Z13PE-D16

Motherboard

E23184
Revised Edition V2
December 2023

Contents

Safety information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing 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.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

Conventions used in this guide

To ensure that you perform certain tasks properly, take note of the following symbols used throughout this manual.

DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.

CAUTION: Information to prevent damage to the components when trying to complete a task.

IMPORTANT: Instructions that you MUST follow to complete a task.

NOTE: Tips and additional information to help you complete a task.

Typography

Bold text	Indicates a menu or an item to select.
Italics	Used to emphasize a word or a phrase.
<Key>	Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key. Example: <Enter> means that you must press the Enter or Return key.
<Key1> + <Key2> + <Key3>	If you must press two or more keys simultaneously, the key names are linked with a plus sign (+). Example: <Ctrl> + <Alt> + <Del>
`Command`	Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets. Example: At DOS prompt, type the command line: `format A:/S`

Z13PE-D16 Specifications Summary

Processor Support		2 x Socket (LGA 4677) 4th Gen Intel® Xeon® Scalable Processors Family (up to 350W) UPI 16 GT/s
Core Logic		Intel® C741 Chipset
Memory	**Total Slots**	16
	Voltage	1.1V
	Capacity	Maximum up to 4096GB
	Memory Type	DDR5 4800/4400 RDIMM/LRDIMM/NVDIMM/3DS DIMM * **Memory frequency support depends on the CPU installed. Refer to www.asus.com for detailed memory AVL & CPU Support list.**
	Memory Size	16GB, 32GB, 64GB (RDIMM) 128GB, 256GB (RDIMM-3DS) * **Refer to ASUS server AVL for the latest update**
Expansion Slots	**Total PCI/PCI-X/ PCI-E/PIKE Slots**	6
	Slot Location 1	1 x PCI-E x16 (x16 Gen5 Link)
	Slot Location 2	1 x PCI-E x16 (x16 Gen5 Link)
	Slot Location 3	1 x PCI-E x16 (x16 Gen5 Link)
	Slot Location 4	1 x PCI-E x16 (x16 Gen5 Link)
	Slot Location 5	1 x PCI-E x16 (x16 Gen5 Link)
	Slot Location 6	1 x PCI-E x16 (x8 Gen5 Link)
Storage	**SATA Controller**	**Intel® C741 PCH:** 10 x SATA 6Gb/s ports (8 by 2 Slimline Connector) Intel® RSTe (for Windows only; Support software RAID 0, 1, 10 & 5) Intel® VROC (for Windows only; Support software RAID 0, 1, 10 & 5)
Networking	**LAN**	2 x Intel® X710 1 x Management Port
Graphic	**VGA**	Aspeed AST2600 64MB
I/O Ports		1 x COM port 2 x USB 3.2 Gen 1 ports 1 x VGA port 1 x Management LAN port 2 x 10GbE LAN ports (RJ45)

(continued on the next page)

Onboard I/O Connectors		1 x TPM header 1 x 24-pin SSI Power connector 2 x 8-pin SSI 12V connectors 1 x USB 3.2 Gen 1 header (supports up to 2 USB 3.2 Gen 1 devices) 1 x USB 2.0 header (supports up to 2 USB 2.0 devices) 8 x Fan headers 1 x SMBus header 1 x Chassis Intrusion header 2 x Front LAN LEDs 2 x NGFF Type (1 x 2280, 1 x 22110) 1 x VROC Key connector
OS Support		Please find the latest OS support from https://www.asus.com/event/Server/OS_support_list/OS.html
Management Solution	**Software**	ASUS Control Center (Classic)
	Out of Band Remote Management	ASMB11-iKVM for KVM-over-IP (Optional)
Dimension		E-ATX, 12 in. x 13 in.
Environment		Operation temperature: 10°C ~ 35°C (50°F ~ 95°F) Non operation temperature: -40°C ~ 70°C (-40°F ~ 158°F) Non operation humidity: 20% ~ 90% (Non condensing)

Specifications are subject to change without notice.

1 Product Introduction

This chapter describes the motherboard features and the new technologies it supports.

1.1 Welcome!

Thank you for buying an ASUS Z13PE-D16 motherboard!

The motherboard delivers a host of new features and latest technologies, making it another standout in the long line of ASUS quality motherboards!

Before you start installing the motherboard and hardware devices on it, check the items in your package with the list below.

1.2 Package contents

Check your motherboard package for the following items.

Items	Standard Gift Box Pack	Standard Bulk Pack
Motherboard	1 x Z13PE-D16	1 x Z13PE-D16
I/O Shield	1 x I/O Shield	1 x I/O Shield
Cables	2 x SATA Cables 2 x Slimline SAS to SATA Cables	-
Accessory	2 x M.2 screw	2 x M.2 screw
Packaging Qty.	1 pc per carton	10 pcs per carton

If any of the above items is damaged or missing, contact your retailer.

1.3 Serial number label

Before requesting support from the ASUS Technical Support team, you must take note of the motherboard's serial number containing 12 characters **xxSxxxxxxxxx** shown as the figure below. With the correct serial number of the product, ASUS Technical Support team members can then offer a quicker and satisfying solution to your problems.

2 Hardware Information

This chapter lists the hardware setup procedures that you have to perform when installing system components. It includes description of the jumpers and connectors on the motherboard.

2.1 Before you proceed

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

- Unplug the power cord from the wall socket before touching any component.
- Use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.
- Hold components by the edges to avoid touching the ICs on them.
- Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.
- Before you install or remove any component, ensure that the power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, and/or components.

2.2 Motherboard overview

Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.

To optimize the motherboard features, we highly recommend that you install it in an EATX compliant chassis.

Ensure to unplug the chassis power cord before installing or removing the motherboard. Failure to do so can cause you physical injury and damage motherboard components!

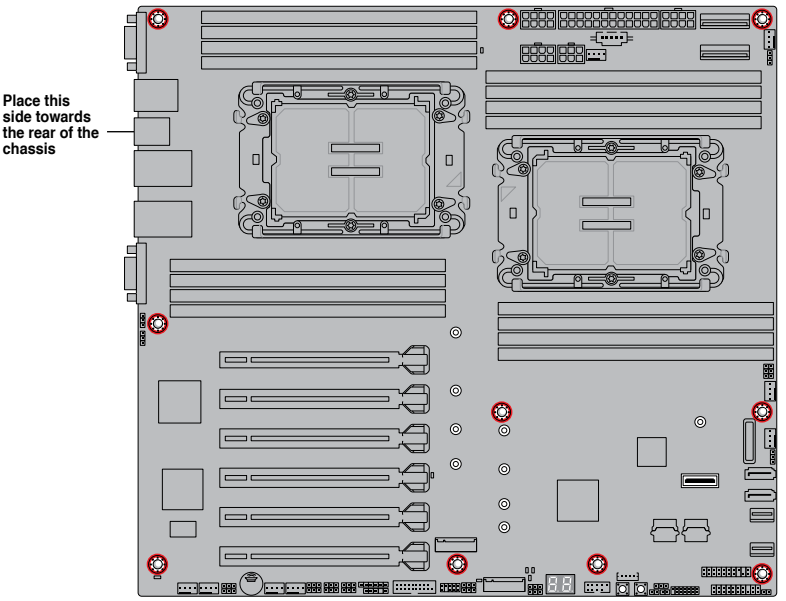
2.2.1 Placement direction

When installing the motherboard, ensure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

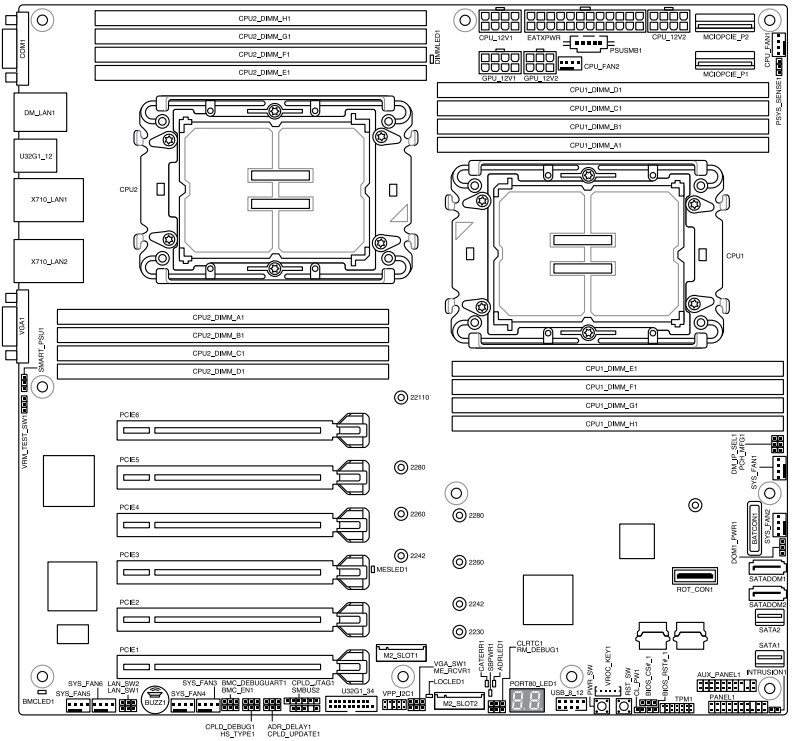
2.2.2 Screw holes

Place ten (10) screws into the holes indicated by circles to secure the motherboard to the chassis.

DO NOT overtighten the screws! Doing so can damage the motherboard.



2.2.3 Motherboard layout



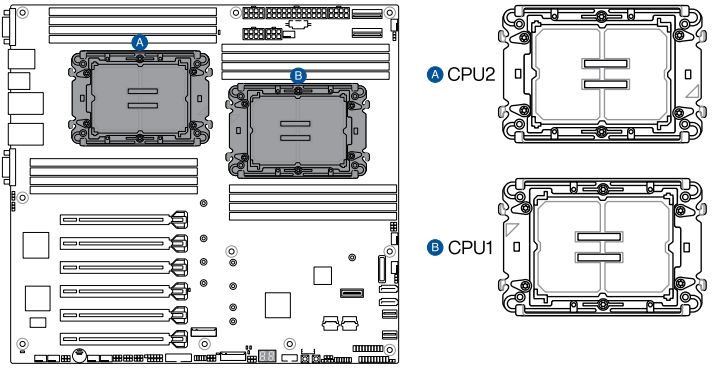
2.2.4 Layout contents

Rear panel connectors		Page
1.	Video Graphics Adapter port	2-28
2.	RJ-45 port for iKVM	2-28
3.	USB 3.2 Gen 1 ports 1 and 2	2-28
4.	RJ-45 ports for Intel® LOM X710AT LAN 1-2	2-28
5.	COM port	2-28

Internal connectors		Page
1.	SATA DOM connectors (7-pin SATADOM1-2)	2-29
2.	SATA Backplane connectors (SATA1-2)	2-29
3.	MCIOPCIE connectors (MCIOPCIE_P1-2)	2-30
4.	USB 3.2 Gen 1 connector (20-1 pin U32G1_34)	2-30
5.	USB 2.0 connector (10-1 pin USB_8_12)	2-31
6.	BMC Debug UART connector (3-pin BMC_DEBUGUART1)	2-31
7.	Power connectors (24-pin EATXPWR; 8-pin CPU_12V1-2)	2-32
8.	GPU Power connectors (8-pin GPU_12V1-2)	2-32
9.	Fan connectors (4-pin CPU_FAN1-2, SYS_FAN1-6)	2-33
10.	VPP_I2C connector (10-1 pin VPP_I2C1)	2-33
11.	System panel connector (20-1 pin PANEL)	2-34
12.	Auxiliary Panel connector (20-2 pin AUX_PANEL1)	2-35
13.	VROC Key connector (4-pin VROC_KEY1)	2-36
14.	Trusted Platform Module connector (14-1 pin SPI_TPM)	2-36
15.	Chassis Intrusion (2-pin INTRUSION1)	2-37
16.	Power Supply SMBus connector (5-pin PSUSMB1)	2-37
17.	M.2 slot (M2_SLOT1-2)	2-38
18.	CPLD Debug connector (6-pin CPLD_JTAG1)	2-38
19.	Platform Firmware Resilience (PFR) module connector (ROT_CON)	2-39
20.	PSYS_SENSE connector (3-pin PSYS_SENSE1)	2-39

2.3 Central Processing Unit (CPU)

The motherboard comes with two surface mount LGA 4677 sockets designed for the 4th Gen Intel® Xeon® Scalable Processors Family Series.



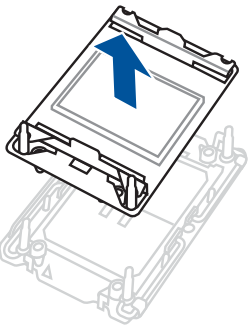
Z13PE-D16 CPU LGA 4677 Socket

Ensure that you install the correct CPU designed for LGA 4677 socket only. DO NOT install a CPU designed for other sockets on the LGA 4677 socket.

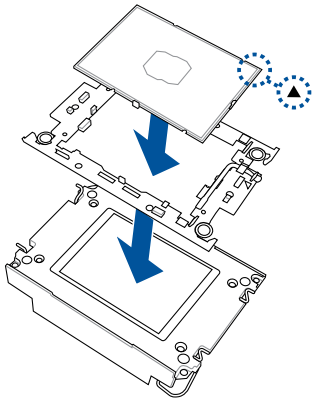
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will bear the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the PnP cap on the 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.

2.3.1 Installing the CPU and heatsink

1

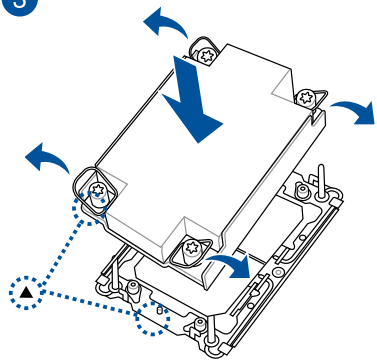


2



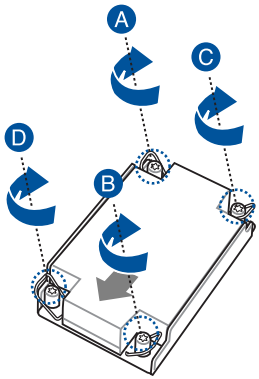
The CPU and CPU Carrier fits in only one correct orientation. DO NOT force the CPU and CPU Carrier into the socket to prevent damaging the CPU pins on the socket.

3



Ensure the triangle mark on the CPU is located in the same corner as the CPU socket.

4

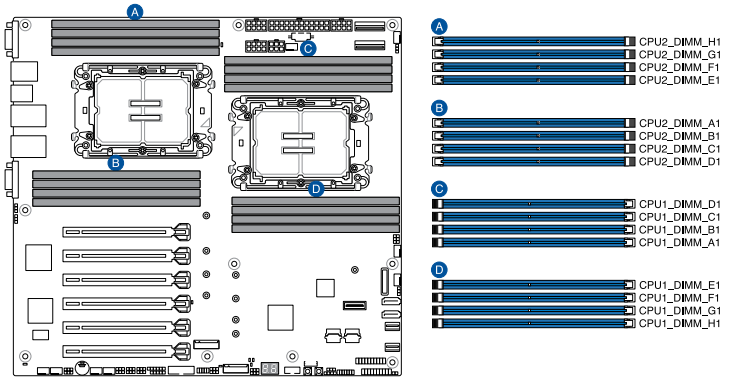


Intel® recommends using a torque driver with a T-30 bit and a torque value of 8 lbf-in to prolong the longevity of all PEEK nuts after the quality of the load post is corrected.

2.4 System memory

The motherboard comes with sixteen (16) DDR 5 (Double Data Rate 5) Dual Inline Memory Modules (DIMM) slots.

A DDR5 module is notched differently from a DDR, DDR2, DDR3, or DDR4 module. DO NOT install a DDR, DDR2, DDR3, or DDR4 memory module to the DDR5 slot.



Z13PE-D16 288-pin DDR5 DIMM sockets

Recommended memory configurations

Single CPU configuration								
Slot	A1	B1	C1	D1	E1	F1	G1	H1
1 DIMMs	•							
2 DIMMs	•						•	
4 DIMMs	•		•		•		•	
6 DIMMs	•		•	•	•	•	•	
8 DIMMs	•	•	•	•	•	•	•	•

Dual CPU configuration																
CPU	CPU1								CPU2							
Slot	A1	B1	C1	D1	E1	F1	G1	H1	A1	B1	C1	D1	E1	F1	G1	H1
2 DIMMs	•								•							
4 DIMMs	•						•		•						•	
8 DIMMs	•		•		•		•		•		•		•		•	
12 DIMMs	•		•	•	•	•	•		•		•	•	•	•	•	
16 DIMMs	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•

Memory configurations

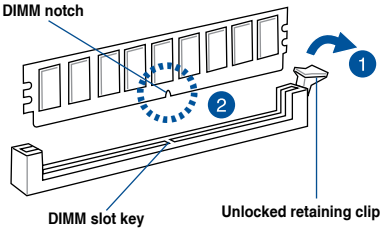
You may install 8GB 16GB, and 32GB RDIMMs, or 128GB and 256GB RDIMM-3DS into the DIMM sockets.

- You may install varying memory sizes in the different channels. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value.
- For system stability, use a more efficient memory cooling system to support a full memory load (16 DIMMs) or overclocking condition.
- Always install the DIMMS with the same CAS Latency. For an optimum compatibility, we recommend that you install memory modules of the same version or data code (D/C) from the same vendor. Check with the vendor to get the correct memory modules.
- Visit the ASUS website for the latest QVL.

2.4.1 Installing a DIMM

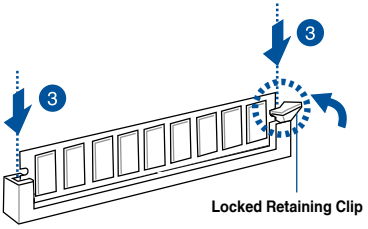
Ensure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clip outward.
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.

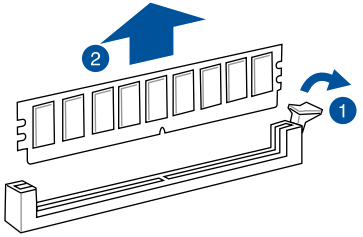
3. Hold the DIMM by both of its ends then insert the DIMM vertically into the socket. Apply force to both ends of the DIMM simultaneously until the retaining clip snaps back into place and the DIMM cannot be pushed in any further to ensure proper sitting of the DIMM.



Always insert the DIMM into the socket vertically to prevent DIMM notch damage.

2.4.2 Removing a DIMM

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.

2.5 Expansion slots

In the future, you may need to install expansion cards. The following subsections describe the slots and the expansion cards that they support.

Unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.

2.5.1 Installing an expansion card

To install 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 system unit cover (if your motherboard is already installed in a chassis).
3. Remove the bracket opposite the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw you removed earlier.
6. Replace the system cover.

2.5.2 Configuring an expansion card

After installing the expansion card, configure it by adjusting the software settings.

1. Turn on the system and change the necessary BIOS settings, if any. See Chapter 4 for information on BIOS setup.
2. Assign an IRQ to the card. Refer to the tables on the next page.
3. Install the software drivers for the expansion card.

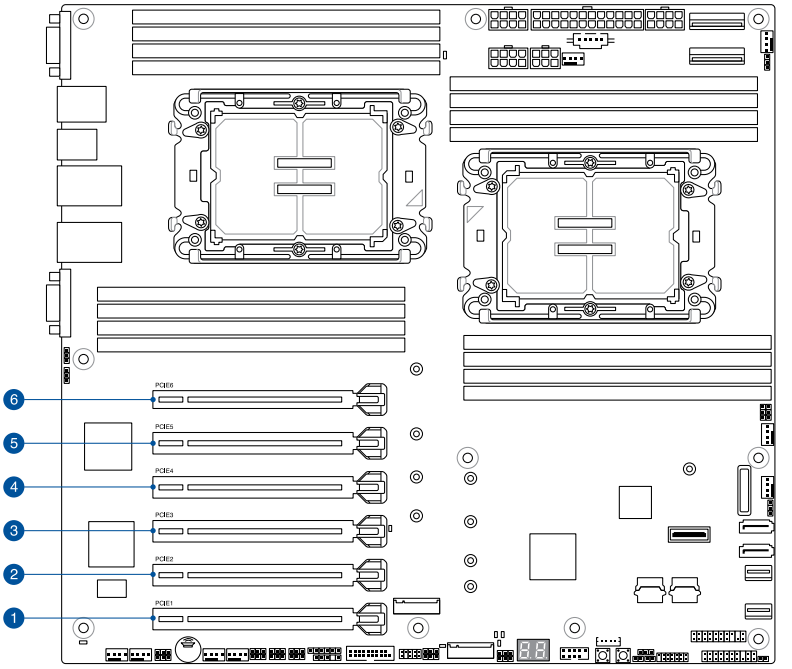
When using PCI cards on shared slots, ensure that the drivers support “Share IRQ” or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable.

