set

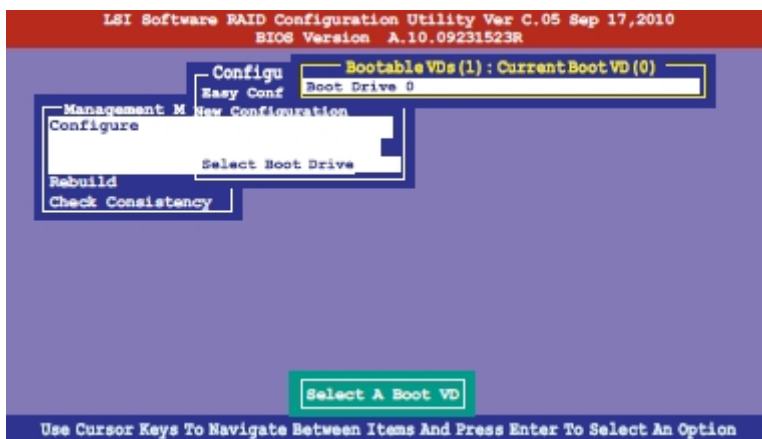
You must have created a new RAID configuration before you can select the boot drive from a RAID set. See section Creating a RAID set: Using New Configuration for details.

To select the boot drive from a RAID set

1. From the Management Menu, select Configure>Select Boot Drive, and then press <Enter>.



2. When prompted, use the arrow keys to select the bootable virtual drive from the list, then press <Enter>.



3. The virtual drive is selected as boot drive. Press any key to continue.

## Enabling WriteCache

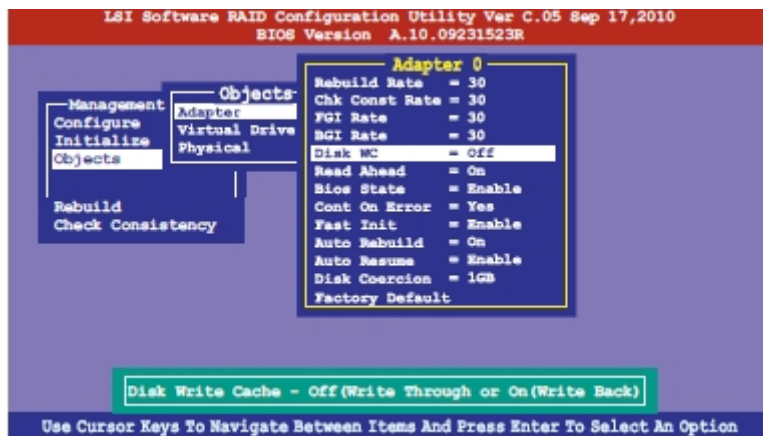
You may manually enable the RAID controller's Write Cache option after creating a RAID set to improve the data transmission performance.

*When you enable WriteCache, you may lose data when a power interruption occurs while transmitting or exchanging data among the drives.*

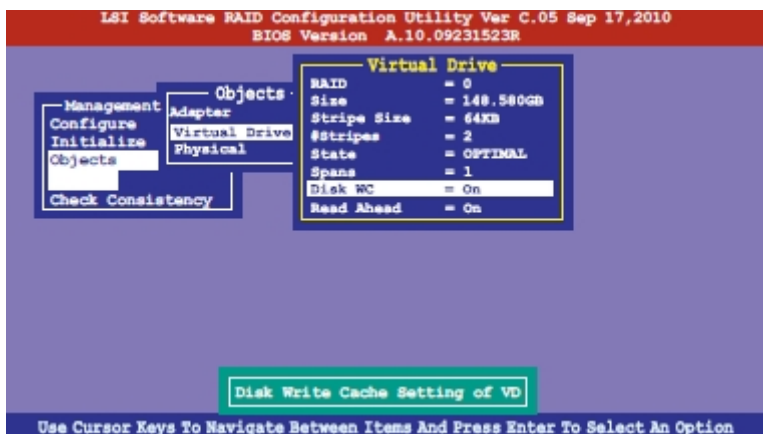
*The WriteCache function is recommended for RAID 1 and RAID 10 sets.*

To enable WriteCache

1. From the Management Menu, select Objects>Adapter, select an existing adapter, and then press <Enter> to display the adapter properties.
2. Select Disk WC, and then press <Enter> to turn on the option.



