

TS300-E9-PS4

Server User Guide



Copyright © 2017 ASUSTeK COMPUTER INC. All Rights Reserved.

No part of this manual, including the products and software described in it, may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form or by any means, except documentation kept by the purchaser for backup purposes, without the express written permission of ASUSTeK COMPUTER INC. ("ASUS").

ASUS provides this manual "as is" without warranty of any kind, either express or implied, including but not limited to the implied warranties or conditions of merchantability or fitness for a particular purpose. In no event shall ASUS, its directors, officers, employees, or agents be liable for any indirect, special, incidental, or consequential damages (including damages for loss of profits, loss of business, loss of use or data, interruption of business and the like), even if ASUS has been advised of the possibility of such damages arising from any defect or error in this manual or product.

Specifications and information contained in this manual are furnished for informational use only, and are subject to change at any time without notice, and should not be construed as a commitment by ASUS. ASUS assumes no responsibility or liability for any errors or inaccuracies that may appear in this manual, including the products and software described in it.

Product warranty or service will not be extended if: (1) the product is repaired, modified or altered, unless such repair, modification or alteration is authorized in writing by ASUS; or (2) the serial number of the product is defaced or missing.

Products and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are used only for identification or explanation and to the owners' benefit, without intent to infringe.

Contents

Notices	vii
Safety information.....	viii
REACH	ix
About this guide.....	x

Chapter 1: Product Introduction

1.1	System package contents	1-2
1.2	Serial number label.....	1-3
1.3	System specifications	1-4
1.4	Front panel features.....	1-6
1.5	Rear panel features.....	1-7
1.6	Internal features	1-8
1.7	LED information	1-9
1.7.1	Front panel LEDs	1-9
1.7.2	LAN (RJ-45) LEDs	1-10

Chapter 2: Hardware Information

2.1	Chassis cover.....	2-2
2.1.1	Removing the side cover.....	2-2
2.1.2	Reinstalling the side cover	2-3
2.2	Central Processing Unit (CPU)	2-4
2.2.1	Installing the CPU	2-4
2.2.2	Installing the CPU heatsink.....	2-7
2.2.3	Uninstalling the CPU heatsink and fan.....	2-8
2.2.4	Installing the CPU heatsink in rack	2-9
2.3	System memory	2-10
2.3.1	Overview	2-10
2.3.2	Memory configurations.....	2-10
2.3.3	Installing a DIMM on a single clip DIMM socket.....	2-11
2.3.4	Removing a DIMM from a single clip DIMM socket	2-11
2.4	Front panel assembly	2-12
2.4.1	Removing the front panel assembly.....	2-12
2.4.2	Reinstalling the front panel assembly	2-12
2.5	SATA/SAS hard disk drives	2-13
2.5.1	Removing the HDD module cage.....	2-13
2.5.2	Installing the HDD module cage.....	2-14
2.5.3	Removing the backplane.....	2-15
2.5.4	Installing a hot-swap SATA/SAS hard disk drive	2-15

Contents

- 2.6 **5.25-inch drives** 2-18
 - 2.6.1 Installing a 5.25-inch drive 2-18
- 2.7 **Expansion slots**..... 2-19
 - 2.7.1 Installing an expansion card..... 2-19
 - 2.7.2 Installing an ASUS PIKE II card..... 2-21
 - 2.7.3 Configuring an expansion card 2-23
 - 2.7.4 Installing an M.2 expansion card..... 2-25
- 2.8 **Cable connections** 2-26
 - 2.8.1 Motherboard connections..... 2-26
 - 2.8.2 SATA/SAS backplane cabling..... 2-27
- 2.9 **Removable components**..... 2-29
 - 2.9.1 System fans 2-29
 - 2.9.2 Chassis footpads..... 2-31

Chapter 3: Installation Options

- 3.1 **Preparing the system for rack mounting**..... 3-2
- 3.2 **Attaching the inner rail to the server** 3-2
- 3.3 **Attaching the rails to the rack** 3-3
- 3.4 **Mounting the server to the rack** 3-4

Chapter 4: Motherboard Information

- 4.1 **Motherboard layout**..... 4-2
- 4.2 **Onboard LEDs**..... 4-5
- 4.3 **Jumpers** 4-8
- 4.4 **Connectors** 4-12
 - 4.4.1 Rear panel connectors..... 4-12
 - 4.4.2 Q-Code table..... 4-13
 - 4.4.3 Internal connectors..... 4-15

Chapter 5: BIOS Setup

- 5.1 **Managing and updating your BIOS**..... 5-2
 - 5.1.1 ASUS CrashFree BIOS 3 utility..... 5-2
 - 5.1.2 ASUS EZ Flash Utility 5-3
 - 5.1.3 BUPDATER utility 5-4

Contents

5.2	BIOS setup program	5-6
5.2.1	BIOS menu screen.....	5-7
5.2.2	Menu bar.....	5-7
5.2.3	Menu items.....	5-8
5.2.4	Submenu items.....	5-8
5.2.5	Navigation keys.....	5-8
5.2.6	General help.....	5-8
5.2.7	Configuration fields.....	5-8
5.2.8	Pop-up window.....	5-8
5.2.9	Scroll bar.....	5-8
5.3	Main menu	5-9
5.3.1	System Date.....	5-9
5.3.2	System Time.....	5-9
5.4	Advanced menu	5-10
5.4.1	Trusted Computing.....	5-10
5.4.2	Chipset Configuration.....	5-10
5.4.3	Platform Configuration.....	5-17
5.4.4	CPU Configuration.....	5-25
5.4.5	SATA Configuration.....	5-28
5.4.6	Network Stack Configuration.....	5-31
5.4.7	CSM Configuration.....	5-32
5.4.8	NVMe controller and Drive information.....	5-33
5.4.9	iSCSI Configuration.....	5-33
5.5	Security menu	5-33
5.6	Boot menu	5-36
5.7	Monitor menu	5-38
5.8	Tool menu.....	5-38
5.9	Save & Exit menu.....	5-39
5.10	Server Mgmt menu.....	5-40
5.11	Event Logs menu.....	5-43

Contents

Chapter 6: RAID Configuration

6.1	Setting up RAID	6-2
6.1.1	RAID definitions	6-2
6.1.2	Installing hard disk drives.....	6-3
6.1.3	Setting the RAID mode in BIOS.....	6-3
6.1.4	RAID configuration utilities.....	6-3
6.2	Intel® Rapid Storage Technology enterprise SATA Option ROM Utility	6-4
6.2.1	Creating a RAID set.....	6-5
6.2.2	Deleting a RAID set.....	6-7
6.2.3	Resetting disks to Non-RAID	6-8
6.2.4	Exiting the Intel® Rapid Storage Technology enterprise SATA Option ROM utility.....	6-9
6.2.5	Rebuilding the RAID.....	6-9
6.2.6	Setting the Boot array in the BIOS Setup Utility.....	6-11
6.3	Intel® Rapid Storage Technology enterprise (Windows)	6-12
6.3.1	Creating a RAID set.....	6-13
6.3.2	Changing a Volume Type.....	6-15
6.3.3	Deleting a volume	6-16
6.3.4	Preferences.....	6-17

Chapter 7: Driver Installation

7.1	RAID driver installation	7-2
7.1.1	Creating a USB flash drive with RAID driver.....	7-2
7.1.2	Installing the RAID controller driver.....	7-2
7.2	Management applications and utilities installation	7-4
7.3	Running the Support DVD	7-4
7.4	Installing the Intel® Chipset device Software driver	7-7
7.5	Installing the Intel® I210 Gigabit Adapters driver	7-10
7.6	Installing the VGA driver	7-13

Appendix

P10S-E/4L block diagram	A-2
ASUS contact information	A-3

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 the 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-3(B)/NMB-3(B)

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

Le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

CAN ICES-3(B)/NMB-3(B)

Safety information

Electrical Safety

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

Operation Safety

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



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

Lithium-Ion Battery Warning

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

CLASS 1 LASER PRODUCT

Heavy System

CAUTION! This server system is heavy. Ask for assistance when moving or carrying the system.

REACH

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we published the chemical substances in our products at ASUS website at <http://csr.asus.com/english/REACH.htm>.

ASUS Recycling/Takeback Services

ASUS recycling and takeback programs come from our commitment to the highest standards for protecting our environment. We believe in providing solutions for you to be able to responsibly recycle our products, batteries, other components as well as the packaging materials. Please go to <http://csr.asus.com/english/Takeback.htm> for detailed recycling information in different regions.



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



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

Australia statement notice

From 1 January 2012 updated warranties apply to all ASUS products, consistent with the Australian Consumer Law. For the latest product warranty details please visit <https://www.asus.com/support>. Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

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

About this guide

Audience

This user guide is intended for system integrators, and experienced users with at least basic knowledge of configuring a server.

Contents

This guide contains the following parts:

1. Chapter 1: Product Introduction

This chapter describes the general features of the server, including sections on front panel and rear panel specifications.

2. Chapter 2: Hardware Information

This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

3. Chapter 3: Installation Options

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

4. Chapter 4: Motherboard Information

This chapter gives information about the motherboard that comes with the server. This chapter includes the motherboard layout, jumper settings, and connector locations.

5. Chapter 5: BIOS Setup

This chapter tells how to change system settings through the BIOS Setup menus and describes the BIOS parameters.

6. Chapter 6: RAID Configuration

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

7. Chapter 7: Driver Installation

This chapter provides instructions for installing the necessary drivers for different system components.

Conventions

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>+

Command

Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.

Example: At the DOS prompt, type the command line: **format A:/S**

References

Refer to the following sources for additional information, and for product and software updates.

1. **ASUS Server Web-based Management (ASWM) user guide**

This manual tells how to set up and use the proprietary ASUS server management utility.

2. **ASUS websites**

The ASUS websites worldwide provide updated information for all ASUS hardware and software products. Refer to the ASUS contact information.

Product Introduction

1

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

1.1 System package contents

Check your system package for the following items.

Model Name	TS300-E9-PS4
Chassis	ASUS T50D Pedestal / 5U Rackmount Chassis
Motherboard	ASUS P10S-E/4L Server Board
Component	1 x 500W (80Plus) Bronze Single Power Supply
	4 x Hot-swap HDD trays*
	1 x SAS/SATA Backplane (BP4LX12G-35-T50D) with 1 x MiniSAS HD Cable
	1 x Front I/O Board (FPB-TRS8A)
	2 x System Fan (Rear: 1 x 120mm x 38mm; Front: 1 x 80mm x 25mm)
Accessories	1 x Support DVD (including the User Guide)
	1 x ASWM** Enterprise DVD
	1 x Bag of Screws
	1 x AC Power Cable
	1 x CPU Heatsink
Optional Items	1 x ASMB8-iKVM Remote management card
	1 x DVD-ROM / DVD-RW
	1 x Ball Bearing Rail Kit
	1 x 4 bay HDD Module Cage (2nd set)
	1 x ASUS PIKE RAID Card

* Four hot-swap 3.5-inch HDDs are supported by default. Upgrade the optional PIKE card before using eight hot-swap 3.5-inch HDDs.

** ASUS System Web-based Management



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

1.2 Serial number label

Before requesting support from the ASUS Technical Support team, you must take note of the product's serial number containing 12 characters such as xxS0xxxxxxx 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.



1.3 System specifications

The ASUS TS300-E9-PS4 is a Pedestal / 5U Rackmount barebone server system featuring the ASUS P10S-E/4L Server Board. The server supports Intel® LGA1151 Intel® Xeon® E3-1200 Processor v5 plus other latest technologies through the chipsets onboard.

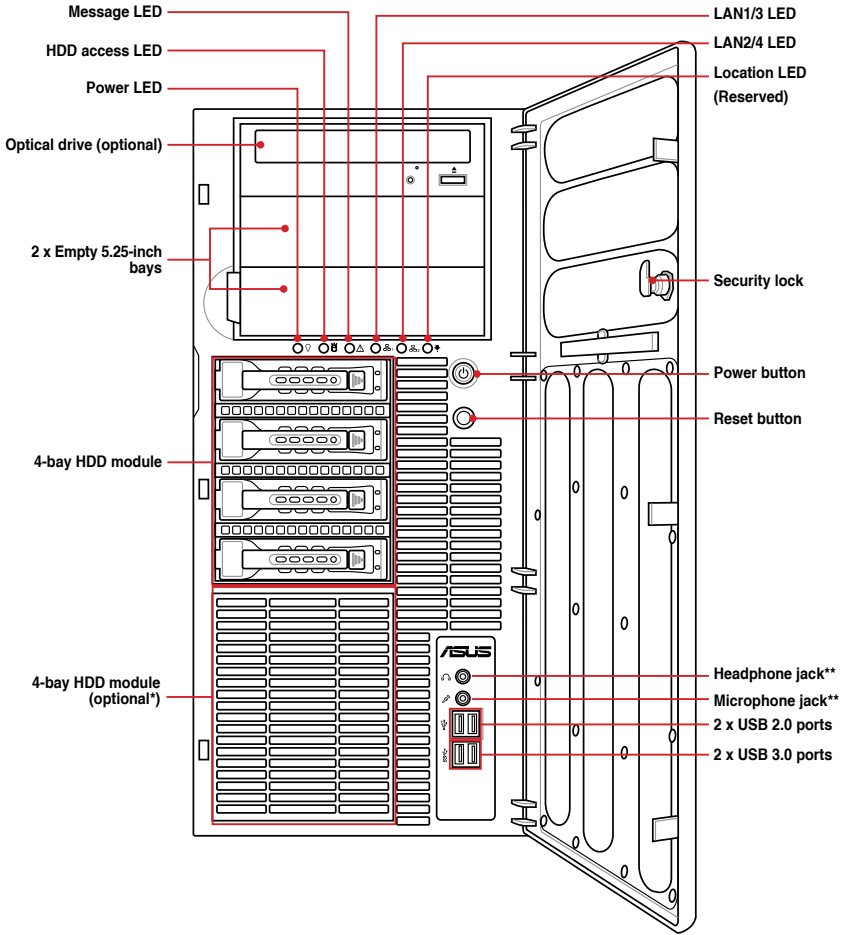
Model Name		TS300-E9-PS4
Processor Support / System Bus		1 * Socket LGA1151 Intel® Xeon® processor E3-1200 v5 product family
Core Logic		Intel® C236 Chipset
Memory	Total Slots	4 (2-Channel)
	Capacity	Maximum up to 64GB (UDIMM)
	Memory Type	DDR4 2133 ECC/non-ECC UDIMM Refer to www.asus.com for the latest memory AVL update.
	Memory Size	16GB, 8GB, 4GB (UDIMM) Refer to www.asus.com for the latest memory AVL update.
Expansion Slots (follow SSI Location #)	Total PCI/PCI-E Slots	4
	Slot Type	1 x PCI-E x16 (Gen3 x16 link) + 1 x PCI-E x8 (Gen3 x4 link) + 1 x PCI + 1 x MIO Or 1 x PCI-E x16 (Gen3 x8 link) + 1 x PCI-E x8 (Gen3 x8 link) + 1 x PCI-E x8 (Gen3 x4 link) + 1 x PCI + 1 x MIO
Storage	SATA Controller	Intel® C236: 8 x SATA 6Gb/s ports (4 by miniSAS HD) with 2 x M.2 (NGFF 2280/2260/2242, PCIe or SATA signal)* Intel® RSTe (For Windows and Linux) (Support software RAID 0, 1, 10 & 5) * Gray SATA port will disable when M.2 is SATA signal
	SAS Controller	RAID card (optional): ASUS PIKE II 3008-8i 8-port SAS 12G RAID card ASUS PIKE II 3108-8i 8-port SAS 12G HW RAID card
HDD Bays	I = internal A or S = hot-swappable	4 x Hot-swap 3.5" HDD Bays Optional (additional 4 x HDD bays)
Networking	LAN	4 x Intel® I210AT + 1 x Mgmt LAN
Graphic	VGA	Aspeed AST2400 32MB
Auxiliary Storage Device Bay (Floppy / Optical Drive) (optional)		1 x 5.25" media bay (Options: No ODD/DVD-RW)

(continued on the next page)

Model Name		TS300-E9-PS4
Front I/O Ports		2 x USB 3.0 ports 2 x USB 2.0 ports 1 x Audio out port (with optional MIO card) 1 x MIC in port (with optional MIO card) 1 x Power Button 1 x Reset Button
Rear I/O Ports		4 x RJ-45 ports 2 x USB 3.0 ports 2 x USB 2.0 ports 2 x internal USB 3.0 connector (Type A USB socket) 1 x VGA port 1 x PS/2 keyboard/mouse port 1 x RJ-45 ports (One for ASMB8-iKVM)(Optional)
Switch/LED		Front LED: 1 x Power LED 1 x Location LED 1 x HDD Access LED 1 x Message LED LAN 1-4 LED
OS Support		Windows® Server 2012 R2 Windows® Server 2012 RedHat® Enterprise Linux SuSE® Linux Enterprise Server CentOS VMware Citrix XenServer * Support versions are subject to change without notice. Refer to www.asus.com for updates.
Management Solution	Software	ASWM Enterprise
	Out of Band Remote Management	Optional ASMB8-iKVM for KVM-over-IP support
Dimensions (HH x WW x DD)		455mm x 217.5mm x 545mm
Net Weight Kg (CPU, DRAM & HDD not included)		15.5 Kg
Power Supply and Rating		Single 500W 80 PLUS Bronze Power Supply (100-240V, 10A-6A, 50-60Hz, Class I)
Environment		Operation temperature: 10° ~ 35° Non operation temperature: -40° ~ 70° Non operation humidity: 20% ~ 90% (Non condensing)

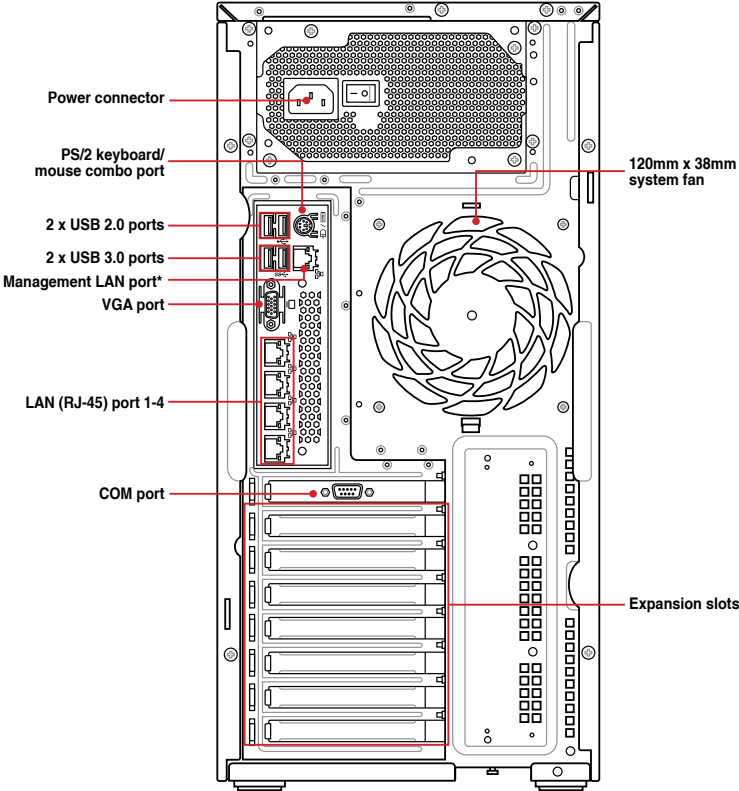
*Specifications are subject to change without notice.