2.5.3 Interrupt assignments

Standard Interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	-	-
2	-	Programmable Interrupt
3	4	Communications Port (COM2)
4	5	Communications Port (COM1)
5	-	-
6	-	-
7	-	-
8	-	-
9	-	-
10	-	-
11	-	-
12	-	-
13	2	Numeric Data Processor
14	3	Intel® GPIO Controller
15	-	-

2.5.4 Slot locations



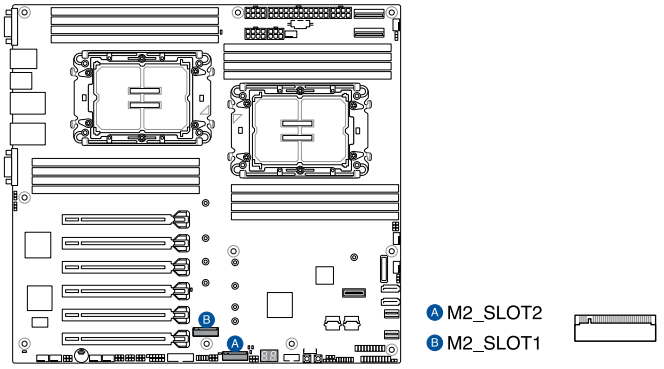
Slot No.	Slot Description
1	PCIE1 x16 (x16 Gen5 Link)
2	PCIE2 x16 (x16 Gen5 Link)
3	PCIE3 x16 (x16 Gen5 Link)
4	PCIE4 x16 (x16 Gen5 Link)
5	PCIE5 x16 (x16 Gen5 Link)
6	PCIE6 x16 (x8 Gen5 Link)

2.5.5 Installing an M.2 module

You may install an M.2 card (supports up to 2280 or 22110) to the onboard M.2 slots on the motherboard.

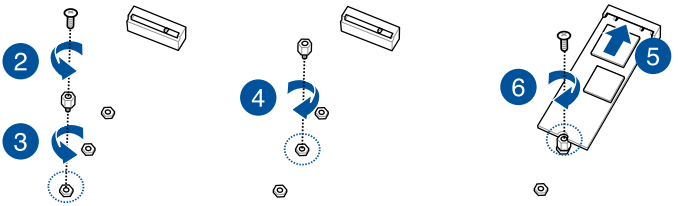
- M2_SLOT1 supports type 2242 / 2260 / 2280 / 22110 devices on PCIe Gen 4 x4 interface from the CPU.
- M2_SLOT2 supports type 2242 / 2260 / 2280 devices on PCIe Gen 4 x4 interface from the PCH.
- The M.2 (NGFF) device is purchased separately.
- The motherboard illustration is for reference only. The motherboard layout and appearance may vary depending on the model, but the installation steps remain the same.

1. Locate the M.2 slots (M2_SLOT1, M2_SLOT2) on the motherboard.



Z13PE-D16 M2_SLOT

2. Remove the screw on the stand screw.
3. (optional) Remove the stand screw if the M.2 length hole you would like to install doesn't already have a stand screw.
4. (optional) Install the stand screw to the length hole corresponding to the M.2 module you wish to install.
5. Prepare the M.2 module, then align and insert the M.2 module into the M.2 slot.
6. Secure the M.2 module with the screw you removed in step 2.

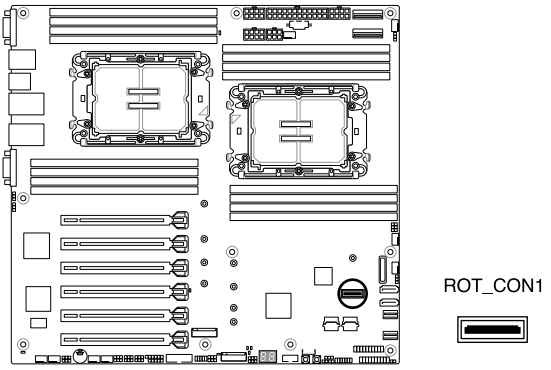


2.5.6 (optional) Installing the PFR module

The optional PFR module will come pre-installed on your system and is connected to the PFR module connector on your motherboard.

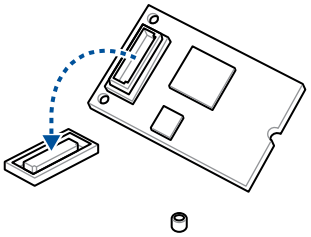
- The illustration below is for reference only.
- For more information or assistance, please refer to www.asus.com.

1. Locate the PFR module connector on your motherboard.

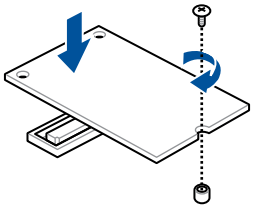


Z13PE-D16 ROT_CON1

2. Align and connect the PFR module to the PFR module connector.



3. Push the PFR module down so that it is seated securely on the PFR module connector, then secure it using a screw.



2.6 Jumpers

The motherboard illustration is for reference only. The motherboard layout and appearance may vary depending on the model, but the locations for these jumpers/LEDs/connectors remain the same.

1. Clear RTC RAM (3-pin CLRTC1)

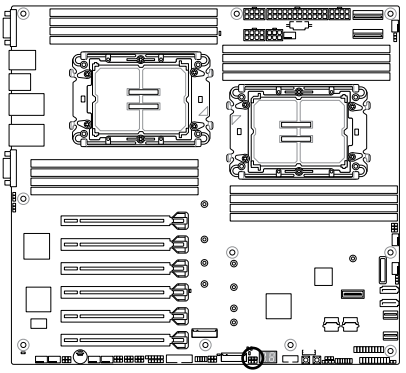
This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

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 CLRTC jumper default position. Removing the cap will cause system boot failure!

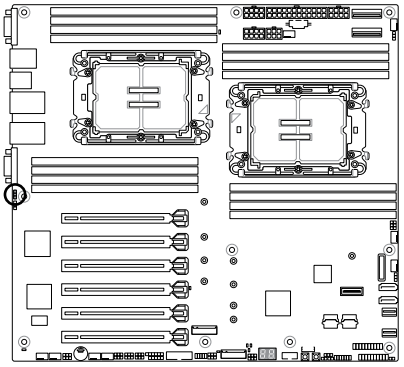
If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.



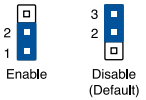
Z13PE-D16 CLRTC1

2. Smart Ride Through (SmaRT) setting (3-pin SMART_PSU1)

This jumper allows you to enable or disable the Smart Ride Through (SmaRT) function. This feature is enabled by default. Set to pins 2-3 to disable it. When enabled, SmaRT allows uninterrupted operation of the system during an AC loss event.



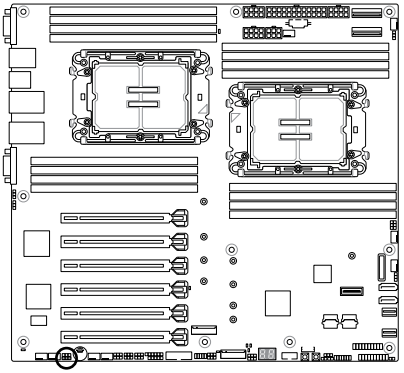
SMART_PSU1



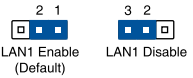
Z13PE-D16 SMART_PSU1

3. LAN Controller settings (3-pin LAN_SW1-2)

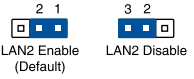
These jumpers allow you to enable or disable the onboard X710 LAN1 or LAN2 port. Set to pins 1-2 to activate the Gigabit LAN feature.



LAN_SW1



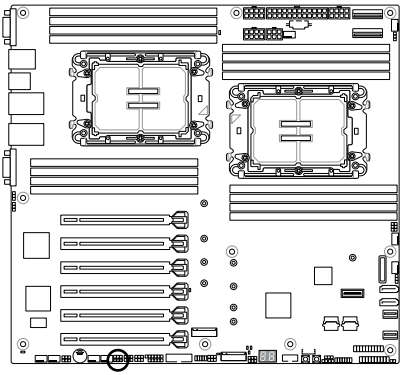
LAN_SW2



Z13PE-D16 LAN_SW1 / LAN_SW2

4. Baseboard Management Controller setting (3-pin BMC_EN1)

This jumper allows you to enable (default) or disable on-board BMC. Ensure to set this BMC jumper to enabled to avoid system fan control and hardware monitor error.



BMC_EN1

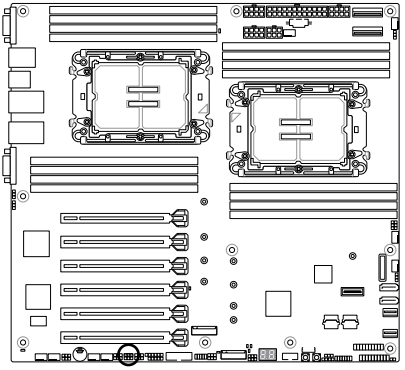
BMC Enable (Default)

BMC Disable

Z13PE-D16 BMC_EN1

5. CPLD Debug Mode setting (3-pin CPLD_DEBUG1)

This jumper allows you to enable or disable (default) CPLD debug mode.



CPLD_DEBUG1

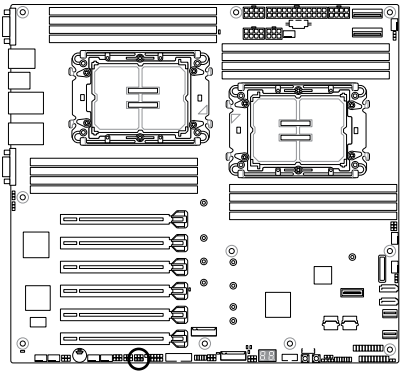
Disable (Default)

Enable

Z13PE-D16 CPLD_DEBUG1

6. CPLD Update setting (3-pin CPLD_UPDATE1)

This jumper allows you to enable or disable Complex Programmable Logic Devices (CPLD) updates.



CPLD_UPDATE1

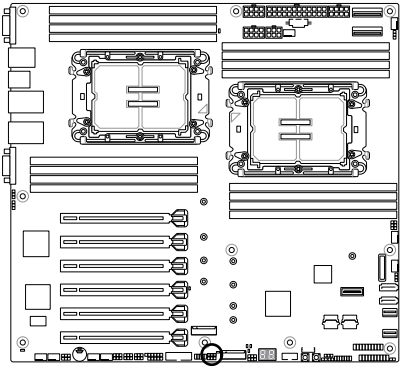
Disable (Default)

Enable

Z13PE-D16 CPLD_UPDATE1

7. ME Firmware Force Recovery setting (3-pin ME_RCVR1)

This jumper allows you to quickly recover the Intel Management Engine (ME) firmware if it becomes corrupted.



ME_RCVR1

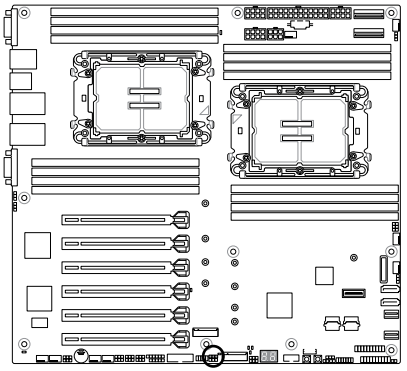
Normal (Default)

Force ME Recovery

Z13PE-D16 ME_RCVR1

8. VGA Controller setting (3-pin VGA_SW1)

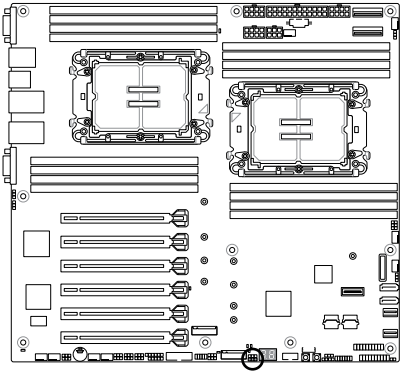
This jumper allows you to enable or disable the onboard VGA controller. Set to pins 1–2 to activate the VGA feature.



Z13PE-D16 VGA_SW1

9. RM Debug setting (3-pin RM_DEBUG1)

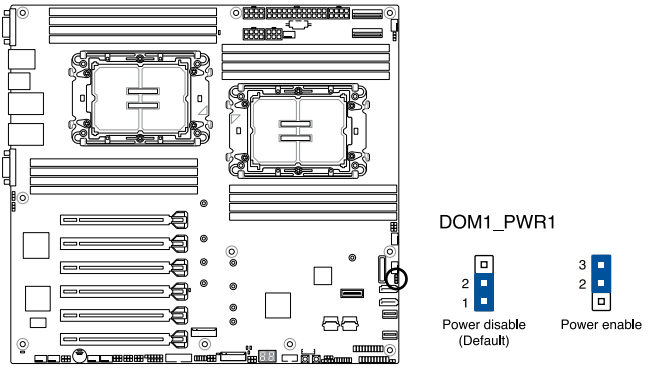
This jumper allows you to enable or disable BMC remote debug feature. RM_DEBUG1 default is 1-2 (disable) and 2-3 is enable.



Z13PE-D16 RM_DEBUG1

10. SATADOM power setting (3-pin DOM1_PWR1)

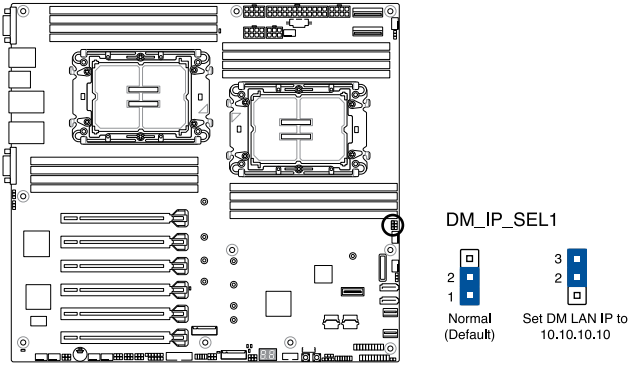
This jumper allows you to enable or disable SATADOM power. You do not need external power connections for the SATA port(s) with the SATADOM power feature enabled. Set **DOM1_PWR1** to pins 2-3 to activate the SATADOM power feature.



Z13PE-D16 DOM1_PWR1

11. DMLAN setting (3-pin DM_IP_SEL1)

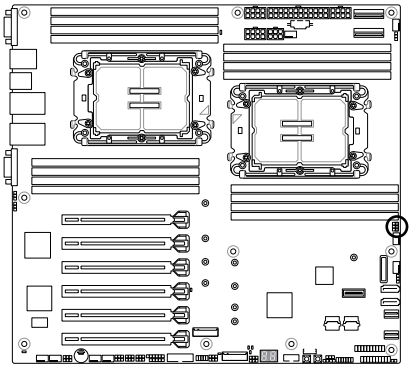
This jumper allows you to select the DMLAN setting. Set to pins 2-3 to force the DMLAN IP to static mode (IP=10.10.10.10, submask=255.255.255.0).



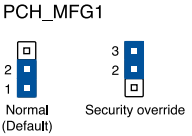
Z13PE-D16 DM_IP_SEL1

12. ME Security setting (3-pin PCH_MFG1)

This jumper allows you to enable or disable ME security for debug use.



Z13PE-D16 PCH_MFG1

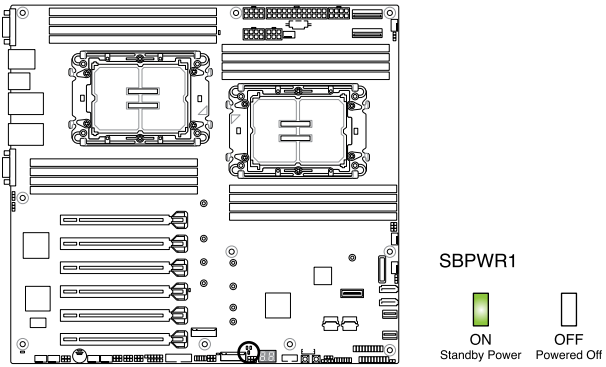


2.7 Onboard LEDs

The motherboard illustration is for reference only. The motherboard layout and appearance may vary depending on the model, but the locations for these jumpers/LEDs/connectors remain the same.

1. Standby Power LED (SBPWR1)

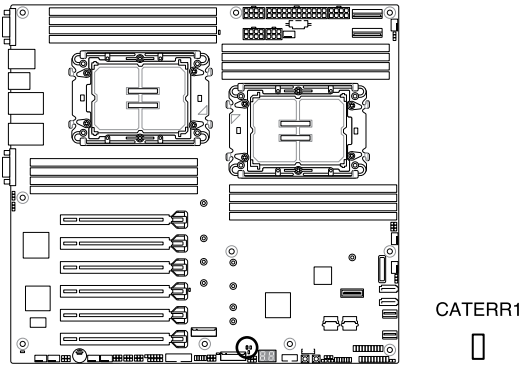
The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in S5 mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard LED.



Z13PE-D16 SBPWR1

2. Processor Catastrophic Error LED (CATERR1)

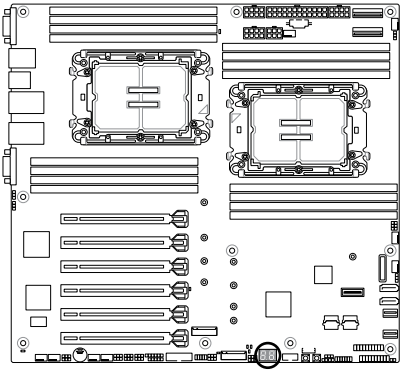
The Processor Catastrophic Error LED indicates that the system has experienced a fatal or catastrophic error and cannot continue to operate.



Z13PE-D16 CATERR1

3. Q-Code LED (PORT80_LED1)

The Q-Code LED design provides you with a 2-digit error code that displays the system status. Refer to the Q-Code table on the next page for details.

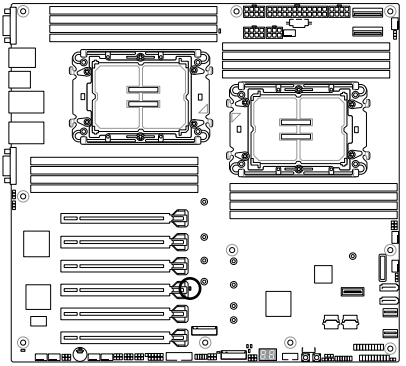


Z13PE-D16 PORT80_LED1

The Q-Code LED provides the most probable cause of an error code as a starting point for troubleshooting. The actual cause may vary from case to case.

4. Message LED (MESLED1)

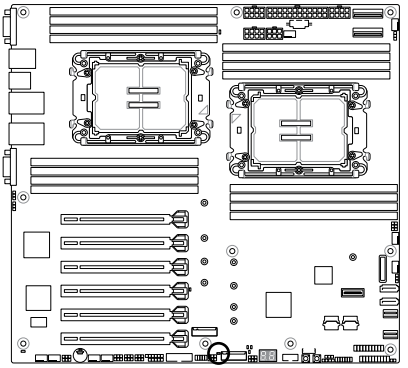
This onboard LED lights up to indicate that there is a temperature warning or a BMC event log is generated.



Z13PE-D16 MESLED1

5. Location LED (LOCLED1)

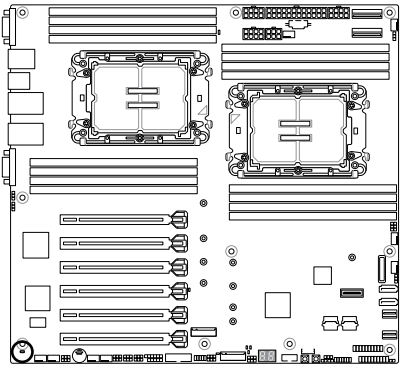
This onboard LED lights up when the Location button on the server is pressed or when triggered by a system management software. The Location LED helps visually locate and quickly identify the server in error on a server rack.