3. From the Management Menu, select Objects >Virtual Drive, select an existing adapter and press <Enter>. Select View/Update Parameters and press <Enter> to display the adapter properties.
4. Select Disk WC, and then press <Enter> to turn on the option.



5. When finished, press any key to continue.

## Intel® Rapid Storage Technology enterprise SATA/SSATA Option ROM Utility

The Intel® Rapid Storage Technology enterprise SATA/SSATA Option ROM utility allows you to create RAID 0, RAID 1, RAID 10 (RAID1+0), and RAID 5 set from Serial ATA hard disk drives that are reconnected to the Serial ATA connectors supported by the Southbridge.

*Before you proceed, ensure that you have installed the Serial ATA hard disk drives, have set the correct jumper settings of the motherboard, and have set the correct SATA mode in the BIOS setup. You can refer to the Installing hard disk drives, Setting Jumpers, and Setting the RAID mode sections in BIOS for more information.*

To launch the Intel® Rapid Storage Technology enterprise SATA/SSATA Option ROM utility:

1. Turn on the system.
2. During POST, press <Ctrl>+<I> to display the utility main menu.

```

Intel (R) Rapid Storage Technology enterprise - SATA Option ROM - 3.6.0.1023
Copyright (C) 2003-12 Intel Corporation. All Rights Reserved.

----- [ MAIN MENU ] -----
1. Create RAID Volume
2. Delete RAID Volume          4. Exit

----- [ DISK/VOLUME INFORMATION ] -----

RAID Volumes:
None defined.

Physical Disks:
ID Drive Model      Serial #           Size  Type/Status (Vol ID)
0 ST3300656SS      HWAS0000991753TR 279.3GB Non-RAID Disk
1 ST3300656SS      37VN00009846RAJ1 279.3GB Non-RAID Disk
2 ST3300656SS      397600009846UEDY 279.3GB Non-RAID Disk
3 ST3300656SS      GWC50000991756G6 279.3GB Non-RAID Disk

[↑↓]-Select      [ESC]-Exit      [ENTER]-Select Menu
  
```

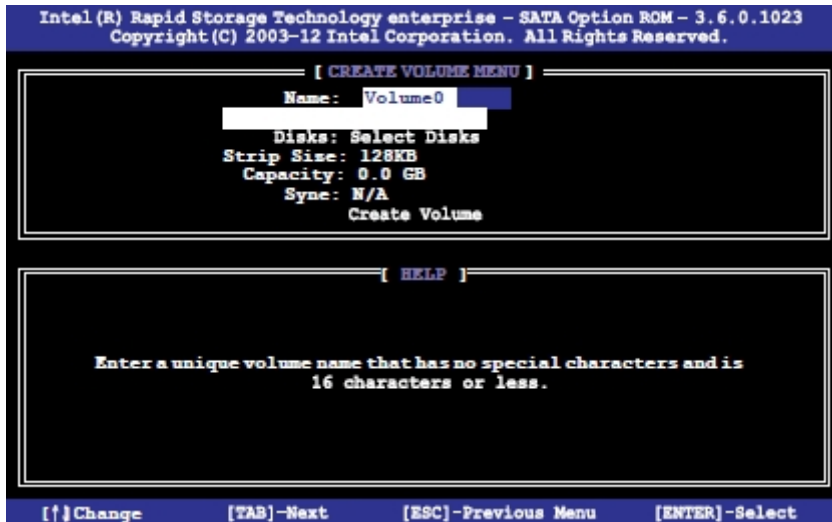
The navigation keys at the bottom of the screen allow you to move through the menus and select the menu options.