1.4 Front panel features



- Refer to the **1.7.1 Front panel LEDs** section for the LED descriptions.
- * Upgrade the optional PIKE card before using eight hot-swap 3.5-inch HDDs.
- ** The function of front panel audio I/O ports is available only when the MIO card is installed.

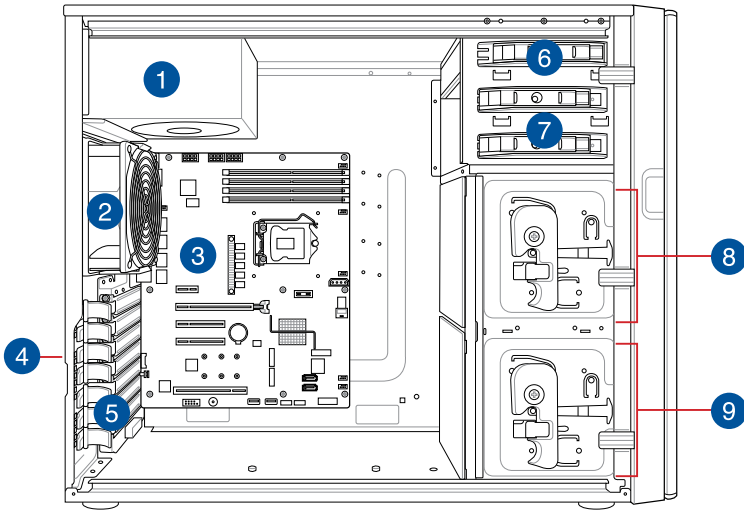
1.5 Rear panel features



* This port is for ASUS ASMB8-iKVM controller and for technicians only.

1.6 Internal features

The barebone server includes the basic components as shown.



1. 500W 80 PLUS Bronze Power Supply
2. 120mm x 38mm system fan
3. ASUS P10S-E/4L Server Board
4. Chassis intrusion switch
5. Expansion card locks
6. Optical drive (optional)
7. 2 x 5.25-inch drive bays
8. 4-bay HDD module (First set with backplane)
9. 4-bay HDD module (Second set with backplane) (optional)



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

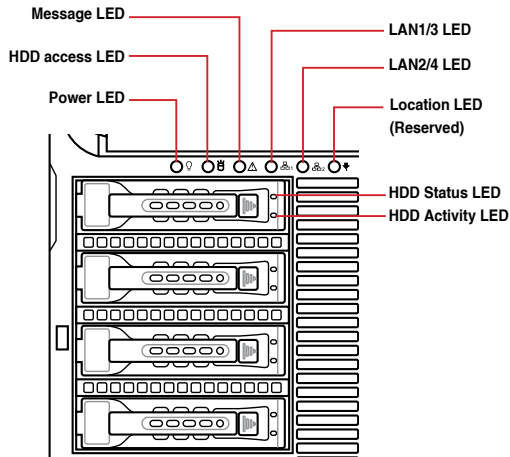


The barebone server does not include a floppy disk drive. Connect a USB floppy disk drive to any of the USB ports on the front or rear panel if you need to use a floppy disk.

WARNING
HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY

1.7 LED information

1.7.1 Front panel LEDs

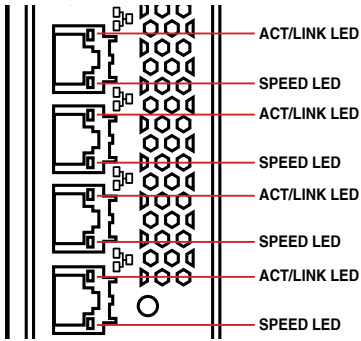


LED	Icon	Display status	Description
Power LED		ON	System power ON
HDD Access LED		OFF Blinking	No activity Read/write data into the HDD
Message LED		OFF ON	System is normal; no incoming event A hardware temperature overheat is detected. Use ASWM to check the abnormal status.
HDD Status LED		Green Red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



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

1.7.2 LAN (RJ-45) LEDs



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

Hardware Information

2

This chapter lists the hardware setup procedures that you have to perform when installing or removing system components.

2.1 Chassis cover

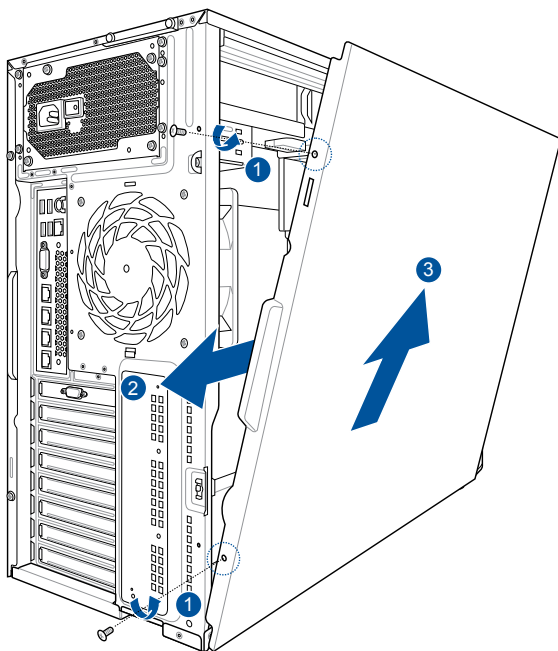
2.1.1 Removing the side cover



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

To remove the side cover:

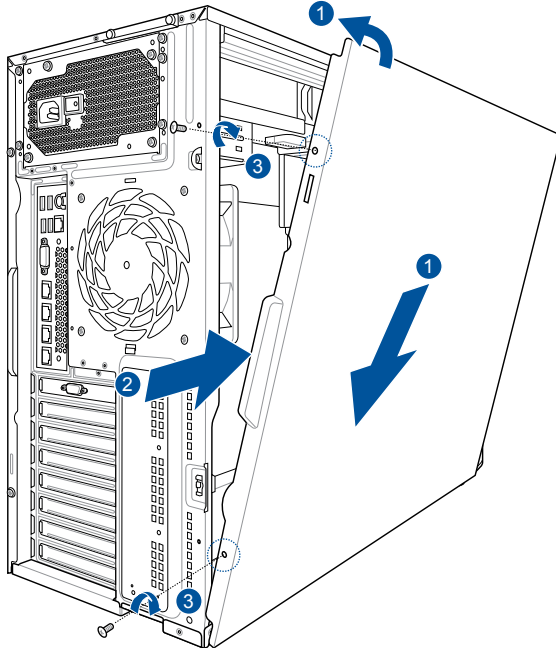
1. Remove the two screws that secure the side cover.
2. Slide the side cover for about half an inch toward the rear until it is disengaged from the chassis.
3. Carefully lift the side cover and set it aside.



2.1.2 Reinstalling the side cover

To reinstall the side cover:

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



2.2 Central Processing Unit (CPU)

The motherboard comes with two surface mount LGA 1151 sockets designed for the Intel® Xeon E3-1200 v5 family processor.

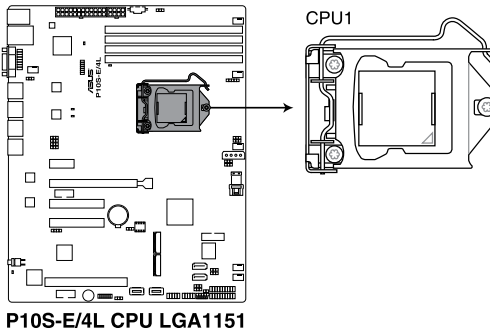


- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA 1151 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.

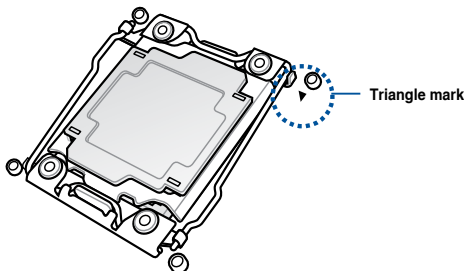
2.2.1 Installing the CPU

To install a CPU:

1. Locate the CPU socket on the motherboard.



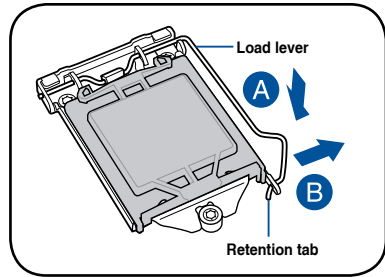
Before installing the CPU, ensure that the socket box is facing toward you and the triangle mark is on the top-right position.



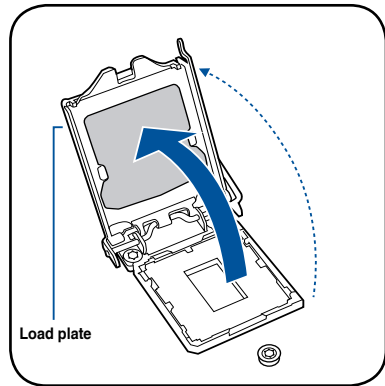
2. Press the load lever with your thumb (A), then move it to the right (B) until it is released from the retention tab.



Do not remove the PnP cap yet from the CPU socket. Doing so may bend the pins of the socket.



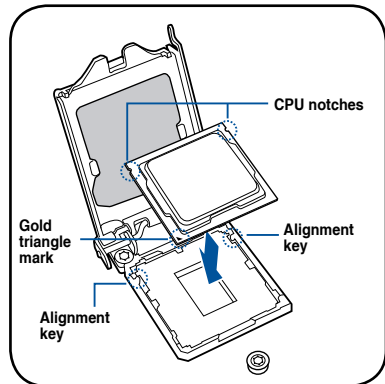
3. Lift the load lever until the load plate is completely lifted.



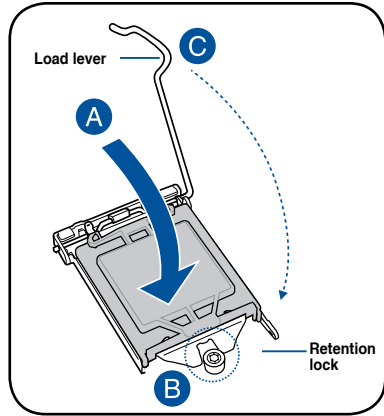
4. Position the CPU above the socket, ensuring that the gold triangle mark is on the bottom-left corner of the socket, then fit the CPU notches to the socket's alignment keys.



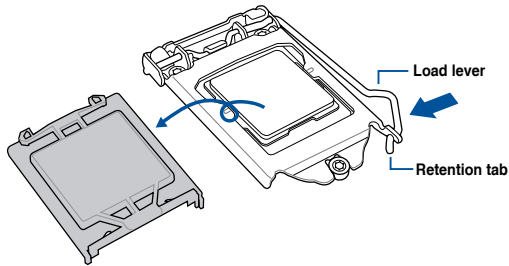
The CPU fits in only one orientation. DO NOT force the CPU into the socket to prevent bending the pins on the socket and damaging the CPU.



5. Close the load plate (A), ensuring that the front edge of the load plate slides under the retention lock (B) then push down the load lever (C).



6. Insert the load lever under the retention tab to remove the PnP cap from the CPU socket.



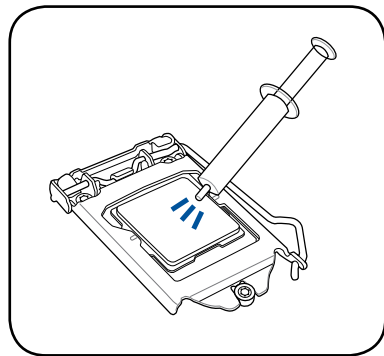
7. Apply some Thermal Interface Material to the exposed area of the CPU that the heatsink will be in contact with, ensuring that it is evenly spread in a thin layer.



Some heatsinks come with pre-applied Thermal Interface Material. If so, skip this step.



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



2.2.2 Installing the CPU heatsink

The Intel® LGA1151 processor requires a specially designed CPU heatsink to ensure optimum thermal condition and performance.



- When you buy a boxed Intel® processor, a specially designed CPU heatsink or a CPU heatsink with a CPU fan assembly is included depending on the package. If you buy a CPU separately, ensure that you use only Intel® certified multi-directional CPU heatsink or CPU heatsink with CPU fan.
- Use an LGA1151-compatible CPU heatsink and CPU fan assembly only. The LGA1151 socket is incompatible with the LGA775 and LGA1366 sockets in size and dimension.



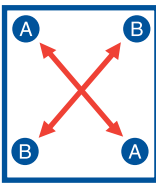
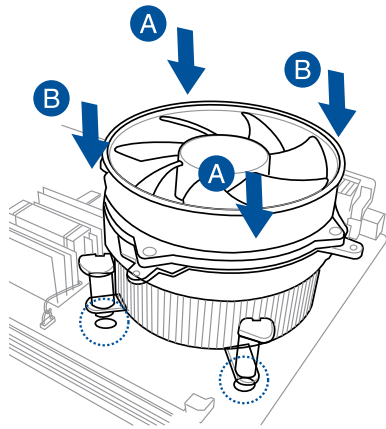
If you purchased a separate CPU heatsink and fan assembly, ensure that the Thermal Interface Material is properly applied to the CPU heatsink or CPU before you install the heatsink and fan assembly.



Ensure that you have installed the motherboard to the chassis before you install the CPU fan and heatsink assembly.

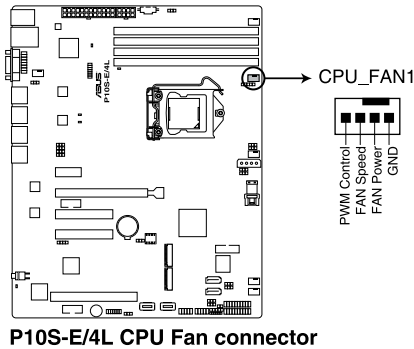
To install the CPU heatsink and fan:

1. Place the heatsink on top of the installed CPU, making sure that the four fasteners match the holes on the motherboard.
2. Push down two fasteners at a time in a diagonal sequence to secure the heatsink and fan assembly in place.



Orient the heatsink and fan assembly such that the CPU fan cable is closest to the CPU fan connector.

3. Connect the CPU fan cable to the connector on the motherboard labeled CPU_FAN1.

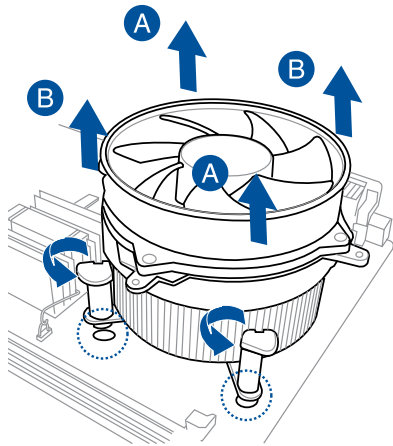
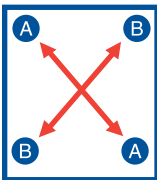


DO NOT forget to connect the CPU fan connector! Hardware monitoring errors can occur if you fail to plug this connector.

2.2.3 Uninstalling the CPU heatsink and fan

To uninstall the CPU fan and fan:

1. Disconnect the CPU fan cable from the connector on the motherboard.
2. Rotate each fastener counterclockwise.
3. Pull up two fasteners at a time in a diagonal sequence to disengage the heatsink and fan assembly from the motherboard.



4. Carefully remove the heatsink and fan assembly from the motherboard.

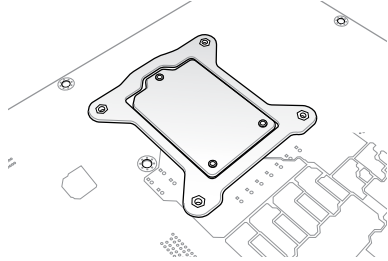
2.2.4 Installing the CPU heatsink in rack

The Intel® LGA1151 processor requires a specially designed heatsink to ensure optimum thermal condition and performance.

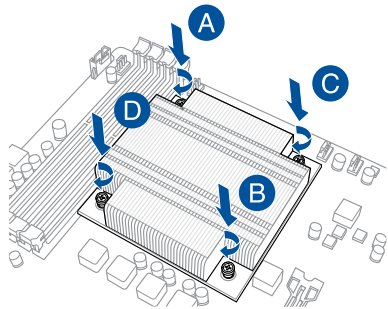
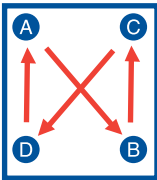


- Ensure that you use qualified heatsink assembly only.
- Ensure that you have applied the thermal interface material to the top of the CPU before installing the heatsink and fan.

1. Peel off the sticker on the heatsink metal plate and affix the plate to the back of the motherboard, matching the standoffs to the heatsink screw holes.



2. Use a Phillips screwdriver to tighten the four heatsink screws using the recommended sequence below.



- Ensure that the heatsink is not skewed or tilted, otherwise the CPU will overheat.
- Do not overtighten the screws. Doing so can damage the CPU.

2.3 System memory

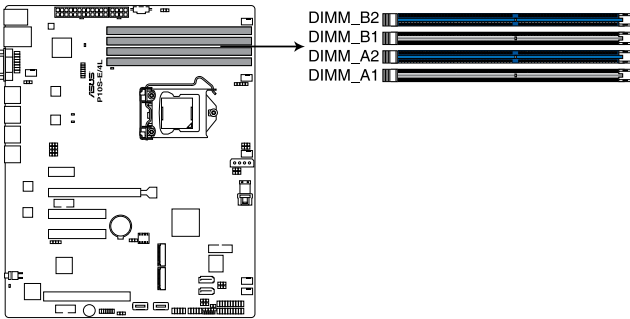
2.3.1 Overview

The motherboard comes with four Double Data Rate 4 (DDR4) Dual Inline Memory Modules (DIMM) sockets.



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

The figure illustrates the location of the DDR4 DIMM sockets:



P10S-E/4L 288-pin DDR4 DIMM sockets

2.3.2 Memory configurations

You may install Unbuffered DDR4 DIMMs into the DIMM sockets using the memory configurations in this section.

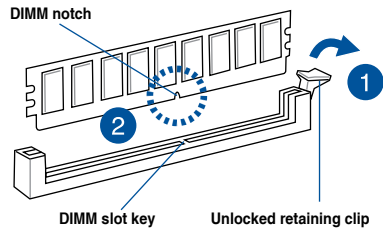
UDIMM				
DIMM Slot Per Channel	DIMM Populated per Channel	DIMM Type	Speed	Rank per DIMM
2	1	Unbuffered DDR4	2133	Single Rank, Dual Rank
2	2	Unbuffered DDR4	2133	Single Rank, Dual Rank



- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.
- Start installing the DIMMs in slots A2 and B2 (Blue).

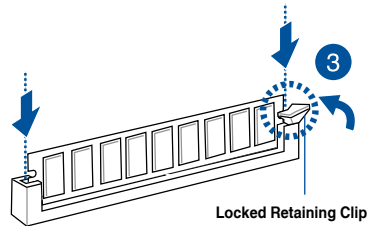
2.3.3 Installing a DIMM on a single clip DIMM socket

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



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

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



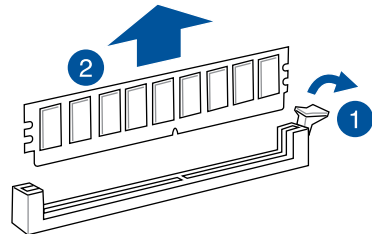
Always insert the DIMM into the socket **VERTICALLY** to prevent DIMM notch damage.