Z13PE-D16 LOCLED1

6. BMC LED (BMCLED1)

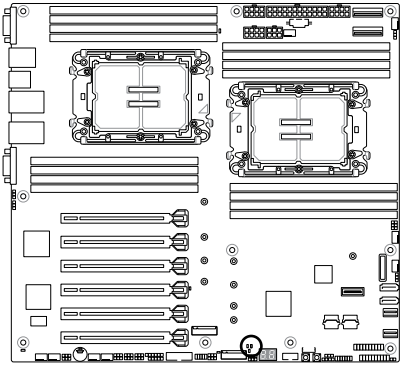
The BMC LED blinks to indicate that the on-board BMC is functional.



Z13PE-D16 BMCLED1

7. Asynchronous DRAM Refresh (ADR) LED (ADRLED1)

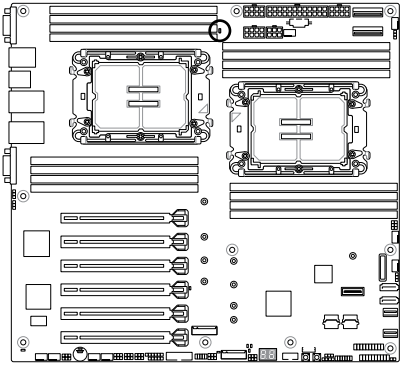
The ADR LED indicates that the Asynchronous DRAM Refresh (ADR) has been completed.



Z13PE-D16 ADRLED1

8. DIMM LED (DIMMLED1)

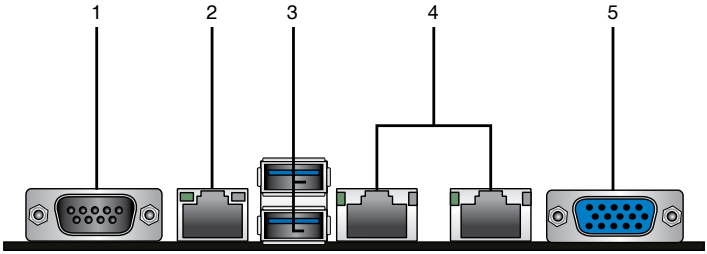
This LED blinks to indicate that there is 12 V power input to the memory.



Z13PE-D16 DIMMLED1

2.8 Connectors

2.8.1 Rear panel connectors

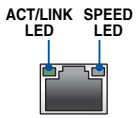


1. **COM port.** This port allows you to connect devices that have serial ports, such as bar code scanners, modems, and printers.
2. **RJ-45 port for iKVM.** This RJ-45 port functions only when you enable ASMB11 Management card. Refer to the table below for the LAN port LED indications.
3. **USB 3.2 Gen 1 ports 1 and 2.** These two 4-pin USB ports are available for connecting USB 3.2 Gen 1 devices.
4. **RJ-45 ports for Intel® LOM X710AT LAN 1-2.** These ports allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.
5. **Video Graphics Adapter port.** This port is for a VGA monitor or other VGA-compatible devices.

Dedicated Management LAN port (DM_LAN1) LED indications

Activity/Link LED	
Status	Description
OFF	No link
YELLOW	Linked
BLINKING	Data activity

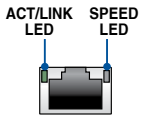
Speed LED	
Status	Description
OFF	10 Mbps connection
ORANGE	100 Mbps connection
GREEN	1 Gbps connection



Intel® LOM X710AT LAN port LED indications

Activity/Link LED	
Status	Description
OFF	No link
GREEN	Linked
BLINKING	Data activity

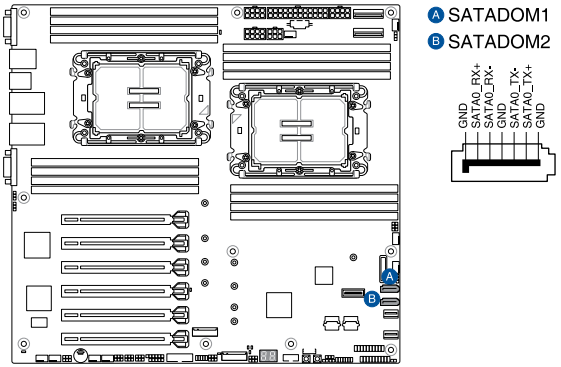
Speed LED	
Status	Description
OFF	100 Mbps connection
ORANGE	1 Gbps connection
GREEN	10 Gbps connection



2.8.2 Internal connectors

1. SATA DOM connectors (7-pin SATADOM1-2)

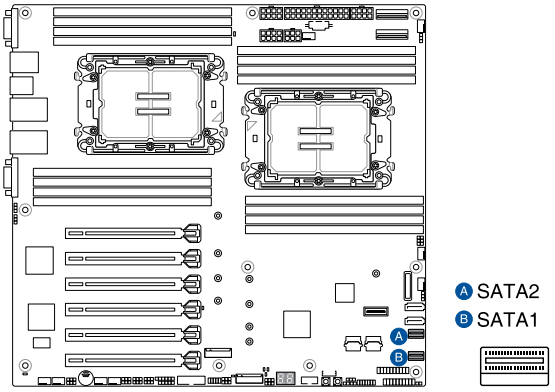
These connectors allow you to connect SATADOM devices.



Z13PE-D16 SATADOM

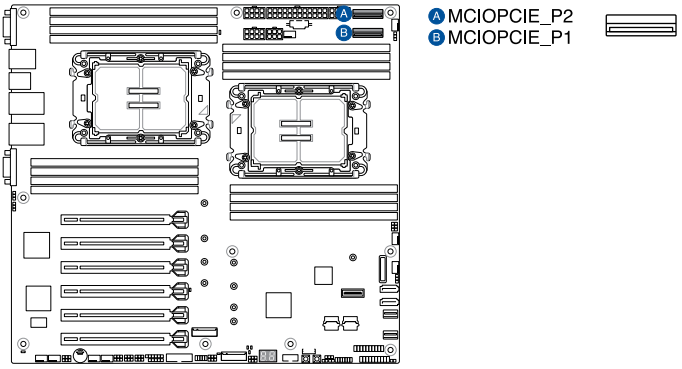
2. SATA Backplane connectors (SATA1-2)

These connectors connect to the backplane for SATA signal.



3. MCIOPCIE connectors (MCIOPCIE_P1-2)

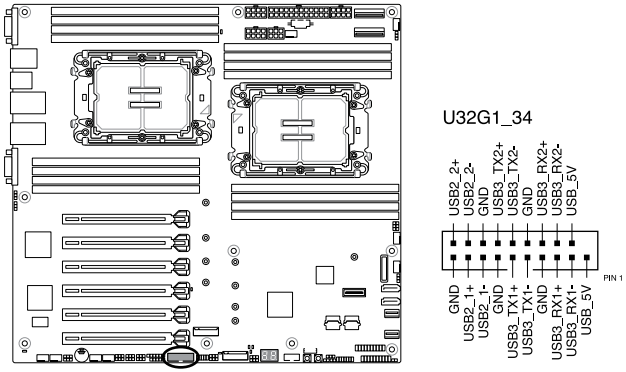
Connects the PCIe signal to the NVMe backplane.



Z13PE-D16 MCIOPCIE

4. USB 3.2 Gen 1 connector (20-1 pin U32G1_34)

This connector allows you to connect a USB 3.2 Gen 1 module for additional USB 3.2 Gen 1 front or rear panel ports. The USB 3.2 Gen 1 connector provides data transfer speeds of up to 5 Gb/s.

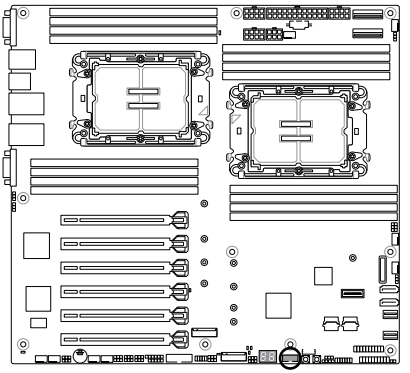


Z13PE-D16 U32G1_34

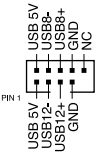
- The USB 3.2 Gen 1 module is purchased separately.
- The plugged USB 3.2 Gen 1 device may run on xHCI or EHCI mode depending on the operating system's setting.

5. USB 2.0 connector (10-1 pin USB_8_12)

This connector is for USB 2.0 ports. Connect the USB module cable to the connector, and then install the module to a slot opening at the back of the system chassis. The USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.



USB_8_12

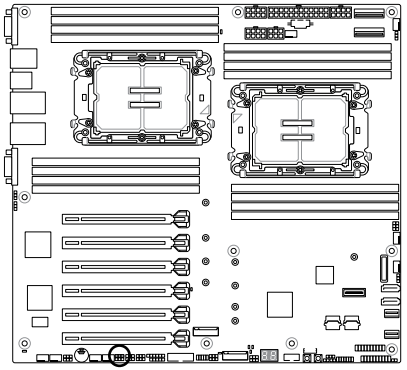


Z13PE-D16 USB_8_12

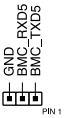
The USB port module is purchased separately.

6. BMC Debug UART connector (3-pin BMC_DEBUGUART1)

This connector is used for reading the BMC UART Debug log.



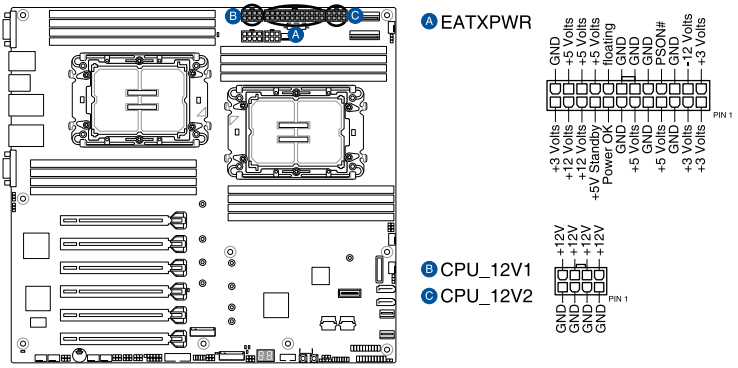
BMC_DEBUGUART1



Z13PE-D16 BMC_DEBUGUART1

7. Power connectors (24-pin EATXPWR; 8-pin CPU_12V1-2)

These connectors are for the power supply plugs that connects to the power board. 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.

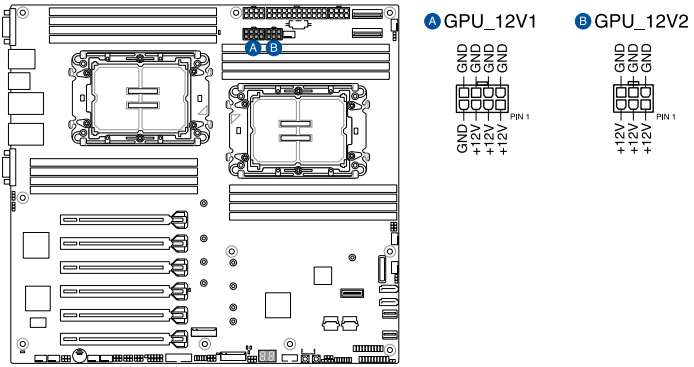


Z13PE-D16 EATXPWR / CPU_12V

DO NOT connect GPU cards to these connectors. Doing so may cause system boot errors and permanent damage to your motherboard or device.

8. GPU Power connectors (8-pin GPU_12V1-2)

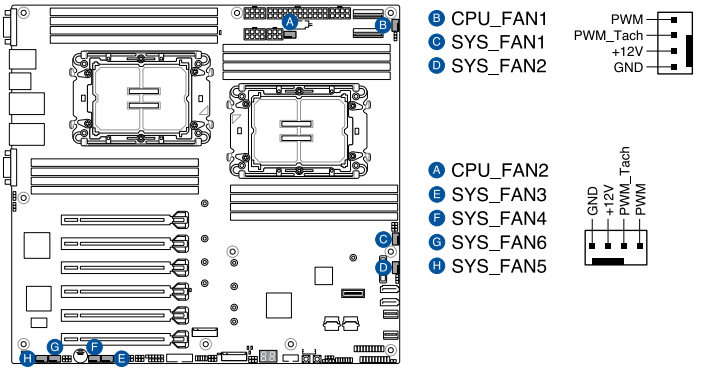
These connectors are for supplying power to installed GPU cards. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.



Z13PE-D16 GPU_12V

9. Fan connectors (4-pin CPU_FAN1-2, SYS_FAN1-6)

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.

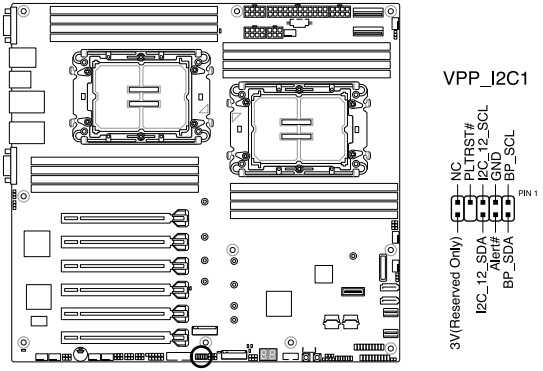


Z13PE-D16 FAN connectors

- 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!

10. VPP_I2C connector (10-1 pin VPP_I2C1)

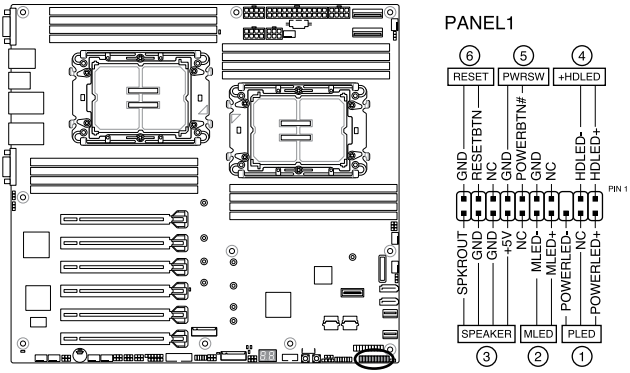
The VPP_I2C connector is used for the storage backplane with sensor readings.



Z13PE-D16 VPP_I2C1

11. System Panel connector (20-1 pin PANEL)

This connector supports several chassis-mounted functions.



Z13PE-D16 PANEL1

- **System power LED (3-pin PLED)**

  The 2-pin and/or 3-1 pin headers allow you to connect the System Power LED. The System Power LED lights up when the system is connected to a power source, or when you turn on the system power, and blinks when the system is in sleep mode.

- **System warning speaker (4-pin SPEAKER)**

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

- **Hard disk drive activity LED (2-pin HDLED)**

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

- **Power button/soft-off button (2-pin PWRSW)**

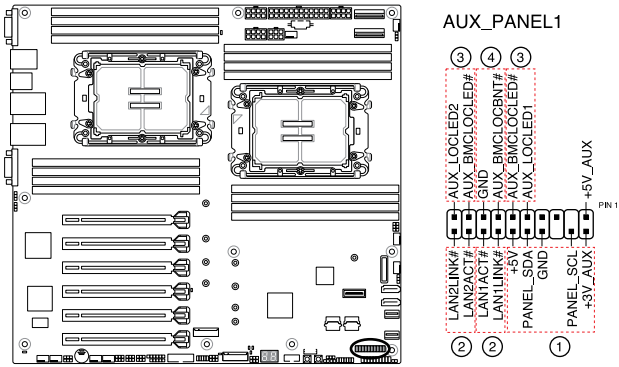
  The connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four (4) seconds while the system is ON turns the system OFF.

- **Reset button (2-pin RESET)**

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

12. Auxiliary Panel connector (20-2 pin AUX_PANEL1)

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



Z13PE-D16 AUX_PANEL1

- **Front panel SMB (6-1 pin PANEL)**

  This 6-1 pin connector is for the front panel SMBus cable.

- **LAN activity LED (2-pin LAN1_LED, LAN2_LED)**

  This 2-pin connector is for the Gigabit LAN activity LEDs on the front panel.

- **Locator LED (2-pin LOCLED1, 2-pin LOCLED2)**

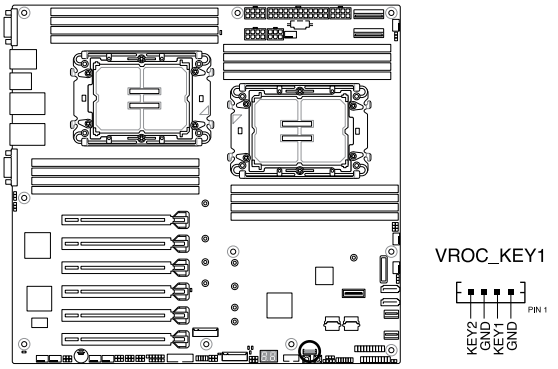
  This 2-pin connector is for the locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connector. The LEDs will light up when the Locator button is pressed.

- **Locator Button/Switch (2-pin BMCLOCBNT)**

  This 2-pin connector is for the locator button on the front panel. This button queries the state of the system locator.

13. VROC Key connector (4-pin VROC_KEY1)

The VROC (Virtual Raid on CPU) Key connector allows you to connect a VROC hardware key to enable additional CPU RAID functions with Intel® CPU RSTe.

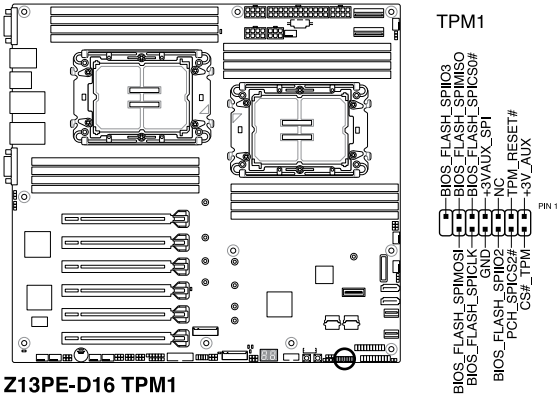


Z13PE-D16 VROC_KEY1

The VROC hardware key is purchased separately.

14. Trusted Platform Module connector (14-1 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.

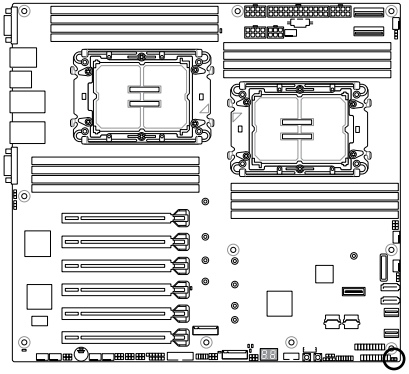


Z13PE-D16 TPM1

The TPM module is purchased separately.

15. Chassis Intrusion (2-pin INTRUSION1)

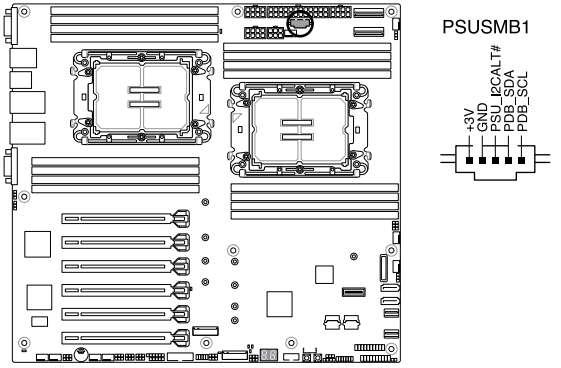
These leads are for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high level signal to these leads to record a chassis intrusion event. The default setting is to short the CHASSIS# and the GND pin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



Z13PE-D16 INTRUSION1

16. Power Supply SMBus connector (5-pin PSUSMB1)

This connector allows you to connect SMBus (System Management Bus) to the PSU (power supply unit) to read PSU information. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface.

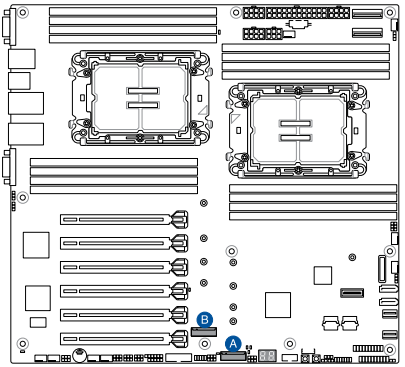


Z13PE-D16 PSUSMB1

This connector functions only when you enable ASUS ASMB11.