*The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.*

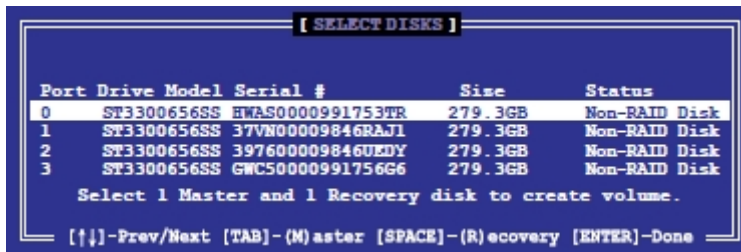
## Creating a RAID set

### To create a RAID set:

1. From the utility main menu, select *1. Create RAID Volume* and press <Enter>.
2. Key in a name for the RAID set and press <Enter>.



3. Press the up/down arrow keys to select a RAID Level that you wish to create then press <Enter>.
4. From the Disks item field, press <Enter> to select the hard disk drives that you want to include in the RAID set.



5. Use the up/down arrow keys to move the selection bar then press <Space> to select a disk. A small triangle before the Port number marks the selected drive. Press <Enter> when you are done.
6. Use the up/down arrow keys to select the stripe size for the RAID array (for RAID 0, 10 and 5 only) then press <Enter>. The available stripe size values range from 4KB to 128KB. The following are typical values:
  - RAID 0: 128KB
  - RAID 10: 64KB
  - RAID 5: 64KB

We recommend a lower stripe size for server systems, and a higher stripe size for multimedia computer systems used mainly for audio and video editing.

7. In the Capacity field item, key in the RAID volume capacity that you want to use and press <Enter>. The default value field indicates the maximum allowed capacity.

8. Press <Enter> to start creating the RAID volume.

9. From the following warning message, press <Y> to create the RAID volume and return to the main menu, or press <N> to go back to the CREATE VOLUME menu.

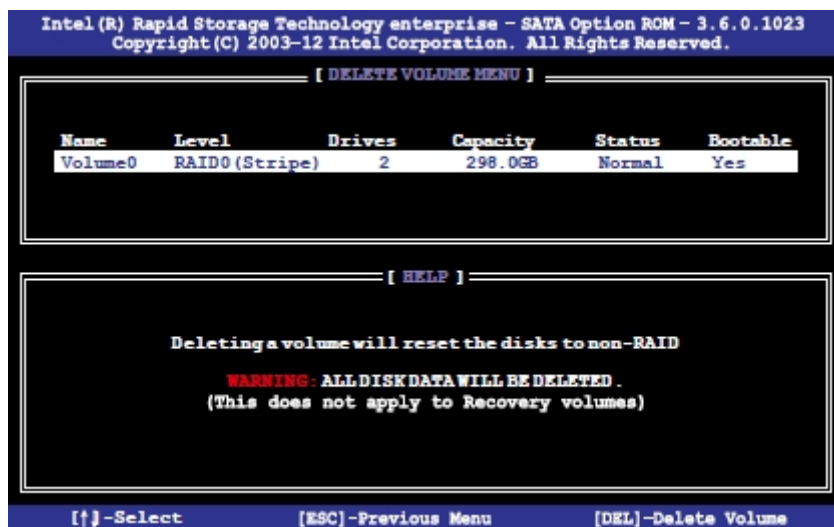


## Deleting a RAID set

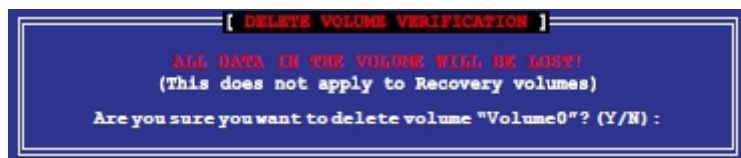
*Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.*

To delete a RAID set:

1. From the utility main menu, select 2. Delete RAID Volume and press <Enter>.
2. From the Delete Volume Menu, press the up/down arrow keys to select the RAID set you want to delete then press <Del>.



3. Press <Y> to confirm deletion of the selected RAID set and return to the utility main menu, or press <N> to return to the DELETE VOLUME menu.



## Resetting disks to Non-RAID

*Take caution before you reset a RAID volume hard disk drive to non-RAID. Resetting a RAID volume hard disk drive deletes all internal RAID structure on the drive.*

To reset a RAID set:

1. From the utility main menu, select 3. Reset Disks to Non-RAID and press <Enter>.
2. Press the up/down arrow keys to select the drive(s) or disks of the RAID set you want to reset, then press <Space>. A small triangle before the Port number marks the selected drive. Press <Enter> when you are done.