- To install two or more DIMMs, refer to the user guide bundled with the motherboard package.
- Refer to the user guide for qualified vendor lists of the memory modules.

2.3.4 Removing a DIMM from a single clip DIMM socket

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



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

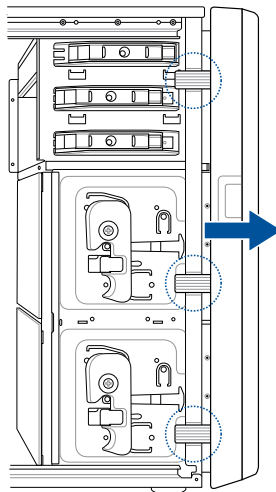
2.4 Front panel assembly

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

2.4.1 Removing the front panel assembly

To remove the front panel assembly

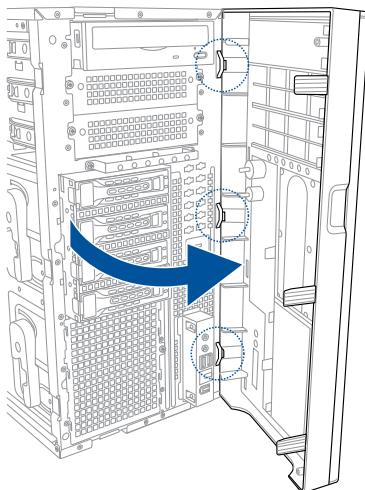
1. Locate the three hooked tabs on the chassis side rail.
2. Shift the hooked tabs and take off the front bezel.



2.4.2 Reinstalling the front panel assembly

To reinstall the front panel assembly:

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



2.5 SATA/SAS hard disk drives

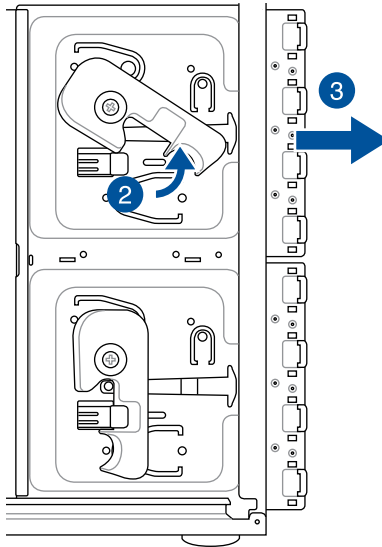
The system comes with two sets of hard disk drive modules. The first set is defaulted and the second set is optional. Each hard disk drive module, including externally removable trays for mounting four hot-swap SATA/SAS hard disk drives, allows you to access the drive trays by simply opening the front bezel.



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

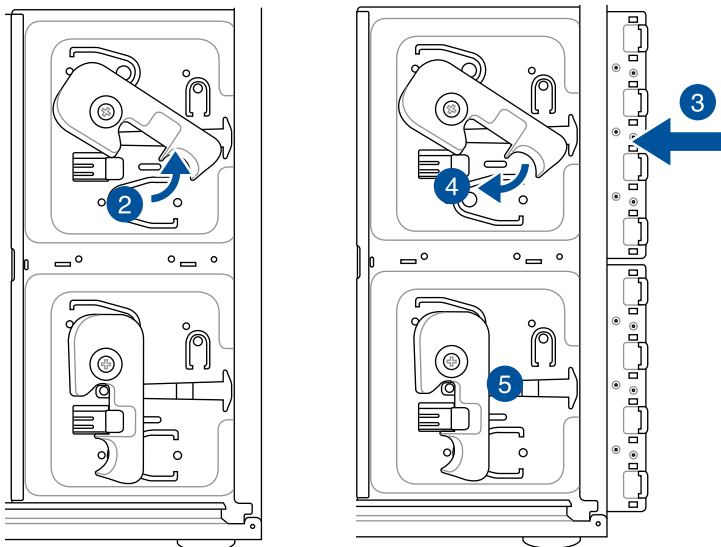
2.5.1 Removing the HDD module cage

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



2.5.2 Installing the HDD module cage

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



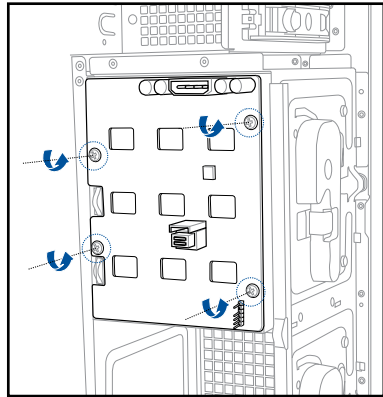
The second set of HDD module is optional.

2.5.3 Removing the backplane

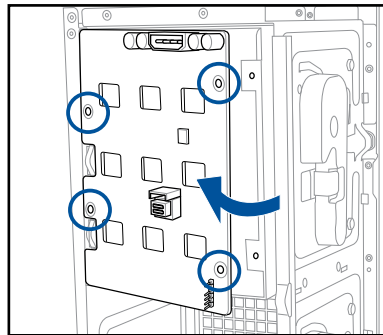


DO NOT remove the backplane unless necessary!

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

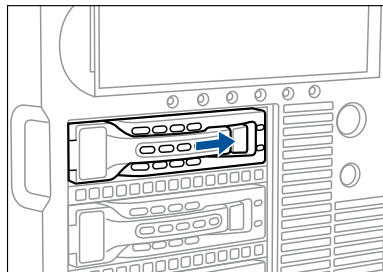


4. Firmly hold the backplane, and turn it in the direction of the arrow.
5. Remove the backplane from the module.

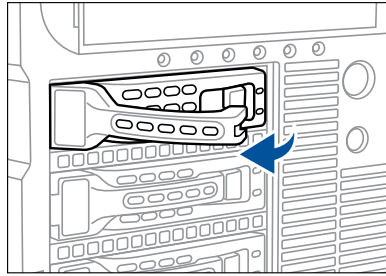


2.5.4 Installing a hot-swap SATA/SAS hard disk drive

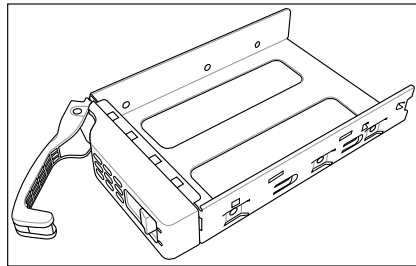
1. Release a drive tray by pushing the spring lock to the right, and then pulling the tray lever outward. The drive tray ejects slightly after you pull out the lever.



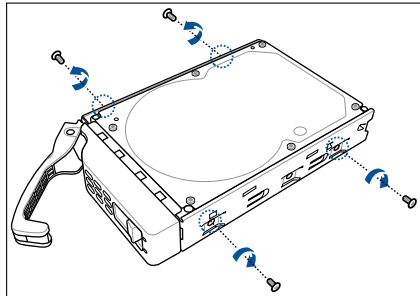
2. Firmly hold the tray lever and pull the drive tray out of the bay.



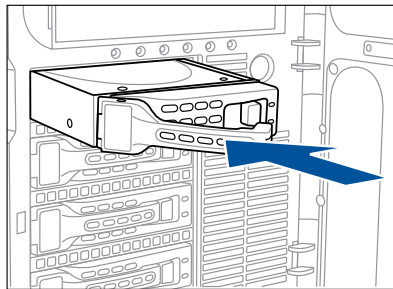
3. Take note of the drive tray holes. Each side has three holes to fit different types of hard disk drives. Use two screws on each side to secure the hard disk drive.



4. Place a SATA/SAS hard disk drive on the tray, and then secure it with four screws.

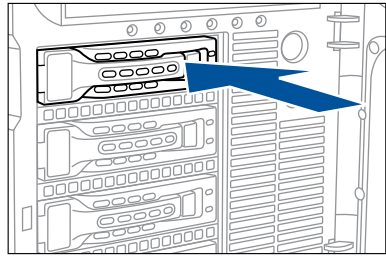


5. Carefully insert the drive tray and push it all the way to the depth of the bay until just a small fraction of the tray edge protrudes.



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

6. Push the tray lever until it clicks, and secures the drive tray in place. The drive tray is correctly placed when its front edge aligns with the bay edge.
7. Repeat steps 1 to 6 if you wish to install a second SATA/SAS drive.

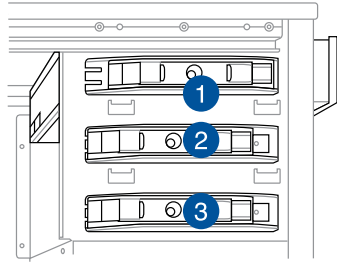


2.6 5.25-inch drives



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

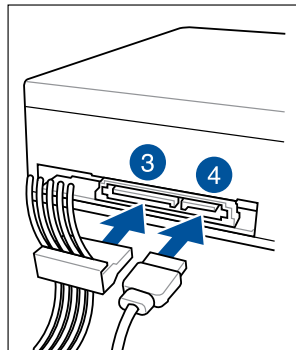
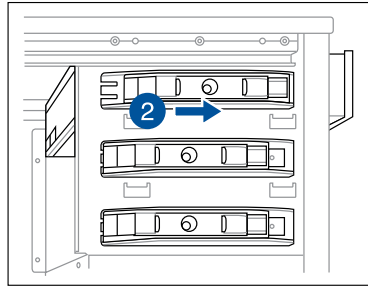
The system comes with three 5.25-inch drive bays located on the upper front part of the chassis. An optional optical drive occupies the uppermost bay (labeled 1). The lower bays (labeled 2 and 3) are available for additional 5.25-inch drives or 5.25-inch to 3.5-inch hard drive adapter for installing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



You must remove the front panel assembly before installing a 5.25-inch drive.

2.6.1 Installing a 5.25-inch drive

1. Unscrew and remove the metal cover of the bay where you want to install the 5.25-inch drive.
2. Insert the drive into the bay and slide the bay lock to the right until it clicks in place.
3. Connect the SATA cable to the SATA connector on the back of the drive.
4. Connect the 4-pin power connector from the power supply to the power connector on the back of the drive.



2.7 Expansion slots

Remove the metal slot cover before installing an expansion card.



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

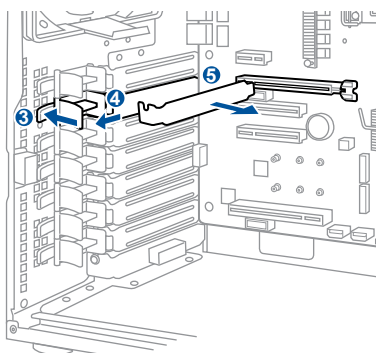
2.7.1 Installing an expansion card

1. Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.
2. Remove the side chassis cover. Lay the system on its side on a flat, stable surface.

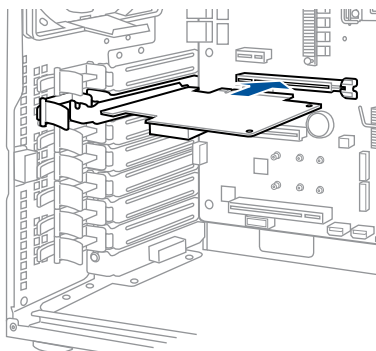
3. Push back the expansion card lock latch.

4. Pull the latch of the expansion card lock to release the metal slot cover.

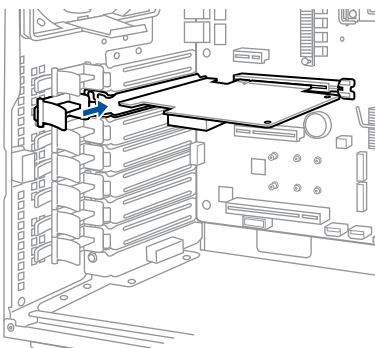
5. Remove the metal slot cover opposite the slot where you wish to install an expansion card.



6. Align the PCI card's golden contact points with the slot, and then press firmly until the card is completely seated on the slot.



7. Restore the expansion card lock to its original position. A light click indicates the card is locked in place.

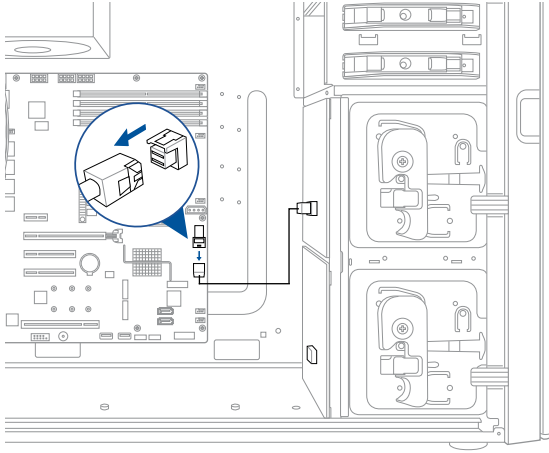


2.7.2 Installing an ASUS PIKE II card

You can install an ASUS PIKE II card on the provided PCI-E slot onboard.

To install an ASUS PIKE II card:

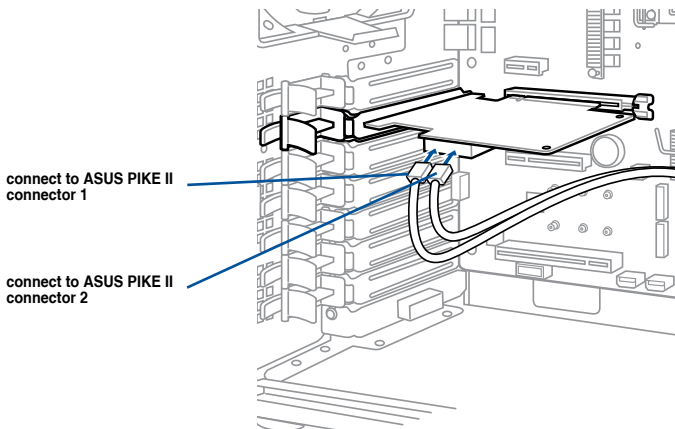
1. Remove the default cable from the motherboard.



2. Follow steps 3 to 7 in section 2.7.1 **Installing an expansion card** to install your ASUS PIKE II card.
3. Connect the two mini-SAS HD cables to the ASUS PIKE II card.



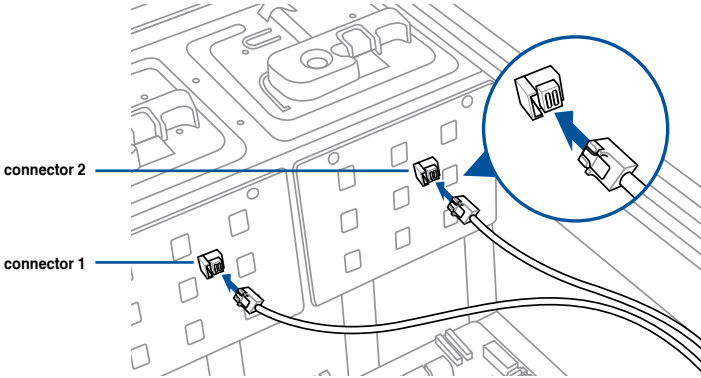
Connect only one (1) mini-SAS HD cable to ASUS PIKE II connector 1 for 4 HDD bays.



4. Connect connector 1 on the ASUS PIKE II card to connector 1 on the backplane and connector 2 on the ASUS PIKE II card to connector 2 on the backplane using two mini-SAS HD cables.



Connect only one (1) mini-SAS HD cable to ASUS PIKE II connector 1 for 4 HDD bays.



2.7.3 Configuring an expansion card

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

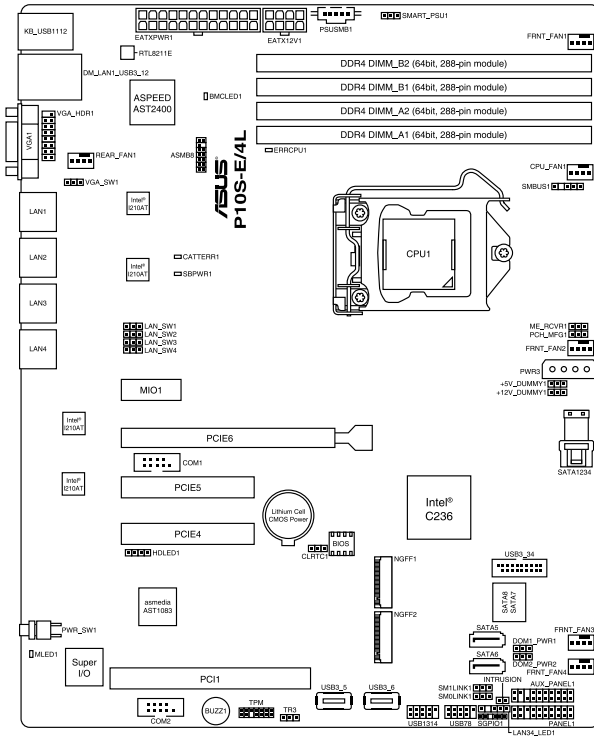
1. Turn on the system and change the necessary BIOS settings, if any. See Chapter 5 for information on BIOS setup.
2. Assign an IRQ to the card. Refer to the following tables.
3. Install the software drivers for the expansion card.

Standard Interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	-	Programmable Interrupt
3*	11	Communications Port (COM2)
4*	12	Communications Port (COM1)
5*	13	--
6	14	Floppy Disk Controller
7*	15	--
8	3	System CMOS/Real Time Clock
9*	4	ACPI Mode when used
10*	5	IRQ Holder for PCI Steering
11*	6	IRQ Holder for PCI Steering
12*	7	PS/2 Compatible Mouse Port
13	8	Numeric Data Processor
14*	9	Primary IDE Channel
15*	10	Secondary IDE Channel

* These IRQs are usually available for PCI devices.

Expansion slots



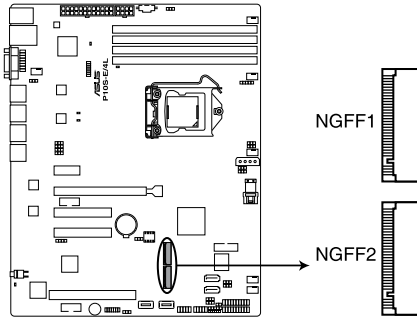
MIO1	1 x MIO slot
PCIE6	1 x PCI-E x16 (x16 Gen3 link) (Auto switch to x8 link if slot 5 is occupied)
PCIE5	1 x PCI-E x8 (x8 Gen3 link)
PCIE4	1 x PCI-E x8 (x4 Gen3 link)
PCI1	1 x PCI 32 bit / 33 MHz

2.7.4 Installing an M.2 expansion card

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

To install an M.2 expansion card:

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

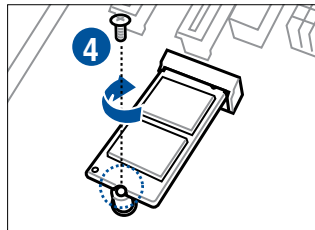
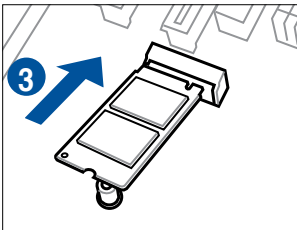


P10S-E/4L NGFF1 & NGFF2 connectors



The illustrations below vary with models. The installation steps are the same.