17. M.2 slot (M2_SLOT1-2)

These slots allow you to install M.2 devices.

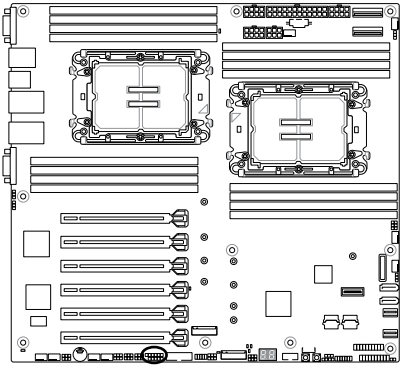


Z13PE-D16 M2_SLOT

- M2_SLOT1 supports up to 22110 devices on PCIe interface.
- M2_SLOT2 supports up to 2280 devices on PCIe interface.
- The M.2 (NGFF) device is purchased separately

18. CPLD Debug connector (6-pin CPLD_JTAG1)

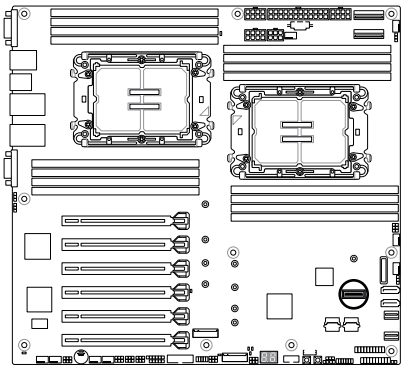
This connector is used CPLD debugging.



Z13PE-D16 CPLD_JTAG1

19. Platform Firmware Resilience (PFR) module connector (ROT_CON1)

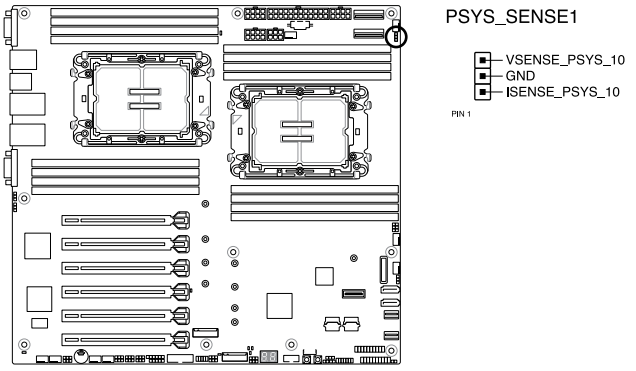
This connector allows you to connect a PFR module to enable platform firmware resilience functions.



Z13PE-D16 ROT_CON1

20. PSYS_SENSE connector (3-pin PSYS_SENSE1)

This connector is reserved CRTS PSU/DB with PSYS functions.



Z13PE-D16 PSYS_SENSE1

3 Powering Up

This chapter describes the power up sequence, and ways of shutting down the system.

3.1 Starting up for the first time

1. After making all the connections, replace the system case cover.
2. Be sure that all switches are off.
3. Connect the power cord to the power connector at the back of the system chassis.
4. Connect the power cord to a power outlet that is equipped with a surge protector.
5. Turn on the devices in the following order:
   a. Monitor
   b. External storage devices (starting with the last device on the chain)
   c. System power
6. After applying power, the system power LED on the system front panel case lights up. For systems with ATX power supplies, the system LED lights up when you press the ATX power button. If your monitor complies with “green” standards or if it has a “power standby” feature, the monitor LED may light up or switch between orange and green after the system LED turns on.

   The system then runs the power-on self-test or POST. While the tests are running, the BIOS beeps or additional messages appear on the screen. If you do not see anything within 30 seconds from the time you turned on the power, the system may have failed a power-on test. Check the jumper settings and connections or call your retailer for assistance.
   The following shows the possible beep codes and its corresponding error condition

BIOS Beep codes	
Beep	**Error condition**
1 short	Power supply surges detected during the previous power on.
1 short	No Keyboard Detected.
1 short, 2 short	No DIMM Detected.
1 short, 8 short	No VGA Detected.
2 long	Chassis Intrusion.
2 long	BIOS-image Crash Detected.

7. At power on, hold down the <Del> key to enter the BIOS Setup. Follow the instructions in Chapter 4.

3.2 Powering off the computer

3.2.1 Using the OS shut down function

Using Windows® Server 2019:

1. Press <Ctrl>+<Alt>+<Del>.
2. Click on the Power icon on the lower right side of the screen.
3. Select **Shut down**.
4. In the Shutdown Event Tracker, select the **Other (Planned)** option in the selection lists. Otherwise, select the option that best describes why you want to shut down the computer.
5. Click **Continue**.

3.2.2 Using the dual function power switch

While the system is ON, press the power switch for less than four seconds to put the system to sleep mode or to soft-off mode, depending on the BIOS setting.

Pressing the power switch for more than four seconds lets the system enter the soft-off mode regardless of the BIOS setting.

4

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.

4.1 Managing and updating your BIOS

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

1. **ASUS CrashFree BIOS 3**

   To recover the BIOS using a bootable USB flash disk drive when the BIOS file fails or gets corrupted.

2. **ASUS EzFlash**

   Updates the BIOS using a USB flash disk.

Refer to the corresponding sections for details on these utilities.

4.1.1 ASUS CrashFree BIOS 3 utility

The ASUS 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 ASUS website at www.asus.com to download the latest BIOS file.

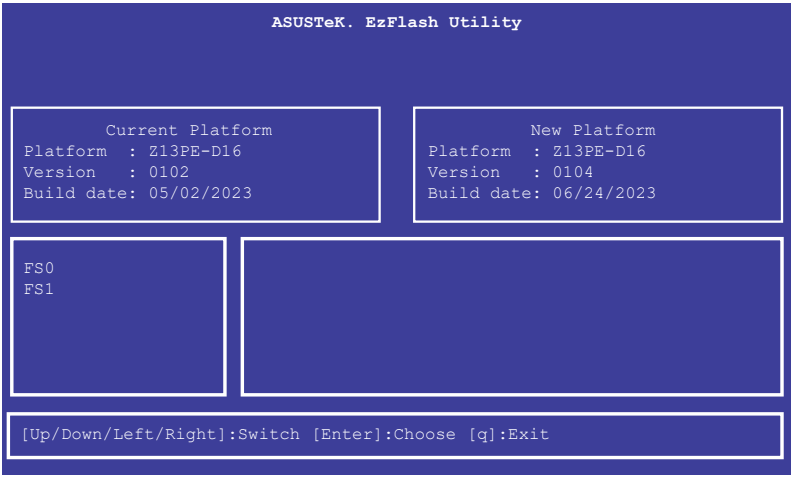
4.1.2 ASUS EZ Flash Utility

The ASUS 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 ASUS website at www.asus.com.

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 **Start ASUS EzFlash**. Press <Enter>.



3. Press Left arrow key 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 Right arrow key 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 FAT 32/16 format and single partition only.
- DO NOT shut down 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.

4.2 BIOS setup program

This motherboard supports a programmable firmware chip that you can update using the provided utility described in section **4.1 Managing and updating your BIOS**.

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to “Run Setup.” 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.

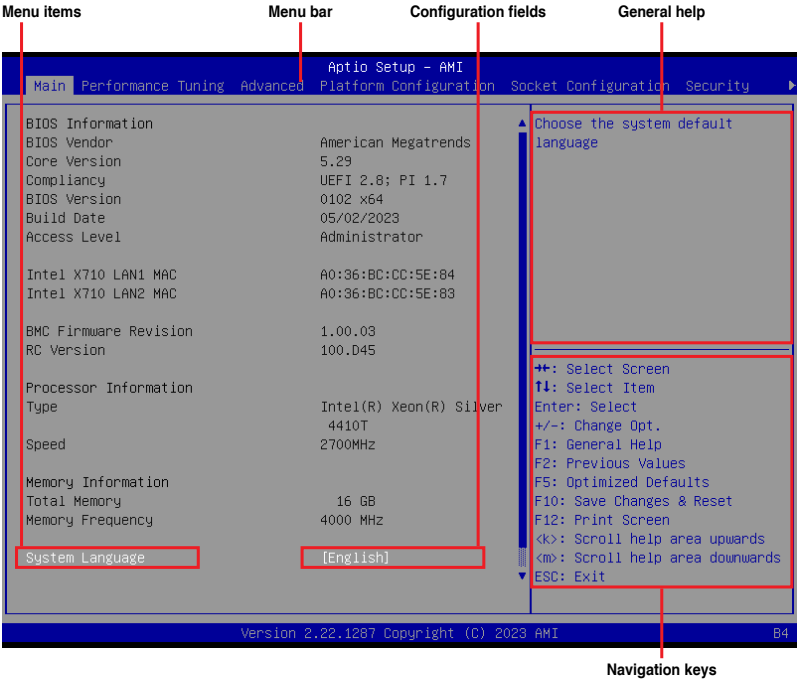
The firmware chip on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press <Del> during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

If you wish to enter Setup after POST, restart the system by pressing <Ctrl>+<Alt>+<Delete>, 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.
- Support for BIOS functions and options may vary based on AVL testing progress. Please contact your sales representative for more information.
- 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 ASUS website (www.asus.com) to download the latest BIOS file for this motherboard.

4.2.1 BIOS menu screen



4.2.2 Menu bar

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

Main	For changing the basic system configuration
Performance Tuning	For changing the performance settings
Advanced	For changing the advanced system settings
Platform Configuration	For configuring the platform settings
Socket Configuration	For configuring the socket settings
Security	For changing the security settings
Boot	For changing the system boot configuration
Tool	For configuring options for special functions
Event Logs	For changing the event log settings
Server Mgmt	For changing the Server Mgmt settings
Save & Exit	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.

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 (such as Advanced) 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

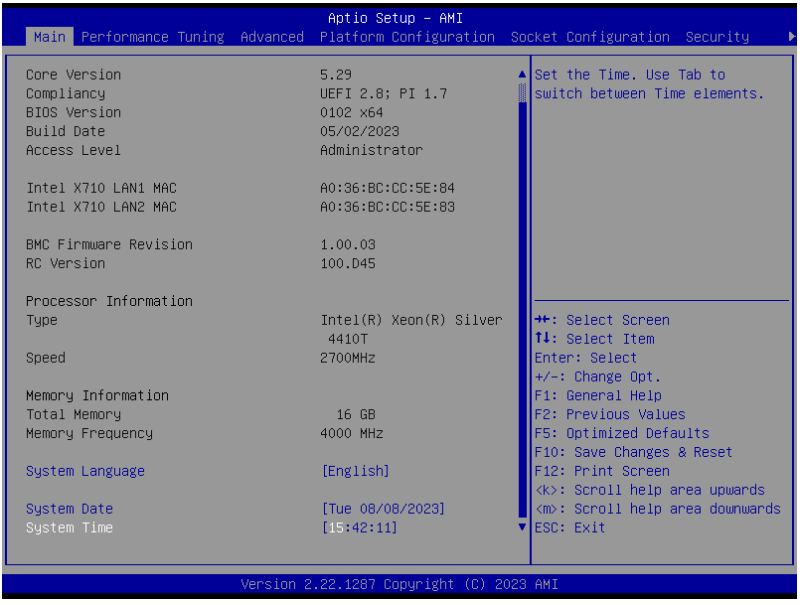
Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

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.

4.3 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, and language settings.



System Language [English]

Allows you to select the system default language.

System Date [Day xx/xx/xxxx]

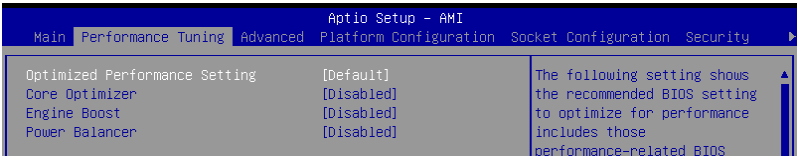
Allows you to set the system date.

System Time [xx:xx:xx]

Allows you to set the system time.

4.4 Performance Tuning menu

The Performance Tuning menu items allow you to change performance related settings for different scenarios.



Optimized Performance Setting [Default]

Allows you to select performance settings for different scenarios.

[Default] Default settings.

[By Benchmark] Optimize for different kinds of benchmarks. Select this option, then select a benchmark type from the >> list.

[By Workload] Optimize for different kinds of workloads. Select this option, then select a workload type from the >> list.

This function will reset some BIOS settings that you have changed back to their default values. Please check your BIOS settings again.

Core Optimizer [Disabled]

Allows you to keep the processor operating at the turbo highest frequency for the maximum performance.
Configuration options: [Disabled] [Auto] [Manual]

The following item appears only when you set **Core Optimizer** to **[Manual]**.

CPU Max frequency [XXXX]
The default value for this option will be the maximum supported frequency of the CPU installed and may vary between different CPUs.

Engine Boost [Disabled]

Enable this item to boost the CPU's frequency. Recommended operation at an ambient temperature of 25°C or below for optimized performance.
Configuration options: [Disabled] [Normal] [Aggressive]

Operate with an ambient temperature of 25°C or lower for optimized performance.

Power Balancer [Disabled]

Allows you to dynamically adjust the frequency of all CPU cores based on their current utilization, delivering better performance per watt for improved system energy efficiency. Configuration options: [Disabled] [Enabled by BIOS] [Enabled by ACC]

When setting **Power Balancer** to **[Enabled by ACC]**, make sure that you have the latest ASUS Control Center software installed to support Power Balancer. Please see below for recommended software versions:
- ACC: 1.4.3.5 version or above.

The following item appears only when you set **Power Balancer** to **[Enabled by BIOS]** or **[Enabled by ACC]**.

Policy [Auto]
Configuration options: [Auto] [Manual]

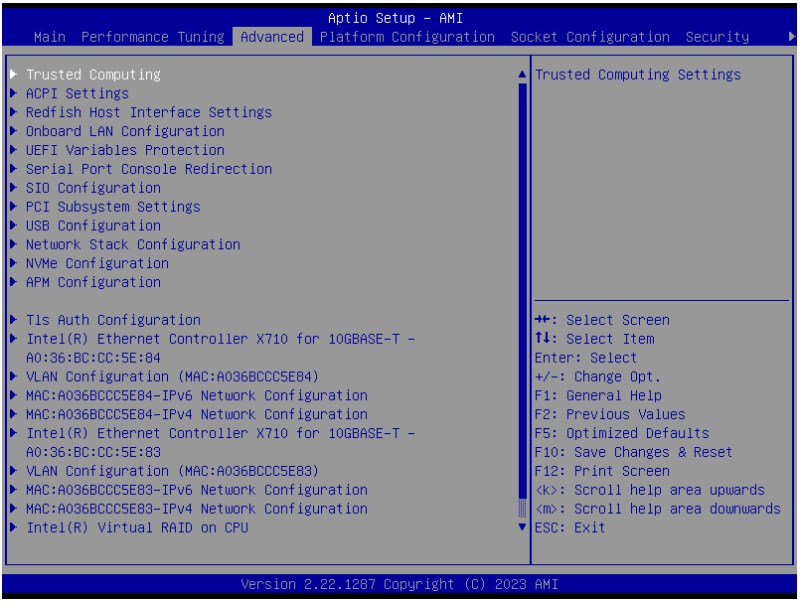
The following item appears only when you set **Policy** to **[Manual]**.

CPU Max frequency [XXXX]
The default value for this option will be the maximum supported frequency of the CPU installed and may vary between different CPUs.

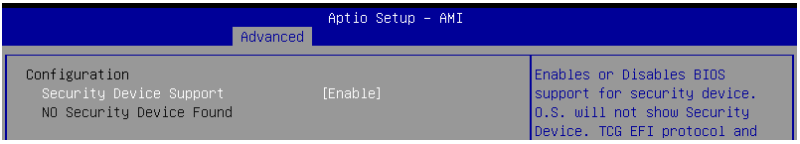
4.5 Advanced menu

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.



4.5.1 Trusted Computing

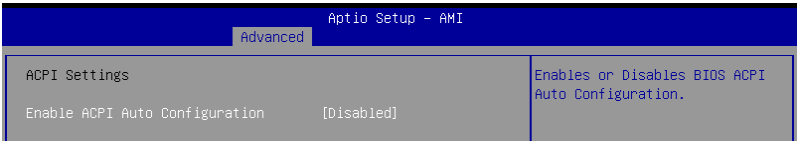


Configuration

Security Device Support [Enable]

Allows you to enable or disable the BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.
Configuration options: [Disable] [Enable]

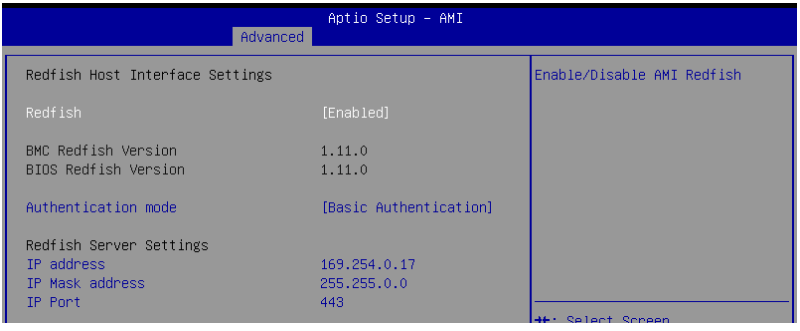
4.5.2 ACPI Settings



Enable ACPI Auto Configuration [Disabled]

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

4.5.3 Redfish Host Interface Settings



Redfish [Enabled]

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

The following items appear only when **Redfish** is set to **[Enabled]**.

Authentication mode [Basic Authentication]
Allows you to select the authentication mode.
Configuration options: [Basic Authentication] [Session Authentication]

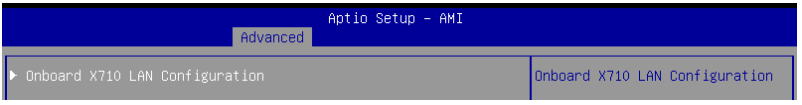
IP address
Allows you to enter the IP address.

IP Mask address
Allows you to enter the IP Mask address.

IP Port
Allows you to enter the IP Port.

4.5.4 Onboard LAN Configuration

The items in this submenu will differ depending on the LAN controller installed on the system.

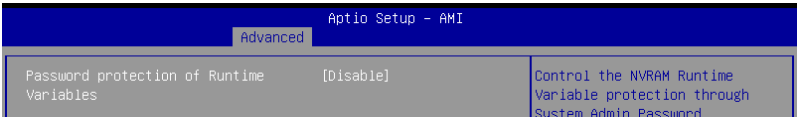


Onboard X710 LAN Configuration

Intel X710 LAN1 and LAN2

LAN Enable [LAN1, LAN2 Enabled]
Allows you to enable or disable the Intel LAN.
Configuration options: [Disabled] [LAN1 Enabled only] [LAN1, LAN2 Enabled]

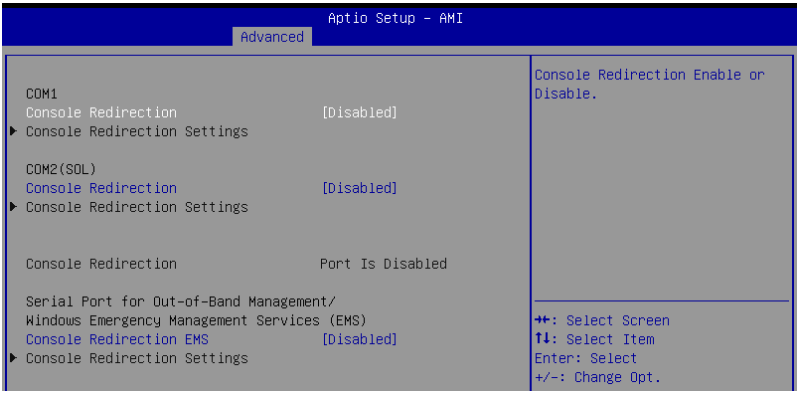
4.5.5 UEFI Variables Protection



Password protection of Runtime Variables [Disable]

Control the NVRAM Runtime Variable protection through System Admin Password.
Configuration options: [Enable] [Disable]

4.5.6 Serial Port Console Redirection



COM1/COM2(SOL)

Console Redirection [Disabled]

Allows you to enable or disable the console redirection feature.
Configuration options: [Disabled] [Enabled]

The following item appears only when **Console Redirection** for **COM1** or **COM2(SOL)** is set to **[Enabled]**.