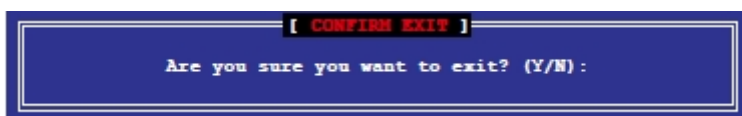


3. Press <Y> in the confirmation window to reset the drive(s) or press <N> to return to the utility main menu.

## Exiting the Intel® Rapid Storage Technology Enterprise SATA/SSATA Option ROM utility

To exit the utility:

1. From the utility main menu, select 4. Exit then press <Enter>.
2. Press <Y> to exit or press <N> to return to the utility main menu.



## Rebuilding the RAID

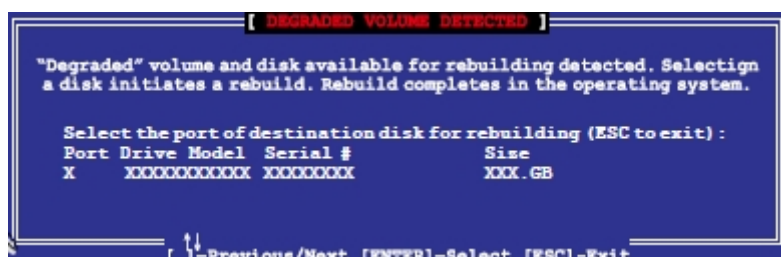
*This option is only for the RAID 1 set.*

### Rebuilding the RAID with other non-RAID disk

If any of the SATA hard disk drives included in the RAID 1 array failed, the system displays the status of the RAID volume as “Degraded” during POST. You can rebuild the RAID array with other installed non-RAID disks.

To rebuild the RAID with other non-RAID disk:

1. During POST, press <Ctrl>+<I> at the prompt to enter the Intel Rapid Storage Technology option ROM utility.
2. If there is a non-RAID SATA Hard Disk available, the utility will prompt you to rebuild the RAID. Press the up/down arrow keys to select the destination disk then Press <Enter> to start the rebuilding process, or press <ESC> to exit.



Select a destination disk with the same size as the original hard disk.

3. The utility immediately starts rebuilding after the disk is selected. When done, the status of the degraded RAID volume is changed to “Rebuild”.

4. Press <Esc> to exit Intel Rapid Storage Technology and reboot the system.
5. Select Start>Programs>Intel Rapid Storage>Intel Rapid Storage Console or click the Intel Rapid Storage Technology tray icon to load the Intel Rapid Storage Manager utility.
6. From the View menu, select Advanced Mode to display the details of the Intel Rapid Storage Console.
7. From the Volumes view option, select RAID volume to view there building status. When finished, the status is changed to “Normal”.

```

Intel (R) Rapid Storage Technology enterprise - SATA Option ROM - 3.6.0.1023
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[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
4. Exit

[ DISK/VOLUME INFORMATION ]

RAID Volumes:
ID Name Level Strip Size Status Bootable
1 Volume0 RAID1(Mirror) N/A 149.0GB Rebuild Yes
*-Data is Encrypted

Physical Devices:
Port Drive Model Serial # Size Type/Status (Vol ID)
1 ST3160812AS 9LS0F4HL 149.0GB Member Disk (0)
2 ST3160812AS 3LS0JYL8 149.0GB Member Disk (0)

Volumes with "Rebuild" status will be rebuilt within the operating system.

[ ]-Select [ESC]-Exit [ENTER]-Select Menu

```

## Rebuilding the RAID with a new hard disk

If any of the SATA hard disk drives included in the RAID array failed, the system displays the status of the RAID volume as “Degraded” during POST. You may replace the disk drive and rebuild the RAID array.