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

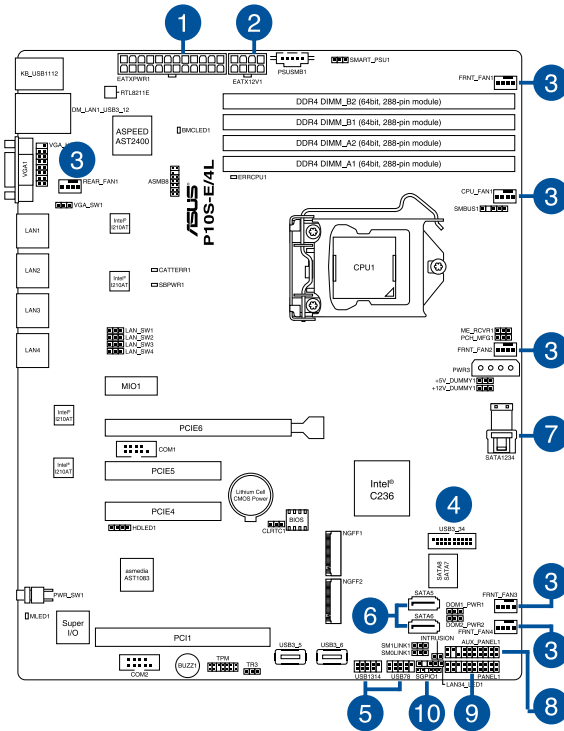


2.8 Cable connections



- The bundled system cables are pre-connected before shipment. You do not need to disconnect these cables unless you will remove pre-installed components to install additional devices.
- Refer to Chapter 4 for detailed information on the connectors.

2.8.1 Motherboard connections



Standard cables connected to the motherboard

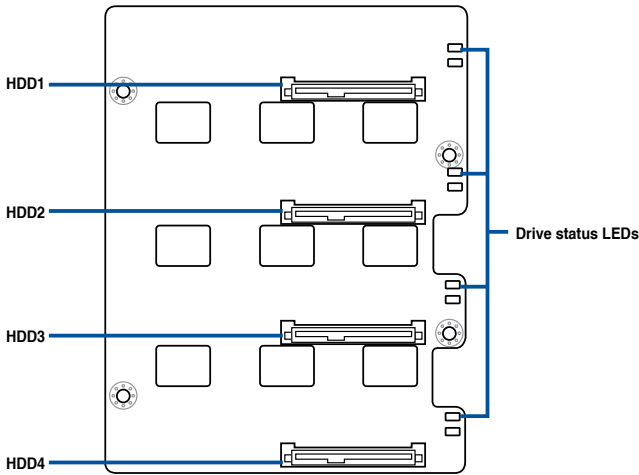
1. 24-pin ATX power connector (from power supply to motherboard)
2. 8-pin 12V power connector (from power supply to motherboard)
3. System fan connector (from system fan to motherboard)
4. USB 3.0 connector (from motherboard to front I/O board)
5. USB 2.0 connector (from motherboard to front I/O board)
6. SATA connector (from motherboard to front 3.5-inch SATA/SAS backplane)
7. Mini-SAS HD connector (from motherboard to SATA backplane)
8. System auxiliary panel connector (from motherboard to front I/O board)
9. System panel connector (from motherboard to front I/O board)
10. Serial General Purpose Input/Output connectors

2.8.2 SATA/SAS backplane cabling

The system comes with a pre-installed SATA/SAS backplane. The SATA/SAS backplane has four 22-pin SATA/SAS connectors to support Serial ATA hard disk drives and SAS hard disk drives. The backplane design incorporates a hot-swap feature to allow easy connection or removal of SATA/SAS hard disks. The LEDs on the backplane connect to the front panel LEDs to indicate HDD status. See section 1.7 **LED information** for details.

Front side

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



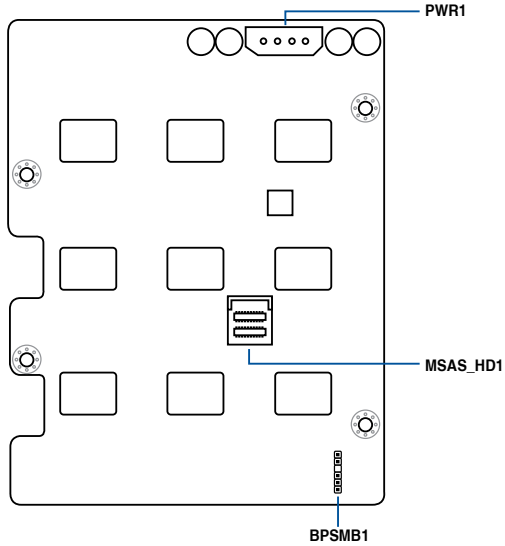
Each SATA/SAS connector is labeled (HDD1, HDD2, HDD3, HDD4) so you can easily determine their counterpart connectors at the back side of the backplane. Refer to the table for reference.



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

Back side

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



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

2.9 Removable components

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

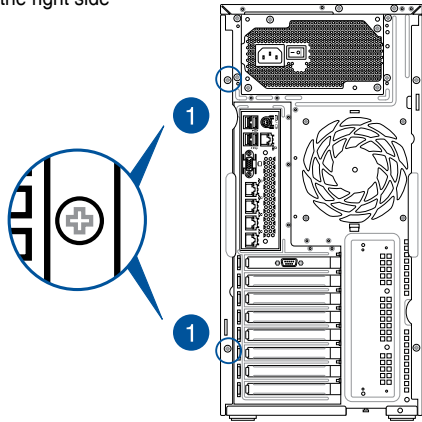
1. System fans (front and rear)
2. Chassis footpads

2.9.1 System fans

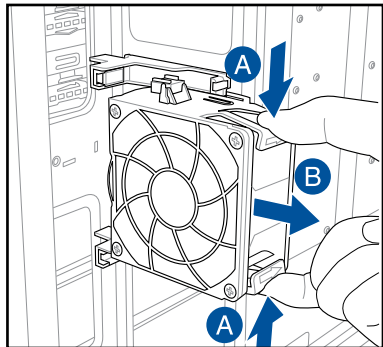
Removing the front system fan

To remove the front system fan:

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



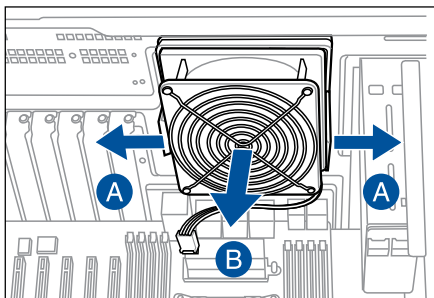
2. Locate the front system fan near the 5.25-inch drive bays.
3. Squeeze the front system fan latches (A) and pull out the front system fan (B), as shown in the right figure.
4. Follow the previous instructions in reverse to reinstall the front system fan.



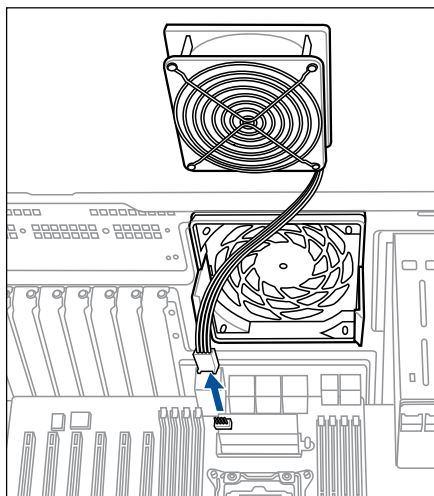
Removing the rear system fan

To remove the rear system fan:

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



2. Unplug the system fan cable from the REAR_FAN1 connector on the motherboard.
3. Carefully remove the system fan.



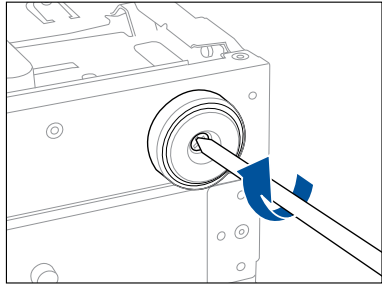
Follow the previous instructions in reverse to reinstall the rear system fan.

2.9.2 Chassis footpads

The barebone server system is shipped with four footpads attached to the bottom of the chassis for stability. You need to remove these footpads if you wish to install the system to a rack. Refer to Chapter 3: Installation Options of this user guide, and to the “Rackmount Kit” user guide for instructions.

To remove the footpads:

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



Installation Options

3

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

3.1 Preparing the system for rack mounting



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

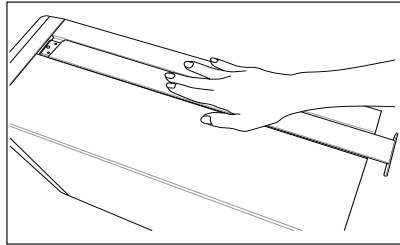
Removing the footpads



Refer to section 2.9.2 Chassis footpads for instructions on removing the footpads.

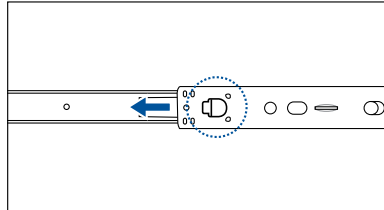
Removing the top cover

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

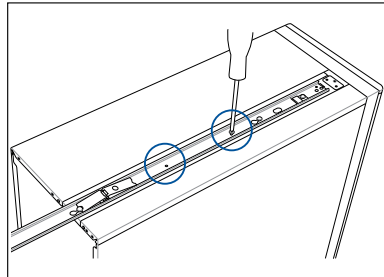


3.2 Attaching the inner rail to the server

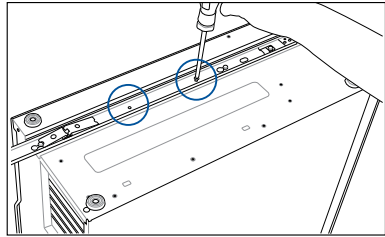
1. Press the lock on side of the rail and slide the inner rail out from the rackmount rail kit.



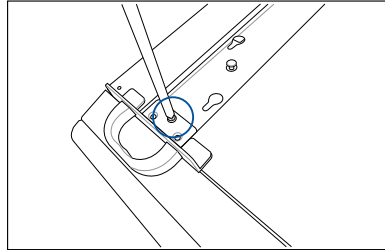
2. Slide the inner rail into the rail on top of the chassis.
3. Align the screw holes on the inner rail and the chassis top, and then secure the inner rail to the chassis top with screws.



4. Repeat the previous steps to secure the other inner rail to the bottom of the chassis with screws.



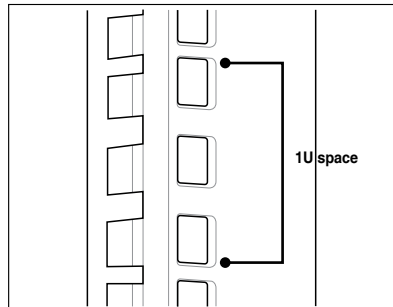
5. Use three screws to secure the side hooks to both rails.



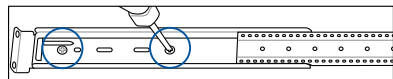
3.3 Attaching the rails to the rack

To attach the rails to the rack:

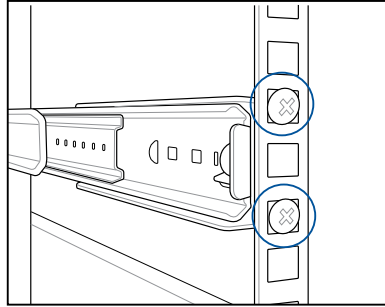
1. Select one unit of space (1U) on the rack where you wish to install the server.



2. Drive in two screws on the rack rails.



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

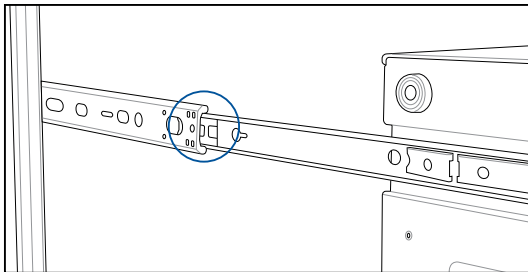


5. Find the rear 1U space that corresponds to the front 1U space where you attached the rail. Drive in two screws on the outer holes to secure the rear end.
6. From the rack front, find the corresponding 1U space for the second rail pair.
7. Repeat steps 3–6 to attach the second rail pair.

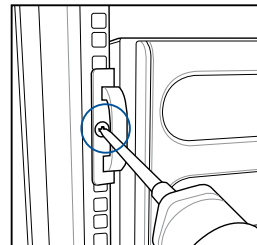
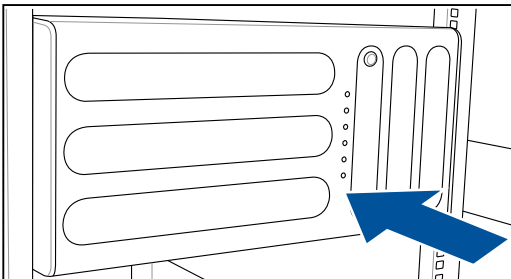
3.4 Mounting the server to the rack

To mount the server to the rack:

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



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

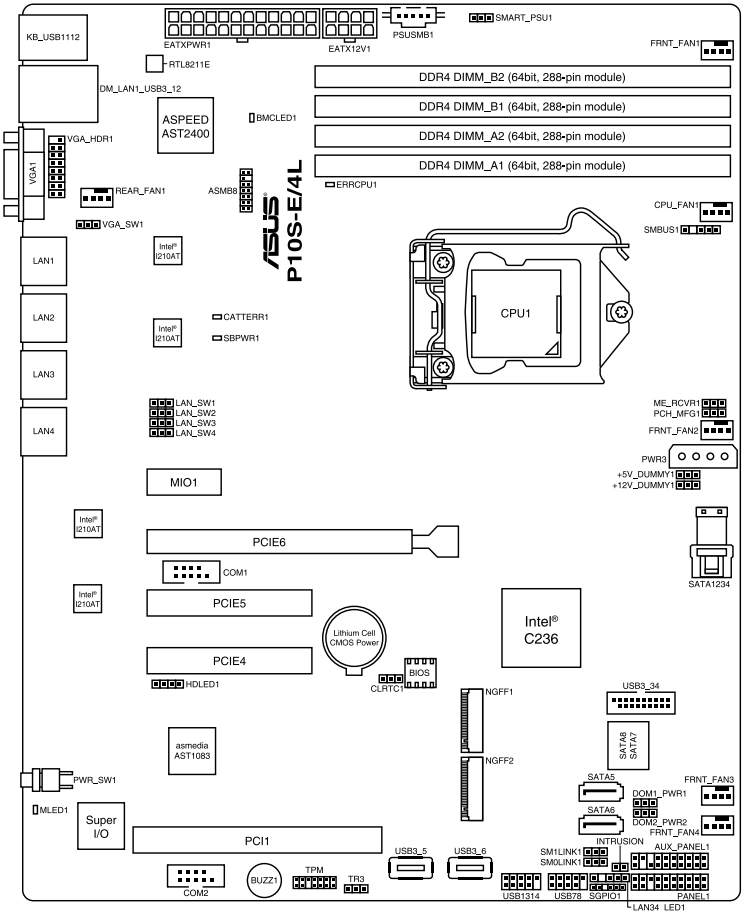


Motherboard Information

4

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

4.1 Motherboard layout



Layout contents

Onboard LEDs		Page
1.	Standby Power LED (SBPWR1)	4-5
2.	Baseboard Management Controller LED (BMCLED1)	4-5
3.	CPU Warning LED (ERRCPU1)	4-6
4.	Message LED (MLED1)	4-6
5.	CATT ERR LED (CATTERR1)	4-7

Jumpers		Page
1.	Clear RTC RAM (3-pin CLRTC1)	4-8
2.	VGA controller setting (3-pin VGA_SW1)	4-9
3.	LAN controller setting (3-pin LAN_SW1-4)	4-9
4.	ME firmware force recovery setting (3-pin ME_RCVR1)	4-10
5.	PCH_MFG1 setting (3-pin PCH_MFG1)	4-10
6.	SATA DOM power setting (3-pin DOM_PWR1-2)	4-11
7.	Smart Ride Through setting (3-pin SMART_PSU1)	4-11

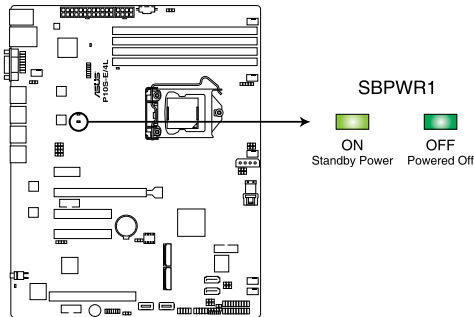
Rear panel connectors		Page
1.	PS/2 keyboard/mouse port	4-12
2.	RJ-45 port for iKVM	4-12
3.	Video Graphics Adapter port	4-12
4.	RJ-45 ports for LAN	4-12
5.	Power-on Button	4-12
6.	Message LED	4-12
7.	USB 2.0 ports 1 and 2	4-12
8.	USB 3.0 ports 1 and 2	4-12

Internal connectors		Page
1.	Serial ATA 6 Gbps connectors (7-pin SATA 6 Gbps_5-6 connector [Gray], 7-8 connector [Light Blue])	4-15
2.	Mini-SAS HD connector (SATA1234)	4-15
3.	Hard disk activity LED connector (4-pin HDLED1)	4-16
4.	USB 2.0 connector (10-1 pin USB1314, USB78)	4-16
5.	USB 3.0 connector (20-1 pin USB3_34; A-Type USB3_5, USB3_6)	4-17
6.	CPU, front and rear fan connectors (4-pin FRNT_FAN1-4, REAR_FAN1, CPU_FAN1)	4-17
7.	Serial General Purpose Input/Output connector (6-1 pin SGPIO1)	4-18
8.	Serial port connectors (10-1 pin COM1/COM2)	4-18
9.	Power Supply SMBus connector (5-pin PSUSMB1)	4-19
10.	Trusted Platform Module connector (14-1 pin TPM)	4-19
11.	SATA DOM power connector (4-pin PWR3)	4-20
12.	LAN34_LED connector (5-1 pin LAN34_LED1)	4-20
13.	VGA connector (16-1 pin VGA_HDR1)	4-21
14.	ATX power connectors (24-pin EATXPWR1, 8-pin EATX12V1)	4-21
15.	System panel connector (20-1 pin PANEL1)	4-22
16.	Auxiliary panel connector (20-2 pin AUX_PANEL1)	4-23
17.	M.2 (NGFF) card connector (NGFF1 & NGFF2)	4-24
18.	System Management Bus (SMBUS) connector (5-1 pin SMBUS1)	4-24
19.	Chassis intrusion connector (2-pin INTRUSION1)	4-25

4.2 Onboard LEDs

1. Standby Power LED (SBPWR1)

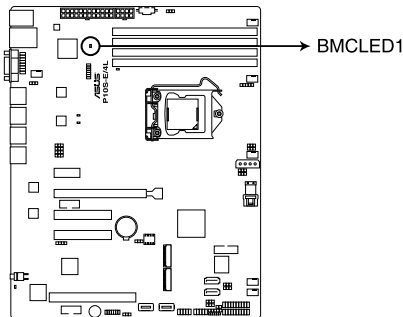
The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration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



P10S-E/4L Standby Power LED

2. Baseboard Management Controller LED (BMCLED1)

The green heartbeat LED blinks per second to indicate that the ASMB8 is working normally. The BMC LED works with the ASUS ASMB8 management device and indicates its initiation status. When the PSU is plugged and the system is OFF, ASUS ASMB8 management device starts system initiation for about one (1) minute. The BMC LED blinks after system initiation finishes.