Console Redirection Settings

These items become 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 [VT100Plus]

Allows you to set the terminal type.

[VT100]	ASCII char set.
[VT100Plus]	Extends VT100 to support color, function keys, etc.
[VT-UTF8]	Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
[ANSI]	Extended ASCII char set.

Bits per second [115200]

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 [None]
Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
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]

Resolution 100x31 [Enabled]
This allows you enable or disable extended terminal resolution.
Configuration options: [Disabled] [Enabled]

Putty Keypad [VT100]
This allows you to select the FunctionKey and Keypad on Putty.
Configuration options: [VT100] [LINUX] [XTERMR6] [SCO] [ESCN] [VT400]

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

Console Redirection EMS [Disabled]

Allows you to enable or disable the console redirection feature.
Configuration options: [Disabled] [Enabled]

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

Console Redirection Settings

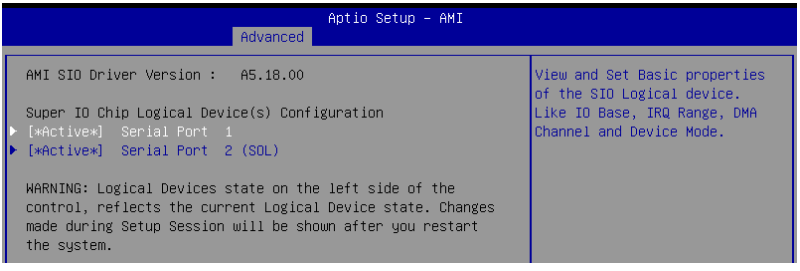
Out-of-Band Mgmt Port [COM1]
Microsoft Windows Emergency Management Services (EMS) allow for remote management of a Windows Server OS through a serial port.
Configuration options: [COM1] [COM2(SOL)]

Terminal Type EMS [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 EMS [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 EMS [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]

4.5.7 SIO Configuration



Logical Devices state on the left side of the control, reflects the current Logical Device state. Changes made during Setup Session will be shown after you restart the system.

[*Active*] Serial Port 1 / [*Active*] Serial Port 2 (SOL)

Allows you to view and set basic properties of the SIO Logical device. Like IO Base, IRQ Range, DMA Channel, and Device Mode.

Use This Device [Enabled]
Allows you to enable or disable this Logical Device.
Configuration options: [Disabled] [Enabled]

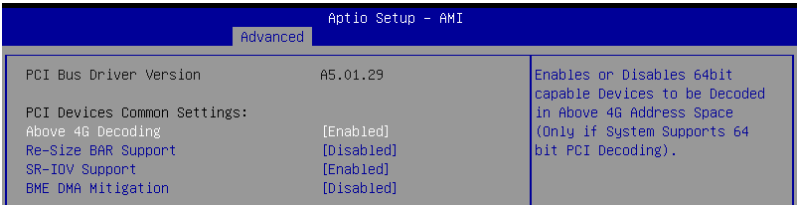
Disabling SIO Logical Devices may have unwanted side effects. PROCEED WITH CAUTION.

The following item appears only when **Use This Device** is set to **[Enabled]**.

Possible: [Use Automatic Settings]
Allows the user to change the device resource settings. New settings will be reflected no this setup page after system restarts.
Configuration options: [Use Automatic Settings] [IO=3F8h; IRQ=4; DMA;] [IO=3F8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;] [IO=2F8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;] [IO=3E8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;] [IO=2E8h; IRQ=3, 4, 5, 7, 9, 10, 11, 12; DMA;]

4.5.8 PCI Subsystem Settings

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



Above 4G Decoding [Enabled]

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]

Re-Size BAR Support [Disabled]

If system has Resizable BAR capable PCIe Devices, this option enables or disables Resizable BAR Support. (Only if system supports 64-bit PCI Decoding).
Configuration options: [Disabled] [Enabled]

To enable Re-Size BAR Support for harnessing full GPU memory, please set **CSM (Compatibility Support Module)** to **[Disabled]**.

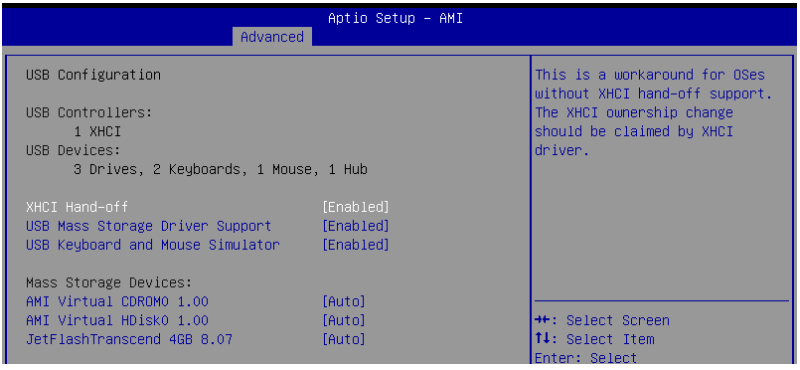
SR-IOV Support [Enabled]

Allows you to enable or disable Single Root IO Virtualization Support if the system has SR-IOV capable PCIe devices.
Configuration options: [Disabled] [Enabled]

BME DMA Mitigation [Disabled]

Allows you to enable or disable BME DMA mitigation. Re-enable Bus Mater Atttribute disabled during PCI enumeration for PCI bridges after SMM locked.
Configuration options: [Disabled] [Enabled]

4.5.9 USB Configuration



XHCI Hand-off [Enabled]

Allows you to enable or disable workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
Configuration options: [Enabled] [Disabled]

USB Mass Storage Driver Support [Enabled]

Allows you to enable or disable the USB Mass Storage driver support.
Configuration options: [Disabled] [Enabled]

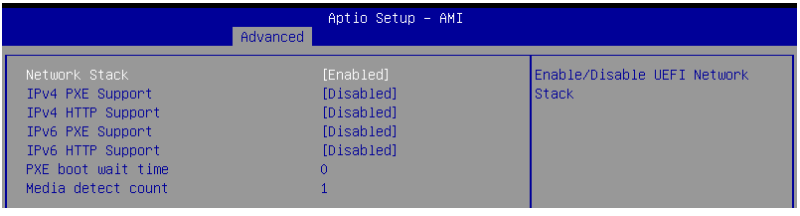
USB Keyboard and Mouse Simulator [Enabled]

Allows you to simulate USB keyboard and mouse to PS/2 module in Windows 7.
Configuration options: [Disabled] [Enabled]

Mass Storage Devices: [Auto]

Allows you to select the mass storage device emulation type for devices connected. [Auto] enumerates devices according to their media format. Optical drives are emulated as [CD-ROM], drives with no media will be emulated according to a drive type.
Configuration options: [Auto] [Floppy] [Forced FDD] [Hard Disk] [CD-ROM]

4.5.10 Network Stack Configuration



Network Stack [Enabled]

Enables or disables the UEFI network stack.
Configuration options: [Disabled] [Enabled]

The following items appear only when **Network Stack** is set to **[Enabled]**.

IPv4 PXE Support [Disabled]
Enables or disables the IPv4 PXE Boot Support. If disabled, IPv4 PXE boot support will not be available.
Configuration options: [Disabled] [Enabled]

IPv4 HTTP Support [Disabled]
Enables or disables the IPv4 HTTP Boot Support. If disabled, IPv4 HTTP boot support will not be available.
Configuration options: [Disabled] [Enabled]

IPv6 PXE Support [Disabled]
Enables or disables the IPv6 PXE Boot Support. If disabled, IPv6 PXE boot support will not be available.
Configuration options: [Disabled] [Enabled]

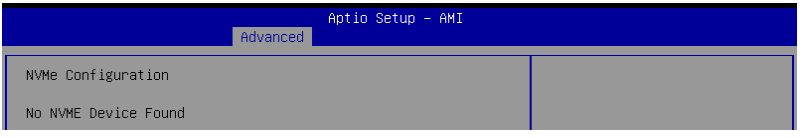
IPv6 HTTP Support [Disabled]
Enables or disables the IPv6 HTTP Boot Support. If disabled, IPv6 HTTP boot support will not be available.
Configuration options: [Disabled] [Enabled]

PXE boot wait time [0]
Set the wait time to press ESC key to abort the PXE boot. Use the <+> or <-> to adjust the value. The values range from 0 to 5.

Media detect count [1]
Set the number of times presence of media will be checked. Use the <+> or <-> to adjust the value. The values range from 1 to 50.

4.5.11 NVMe Configuration

This page will display the NVMe controller and drive information.



Device

The devices and names shown in the NVMe configuration list depends on the connected devices. If no devices are connected, **No NVMe Device Found** will be displayed.

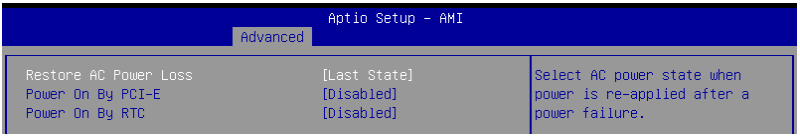
Self Test Option [Short]
This option allows you to select either Short or Extended Self Test. Short option will take couple of minutes, and the extended option will take several minutes to complete.
Configuration options: [Short] [Extended]

Self Test Action [Controller Only Test]
This item allows you to select either to test Controller alone or Controller and NameSpace. Selecting Controller and Namespace option will take a lot longer to complete the test.
Configuration options: [Controller Only Test] [Controller and NameSpace Test]

Run Device Self Test
Press <Enter> to perform device self test for the corresponding Option and Action selected by the user. Pressing the <ESC> key will abort the test. The results shown below is the most recent result logged in the device.

4.5.12 APM Configuration

This page will allow 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 On] [Power Off] [Last State]

Power On By PCI-E [Disabled]

Allows you to enable or disable the wake-on-LAN function of the onboard LAN controller or other installed PCI-E LAN cards.
Configuration options: [Disabled] [Enabled]

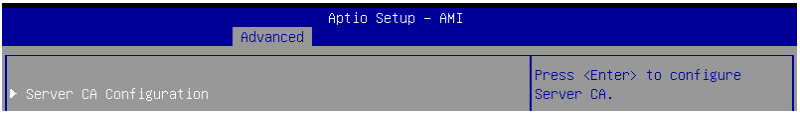
Power On By RTC [Disabled]

[Disabled] Disables RTC to generate a wake event.

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

4.5.13 Tls Auth Configuration

The items in this menu allows you to set the authentication mode.

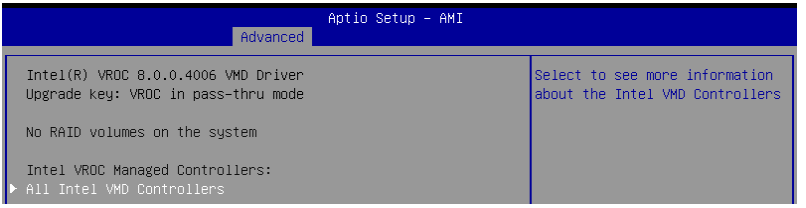


Server CA Configuration

This option allows you to configure the server's CA. This allows you to both enroll the required certificate files and also to delete the certicates that are not required.

4.5.14 Intel(R) Virtual RAID on CPU

This page will allow you to manage Intel(R) Virtual RAID on CPU.

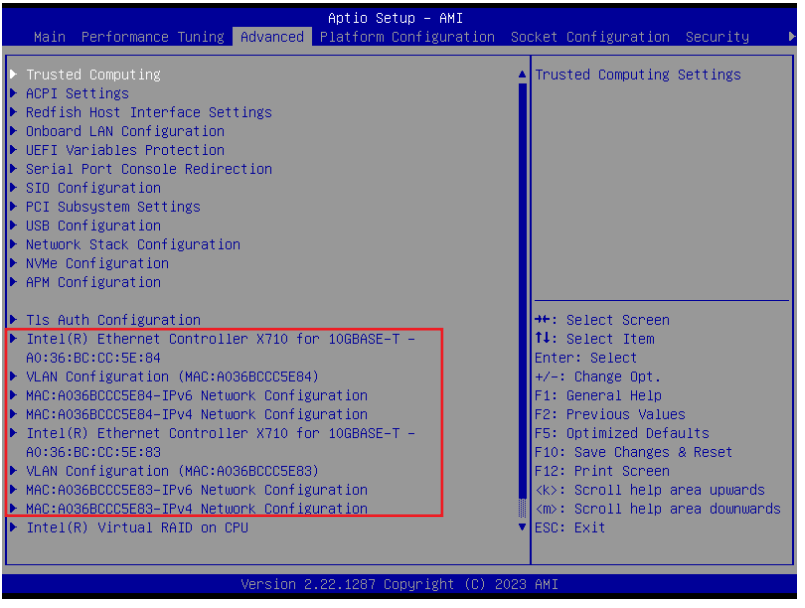


All Intel VMD Controllers

For more information on the Intel VMD controllers, press <Enter>.

4.5.15 Third-party UEFI driver configurations

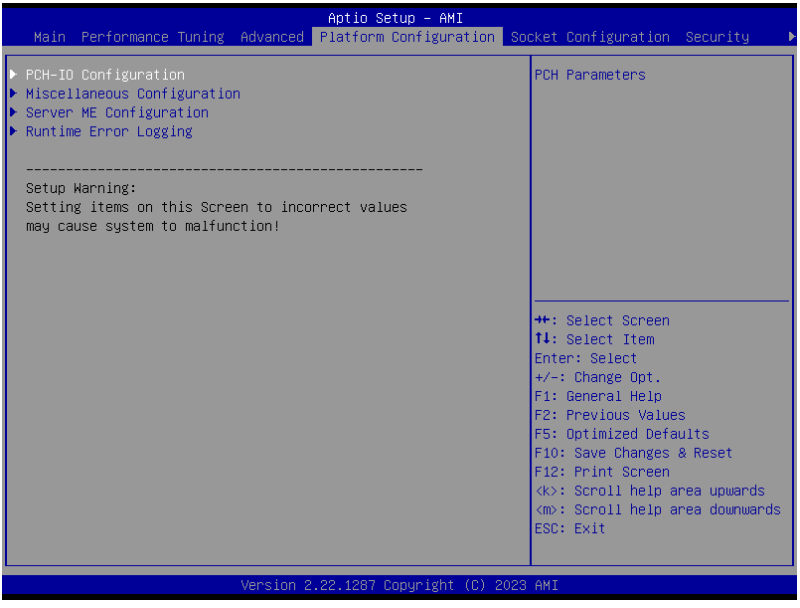
Additonal configuration options for third-party UEFI drivers installed to the system will appear in the section marked in red in the screenshot below.



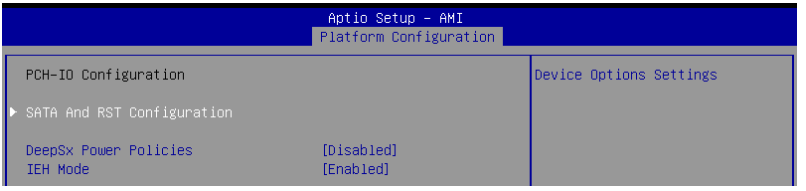
4.6 Platform Configuration menu

The Platform Configuration menu items allow you to change the platform settings.

Settings items in this menu to incorrect values may cause the system to malfunction!



4.6.1 PCH-IO Configuration



SATA And RST Configuration

This option allows you to make device options settings.

Controller 1/2/3 SATA And RST Configuration
Allows you to configure SATA Controller 1/2/3 Device Options Settings.

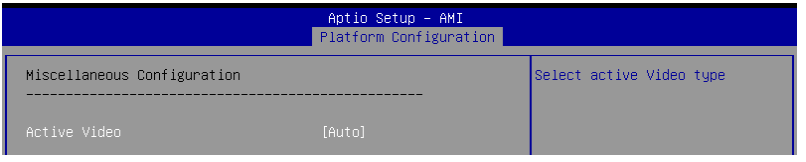
DeepSx Power Policies [Disabled]

This option allows you to enable to disable DeepSx power policies.
Configuration options: [Disabled] [Enabled in S5]

IEH Mode [Enabled]

This option allows you to enable or bypass IEH mode.
Configuration options: [Bypass Mode] [Enabled]

4.6.2 Miscellaneous Configuration

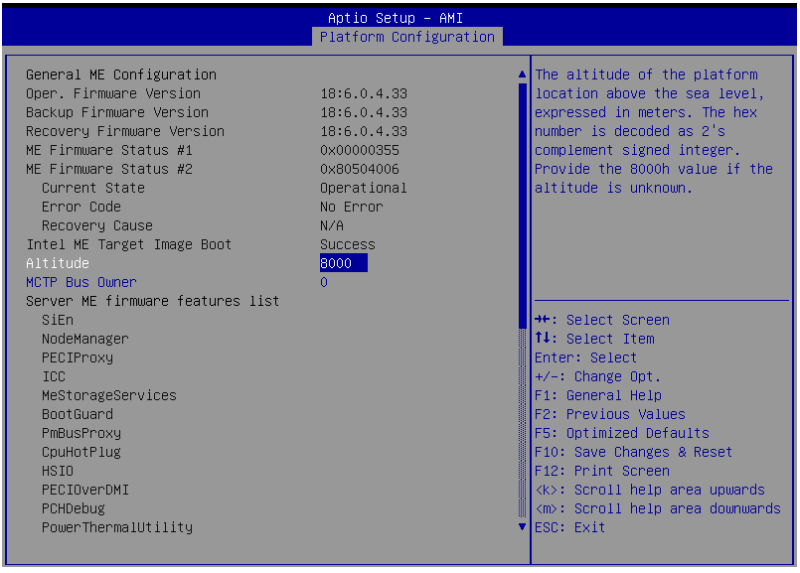


Active Video [Auto]

Allows you to select the active video type.
Configuration options: [Auto] [Onboard Device] [PCIE Device]

4.6.3 Server ME Configuration

Displays the Server ME Technology parameters on your system. Scroll using <Page Up> / <Page Down> keys to see more items.



Altitude [8000]

Allows you to set the altitude of the platform location above the sea level, expressed in meters. The hex number is decoded as 2's complement signed integer. Provide the 8000h value if the altitude is unknown.

MCTP Bus Owner [0]

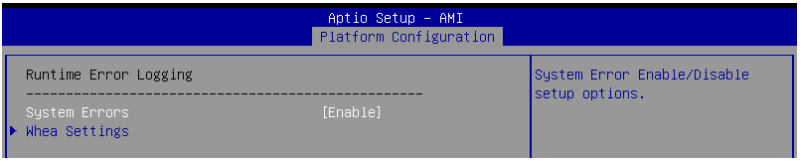
Allows you to enter the MCTP bus owner location on PCIe: [15:8] bus, [7:3] device, [2:0] function. If all zeros sending bus owner will be disabled.

Power Supply Units Configuration

PSU #1/2/3/4

Allows you to enter the PMBus address (7-bit) that will be used to retrieve the status of the PSU. Enter zero to disable query.

4.6.4 Runtime Error Logging



System Errors [Enable]

Allows you to enable or disable System Errors setup options.
Configuration options: [Disable] [Enable]

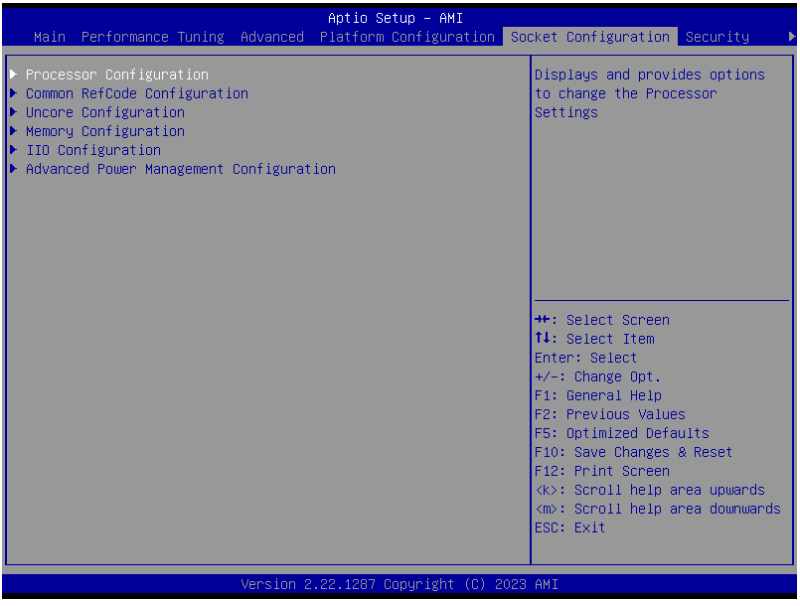
The following items are only available when **System Errors** is set to **[Enable]**.