To rebuild the RAID with a new hard disk:

1. Remove the failed SATA hard disk and install a new SATA hard disk of the same specification into the same SATA Port.

*Select a destination disk with the same size as the original hard disk.*

2. Reboot the system then follow the steps in section Rebuilding the RAID with other non-RAID disk.

## Setting the Boot array in the BIOS Setup Utility

You can set the boot priority sequence in the BIOS for your RAID arrays when creating multi-RAID using the Intel® Rapid Storage Technology Enterprise SATA Option ROM utility.

To set the boot array in the BIOS:

*Set at least one of the arrays bootable to boot from the hard disk.*

1. Reboot the system and press <Del> to enter the BIOS setup utility during POST.

2. Go to the Boot menu and select the boot option priority.
3. Use up/down arrow keys to select the boot priority and press <Enter>. See the Boot menu section for more details.
4. From the Exit menu, select Save Changes & Exit, then press <Enter>.
5. When the confirmation window appears, select Yes, then press <Enter>.

## Driver Installation

This chapter provides the instructions for installing the necessary drivers for different system components in both Linux® and Windows® Operating Systems.

### RAID Driver Installation

After creating the RAID sets for your server system, you are now ready to install an operating system to the independent hard disk drive or bootable array. This part provides the instructions on how to install the RAID controller drivers during OS installation.

### Creating a RAID driver disk

*The system does not include a floppy drive. You have to use a USB floppy drive when creating a SATA RAID driver disk.*

*If you have created RAID sets with the LSI Software RAID configuration utility, the boot priority of the SATA optical disk drive has to be manually adjusted. Otherwise, the system will not boot from the connected SATA ODD.*

To create a RAID driver disk in **Windows®** environment

1. Start Windows®.
2. Place the motherboard support DVD into the optical drive.
3. Go to the Make disk menu, and then select the type of RAID driver disk you want to create.
4. Insert a floppy disk into the USB floppy disk drive.
5. Follow succeeding screen instructions to complete the process.

To create a RAID driver disk in **Red Hat® Enterprise Linux** server environment

1. Insert a blank formatted high-density floppy disk to the USB floppy disk drive.
2. Type **`dd if=XXX.img of=/dev/fd0`** to decompress the file into the floppy disk from the following path in the support DVD: For LSI MegaRAID Driver

`\Drivers\C610 LSI RAID\Driver\makedisk\Linux`

3. Eject the floppy disk.

## Installing the RAID controller driver

### *During Windows® Server 2008 R2 OS installation*

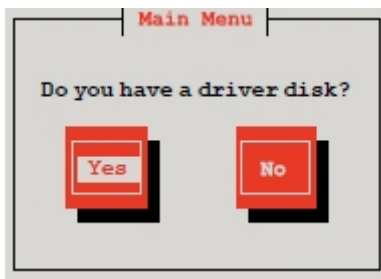
To install the RAID controller driver when installing Windows® Server 2008 R2 OS

1. Boot the computer using the Windows® Server 2008 R2 OS installation disc. Follow the screen instructions to start installing Windows Server 2008 R2.
2. When prompted to choose a type of installation, click Custom (advanced).
3. Click Load Driver.
4. A message appears, reminding you to insert the installation media containing the driver of the RAID controller driver. If you have only one optical drive installed in your system, eject the Windows OS installation disc and replace with the motherboard Support DVD into the optical drive. Click Browse to continue.
5. Locate the driver in the corresponding folder of the Support DVD then click OK to continue.
6. Select the RAID controller driver you need from the list and click Next.
7. When the system finishes loading the RAID driver, replace the motherboard Support DVD with the Windows Server installation disc. Select the drive to install Windows and click Next.
8. Setup then proceeds with the OS installation. Follow screen instructions to continue.

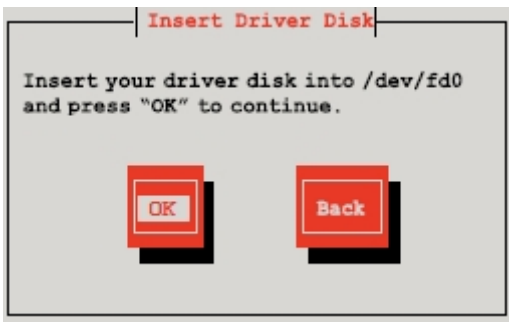
### Red Hat® Enterprise Linux OS 5.x

To load the LSI MegaRAID controller driver when installing Red Hat® Enterprise OS:

1. Boot the system from the RedHat®OS installation CD.
2. At the **boot:**, type **linux dd** then press <Enter>.
3. Select Yes using the <Tab> key when asked if you have the driver disk, then press <Enter>.