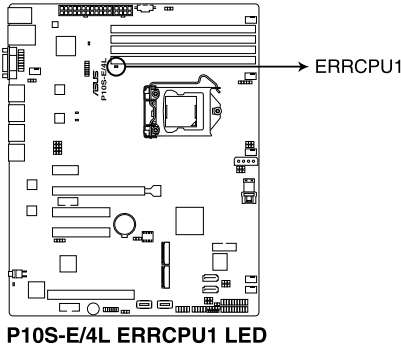
P10S-E/4L BMC LED



- The heartbeat LED functions only when you install the ASUS ASMB8 Management card.
- Everytime after the AC power is replugged, you have to wait for about 60 seconds for the system to power up.

3. CPU Warning LED (ERRCPU1)

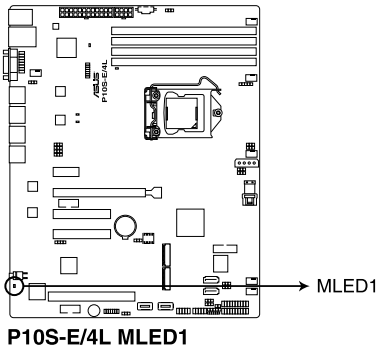
The CPU warning LED lights up to indicate that a CPU error or failure has occurred.



The warning LED functions only when you install the ASUS ASMB8 Management card.

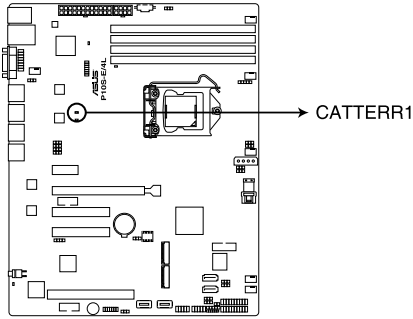
4. Message LED (MLED1)

The Message LED is an onboard LED that lights up to indicate an abnormal event occurrence.



5. CATT ERR LED (CATTERR1)

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



P10S-E/4L CATTERR1 LED

4.3 Jumpers

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:

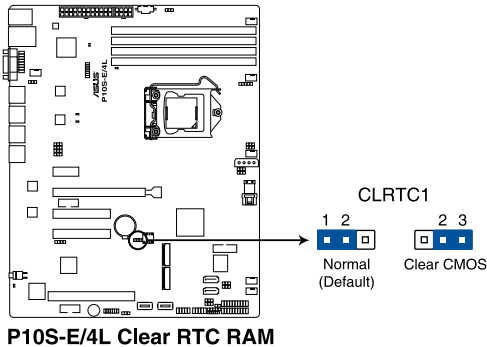
1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from pins 1–2 (default) to pins 2–3. Keep the cap on pins 2–3 for about 5–10 seconds, then move the cap back to pins 1–2.
3. Plug the power cord and turn ON the computer.
4. Hold down the key during the boot process and enter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

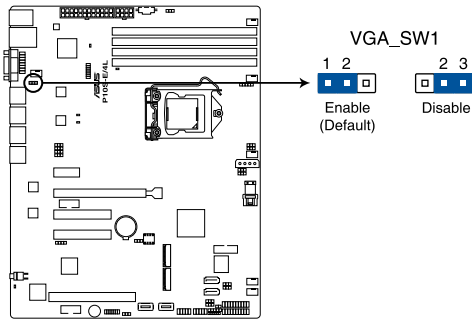


If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.



2. VGA controller setting (3-pin VGA_SW1)

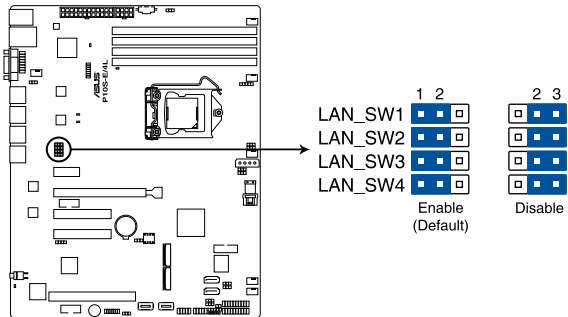
This jumper allows you to enable or disable the onboard VGA controller. Set to pins 1–2 to activate the VGA feature.



P10S-E/4L VGA setting

3. LAN controller setting (3-pin LAN_SW1-4)

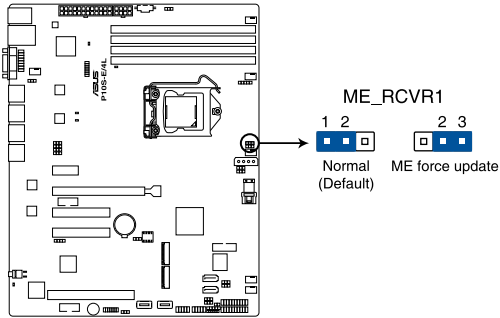
These jumpers allow you to enable or disable the onboard Intel® I210 Gigabit LAN controllers. Set to pins 1-2 to activate the Gigabit LAN feature.



P10S-E/4L LAN setting

4. ME firmware force recovery setting (3-pin ME_RCVR1)

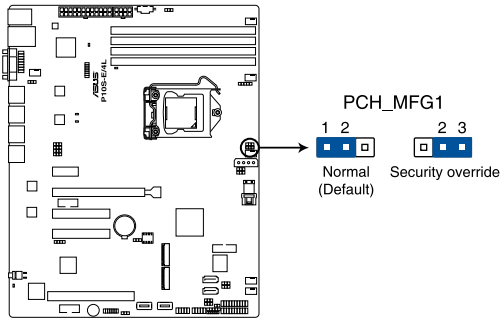
This jumper allows you to force Intel Management Engine (ME) boot from recovery mode when ME become corrupted.



P10S-E/4L ME recovery setting

5. PCH_MFG1 setting (3-pin PCH_MFG1)

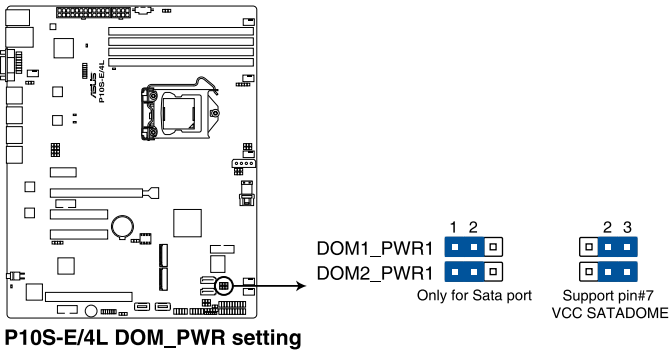
This jumper allows you to update the BIOS ME block select.



P10S-E/4L PCH_MFG setting

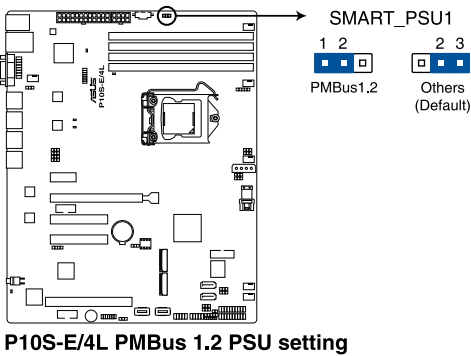
6. SATA DOM power setting (3-pin DOM1_PWR1, DOM2_PWR2)

This jumper allows you to configure the DOM power setting.



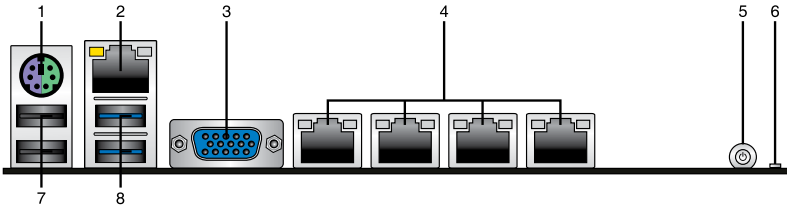
7. Smart Ride Through (SmaRT) setting (3-pin SMART_PSU1)

This jumper allows you to enable or disable the Smart Ride Through (SmaRT) function. This feature is disabled by default. Set to pins 1-2 to enable it. When enabled, SmaRT allows uninterrupted operation of the system during an AC loss event.



4.4 Connectors

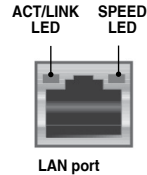
4.4.1 Rear panel connectors



- PS/2 keyboard/mouse port (purple/green):** This port is for a PS/2 keyboard or mouse.
- RJ-45 port for iKVM:** This RJ-45 port functions only when you install ASMB8 management card.
- Video Graphics Adapter port:** This port is for a VGA monitor or other VGA-compatible devices.
- RJ-45 ports for LAN:** These ports allows Gigabit connection to a LAN (Local Area Network) through a network hub. Refer to the table below for the LAN port LED indications.
- Power-on Button:** Press this button to turn on the system.
- Message LED:** The Message LED is an onboard LED that lights up to indicate an abnormal event occurrence.
- USB 2.0 ports 1 and 2:** These two 4-pin USB (Universal Serial Bus) ports are available for connecting USB 2.0 devices.
- USB 3.0 ports 1 and 2:** These two 4-pin USB (Universal Serial Bus) ports are available for connecting USB 3.0 devices.

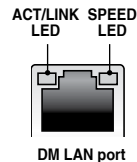
LAN port LED indications

Activity/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
GREEN	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection



Dedicated Management LAN port (DM_LAN1) LED indications

Activity/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
ORANGE	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection



4.4.2 Q-Code table

Action	PHASE	POST CODE	TYPE	DESCRIPTIONz
Security Phase		1	Progress	First post code(POWER_ON_POST_CODE)
		2	Progress	Load BSP microcode(MICROCODE_POST_CODE)
		3	Progress	Perform early platform initialization
		4	Progress	Set cache as ram for PEI phase(CACHE_ENABLED_POST_CODE)
		5	Progress	Establish Stack
		6	Progress	CPU Early init.(CPU_EARLY_INIT_POST_CODE)
Normal boot	PEI(Pre-EFI initialization) phase	10	Progress	PEI Core Entry
		11	Progress	PEI cache as ram CPU initial
		15	Progress	NB initialize before installed memory
		19	Progress	SB initialize before installed memory
		0	MRC Progress	MRC_INITIALIZATION_START
		10	MRC Progress	MRC_CMD_PLOT_2D
		1B	MRC Progress	MRC_FAST_BOOT_PERMITTED
		1C	MRC Progress	MRC_RESTORE_NON_TRAINING
		1D	MRC Progress	MRC_PRINT_INPUT_PARAMS
		1E	MRC Progress	MRC_SET_OVERRIDES_PSPD
		20	MRC Progress	MRC_SPD_PROCESSING
		21	MRC Progress	MRC_SET_OVERRIDES
		22	MRC Progress	MRC_MC_CAPABILITY
		23	MRC Progress	MRC_MC_CONFIG
		24	MRC Progress	MRC_MC_MEMORY_MAP
		25	MRC Progress	MRC_JEDEC_INIT_LPDDR3
		26	MRC Progress	MRC_RESET_SEQUENCE
		27	MRC Progress	MRC_PRE_TRAINING
		28	MRC Progress	MRC_EARLY_COMMAND
		29	MRC Progress	MRC_SENSE_AMP_OFFSET
		2A	MRC Progress	MRC_READ_MPR
		2B	MRC Progress	MRC_RECEIVE_ENABLE
		2C	MRC Progress	MRC_JEDEC_WRITE_LEVELING
		2D	MRC Progress	MRC_LPDDR_LATENCY_SET_B
		2E	MRC Progress	MRC_WRITE_TIMING_1D
		2F	MRC Progress	MRC_READ_TIMING_1D
		30	MRC Progress	MRC_DIMM_ODT
		31	MRC Progress	MRC_EARLY_WRITE_TIMING_2D
		32	MRC Progress	MRC_WRITE_DS
		33	MRC Progress	MRC_WRITE_EQ
		34	MRC Progress	MRC_EARLY_READ_TIMING_2D
		35	MRC Progress	MRC_READ_ODT
		36	MRC Progress	MRC_READ_EQ
		37	MRC Progress	MRC_READ_AMP_POWER
		38	MRC Progress	MRC_WRITE_TIMING_2D
		39	MRC Progress	MRC_READ_TIMING_2D
		3A	MRC Progress	MRC_CMD_VREF
		3B	MRC Progress	MRC_WRITE_VREF_2D
		3C	MRC Progress	MRC_READ_VREF_2D
		3D	MRC Progress	MRC_POST_TRAINING
		3E	MRC Progress	MRC_LATE_COMMAND
		3F	MRC Progress	MRC_ROUND_TRIP_LAT
		40	MRC Progress	MRC_TURN_AROUND
		41	MRC Progress	MRC_CMP_OPT
		42	MRC Progress	MRC_SAVE_MC_VALUES
		43	MRC Progress	MRC_RESTORE_TRAINING
		44	MRC Progress	MRC_RMT_TOOL
		45	MRC Progress	MRC_WRITE_SR
		46	MRC Progress	MRC_DIMM_RON
		47	MRC Progress	MRC_RCVEN_TIMING_1D
48	MRC Progress	MRC_MR_FILL		
49	MRC Progress	MRC_PWR_MTR		
4A	MRC Progress	MRC_DDR4_MAPPING		
4B	MRC Progress	MRC_WRITE_VOLTAGE_1D		
4C	MRC Progress	MRC_EARLY_RDMPR_TIMING_2D		
4D	MRC Progress	MRC_FORCE_OLTM		
50	MRC Progress	MRC_MC_ACTIVATE		

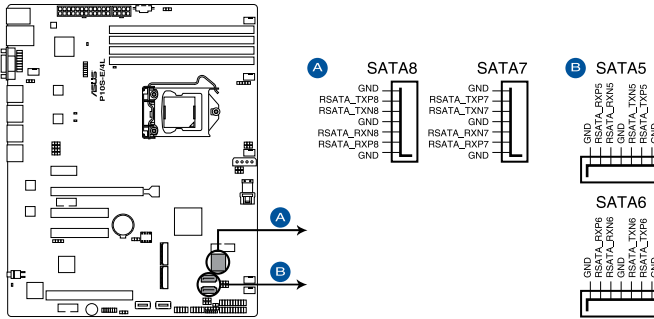
Normal boot	PEI(Pre-EFI initialization) phase	51	MRC Progress	MRC_RH_PREVENTION
		52	MRC Progress	MRC_GET_MRC_DATA
		58	MRC Progress	MRC_RETRAIN_CHECK
		5A	MRC Progress	MRC_SA_GV_SWITCH
		5B	MRC Progress	MRC_ALIAS_CHECK
		5C	MRC Progress	MRC_ECC_CLEAN_START
		5D	MRC Progress	MRC_DONE
		5F	MRC Progress	MRC_CPGC_MEMORY_TEST
		60	MRC Progress	MRC_TXT_ALIAS_CHECK
		61	MRC Progress	MRC_ENG_PERF_GAIN
		68	MRC Progress	MRC_MEMORY_TEST
		69	MRC Progress	MRC_FILL_RMT_STRUCTURE
		70	MRC Progress	MRC_SELF_REFRESH_EXIT
		71	MRC Progress	MRC_NORMAL_MODE
		7D	MRC Progress	MRC_SSA_PRE_STOP_POINT
	7E	MRC Progress	MRC_NO_MEMORY_DETECTED	
	7F	MRC Progress	MRC_SSA_STOP_POINT	
	55	MRC Progress	MRC_MEM_INIT_DONE	
	32	Progress	CPU Init.	
	34	Progress	CPU Init.	
	36	Progress	CPU Init.	
	4F	Progress	DXE Initial Program Load(IPL)	
	60	Progress	DXE Core Started	
	61	Progress	DXE NVRAM Init.	
	62	Progress	SB run-time init.	
	63	Progress	DXE CPU Init	
	68	Progress	NB Init.	
	69	Progress	NB Init.	
	6A	Progress	NB Init.	
	70	Progress	SB Init.	
	71	Progress	SB Init.	
	72	Progress	SB Init.	
	78	Progress	ACPI Init.	
	79	Progress	CSM Init.	
	90	Progress	BDS started	
	91	Progress	Connect device event	
	92	Progress	PCI Bus Enumeration.	
	93	Progress	PCI Bus Enumeration.	
	94	Progress	PCI Bus Enumeration.	
	95	Progress	PCI Bus Enumeration.	
96	Progress	PCI Bus Enumeration.		
97	Progress	Console output connect event		
98	Progress	Console input connect event		
99	Progress	AMI Super IO start		
9A	Progress	AMI USB Driver Init.		
9B	Progress	AMI USB Driver Init.		
9C	Progress	AMI USB Driver Init.		
9D	Progress	AMI USB Driver Init.		
b2	Progress	Legacy Option ROM Init.		
b3	Progress	Reset system		
b4	Progress	USB hotplug		
b6	Progress	NVRAM clean up		
b7	Progress	NVRAM configuration reset		
A0	Progress	IDE, AHCI Init.		
A1	Progress	IDE, AHCI Init.		
A2	Progress	IDE, AHCI Init.		
A3	Progress	IDE, AHCI Init.		
FF-00	Progress	Wait BMC ready(duration: 120 seconds).		
A8	Progress	BIOS Setup Utility password verify		
A9	Progress	BIOS Setup Utility start		
AB	Progress	BIOS Setup Utility input wait		
AD	Progress	Ready to boot event		
AE	Progress	Legacy boot event		
AA	Progress	APIC mode		
AC	Progress	PIC mode		
	Operating system phase			

4.4.3 Internal connectors

1. Serial ATA 6.0 Gbps connectors (7-pin SATA 6 Gbps_5-6 connector [Gray], 7-8 connector [Light Blue])

Supported by the Intel® C236 chipset, these connectors are for the Serial ATA signal cables for Serial ATA hard disk drives that allows up to 6Gb/s of data transfer rate.

If you installed Serial ATA hard disk drives, you can create a RAID 0, RAID 1, RAID 10, or RAID 5 configuration.



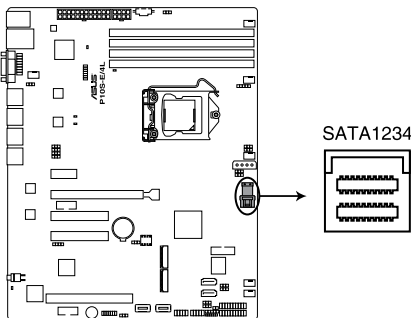
P10S-E/4L Intel® SATA 6 Gb/s connectors



- The actual data transfer rate depends on the speed of Serial ATA hard disks installed.
- When the M.2 connector is operating in SATA mode, SATA connector 5 and 6 (SATA 6 Gbps_5-6) will be disabled.