Whea Settings

Whea Support [Enable]
Allows you to enable or disable Whea support.
Configuration options: [Disable] [Enable]

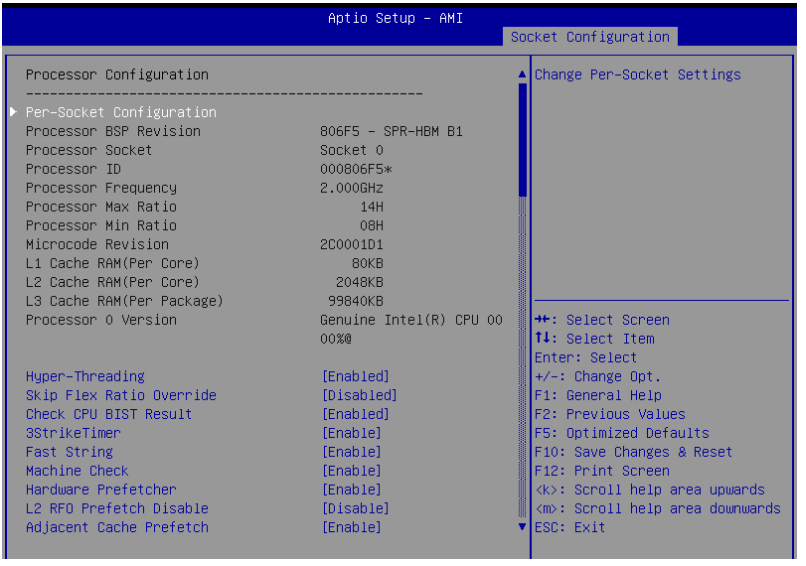
4.7 Socket Configuration menu

The Socket Configuration menu items allow you to change the socket settings.



4.7.1 Processor Configuration

Scroll using the <Page Up> / <Page Down> keys to view more items.



Processor Configuration

Per-Socket Configuration

Allows you to change Per-Socket Settings.

CPU Socket 0/1 Configuration

The options in this submenu allow you to enable or disable cores by setting the disable bitmap.

At least one core per CPU must be enabled. Disabling all cores is an invalid configuration.

Hyper Threading [Enabled]

Allows you to enable or disable the Hyper-Threading Technology function. When disabled, only one thread per activated core is enabled. This is the software method to enable or disable Logical Processor threads.
Configuration options: [Disabled] [Enabled]

Skip Flex Ratio Override [Disabled]

Allows you to use power-on default Flex Ratio values. In multi-socket systems, this will allow mixed flex ratio limits.
Configuration options: [Disabled] [Enabled]

Check CPU BIST Result [Enabled]

When enabled, this item disables failed BIST core. Otherwise, it ignores BIST result.
Configuration options: [Disable] [Enable]

3StrikeTimer [Enable]

The 3 strike counter can be turned off by writing into the MISC_FEATURE_CONTROL_ DISABLE_THREE_STRIKE_CNT (MSR 0X01a4).
Configuration options: [Enable] [Disable]

Fast String [Enable]

This item allows you to enable or disable fast strings for REP MOVS/STOS.
Configuration options: [Disable] [Enable]

Machine Check [Enable]

This item allows you to enable or disable machine check.
Configuration options: [Disable] [Enable]

Hardware Prefetcher [Enable]

Allows you to enable or disable MLC streamer prefetcher (MSR 1A4h Bit[0]).
Configuration options: [Disable] [Enable]

L2 RFO Prefetch Disable [Disable]

Allows you to enable or disable L2 RFO prefetcher (MSR 6Dh Bit[35]).
Configuration options: [Disable] [Enable]

Adjacent Cache Prefetch [Disable]

Allows you to enable or disable MLC spatial prefetcher (MSR 1A4h Bit[1]).
Configuration options: [Enable] [Disable]

DCU Streamer Prefetcher [Enable]

Allows you to enable or disable DCU streamer prefetcher, which is a L1 data cache prefetcher (MSR 1A4h Bit[2]).
Configuration options: [Enable] [Disable]

DCU IP Prefetcher [Enable]

Allows you to enable or disable DCU IP prefetcher, which is a L1 data cache prefetcher (MSR 1A4h Bit[3]).
Configuration options: [Enable] [Disable]

LLC Prefetch [Disable]

Allows you to enable or disable LLC prefetch on all threads.
Configuration options: [Disable] [Enable]

Homeless Prefetch [Auto]

Allows you to enable or disable Homeless Prefetch on all threads, the setting **[Auto]** maps to is program specific.
Configuration options: [Disable] [Enable] [Auto]

FB Thread Slicing [Disable]

Allows you to enable or disable FB (Fill Buffer) Thread Slicing per thread.
Configuration options: [Disable] [Enable]

AMP Prefetch [Disable]

Allows you to enable or disable MLC AMP Prefetch (MSR 1A4h [4]).
Configuration options: [Disable] [Enable]

Bsp Selection [Auto]

Allows you to choose the method to select BSP. **[Auto]** maps to hardware default BSP.
Configuration options: [Socket 0] [Socket 1] [Auto]

Extended APIC [Disable]

Allows you to enable or disable extended APIC support.
Configuration options: [Disable] [Enable]

Enabling this item will automatically enable VT-d & Interrupt Remapping.

APIC Physical Mode [Disable]

Allows you to enable or disable APIC physical destination mode.
Configuration options: [Disable] [Enable]

PECI Trust Mode [Use per-PECI agent trust mode]

Allows you to set PECI trust configuration.
Configuration options: [All PECI Agents untrusted] [All PECI Agents trusted] [Use per-PECI agent trust mode]

The following item appears only when **PECI Trust Mode** is set to **[Use per-PECI agent trust mode]**.

Legacy Agent [Enable]
Allows you to enable or disable the legacy PECI agent in trust bit enable.
Configuration options: [Disable] [Enable]

SMBus Agent [Disable]
Allows you to enable or disable the SMBus PECI agent in trust bit enable.
Configuration options: [Disable] [Enable]

IE Agent [Disable]
Allows you to enable or disable the IE PECI agent in trust bit enable.
Configuration options: [Disable] [Enable]

Generic Agent [Disable]
Allows you to enable or disable the generic PECI agent in trust bit enable.
Configuration options: [Disable] [Enable]

eSPI Agent [Disable]
Allows you to enable or disable the eSPI PECI agent in trust bit enable.
Configuration options: [Disable] [Enable]

DfxRedManu Agent [Disable]
Allows you to enable or disable the DfxRedManu PECI agent in trust bit enable.
Configuration options: [Disable] [Enable]

DfxOrange Agent [Disable]
Allows you to enable or disable the Orange PECI agent in trust bit enable.
Configuration options: [Disable] [Enable]

DBP-F [Disable]

Allows you to enable or disable DBP-F. DBP-F can be turned off by writing into the MSR 6Dh [2:3].
Configuration options: [Enable] [Disable]

IIO LLC Ways [14:0] (Hex) [0]

Allows you to adjust the LLC value of MSR_IIO_LLC_WAYS bitmask. (All bits set in the mask must be contiguous to each other).
Configuration options: [0] - [7FFF]

SMM Blocked and Delayed [Disable]

Allows you to enable or disable SMM Blocked and Delayed.
Configuration options: [Disable] [Enable]

eSMM Save State [Disable]

Allows you to enable or disable the eSMM Save State Feature.
Configuration options: [Disable] [Enable]

Smbus Error Recovery [Enable]

Allows you to enable or disable Smbus Error Recovery.
Configuration options: [Disable] [Enable]

Enable Intel(R) TXT [Disable]

Allows you to enable or disable Intel(R) TXT.
Configuration options: [Disable] [Enable]

VMX [Enable]

Allows you to enable or disable Vanderpool Technology. Changes take effect only after reboot.
Configuration options: [Disable] [Enable]

Enable SMX [Disable]

Allows you to enable or disable Safer Mode Extensions.
Configuration options: [Disable] [Enable]

Lock Chipset [Enable]

Allows you to lock or unlock the chipset.
Configuration options: [Enable] [Disable]

MSR Lock Control [Enable]

Allows you to enable or disable the locking of MSR 3Ah and CSR 80h. Power Good reset is needed to remove lock bits.
Configuration options: [Disable] [Enable]

PPIN Control [Unlock/Enable]

Allows you to unlock and enable or lock and disable the PPIN control.
Configuration options: [Lock/Disable] [Unlock/Enable]

AES-NI [Enable]

Allows you to enable or disable AES-NI support.
Configuration options: [Disable] [Enable]

PSMI Configuration

Press <Enter> to bring up the PSMI Configuration menu.

Global PSMI Enable [Enable]
Allows you to enable or disable Scan At Field (SAF)
Configuration options: [Disable] [Enable] [Force setup]

The following items appear only when **Global PSMI Enable** is set to **[Enable] or [Force setup].**

Socket 0/1 Configuration
The options in this submenu Allows you to enable or disable PSMI Enable setting for the socket.

Processor CFR Configuration

Press <Enter> to bring up the Processor CFR Configuration menu that displays and provides options to change the processor CFR settings.

Provision S3M CFR [Enable]
Allows you to enable or disable provision S3M CFR.
Configuration options: [Disable] [Enable]

The following item appears only when **Provision S3M CFR** is set to **[Enable].**

Manual Commit S3M FW CFR [Auto]
Allows you to enable or disable manual commit S3M FW CFR.
Configuration options: [Disable] [Enable] [Auto]

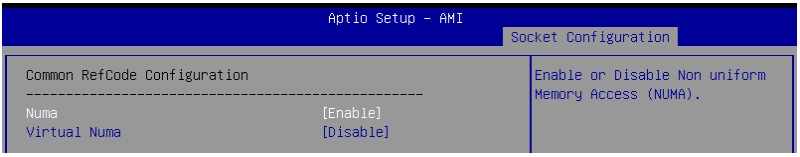
Provision PUcode CFR [Enable]
Allows you to enable or disable provision PUcode CFR.
Configuration options: [Disable] [Enable]

The following item appears only when **Provision PUcode CFR** is set to **[Enable].**

Manual Commit PUcode CFR [Auto]
Allows you to enable or disable manual commit PUcode CFR.
Configuration options: [Disabled] [Enabled] [Auto]

Socket0/1/2/3 CFR Revision Info
These items display the CFR revision info for each socket.

4.7.2 Common RefCode Configuration



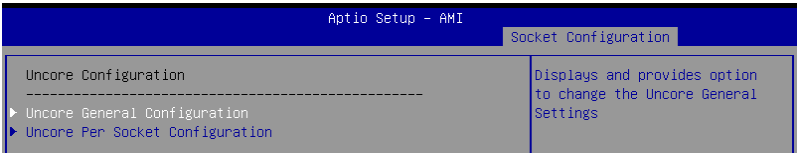
Numa [Enable]

Allows you to enable or disable Non Uniform Memory Access (NUMA).
Configuration options: [Disable] [Enable]

Virtual Numa [Disable]

Enabling this option divides physical NUMA nodes into evenly sized virtual NUMA modes in ACPI table. This may improve Windows performance on CPUs with more than 64 logical processors.
Configuration options: [Disable] [Enable]

4.7.3 Uncore Configuration



Uncore General Configuration

This item displays and provides options to change the Uncore General Settings.

Uncore Status
Displays uncore status

MMCFG Base [Auto]
Allows you to select the MMCFG base.
Configuration options: [1G] [1.5G] [1.75G] [2G] [2.25G] [3G] [Auto]

MMCFG Size [Auto]
Allows you to select the MMCFG size.
Configuration options: [64M] [128M] [256M] [512M] [1G] [2G] [Auto]

MMIO High Base [32T]
Allows you to select the MMIO high base.
Configuration options: [56T] [40T] [32T] [24T] [16T] [4T] [2T] [1T] [512G] [3584T]

MMIO High Granularity Size [256G]
Allows you to select the allocation size used to assign mmioh resources. Total mmioh space can be up to 32xgranularity. Per stack mmioh resource assignments are multiples of the granularity where 1 unit per stack is the default allocation.
Configuration options: [1G] [4G] [16G] [64G] [256G] [1024G]

Limit CPU PA to 46 bits [Enable]
Allows you to limit CPU physical address to 46 bits to support older Hyper-v. If enabled, automatically disables TME-MT.
Configuration options: [Disable] [Enable]

Clock Modulation Enabled [Auto]
When **[Auto]** is set, the setting will be based on Si Compatibility.
Configuration options: [Disable] [Enable] [Auto]

Uncore Per Socket Configuration

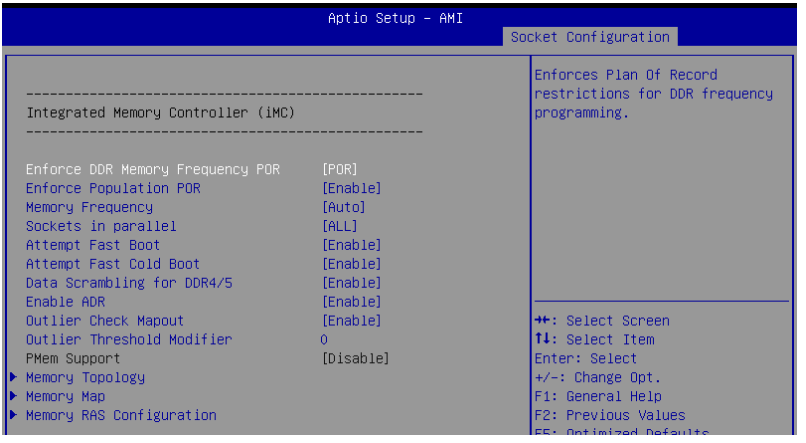
CPU1

CPU 1 UPI Port 3
The options in this submenu allow you to configure CPU 1 UPI Port 3 configurations.

CPU2

CPU 2 UPI Port 3
The options in this submenu allow you to configure CPU 2 UPI Port 3 configurations.

4.7.4 Memory Configuration



Enforce DDR Memory Frequency POR [POR]

Allows you to enforce Plan Of Record restrictions for DDR frequency programming.
Configuration options: [POR] [Disable]

Enforce Population POR [Enable]

Allows you to enable or disable memory population POR enforcement.
Configuration options: [Disable] [Enable]

Memory Frequency [Auto]

Allows you to select the maximum memory frequency setting in MT/s. If Enforce POR is set to **[Disable]**, user will be able to run at higher frequencies than the memory support (limited by processor support). Do not select Reserved.
Configuration options: [Auto] [3200] [3600] [4000] [4400] [4800]

Sockets in parallel [ALL]

Allows you to set how many sockets are executing at any time.

[ALL]	All sockets operate in parallel.
[1]	At any one time, only one socket is executing.
[2]	At any one time, only two sockets are executing.
[4]	At any one time, only four sockets are executing.

Attempt Fast Boot [Enable]

[Enable]	Portions of memory reference code will be skipped when possible to increase boot speed on warm boots.
[Disable]	Disables this feature.

Attempt Fast Cold Boot [Enable]

[Enable]	Portions of memory reference code will be skipped when possible to increase boot speed on cold boots.
[Disable]	Disables this feature.

Data Scrambling for DDR4/5 [Enable]

[Disable]	Disables this feature.
[Enable]	Enables data scrambling for DDR4 and DDR5.

Enable ADR [Enable]

Allows you to enable or disable the detecting and enabling of ADR. This is not available if fADR is enabled since fADR requires ADR to be enabled.
Configuration options: [Disable] [Enable]

Outlier Check Mapout [Enable]

Allows you to enable or disable Vendor Specific DIMM Outlier Check and Mapout. Enable means to do the Check and Mapout.
Configuration options: [Disable] [Enable]

Outlier Threshold Modifier [0]

Specify how much to modify the base outlier threshold (i.e. -17), to modify -1, enter 101 (threshold will be -18), to modify +1, enter 1 (threshold will be -16).
Configuration options: [0] - [255]

Memory Topology

Displays memory topology with DIMM population information.

Memory Map

Allows you to set memory mapping settings.

Memory RAS Configuration

Displays and provides options to change the memory RAS Settings.

Dynamic ECC Mode Selection [Enabled]
Allows you to enable or disable dynamic ECC mode selection.
Configuration options: [Disabled] [Enabled] [Enable + Allow Partial Poison Mode]

Enable Pcode WA for SAI PG [Disabled]
Allows you to enable or disable Pcode Work Around for SAI Policy group for A Step.
Configuration options: [Disabled] [Enabled]

Mirror Mode [Disabled]
Full Mirror Mode will set entire 1LM memory in system to be mirrored, consequently reducing the memory capacity by half. Partial Mirror Mode will enable the required size of memory to be mirrored. If rank sparing is enabled partial mirroring will not take effect. Enabling any type of Mirror Mode will disable XPT Prefetch.
Configuration options: [Disabled] [Full Mirror Mode]

Memory Correctable Error Flood Policy [Frequency]

[Disable]	Don't deal with Memory CE flood
[Once]	Only First Memory CE will trigger SMI, and BIOS will disable this rank silicon side to trigger SMI.
[Frequency]	Disable SMI when Memory CE reaches threshold within time limits.

Correctable Error Threshold [7FFF]
Allows you to set the Correctable Error Threshold (0x01 - 0x7FFF) used for DDR sparing and DDR leaky bucket.
Configuration options: [1] - [7FFF]

Trigger SW Error Threshold [Disabled]
Allows you to enable to disable sparing trigger SW error match threshold.
Configuration options: [Disabled] [Enabled]

Leaky bucket time window based interface [Disabled]
Allows you to enable to disable leaky bucket time window based interface for DDR.
Configuration options: [Disabled] [Enabled]

The following item appears only when **Leaky bucket time window based interface** is set to **[Enabled]**.

Leaky bucket time window based interface Hour [24]
Allows you to set the leaky bucket time window based interface Hour used for DDR.
Configuration options: [0] - [24]

Leaky bucket time window based interface Minute [0]
Allows you to set the leaky bucket time window based interface Minute used for DDR.
Configuration options: [0] - [60]

The following item appears only when **Leaky bucket time window based interface** is set to **[Disabled]**.

Leaky bucket low bit [28]
Allows you to set the leaky bucket low bit used for DDR" (0x1 - 0x29)
Configuration options: [1] - [29]

Leaky bucket high bit [29]
Allows you to set the leaky bucket high bit used for DDR" (0x1 - 0x29)
Configuration options: [1] - [29]

Partial Cache Line Sparing PCLS [Enabled]
Allows you to enable or disable PCLS Sparing.
Configuration options: [Disabled] [Enabled]

ADDDC Sparing [Disabled]
Allows you to enable to disable ADDDC Sparing.
Configuration options: [Disabled] [Enabled]

The following item appears only when **ADDDC Sparing** is set to **[Enabled]**.

Enable ADDDC Error Injection [Enabled]
Allows you to enable to disable ADDDC error injection, which is required forcing the interleave granularity to 64B for B/L step parts.
Configuration options: [Disabled] [Enabled]

Patrol Scrub [Enable at End of POST]
Allows you to enable to disable patrol scrub.
Configuration options: [Disabled] [Enable at End of POST]

The following item appears only when **Patrol Scrub** is set to **[Enable at End of POST]**.

Patrol Scrub Interval [24]
Allows you to set the number of hours (1-24) required to complete full scub. A value of zero means Auto.
Configuration options: [0] - [24]

PDDR5 ECS [Enabled]
Allows you to enable to disable DDR5 Error Check and Scrub (ECS).

[Disabled]	Disable ECS/Result collection.
[Enable]	Enable ECS without Result Collection.
[Enable ECS with Result Collection]	Enable ECS/Result Collection.

4.7.5 IIO Configuration

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

Press <Enter> to bring up the Intel Virtualization Technology for Directed I/O (VT-d) configuration menu.