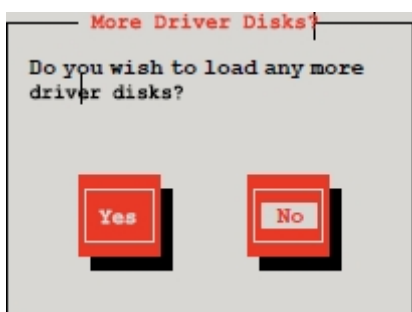


4. Insert the RedHat® Enterprise RAID driver disk to the USB floppy disk drive, select OK, then press <Enter>.



The drivers for the RAID card are installed to the system.

5. When asked if you will load additional RAID controller drivers, select No, then press <Enter>.



6. Follow the onscreen instructions to finish the OS installation.

7. When the installation is completed, DO NOT click Reboot. Press <Ctrl>+<Alt>+ <F2> to switch to the command-line interface from graphic user interface.

8. Type the following commands when using a Legacy floppy.

```
mkdir /mnt/driver
```

```
mount /dev/fd0 /mnt/driver
```

```
cd /mnt/driver
```

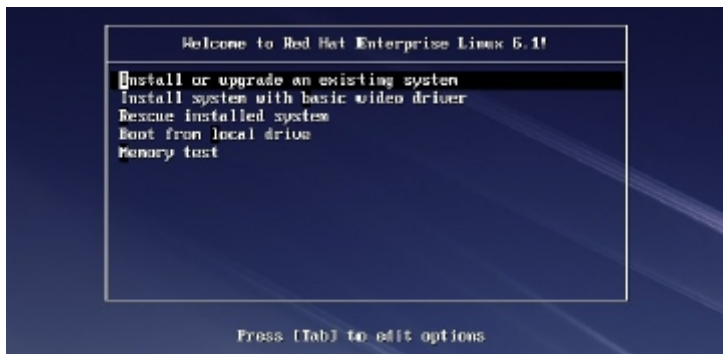
```
sh replace_ahci.sh
```

```
reboot
```

## Red Hat Enterprise Linux OS 6.x

To install the LSI MegaRAID controller driver when installing Red Hat® Enterprise OS:

1. Boot the system from the RedHat® OS installation CD.
2. Press <Tab> to edit options.



3. While booting from DVD, press <ESC> to give the third party driver. Enter the following command at the boot: ***linux dd blacklist=isci blacklist=ahci nodmraid***, then press <ENTER>.



4. Select Yes using the <Tab> key when asked if you have the driver disk, then press <Enter>.
  5. You have multiple devices which could serve as source for a driver disk. Choose one you like to use and select OK, then press <Enter>.
  6. Insert the RedHat®Enterprise RAID driver disk to the USB floppy disk drive, select OK, then press <Enter>.
- The drivers for the RAID card are installed to the system.
7. When asked if you will load additional RAID controller drivers, select No, then press <Enter>.
  8. Follow the on screen instructions to finish the OS installation.



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### Preparing the Linux Driver

Ensure that there is another computer with a Linux-based OS to create the RAID driver. When creating the RAID driver, you may refer to the examples below which uses a 64bit SUSE Linux system to create a 64bit RAID driver for SUSE11 sp1.

1. Copy the image file into the Linux system.

Example: **megasr-15.00.0120.2012-1-sles11-ga-x86\_64.img**

2. Create a folder.

Example: **image**

3. Mount the image file into the image folder using this command format:

**mount -o loop [image file name] image**

Example: **mount -o loop megasr-15-15.00.0120.2012-1-sles11- ga-x86 64.img image**