2. Mini-SAS HD connector (SATA1234)

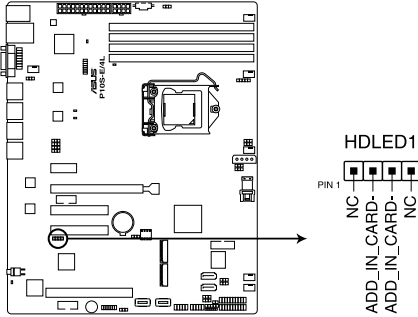
This motherboard comes with a mini Serial Attached SCSI (SAS) HD connector, the storage technology that supports Serial ATA. The connector supports up to four devices.



P10S-E/4L SATA1234 connector

3. Hard disk activity LED connector (4-pin HDLED1)

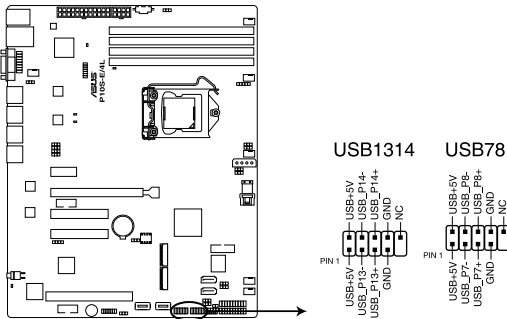
This LED connector is for the storage add-on card cable connected to the SATA or SAS add-on card. The read or write activities of any device connected to the SATA or SAS add-on card causes the front panel LED to light up.



P10S-E/4L Hard disk activity LED connector

4. USB 2.0 connector (10-1 pin USB1314; USB78)

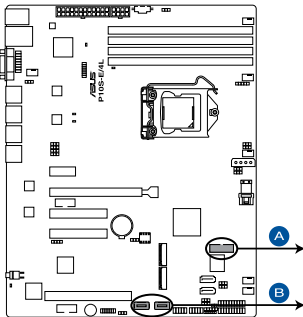
These connectors are for USB 2.0 ports. Connect the USB module cables to these connectors. These USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.



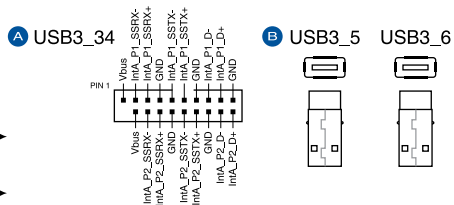
P10S-E/4L USB2.0 connectors

5. USB 3.0 connector (20-1 pin USB3_34; A-Type USB3_5, USB3_6)

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



P10S-E/4L USB3.0 connectors

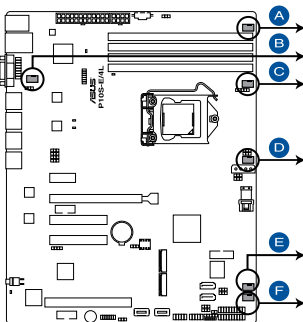


6. CPU, front, and rear fan connectors (4-pin FRNT_FAN1-4, REAR_FAN1, CPU_FAN1)

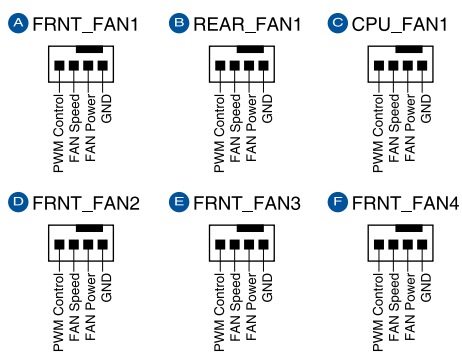
The fan connectors support cooling fans. Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.



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

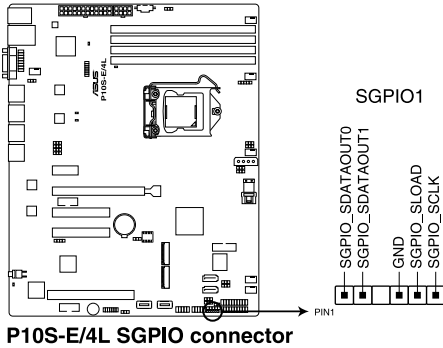


P10S-E/4L Fan connectors



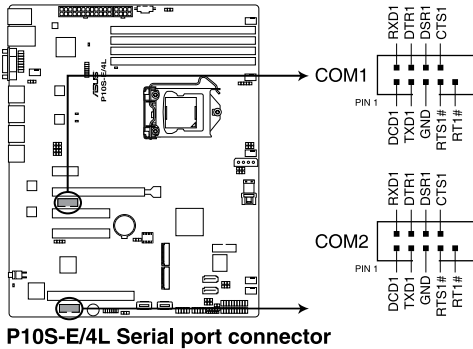
7. Serial General Purpose Input/Output connector (6-1 pin SGPIO1)

The SGPIO 1 connector is used for the Intel Rapid Storage Technology Enterprise SGPIO interface that controls the LED pattern generation, device information, and general purpose data.



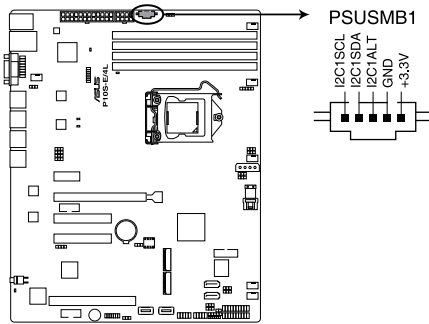
8. Serial port connectors (10-1 pin COM1/COM2)

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



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

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



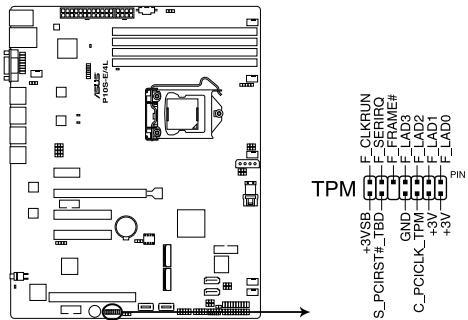
P10S-E/4L Power supply SMBus connector



This connector functions only when you install the ASUS ASMB8.

10. Trusted Platform Module connector (14-1 pin TPM)

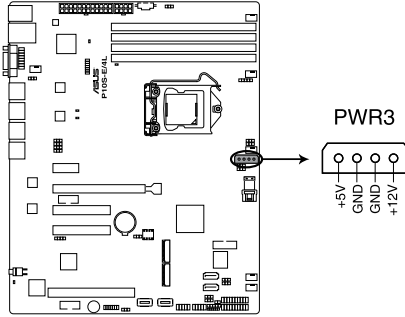
This connector supports a TPM (Trusted Platform Module) system, which can securely store keys, digital certificates, passwords, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.



P10S-E/4L TPM connector

11. SATA DOM power connector (4-pin PWR3)

This 4-pin connector is for 5V power of a certain SATA DOM (Disk on Module) device when using an appropriate cable.



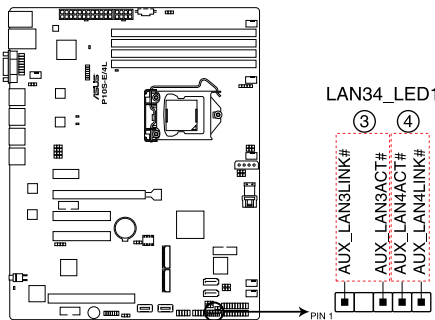
P10S-E/4L Power connector



- The SATA DOM power connector is for output power only. It has a maximum output current of 1A.
- Ensure that the power of the SATA DOM device that you will use is less than 1A.

12. LAN34_LED connector (5-1 pin LAN34_LED1)

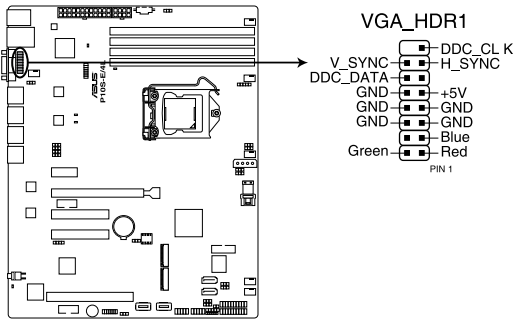
These LEDs are for Gigabit LAN activity LEDs on the front panel. Connect the LAN LED cable to the backplane for LAN activity indication.



P10S-E/4L LAN3 & LAN4 LED

13. VGA connector (16-1 pin VGA_HDR1)

This connector supports the VGA High Dynamic-Range interface.



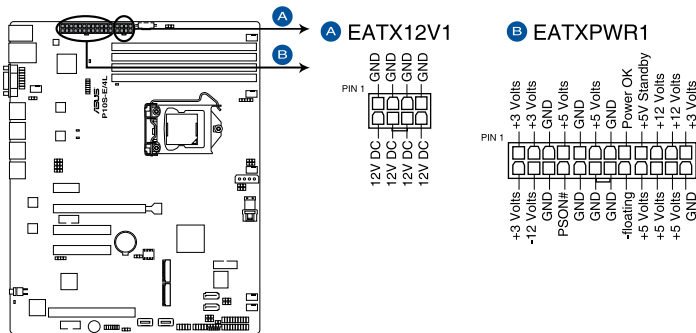
P10S-E/4L Internal VGA connector

14. ATX power connectors (24-pin EATXPWR1, 8-pin EATX12V1)

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



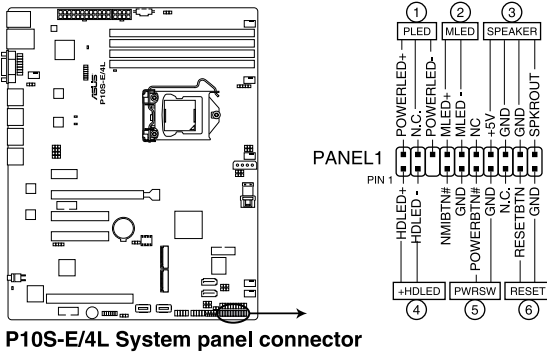
- DO NOT forget to connect the 24-pin and the 8-pin power plugs; otherwise, the system will not boot up.
- Use of a power supply unit (PSU) with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- This motherboard supports ATX2.0 PSU or later version.
- Ensure that your PSU can provide at least the minimum power required by your system.



P10S-E/4L ATX power connectors

15. System panel connector (20-1 pin PANEL1)

This connector supports several chassis-mounted functions.



P10S-E/4L System panel connector

1. System power LED (3-pin PLED)

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

2. Message LED (2-pin MLED)

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

3. System warning speaker (4-pin SPEAKER)

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

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

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

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

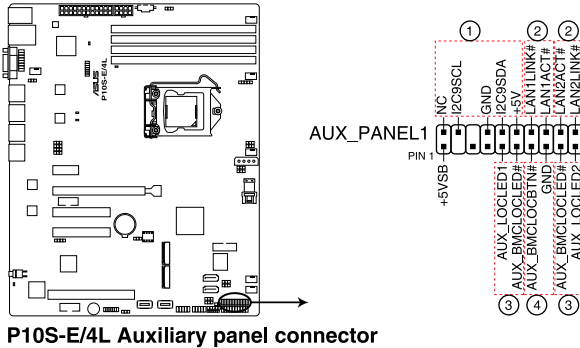
This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

6. Reset button (2-pin RESET)

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

16. 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.



1. Front panel SMB (6-1 pin FPSMB)

These connectors connect the front panel SMBus cable.

2. LAN activity LED (2-pin LAN1LINK and 2-pin LAN2LINK)

These connectors are for Gigabit LAN activity LEDs on the front panel.

3. Locator LED (2-pin AUX_LOCLE1 and 2-pin AUX_LOCLE2)

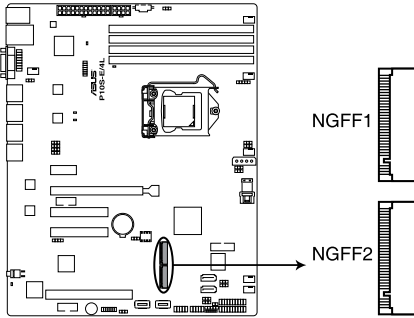
These connectors are for the Locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connector. The LEDs will light up when the Locator button is pressed.

4. Locator Button/Switch (2-pin AUX_BMCLOCBTN)

These connectors are for the locator button on the front panel. This button queries the state of the system locator.

17. M.2 (NGFF) card connector (NGFF1 & NGFF2)

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



P10S-E/4L NGFF1 & NGFF2 connectors



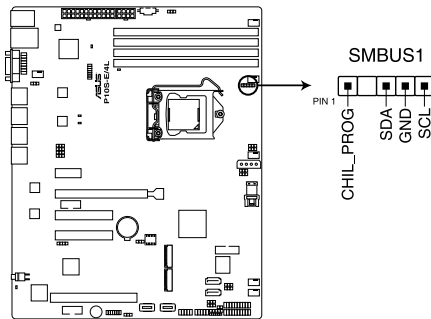
- This connector supports type 2242/2260/2280 devices on both PCI-E and SATA interface.
- When the M.2 connector is operating in SATA mode, SATA connector 5 and 6 (SATA 6 Gbps_5-6) will be disabled.



The M.2 (NGFF) device is purchased separately.

18. System Management Bus (SMBUS) connector (5-1 pin SMBUS1)

This connector controls the system and power management-related tasks. This connector processes the messages to and from devices rather than tripping the individual control lines.

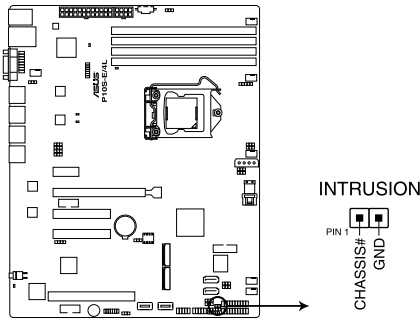


P10S-E/4L SMBUS connector

19. Chassis intrusion connector (2-pin INTRUSION1)

This connector is for a chassis-mounted intrusion detection sensor or switch. Connect one end of the chassis intrusion sensor or switch cable to this connector. The chassis intrusion sensor or switch sends a high-level signal to this connector when a chassis component is removed or replaced. The signal is then generated as a chassis intrusion event.

By default, the pin labeled “Chassis Signal” and “Ground” are shorted with a jumper cap. Remove the jumper caps only when you intend to use the chassis intrusion detection feature.



P10S-E/4L Chassis Intrusion connector

BIOS Setup

5

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

5.1 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.

3. **BUPDATER**

Updates the BIOS in DOS mode using a bootable USB flash disk drive.

Refer to the corresponding sections for details on these utilities.



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

5.1.1 **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.

5.1.2 ASUS EZ Flash Utility

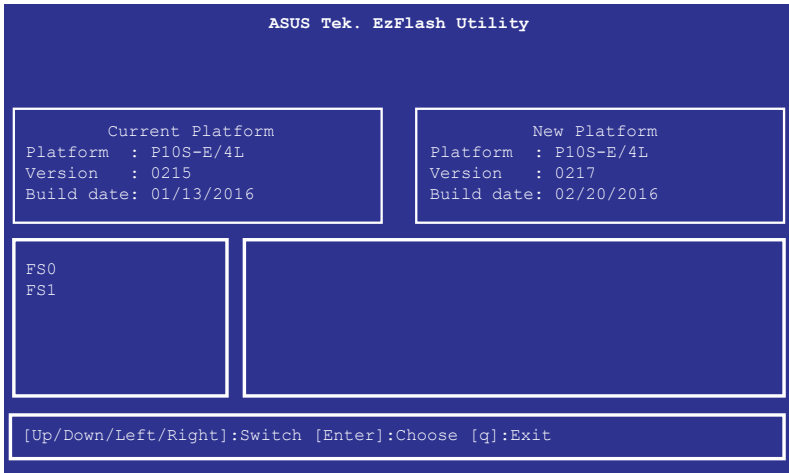
The ASUS EZ Flash Utility feature allows you to update the BIOS without having to use a DOS-based utility.



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 **ASUS EZ Flash Utility**. Press <Enter>.



3. Press <Tab> to switch to the **Drive** field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS, then press <Enter>.
5. Press <Tab> to switch to the **Folder Info** field.
6. Press the Up/Down arrow keys to find the BIOS file, and then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.



- This function can support devices such as a USB flash disk with 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.

5.1.3 BUPDATER utility



The succeeding BIOS screens are for reference only. The actual BIOS screen displays may not be the same as shown.

The BUPDATER utility allows you to update the BIOS file in the DOS environment using a bootable USB flash disk drive with the updated BIOS file.

Updating the BIOS file

To update the BIOS file using the BUPDATER utility:

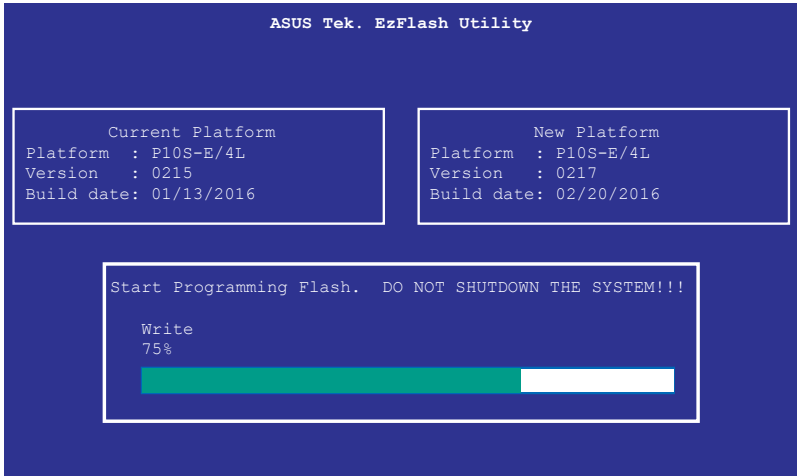
1. Visit the ASUS website at www.asus.com and download the latest BIOS file for the motherboard. Save the BIOS file to a bootable USB flash disk drive.
2. Copy the BUPDATER utility (BUPDATER.exe) from the ASUS support website at support.asus.com to the bootable USB flash disk drive you created earlier.
3. Boot the system in DOS mode, then at the prompt, type:

```
BUPDATER /i [filename] .CAP
```

where [filename] is the latest or the original BIOS file on the bootable USB flash disk drive, then press <Enter>.

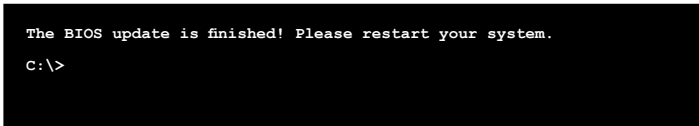
```
A:\>BUPDATER /i[file name].CAP
```

4. The utility verifies the file, then starts updating the BIOS file.



DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

5. The utility returns to the DOS prompt after the BIOS update process is completed. Reboot the system from the hard disk drive.