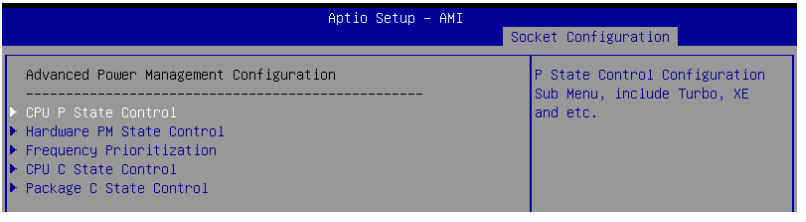
Intel VT for Directed I/O [Enable]
Allows you to enable or disable Intel Virtualization Technology for Directed I/O (VT-d) by reporting the I/O device assignment to VMM through DMAR ACPI Tables. To disable VT-d, X2APIC must also be disabled.
Configuration options: [Enable] [Disable]

The following items appear only when **Intel VT for Directed I/O** is set to **[Enable]**.

DMA Control Opt-In Flag [Disable]
Allows you to enable or disable DMA_CTRL_PLATFORM_OPT_IN_FLAG in DMAR table in ACPI. Not compatible with Directive Device Assignment (DDA).
Configuration options: [Enable] [Disable]

Pre-boot DMA Protection [Disable]
Allows you to enable or disable DMA Protection in Pre-boot environment (If DMAR table is installed in DXE and if VTD_INFO_PPI is installed in PEI).
Configuration options: [Disable] [Enable]

4.7.6 Advanced Power Management Configuration



CPU P State Control

P State Control Configuration Sub Menus, including Turbo, XE, etc.

AVX License Pre-Grant Override [Disable]
Allows you to enable or disable AVX ICCP pre-grant level override.
Configuration options: [Disable] [Enable]

The following item appears only when **AVX Licence Pre-Grant Override** is set to **[Enable]**.

AVX ICCP pre-grant level [128 Heavy]
Pre-grants an AVX level to the core. Base frequency is not updated.
Configuration options: [128 Heavy] [256 Light] [256 Heavy] [512 Light] [512 Heavy]

The following items appear only when **SpeedStep (Pstates)** is set to **[Enable]**.

AVX P1 [Nominal]
AVX P1 level selection.
Configuration options: [Nominal] [Level 1] [Level 2]

The following item appears only when **Dynamic SST-PP** is set to **[Disable]**.

Intel SST-PP [Auto]
Intel SST-PP allows user to choose level. **[Auto]** will choose the lowest level the hardware supports.
Configuration options: [Auto] [Level 0] [Level 3] [Level 4]

The following item appears only when **AVX P1** is set to **[Nominal]**.

Dynamic SST-PP [Disable]
Enabling Dynamic SST-PP supports dynamic SST-PP selection.
Configuration options: [Disable] [Enable]

HWP Native Mode is a prerequisite for enabling Dynamic SST-PP.

SpeedStep (Pstates) [Enable]
Allows you to enable or disable EIST (P-States).
Configuration options: [Disable] [Enable]

Boot performance mode [Max Performance]
Allows you to select the performance state that the BIOS will set before OS hand off.
Configuration options: [Max Performance] [Max Efficient] [Set by Intel Node Manager]

Energy Efficient Turbo [Enable]
Allows you to enable or disable Energy Efficient Turbo, MSR 0x1FC [19].
Configuration options: [Disable] [Enable]

The following item appears only when **SpeedStep (Pstates)** is set to **[Enable]**.

Turbo Mode [Enable]
Allows you to enable or disable processor Turbo Mode (requires EMTTM enabled too).
Configuration options: [Disable] [Enable]

Hardware PM State Control

Hardware P-States [Native Mode]
Allows you to switch between Hardware P-States mode.

[Disable]	Hardware chooses a P-state based on OS Request (Legacy P-States).
[Native Mode]	Hardware chooses a P-state based on OS guidance.
[Out of Band Mode]	Hardware autonomously chooses a P-state (no OS guidance).
[Native Mode with no Legacy Support]	Hardware chooses a P-state based on OS guidance (without Legacy support).

When HWP mode is **[Disable]** or **[Out of Band Mode]**, Dynamic SST-PP, SST-BF and SST-CP will be disabled.

Frequency Prioritization

SST-CP [Disable]
Allows you to enable or disable SST-CP. When enabled, per core power budgeting is activated.
Configuration options: [Enable] [Disable]

HWP Native Mode is a prerequisite for enabling SST-CP.

CPU C State Control

Enable Monitor MWAIT [Auto]
Allows you to enable or disable Monitor and MWAIT instructions. **[Auto]** maps to Enable.
Configuration options: [Disable] [Enable] [Auto]

CPU C1 auto demotion [Enable]
Allows CPU to automatically demote to C1. Takes effect after reboot.
Configuration options: [Disable] [Enable]

CPU C1 auto undemotion [Enable]
Allows CPU to automatically undemote from C1. Takes effect after reboot.
Configuration options: [Disable] [Enable]

CPU C6 report [Auto]
Allows you to enable or disable CPU C6 (ACPI C3) report to OS. **[Auto]** maps to Enable.
Configuration options: [Disable] [Enable] [Auto]

Enhanced Halt State (C1E) [Enable]
Core C1E auto promotion Control. Takes effect after reboot. Will be enforced to enable when Optimized Power Mode is enabled.
Configuration options: [Disable] [Enable]

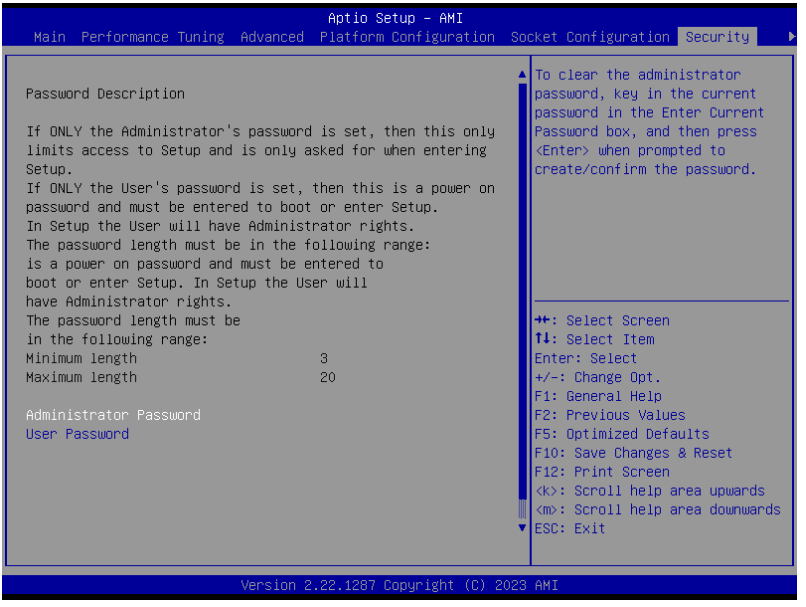
OS ACPI Cx [ACPI C2]
Allows you to select to report CC3/CC6 to OS ACPI C2 or ACPI C3.
Configuration options: [ACPI C2] [ACPI C3]

Package C State Control

Package C State [Auto]
Allows you to select Package C State limit.
Configuration options: [C0/C1 state] [C2 state] [C6(non Retention state] [C6(Retention state] [No Limit] [Auto]

4.8 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 Mode state.



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.

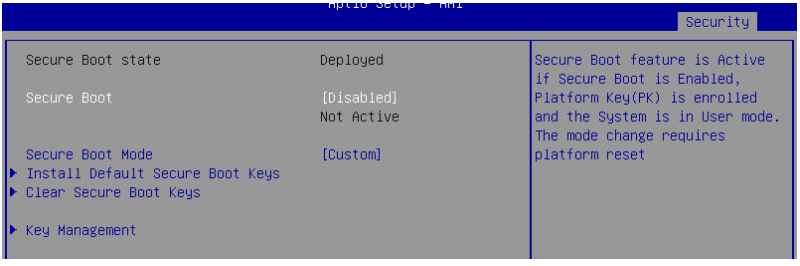
To change a user password:

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 the user password, follow the same steps as in changing a user password, but press <Enter> when prompted to create/confirm the password.

4.8.1 Secure Boot

This item allows you to customize the Secure Boot settings.



Secure Boot [Disabled]

Secure Boot feature is active if Secure Boot is Enabled, Platform Key (PK) is enrolled and the system is in User mode. The mode change requires platform reset.
Configuration options: [Disabled] [Enabled]

Secure Boot Mode [Custom]

Allows you to set the Secure Boot selector. In Custom mode, Secure Boot Policy variables can be configured physically by the present user without full authentication.
Configuration options: [Custom] [Standard]

The following items are available only when **Secure Boot Mode** is set to **[Custom]**.

Install Default Secure Boot Keys

This option will load the default secure boot keys, including the PK (Platform key), KEK (key-exchange key), db (signature database), and dbx (revoked signature database). All the secure boot keys states will change from unloaded to loaded. Save changes and reset the system for the changes to take effect.

Clear Secure Boot Keys

This option will delete all previously applied secure boot keys, including the PK (Platform key), KEK (key-exchange key), db (signature database), and dbx (revoked signature database). All the secure boot keys states will change from unloaded to loaded. Save changes and reset the system for the changes to take effect.

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.

Factory Key Provision [Enabled]
Allows you to provision factory default Secure Boot keys when the system is in Setup Mode.
Configuration options: [Disabled] [Enabled]

Install Default Secure Boot Keys
This option will load the default secure boot keys, including the PK (Platform key), KEK (key-exchange key), db (signature database), and dbx (revoked signature database). All the secure boot keys states will change from unloaded to loaded. Save changes and reset the system for the changes to take effect.

Clear Secure Boot Keys
This option will delete all previously applied secure boot keys, including the PK (Platform key), KEK (key-exchange key), db (signature database), and dbx (revoked signature database). All the secure boot keys states will change from unloaded to loaded. Save changes and reset the system for the changes to take effect.

Enroll Efi Image
This item will allow the image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db).

Save all Secure Boot Variables
This option will save NVRAM content of Secure Boot policy variables to the file (EFI_ SIGNATURE_LIST data format) in root foler on a target file system device.

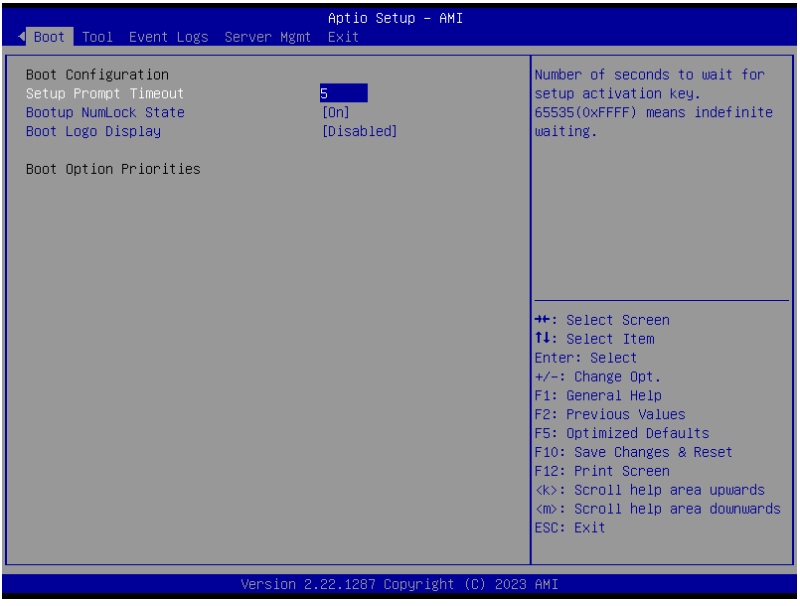
PK Management
Configuration options: [Details] [Save To File] [Set New Key] [Delete key]

KEK Management / DB Management / DBX Management
Configuration options: [Details] [Save To File] [Set New Key] [Append Key] [Delete key]

Authorized TimeStamps / OsRecovery Signatures
Configuration options: [Set New Key] [Append Key]

4.9 Boot menu

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



Setup Prompt Timeout [5]

Allows you to set the number of seconds that the firmware waits before initiating the original default boot selection. 65535(OxFFFF) means indefinite waiting. Use the <+> or <-> to adjust the value.

Bootup NumLock State [On]

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

Boot Logo Display [Disabled]

[Disabled] Hide the logo during POST.

[Enabled] Display the logo during POST.

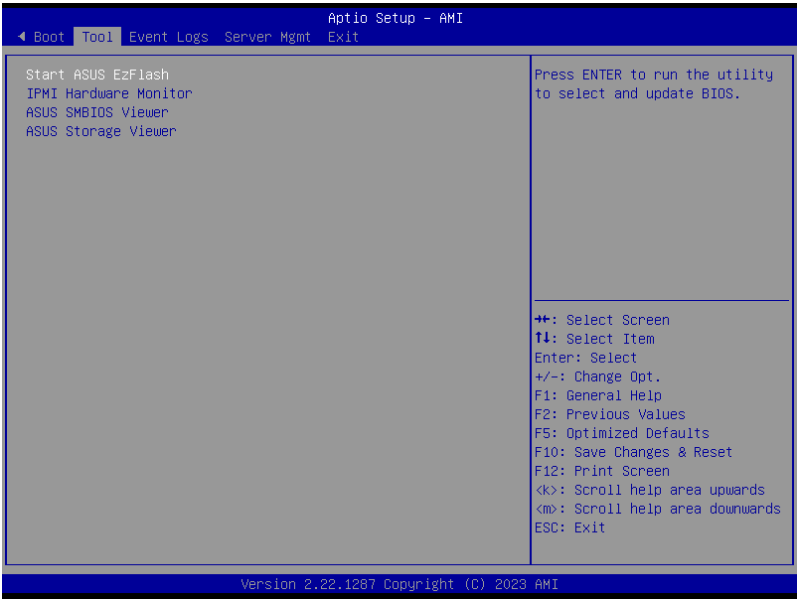
Boot Option Priorities

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 <F11> when logo appears.
- To access Windows OS in Safe Mode, please press <F8> after POST.

4.10 Tool menu

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



Start ASUS EzFlash

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

IPMI Hardware Monitor

Allows you to run the IPMI hardware monitor.

ASUS SMBIOS Viewer

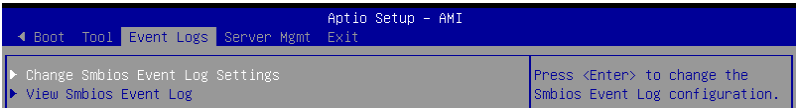
Allows you to start ASUS SMBIOS Viewer when you press <Enter>.

ASUS Storage Viewer

Allows you to start ASUS Storage Viewer when you press <Enter>.

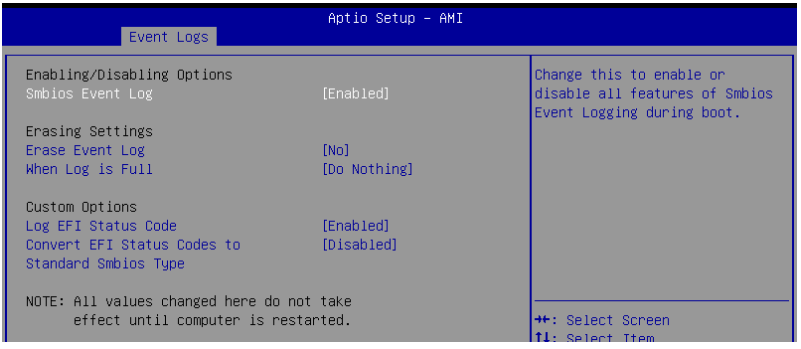
4.11 Event Logs menu

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



4.11.1 Change Smbios Event Log Settings

Press <Enter> to view all smbios event logs.



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]

The following items only appear when **Smbios Event Log** is set to **[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]

Choose options for reactions to a full Smbios Event Log.
Configuration options: [Do Nothing] [Erase Immediately]

Custom Options

Log EFI Status Code [Enabled]

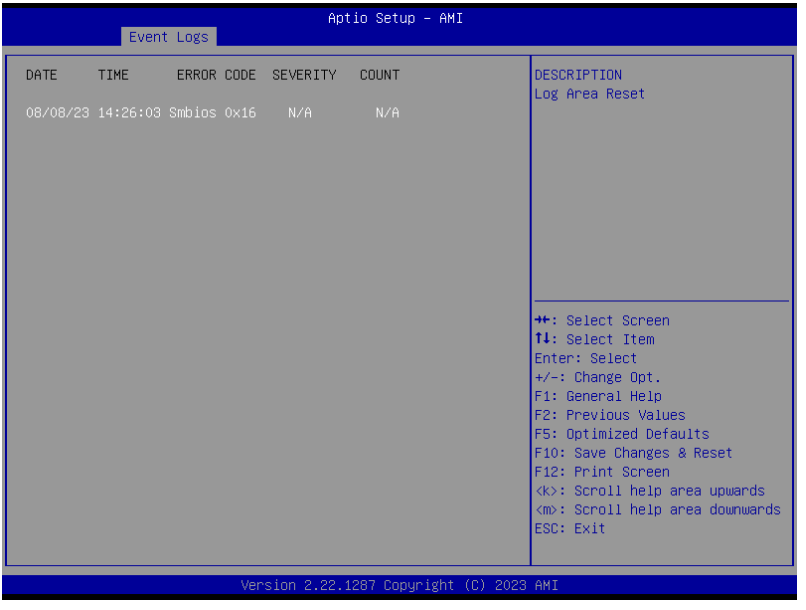
Allows you to enable or disable the logging of EFI Status Codes as OEM reserved type E0 (if not already converted to legacy).
Configuration options: [Disabled] [Enabled]

The following item only appears when **Log EFI Status Code** is set to **[Enabled]**.

Convert EFI Status Codes to Standard Smbios Type [Disabled]
Allows you to enable or disable the converting of EFI Status Codes to Standard Smbios Types (not all may be translated).
Configuration options: [Disabled] [Enabled]

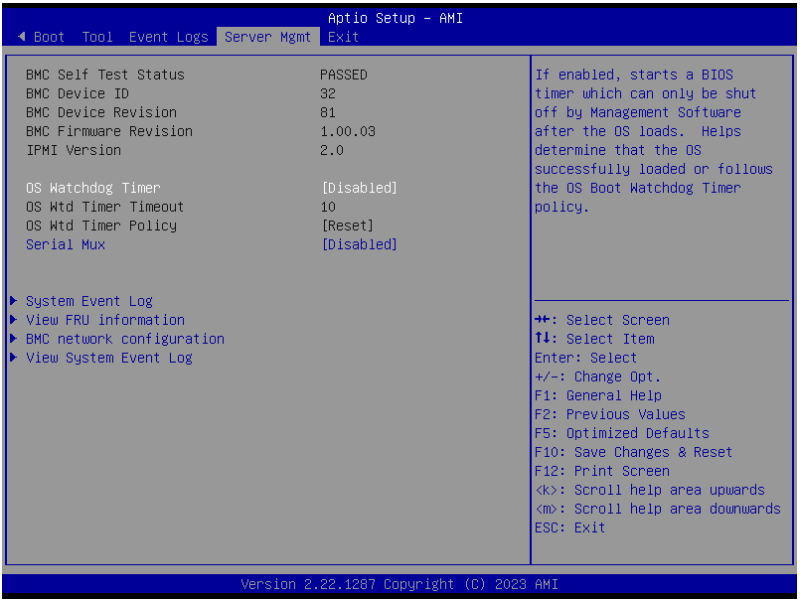
4.11.2 View Smbios Event Log

Press <Enter> to view all smbios event logs.



4.12 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 Management Software after the OS loads. Helps determine if the OS successfully loaded or follows the OS Boot Watchdog Timer policy.
Configuration options: [Disabled] [Enabled]

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

OS Wtd Timer Timeout [10]
Allows you to enter a value between 1 to 30 minutes for OS Boot Watchdog Timer Expiration. Not available if OS Boot Watchdog Timer is disabled.
Configuration options: [1] - [30]

OS Wtd Timer Policy [Reset]
This item allows you to configure the how the system should respond if the OS Boot Watch Timer expires. Not available if OS Boot Watchdog Timer is disabled.
Configuration options: [Do Nothing] [Reset] [Power Down] [Power Cycle]

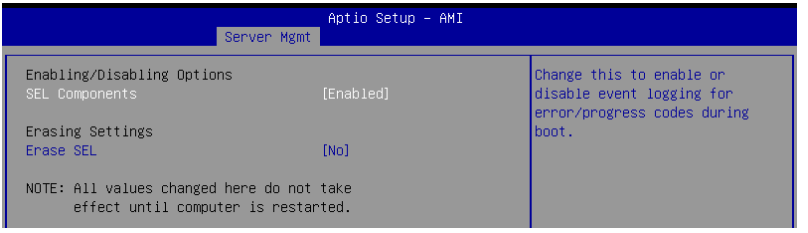
Serial Mux [Disabled]

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

4.12.1 System Event Log

Allows you to change the SEL event log configuration.