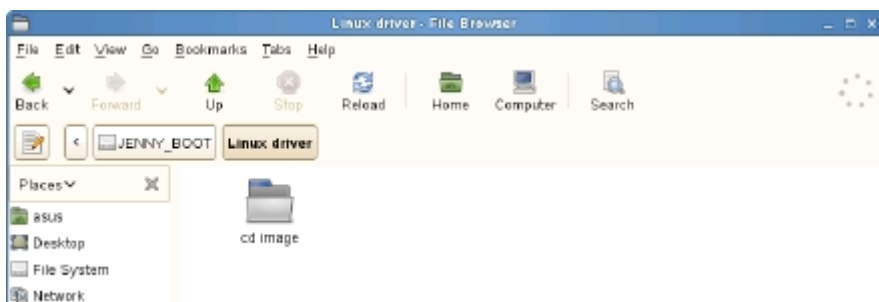
```

asus@linux-doe5:~$ su -
Password:
linux-doe5:~ # cd tmp
linux-doe5:~/tmp # mount -o loop megasr-15.00.0120.2012-1-sles11-ga-x86_64.img image
linux-doe5:~/tmp #
  
```

4. Copy the contents of the image directory, labeled as **01**, into a FAT32 USB drive.



5. Rename the **01** folder to **CD Image**.



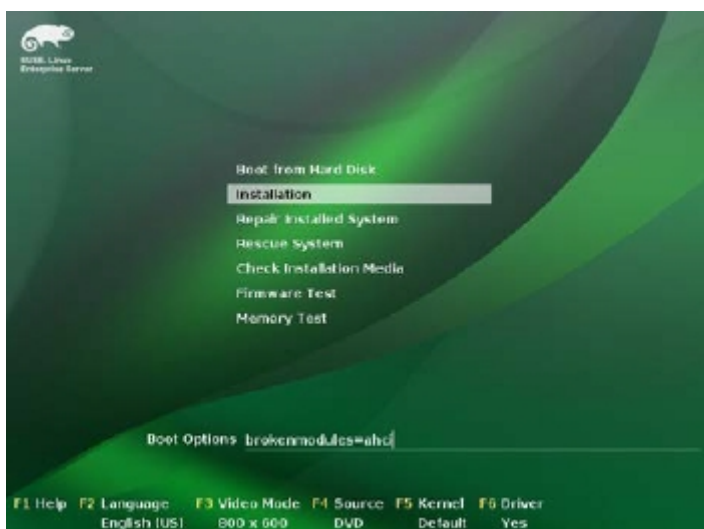
### Installing SUSE 11 Linux OS

To install the LSI MegaRAID controller driver when installing SUSE Linux Enterprise Server OS:

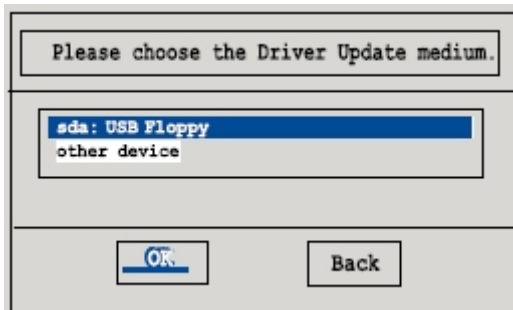
1. Boot the system from the SUSE OS installation CD.
2. Use the arrow keys to select Installation from the Boot Options menu.



3. Press <F6>, then select Yes from the menu. Press <Enter>.
4. Use the USB drive to provide the third-party driver during the OS installation. Type the command ***brokenmodules=ahci*** in Boot Options field, and press <Enter>.



5. When below screen appears, select the USB floppy disk drive (sda) as the driver update medium. Select OK, then press <Enter>.



6. Select Back and follow the onscreen instructions to finish the installation.

### Software drivers and utilities installation

The support DVD bundled with your motherboard contains the user guide of your motherboard, drivers, management applications, and utilities that you can install to maximize the features of your motherboard.

- 1. The contents of the support DVD are subject to change at any time without notice. Visit the GRAFENTHAL website ([www.grafenthal.de](http://www.grafenthal.de)) for the latest updates on software and utilities.*
- 2. The support DVD is supported on Windows® Server 2008R2, Windows® Server 2012, and Windows® Server 2012 R2.*

## Appendix

This appendix includes additional information that you may refer to when configuring the motherboard.

### Block Diagram