5.2 BIOS setup program

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

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to “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 during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

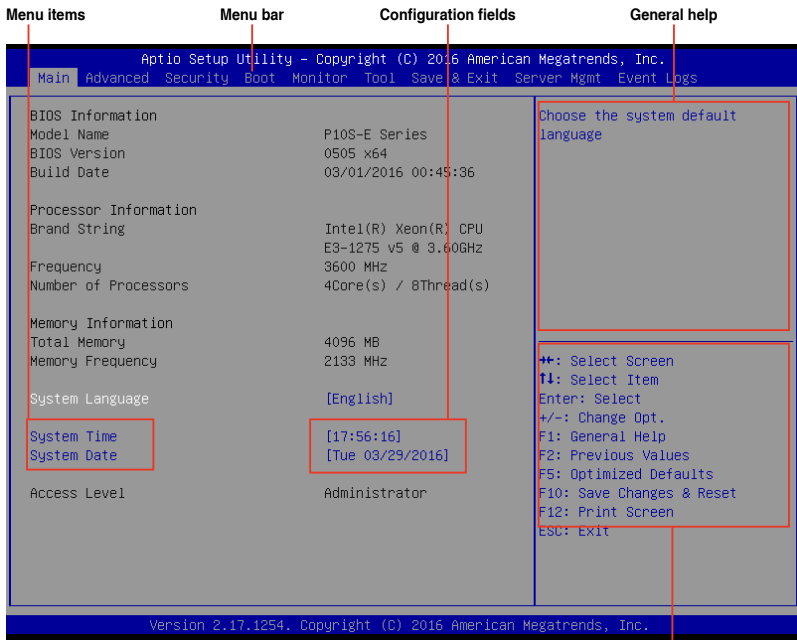
If you wish to enter Setup after POST, restart the system by pressing <Ctrl>+<Alt>+, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

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



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

5.2.1 BIOS menu screen



Navigation keys

5.2.2 Menu bar

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

- Main** For changing the basic system configuration
- Advanced** For changing the advanced system settings
- Security** For changing the security settings
- Boot** For changing the system boot configuration
- Monitor** For displaying the system temperature, power status, and changing the fan settings
- Tool** For configuring options for special functions
- Save & Exit** For selecting the save & exit options
- Server Mgmt** For changing the server mgmt settings
- Event Logs** For changing the event log settings

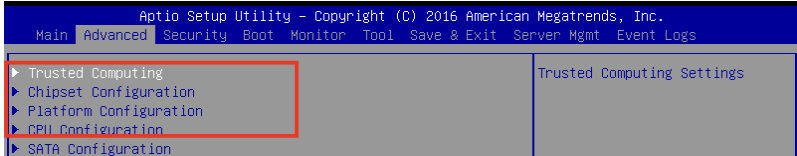
To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

5.2.3 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 (Advanced, Security, Boot, Monitor, Tool, Save & Exit, Server Mgmt, and Event Logs) on the menu bar have their respective menu items.

5.2.4 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 and press <Enter>.



5.2.5 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.

5.2.6 General help

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

5.2.7 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.

5.2.8 Pop-up window

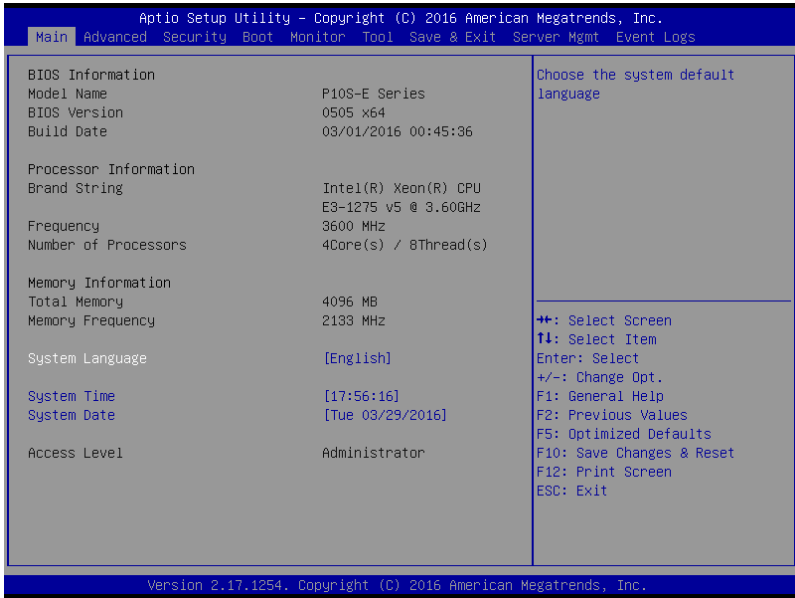
Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

5.2.9 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.

5.3 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 and time.



5.3.1 System Date

Allows you to set the system date to **[Day mm/dd/yyyy]**.

Day = Day of the week

mm = month (numeric value)

dd = day (numeric value)

yyyy = year (numeric value)

5.3.2 System Time

Allows you to set the system time to **[hh/mm/ss]**.

hh = hour (numeric value)

mm = minutes (numeric value)

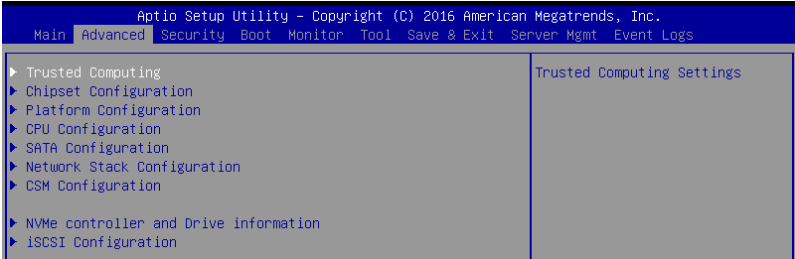
ss = seconds (numeric value)

5.4 Advanced menu

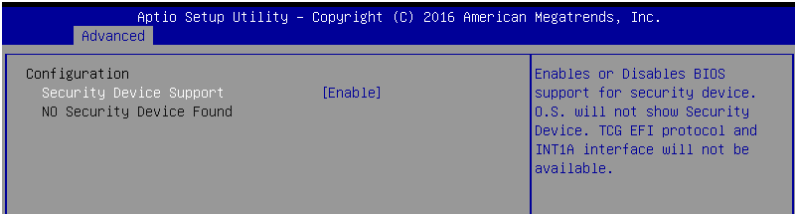
The Advanced menu items allow you to change the settings for the CPU and other system devices.



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



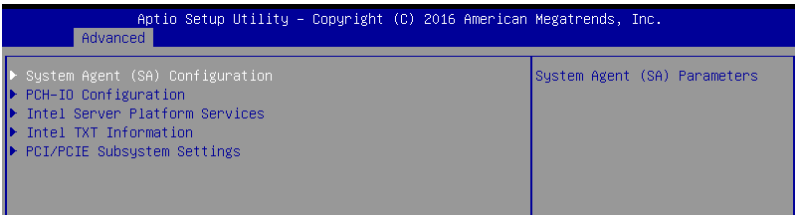
5.4.1 Trusted Computing



Security Device Support [Enable]

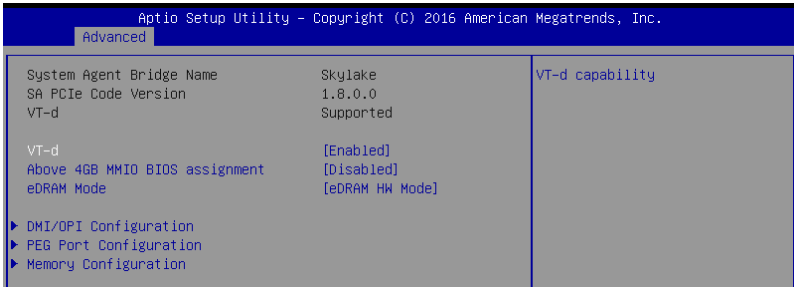
Allows you to enable or disable the BIOS support for security device.
Configuration options: [Disable] [Enable]

5.4.2 Chipset Configuration



System Agent (SA) Configuration

This allows you to change System Agent (SA) parameters.



VT-d [Enabled]

Allows you to enable virtualization technology function on memory control hub.

Configuration options: [Enabled] [Disabled]

Above 4GB MMIO BIOS assignment [Disabled]

Allows you to enable or disable above 4GB MemoryMappedIO BIOS assignment.

When aperture size is set to 2048 MB, this is disabled automatically.

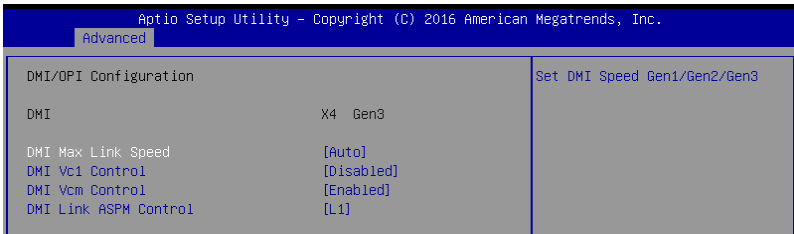
Configuration options: [Enabled] [Disabled]

eDRAM Mode [eDRAM HW Mode]

Allows you to enable or disable SW Mode eDRAM.

Configuration options: [SW Mode eDRAM Off] [SW Mode eDRAM On] [eDRAM HW Mode]

DMI/OPI Configuration



DMI Max Link Speed [Auto]

Allows you to set the DMI speed.

Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

DMI Vc1 Control [Disabled]

Allows you to enable or disable DMI Vc1.

Configuration options: [Enabled] [Disabled]

DMI Vcm Control [Enabled]

Allows you to enable or disable DMI Vcm.

Configuration options: [Enabled] [Disabled]

DMI Link ASPM Control [L1]

This item is for the control of the Active State Power Management on SA side of the DMI link.

Configuration options: [Disabled] [L1]

PEG Port Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.	
Advanced	
PEG Port Configuration	Enable or Disable the Root Port
PEG 0:1:0	Not Present
Enable Root Port	[Auto]
Max Link Speed	[Auto]
Max Link Width	[Auto]
Power Down Unused Lanes	[Auto]
ASPM	[Auto]
PEG 0:1:1	Not Present
Enable Root Port	[Auto]
Max Link Speed	[Auto]
Max Link Width	[Auto]
Power Down Unused Lanes	[Auto]
ASPM	[Auto]
PEG0 Max Payload size	[Auto]
PEG1 Max Payload size	[Auto]
Program PCIe ASPM after OpROM	[Disabled]

⬆: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values

PEG 0:1:0

Enable Root Port [Auto]

Allows you to enable or disable the root port.

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

Max Link Speed [Auto]

Allows you to configure PEG 0:1:0 Max Speed.

Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

Max Link Width [Auto]

Allows you to force PEG link to retrain to X1/2/4/8.

Configuration options: [Auto] [Force X1] [Force X2] [Force X4] [Force X8]

Power Down Unused Lanes [Auto]

Allows you to power down unused lanes. When set to [Auto], Bios will power down unused lanes based on the max possible link width.

Configuration options: [Disabled] [Auto]

ASPM [Auto]

Allows you to control ASPM support for the PEG 0. This has no effect if PEG is not the currently active device.

Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

PEG 0:1:1

Enable Root Port [Auto]

Allows you to enable or disable the root port.

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

Max Link Speed [Auto]

Allows you to configure PEG 0:1:1 Max Speed.

Configuration options: [Auto] [Gen1] [Gen2] [Gen3]

Max Link Width [Auto]

Allows you to force PEG link to retrain to X1/2/4/8.

Configuration options: [Auto] [Force X1] [Force X2] [Force X4]

Power Down Unused Lanes [Auto]

Allows you to power down unused lanes. When set to [Auto], Bios will power down unused lanes based on the max possible link width.
Configuration options: [Disabled] [Auto]

ASPM [Auto]

Allows you to control ASPM support for the PEG 1. This has no effect if PEG is not the currently active device.
Configuration options: [Disabled] [Auto] [ASPM L0s] [ASPM L1] [ASPM L0sL1]

PEG0 Max Payload size [Auto]

Allows you to set the PEG0 max payload size.
Configuration options: [Auto] [128 TLP] [256 TLP]

PEG1 Max Payload size [Auto]

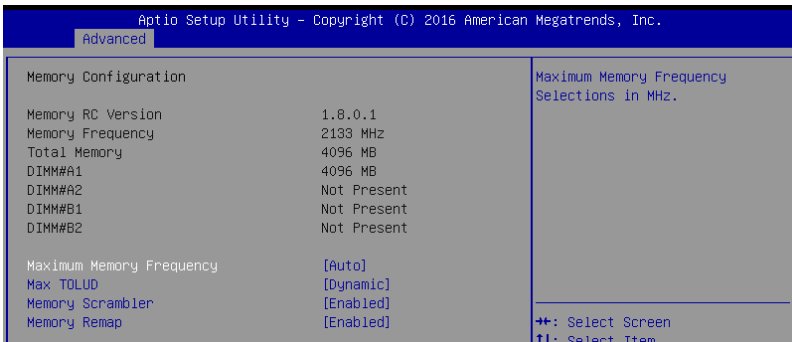
Allows you to set the PEG1 max payload size.
Configuration options: [Auto] [128 TLP] [256 TLP]

Program PCIe ASPM after OpRom [Disabled]

Allows you to select when to program the PCIe ASPM.
[Disabled] PCIe ASPM will be programmed before OpROM.
[Enabled] PCIe ASPM will be programmed after OpROM.

Memory Configuration

Allows you to change memory information settings.



Maximum Memory Frequency [Auto]

Allows you to set the maximum memory frequency.
Configuration options: [Auto] [1067] [1333] [1600] [1867] [2133]

Max TOLUD [Dynamic]

Allows you to set the maximum value of TOLUD. Dynamic assignment would adjust TOLUD automatically based on largest MMIO length of installed graphic controller.
Configuration options: [Dynamic] [1 GB] [1.25 GB] [1.5 GB] [1.75 GB] [2 GB] [2.25 GB] [2.5 GB] [2.75 GB] [3 GB] [3.25 GB] [3.5 GB]

Memory Scrambler [Enabled]

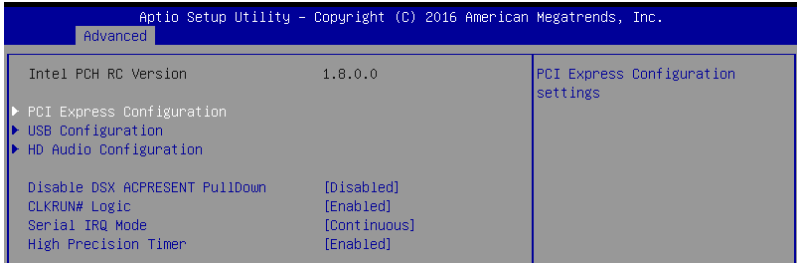
Set this item to enable or disable memory scrambler support.
Configuration options: [Disabled] [Enabled]

Memory Remap [Enabled]

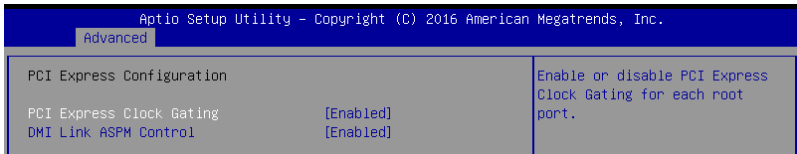
Allows you to enable or disable memory remap above 4GB.
Configuration options: [Enabled] [Disabled]

PCH-IO Configuration

Allows you to set PCH-IO parameters.



PCI Express Configuration



PCI Express Clock Gating [Enabled]

Allows you to enable or disable PCI Express Clock Gating for each root port.

Configuration options: [Disabled] [Enabled]

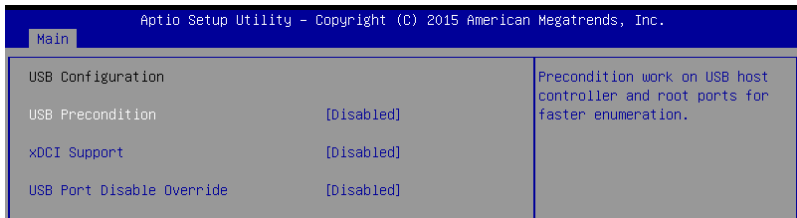
DMI Link ASPM Control [Enabled]

Allows you to enable or disable the control of Active State Power Management on SA side of the DMI link.

Configuration options: [Disabled] [Enabled]

USB Configuration

Allows you to set the USB Configuration settings.



USB Precondition [Disabled]

Allows you to precondition work on USB host controller and root ports for faster enumeration.

Configuration options: [Enabled] [Disabled]

xDCI Support [Disabled]

Allows you to enable or disable xDCI (USB OTG Device).

Configuration options: [Disabled] [Enabled]

USB Port Disable Override [Disabled]

Allows you to enable or disable the corresponding USB port from reporting a Device Connection to the controller.

Configuration options: [Disabled] [Select Per-Pin]

HD Audio

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.		
Advanced		
HD Audio Configuration		Control Detection of the HD-Audio device.
HD Audio	[Auto]	Disabled = HDA will be

HD Audio [Auto]

Allows you to control detection of the HD-Audio device.

[Disabled] HDA will be unconditionally disabled.

[Enabled] HDA will be unconditionally enabled.

[Auto] HDA will be enabled if present, otherwise it will be disabled.

Disable DSX ACPRESENT PullDown [Disabled]

Allows you to enable or disable PCH internal ACPRESENT PullDown when DeepSX or G3 exit.

Configuration options: [Enabled] [Disabled]

CLKRUN# Logic [Enabled]

Allows you to enable or disable the CLKRUN# logic to stop the PCI clocks.

Configuration options: [Disabled] [Enabled]

Serial IRQ Mode [Continuous]

Allows you to configure Serial IRQ mode.

Configuration options: [Quiet] [Continuous]

High Precision Timer [Enabled]

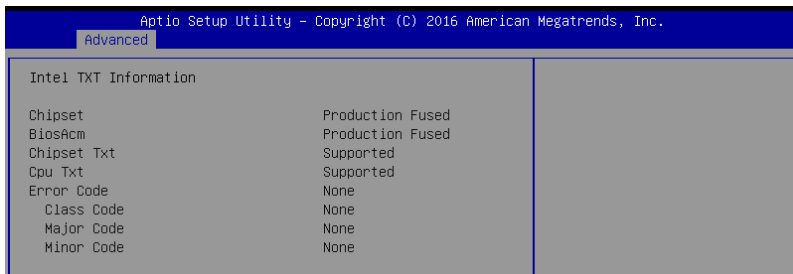
Allows you to enable or disable the High Precision Event Timer.

Configuration options: [Disabled] [Enabled]

Intel Server Platform Services

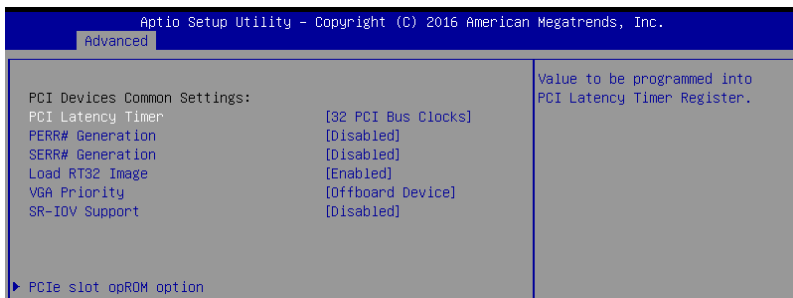
Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.		
Advanced		
Intel Server Platform Services Configuration		
ME BIOS Interface Version	1.2	
SPS Version	2308.0.3.15	
ME FW Status Value	: 0xF02C5	
ME FW State	: SPS ME FW Active	
ME FW Operation State	: Reserved	
ME FW Error Code	: No Error	
ME NM FW Status Value	: 0x80000001	
BIOS Booting Mode	: Performance Optimized mode	
Cores Disabled	: 0	
ME FW SKU Information	: NM + SiEn	
End-of-POST Status	: EOP disabled in POST	
		+*: Select Screen
		↑↓: Select Item

Intel TXT Information



PCI/PCIE Subsystem Settings

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



PCI Latency Timer [32 PCI Bus Clocks]

Allows you to set the value to be programmed into PCI Latency Timer Register.