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



SEL Components [Enabled]

Allows you to enable or disable event logging for error/progress codes during boot.
Configuration options: [Disabled] [Enabled]

The following item is available only when **SEL Components** is set to **[Enabled]**.

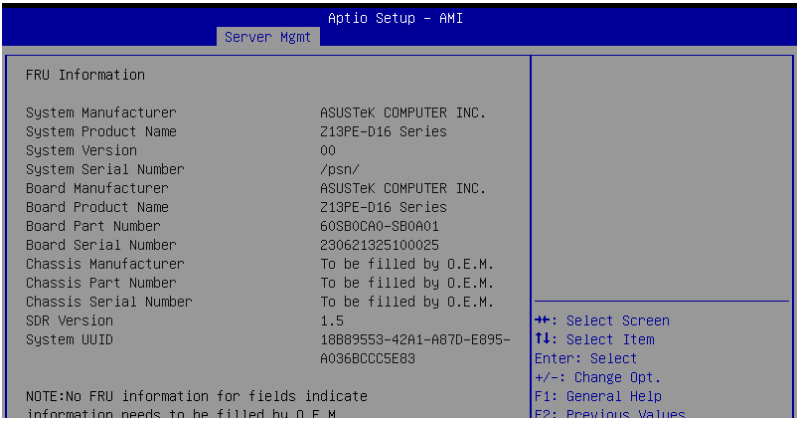
Erase SEL [No]

Allows you to choose options for erasing SEL.
Configuration options: [No] [Yes, On next reset] [Yes, On every reset]

4.12.2 FRU Information

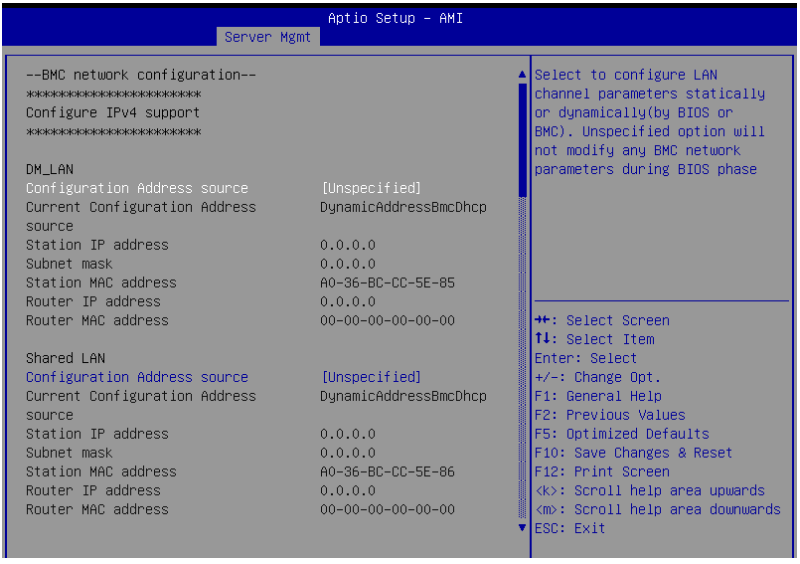
Press <Enter> to view FRU information.

No FRU information for fields indicates that those are to be filled by O.E.M.



4.12.3 BMC network configuration

The sub-items in this configuration allow you to configure the BMC network parameters. Scroll using <Page Up> / <Page Down> keys to see more items.



Configure IPv4 support

DM_LAN / Shared LAN

Configuration Address source [Unspecified]
Allows you to set the LAN channel parameters statically or dynamically (by BIOS or by BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

The following items are available only when **Configuration Address source** is set to **[Static]**.

Station IP address
Allows you to set the station IP address.

Subnet mask
Allows you to set the subnet mask. We recommend that you use the same Subnet Mask you have specified on the operating system network for the used network card.

Router IP Address
Allows you to set the router IP address.

Router MAC Address
Allows you to set the router MAC address.

Configure IPv6 support

DM_LAN / Shared LAN

IPV6 support [Enabled]
Allows you to enable or disable IPV6 support.
Configuration options: [Enabled] [Disabled]

The following items appear only when **IPV6 support** is set to **[Enabled]**.

Configuration Address source [Unspecified]
Allows you to set the LAN channel parameters statically or dynamically (by BIOS or by BMC). **[Unspecified]** option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

The following items are available only when **Configuration Address source** is set to **[Static]**.

Station IPV6 address
Allows you to set the station IPV6 address.

Prefix Length
Allows you to set the prefix length (maximum of Prefix Length is 128).

Configuration Router LAN1/2 Address [Unspecified]
Allows you to set the LAN channel parameters statically or dynamically (by BIOS or by BMC). Unspecified option will not modify any BMC network parameters during BIOS phase.
Configuration options: [Unspecified] [Static] [DynamicBmcDhcp]

The following items are available only when **Configuration Router LAN1/2 Address** is set to **[Static]**.

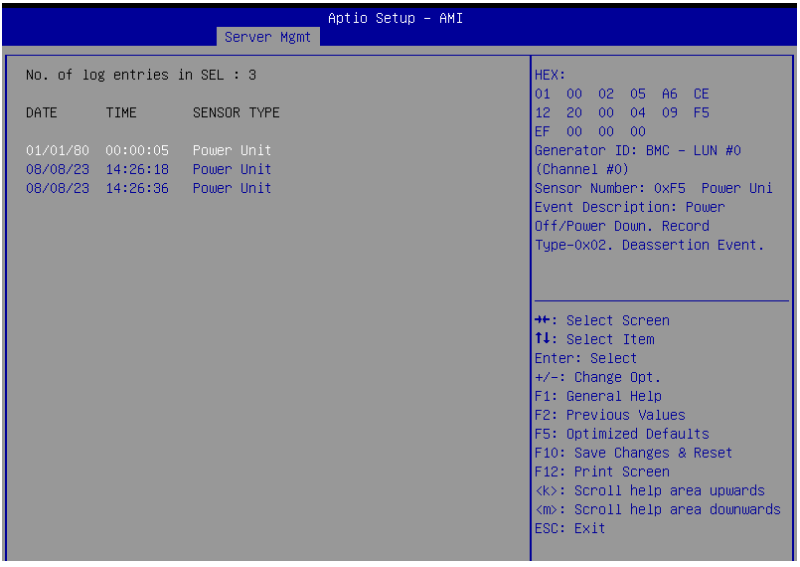
IPV6 Router1 IP Address
Allows you to set the IPV6 Router1 IP address.

IPV6 Router1 Prefix Length Lan1/2
Allows you to set the IPV6 router prefix length (maximum of IPV6 Router Prefix Length is 128).

IPV6 Router1 Prefix Value Lan1/2
Allows you to change the IPV6 router prefix value.

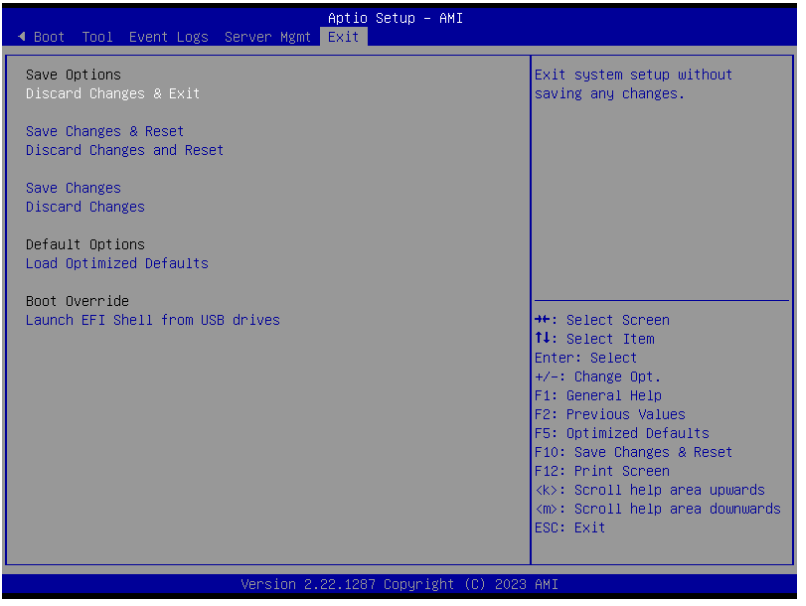
4.12.4 View System Event Log

This item allows you to view the system event log records. Scroll using <Page Up> / <Page Down> keys to see more items.



4.13 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.

Discard Changes and Exit

Exit system setup without saving any changes.

Save Changes and Reset

Reset system after saving the changes.

Discard Changes and Reset

Reset system setup without saving any changes.

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.

Load Optimized Defaults

Load optimized default values for all the setup options.

Boot Override

This item displays the available devices. The device 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.

5 RAID Configuration

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

5.1 Setting up RAID

The motherboard supports Intel® Rapid Storage Technology, with RAID 0, RAID 1, RAID 10, and RAID 5 support (for Windows OS and Linux).

The BIOS options in this chapter may differ slightly from the BIOS shown on your motherboard, but the steps remain the same.

5.1.1 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 database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

5.1.2 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.

5.2 Creating a SATA RAID set 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® C741 chipset.

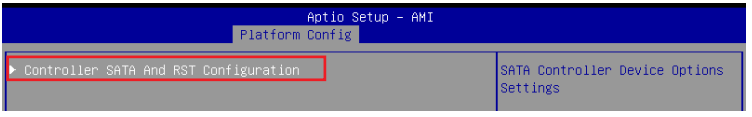
To do this:

1. Enter the BIOS Setup during POST.

Refer to Chapter 4 for details on entering and navigating through the BIOS Setup.

2. Go to **Platform Configuration** > **PCH Configuration** > **PCH Storage Configuration** > **Controller SATA and RST Configuration**.

3. Set **SATA Mode Selection** to **[RAID]**.

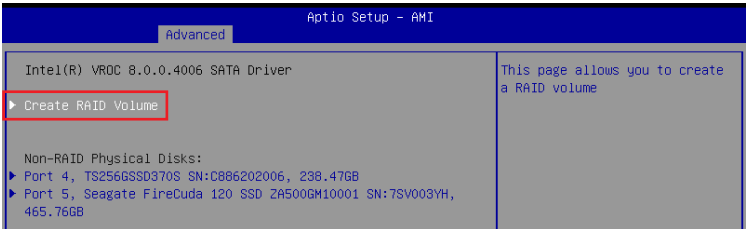


4. Press <F10> to save your changes and exit the BIOS Setup, then enter the BIOS Setup again..

5.2.1 Creating a RAID set

1. Go to **Advanced** > **Intel(R) Virtual RAID on CPU** to display the Intel® VROC SATA controller menu.

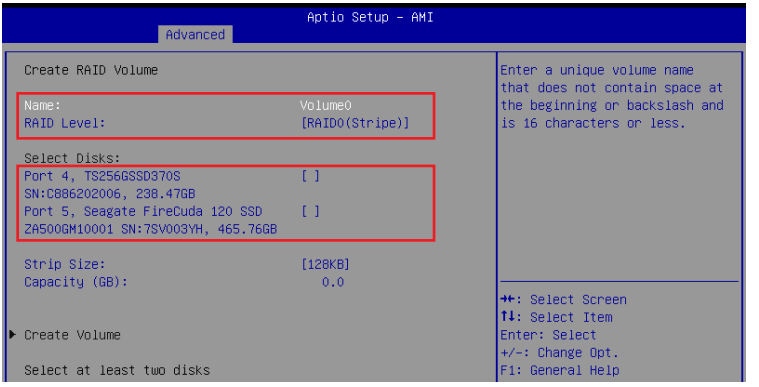
2. From the Intel® VROC SATA controller menu, select **All Intel VMD Controllers**, then select **Create RAID Volume** and press <Enter>.



3. When the **Name** item is selected, enter a name for the RAID set and press <Enter>.

4. When the **RAID Level** item is selected, press <Enter> to select the RAID level to create, and then press <Enter>.

5. Under **Select Disks**, press <Enter> and select **X** for the disks you want to include in the RAID set.



6. When the **Strip Size** item is selected, press <Enter> to select strip size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available strip size values range from 4 KB to 128 KB. The following are typical values:

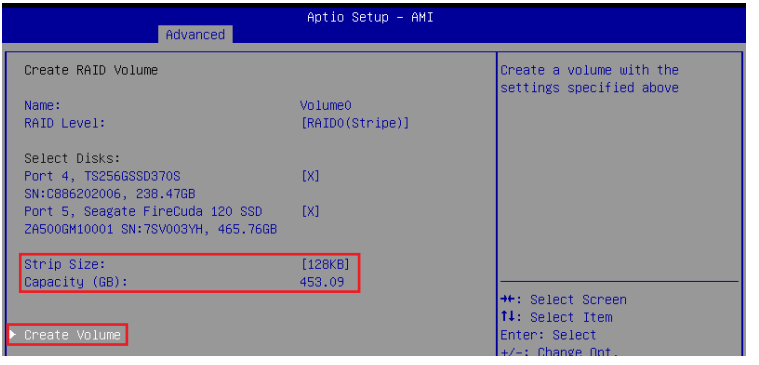
   - RAID 0: 128 KB
   - RAID 10: 64 KB
   - RAID 5: 64 KB

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

7. When the **Capacity (GB)** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.

8. Select the **Create Volume** item, then click **Yes** on the confirmation screen to create the RAID set.

Creating a RAID volume will delete all data on the selected drives. Ensure to back up the data on the drives before creating a RAID volume.



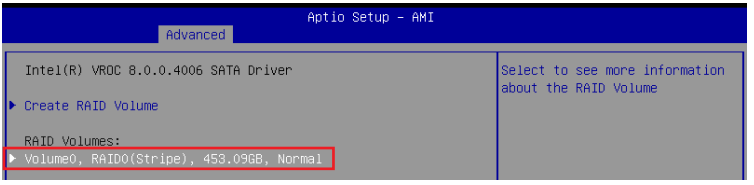
9. After the RAID set has been created, you will be directed back to the Intel® VROC SATA controller menu and the newly created RAID volume should appear under the RAID Volumes item.

5.2.2 Deleting a RAID set

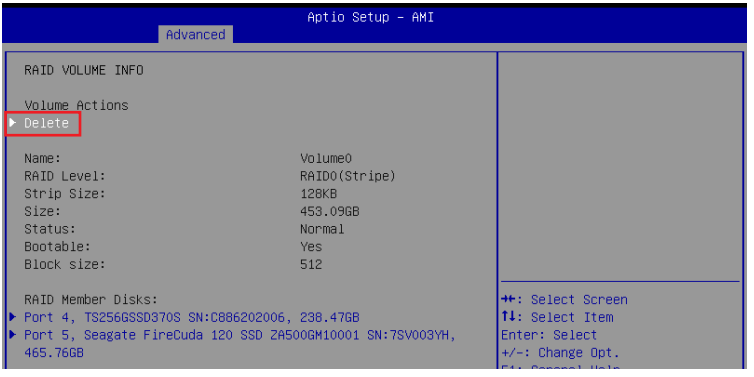
Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

1. From the Intel® VROC SATA controller menu, select the RAID volume you want to delete.



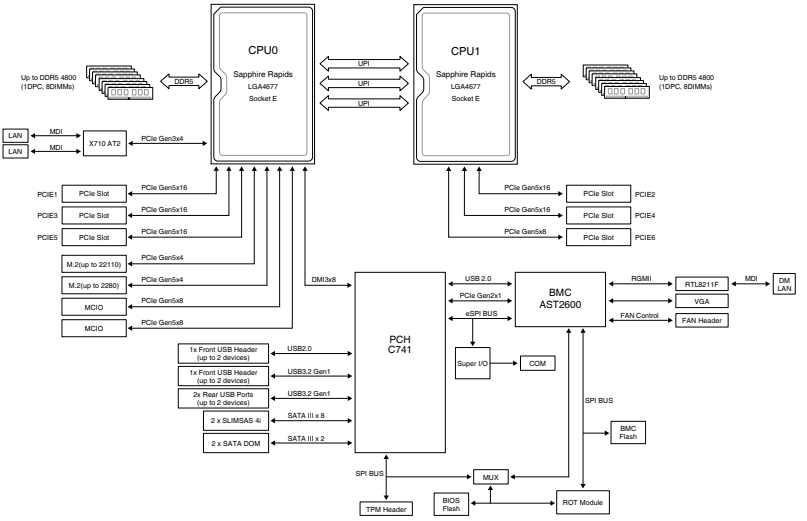
2. Select the **Delete** item.



3. Select **Yes** to delete the RAID volume and return to the Intel® VROC SATA controller menu, or select **No** to cancel.

Appendix A

Z13PE-D16 block diagram



Q-Code table

Code	Description
00	Not used
02	microcode
03	CACHE_ENABLED
04	PCH initialization
06	CPU_EARLY_INIT
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
3B – 3E	Post-Memory PCH initialization is started
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
4F	DXE IPL is started
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 stared (S3 Resume PPI is called by the DXE IPL)
E1	S3 Boot Script execution
E2	Video repost
E3	OS S3 wake vector call
E4 – E7	Reserved for future AMI progress codes
E8	S3 Resume Failed
E9	S3 Resume PPI not Found
EA	S3 Resume Boot Script Error
EB	S3 OS Wake Error
EC – EF	Reserved for future AMI error codes
F0	Recovery condition triggered by firmware (Auto recovery)
F1	Recovery condition triggered by user (Forced recovery)
F2	Recovery process started
F3	Recovery firmware image is found

(continued on the next page)

Code	Description
F4	Recovery firmware image is loaded
F5 – F7	Reserved for future AMI progress codes
F8	Recovery PPI is not available
F9	Recovery capsule is not found
FB – FF	Reserved for future AMI error codes
60	DXE Core is started
61	NVRAM initialization
62	Installation of the PCH Runtime Services
63 – 67	CPU DXE initialization is started
68	PCI host bridge initialization
69	System Agent DXE initialization is started
6A	System Agent DXE SMM initialization is started
6B – 6F	System Agent DXE initialization (System Agent module specific)
70	PCH DXE initialization is started
71	PCH DXE SMM initialization is started
72	PCH devices initialization
73 – 77	PCH DXE Initialization (PCH module specific)
78	ACPI module initialization
79	CSM initialization
7A – 7F	Reserved for future AMI DXE codes
90	Boot Device Selection (BDS) phase is started
91	Driver connecting is started
92	PCI Bus initialization is started
93	PCI Bus Hot Plug Controller Initialization
94	PCI Bus Enumeration
95	PCI Bus Request Resources
96	PCI Bus Assign Resources
97	Console Output devices connect
98	Console input devices connect
99	Super IO Initialization
9A	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

(continued on the next page)

Code	Description
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 (under OS)

Code	Description
03	System is entering S3 sleep state
04	System is entering S4 sleep state
05	System is entering S5 sleep state
30	System is waking up from the S3 sleep state
40	System is waking up from the S4 sleep state
AC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
AA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

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.

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.

Compliance Statement of Innovation, Science and Economic Development Canada (ISED)

This device complies with Innovation, Science and Economic Development Canada licence exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

CAN ICES-003(B)/NMB-003(B)

Déclaration de conformité de Innovation, Sciences et Développement économique Canada (ISED)

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CAN ICES-003(B)/NMB-003(B)

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If you require assistance please call ASUS Customer Service 1300 2787 88 or visit us at https://www.asus.com/support

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Please refer to http://csr.asus.com/Compliance.htm for information disclosure based on regulation requirements ASUS is complied with:

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EU RoHS

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This product complies with the “India E-Waste (Management) Rules, 2016” and prohibits use of lead, mercury, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs) in concentrations exceeding 0.1% by weight in homogenous materials and 0.01% by weight in homogenous materials for cadmium, except for the exemptions listed in Schedule II of the Rule.

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Các sản phẩm ASUS bán tại Việt Nam, vào ngày 23 tháng 9 năm2011 trở về sau, đều phải đáp ứng các yêu cầu của Thông tư 30/2011/TT-BCT của Việt Nam.

Türkiye RoHS

AEEE Yönetmeliğine Uygundur

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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.

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Japan JATE

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