Configuration options: [32 PCI Bus Clocks] [64 PCI Bus Clocks] [96 PCI Bus Clocks] [128 PCI Bus Clocks] [160 PCI Bus Clocks] [192 PCI Bus Clocks] [224 PCI Bus Clocks] [248 PCI Bus Clocks]

PERR# Generation [Disabled]

Allows you to enable or disable PCI Device to Generate PERR#.

Configuration options: [Disabled] [Enabled]

SERR# Generation [Disabled]

Allows you to enable or disable PCI Device to Generate SERR#.

Configuration options: [Disabled] [Enabled]

Load RT32 Image [Enabled]

Allows you to enable or disable RT32 Image Loading.

Configuration options: [Disabled] [Enabled]

VGA Priority [Offboard Device]

This allows you to prioritize between onboard and the first offboard video device found.

Configuration options: [Onboard Device] [Offboard Device]

SR-IOV Support [Disabled]

If system has SR-IOV capable PCIe devices, this option allows you to enable or disable Single Root IO Virtualization Support.

Configuration options: [Disabled] [Enabled]

PCIe slot opROM option

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.		
Advanced		
PCIe Slot Option Rom Setting		Enabled/Disabled PCIe6 Option Rom
PCIe6 Option Rom	[Enabled]	
PCIe5 Option Rom	[Enabled]	
PCIe4 Option Rom	[Enabled]	

PCIe6/PCIe5/PCIe4 Option ROM [Enabled]

Allows you to enable or disable PCIe6/PCIe5/PCIe4 Option ROM.

Configuration options: [Disabled] [Enabled]

5.4.3 Platform Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.	
Advanced	
▶ USB Configuration	USB Configuration Parameters
▶ NVMe Configuration	
▶ Onboard LAN Configuration	
▶ Super ID Configuration	
▶ Serial Port Console Redirection	
▶ ACPI Settings	
▶ APM	
▶ SMART Settings	
▶ MHEA Configuration	

USB Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.		
Advanced		
USB Configuration		Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
USB Controllers:		
1 XHCI		
USB Devices:		
1 Drive, 1 Keyboard		
Legacy USB Support	[Enabled]	
XHCI Hand-off	[Enabled]	
USB Mass Storage Driver Support	[Enabled]	
Port 60/64 Emulation	[Enabled]	
USB Hardware delays and time-outs:		
USB transfer time-out	[20 sec]	←+: Select Screen
Device reset time-out	[20 sec]	T4: Select Item
Device power-up delay	[Auto]	Enter: Select
Mass Storage Devices:		+/-: Change Opt.
JetFlashTranscend 4GB 8.07	[Auto]	F1: General Help
		F2: Previous Values
		F5: Optimized Defaults

Legacy USB Support [Enabled]

Allows you to enable or disable the support for legacy USB devices. If no USB device are connected, the legacy USB support is disabled.

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

XHCI Hand-off [Enabled]

This functions as a workaround for Oses without XHCI hand-off support.

Configuration options: [Enabled] [Disabled]

USB Mass Storage Driver Support [Enabled]

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

Port 60/64 Emulation [Enabled]

This allows you to enable the I/O port 60h/64h emulation support. This should be enabled for the complete USB keyboard legacy support for non-USB aware OSes.
Configuration options: [Disabled] [Enabled]

USB transfer time-out [20 sec]

Allows you to select the USB transfer time-out value.
Configuration options: [1 sec] [5 sec] [10 sec] [20 sec]

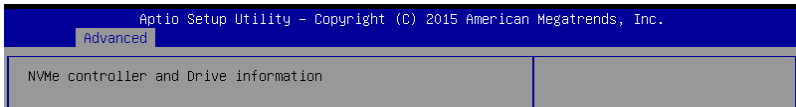
Device reset time-out [20 sec]

Allows you to select the USB device reset time-out value.
Configuration options: [10 sec] [20 sec] [30 sec] [40 sec]

Device power-up delay [Auto]

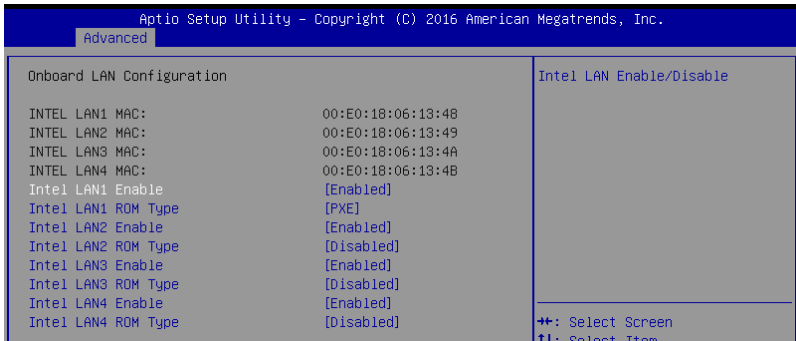
This allows you to set the maximum time the device will take before it properly reports itself to the Host Controller.
Configuration options: [Auto] [Manual]

NVMe Configuration



Onboard LAN Configuration

This allows you to enable or disable the onboard LAN.



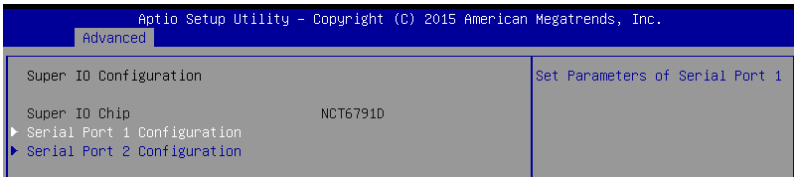
Intel LAN1-4 Enable [Enabled]

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

Intel LAN 1-4 ROM Type [PXE]/[Disabled]

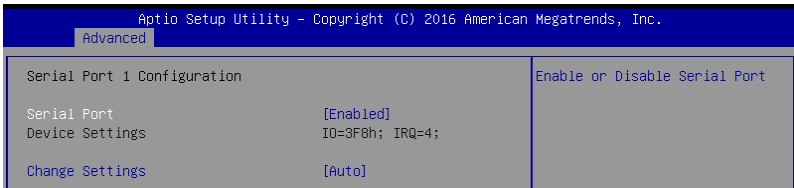
Allows you to select the Intel LAN ROM type.
Configuration options: [Disabled] [PXE] [iSCSI]

Super IO Configuration



Serial Port 1 Configuration

Allows you to set the parameters of Serial Port 1.



Serial Port [Enabled]

Allows you to enable or disable Serial Port (COM).

Configuration options: [Disabled] [Enabled]

Change Settings [Auto]

Allows you to choose the setting for Super IO device.

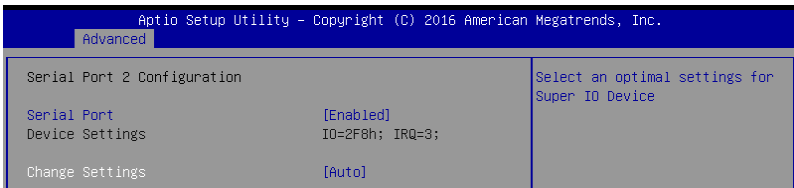
Configuration options: [Auto] [IO=3F8h; IRQ=4;]

[IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]

[IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]

Serial Port 2 Configuration

Allows you to set the parameters of Serial Port 2.



Serial Port [Enabled]

Allows you to enable or disable Serial Port (COM).

Configuration options: [Disabled] [Enabled]

Change Settings [Auto]

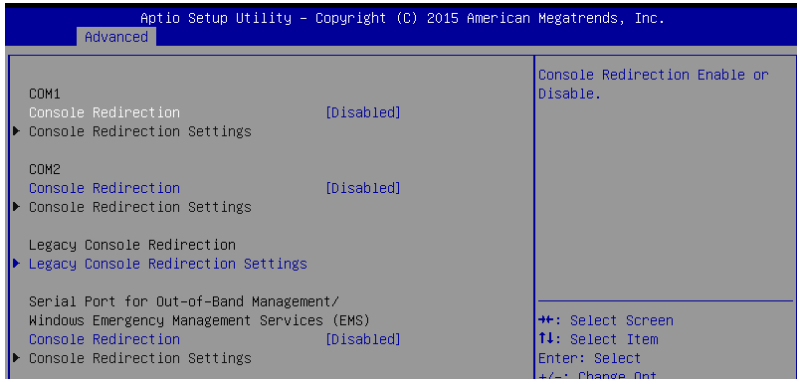
Allows you to choose the setting for Super IO device.

Configuration options: [Auto] [IO=2F8h; IRQ=3;]

[IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]

[IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;] [IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;]

Serial Port Console Redirection



COM1/COM2 Console Redirection [Disabled]

Allows you to enable or disable the console redirection feature.

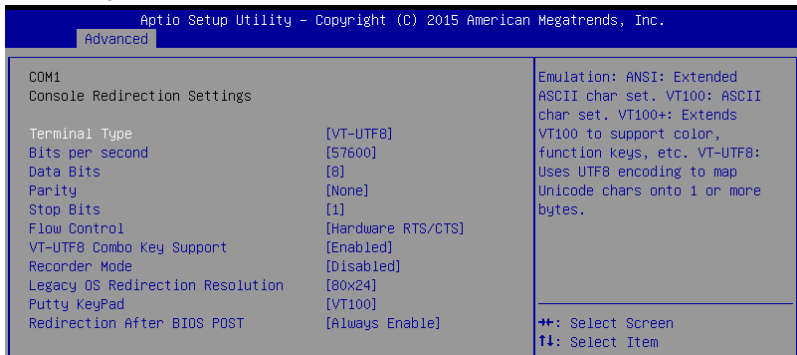
Configuration options: [Disabled] [Enabled]



The **Console Redirection Settings** becomes configurable when **Console Redirection** is set to [Enabled].

Console Redirection Settings

The settings specify how the host computer and the remote computer (which the user is using) will exchange data. Both computers should have the same or compatible settings.



Terminal Type [VT-UTF8]

Allows you to set the terminal type.

[VT100] ASCII char set.

[VT100+] 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 [57600]

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

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

Data Bits [8]

Allows you to set the data bits.

Configuration options: [7] [8]

Parity [None]

Allows you to select the parity bit. A parity bit is sent with the data bits to detect transmission errors.

Configuration options: [None] [Even] [Odd] [Mark] [Space]

Stop Bits [1]

Stop bits indicate the end of a serial data packet (a start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.

Configuration options: [1] [2]

Flow Control [Hardware RTS/CTS]

Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a "stop" signal can be sent to stop the data flow. Once the buffers are empty, a "start" signal can be sent to 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]

This allows you to enable or disable the Recorder Mode to capture Terminal data.

Configuration options: [Disabled] [Enabled]

Legacy OS Redirection Resolution [80x24]

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

Configuration options: [80x24] [80x25]

Putty Keypad [VT100]

This allows you to select the FunctionKey and Keypad on Putty.

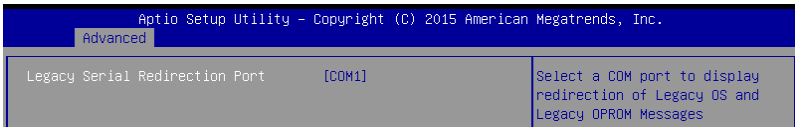
Configuration options: [VT100] [LINUX] [XTERMR6] [SCO] [ESCN] [VT400]

Redirection After BIOS POST [Always Enable]

This setting allows you to specify if BootLoader is selected then Legacy console redirection.

Configuration options: [Always Enable] [BootLoader]

Legacy Console Redirection Settings



Legacy Serial Redirection Port [COM1]

Allows you to select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.

Configuration options: [COM1] [COM2]

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

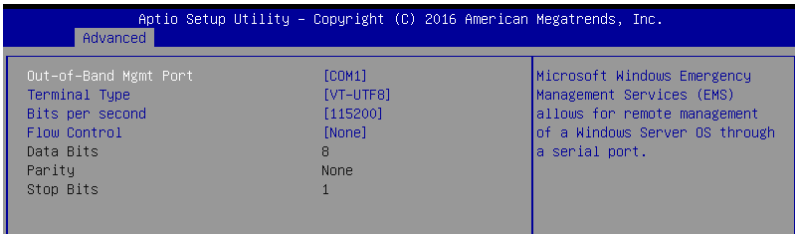
Console Redirection [Disabled]

Allows you to enable or disable the console redirection feature.

Configuration options: [Disabled] [Enabled]



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



Console Redirection Settings

Out-of-Band Mgmt Port [COM1]

Allows remote management of a Windows Server OS through a serial port.

Configuration options: [COM1] [COM2]

Terminal Type [VT-UTF8]

Allows you to set the terminal type for out-of-band management.

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

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] [57600] [115200]

Flow Control [None]

Allows you to set the flow control to prevent data loss from buffer overflow.

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

ACPI Settings

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.		
Advanced		
ACPI Settings		Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
Enable Hibernation	[Enabled]	
ACPI Sleep State	[S3 (Suspend to RAM)]	

Enable Hibernation [Enabled]

Allows you to enable or disable the ability of the system to hibernate (OS/S4 Sleep State).

Configuration options: [Disabled] [Enabled]



This option may be not be effective with some OS.

ACPI Sleep State [S3 (Suspend to RAM)]

Allows you to select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

Configuration options: [Suspend Disabled] [S3 (Suspend to RAM)]

APM

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

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.		
Advanced		
Restore AC Power Loss	[Last State]	Specify what state to go to when power is re-applied after a power failure (G3 state).
Power On By PCI	[Disabled]	
Power On By PCIE	[Disabled]	
Power On By Ring	[Disabled]	
Power On By RTC	[Disabled]	

Restore AC Power Loss [Last State]

Allows you to set the state the system will go to after an AC power loss.

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

Power On By PCI [Disabled]

You can use this option to enable or disable the Wake-on-LAN feature of the Intel LAN.

Configuration options: [Disabled] [Enabled]

Power On By PCIE [Disabled]

This allows you to enable or diaspble the PCIE devices to generate a wake event.

Configuration options: [Disabled] [Enabled]

Power On By Ring [Disabled]

This allows you to enable or diaspble the Ring devices to generate a wake event.

Configuration options: [Disabled] [Enabled]



This item functions only if there is a serial port (COM1) connector on a motherboard.

Power On By RTC [Disabled]

This item allows you to enable or disable RTC to generate a wake event. When set to [Enabled], the items **RTC Alarm Date (Days)** and **Hour/Minute/Second** becomes user-configurable where you can set values.

Configuration options: [Disabled] [Enabled]

SMART Settings

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.		
Advanced		
SMART Settings		Run SMART Self Test on all HDDs during POST.
SMART Self Test	[Enabled]	

SMART Self Test [Enabled]

Allows you to run SMART Self Test on all HDDs during POST.

Configuration options: [Disabled] [Enabled]

WHEA Configuration

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.		
Advanced		
WHEA Support	[Enabled]	Enable or disable Windows Hardware Error Architecture.

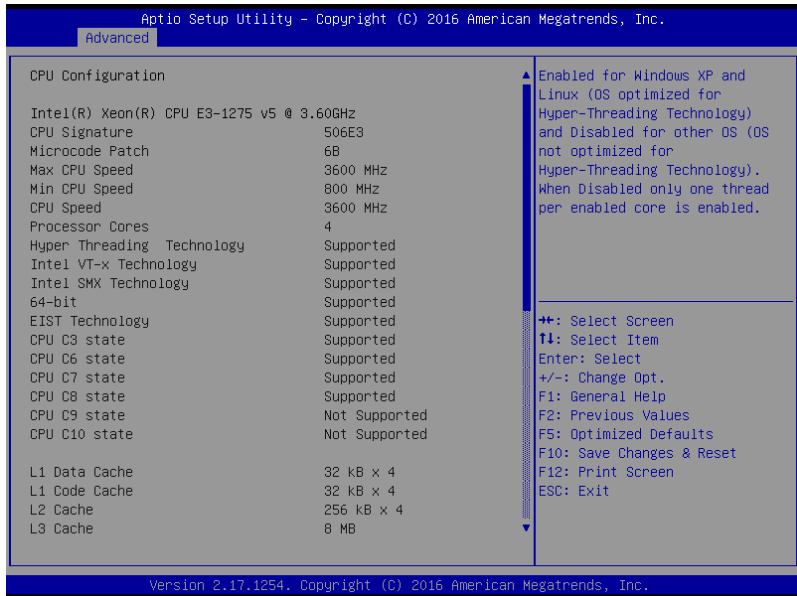
WHEA Support [Enabled]

Allows you to enable or disable the WHEA (Windows Hardware Error Architecture) support.

Configuration options: [Disabled] [Enabled]

5.4.4 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects. Some items may not appear if your CPU does not support the related functions.



Navigate to the second page of the screen to see the rest of items in this menu by pressing the Up or Down arrow keys.



To quickly go to the last item of the second page, press the **Page Down** button. Press the **Page Up** button to go back to the first item in the first page.

Hyper-threading [Enabled]

This item allows a hyper-threading processor to appear as two logical processors, allowing the operating system to schedule two threads or processors simultaneously.

Configuration options: [Disabled] [Enabled]

Active Processor Cores [All]

Allows you to choose the number of CPU cores to activate in each processor package.

Configuration options: [All] [1] [2] [3]

Intel Virtualization Technology [Enabled]

When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.

Configuration options: [Disabled] [Enabled]

Hardware Prefetcher [Enabled]

Allows you to enable or disable the MLC streamer prefetcher.
Configuration options: [Disabled] [Enabled]

Adjacent Cache Line Prefetch [Enabled]

Allows you to enable or disable prefetching of adjacent cache lines.
Configuration options: [Disabled] [Enabled]

CPU AES [Enabled]

Allows you to enable or disable the CPU Advance Encryption Standard instructions.
Configuration options: [Disabled] [Enabled]

Boot performance mode [Max Non-Turbo Performance]

This item allows you to select the performance state that the BIOS will set before OS handoff.
Configuration options: [Max Battery] [Max Non-Turbo Performance] [Turbo Performance]

Intel(R) Speed Shift Technology [Enabled]

Allows you to enable or disable Intel(R) Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Configuration options: [Disabled] [Enabled]

Intel(R) SpeedStep(tm) [Enabled]

Allows your system to adjust the CPU's voltage and cores frequency, resulting in decreased power consumption and heat production.
Configuration options: [Disabled] [Enabled]



The following item appear only when you set the Intel(R) SpeedStep(tm) to **[Enabled]**.

Turbo Mode [Enabled]

This item allows you to automatically set the CPU cores to run faster than the base operating frequency when it is below the operating power, current and temperature specification limit.
Configuration options: [Disabled] [Enabled]

CPU C states [Enabled]

Allows you to enable or disable the CPU C states.
Configuration options: [Disabled] [Enabled]



The following items appear only when you set the CPU C states to **[Enabled]**.

Enhanced C-States [Enabled]

This item allows you to enable or disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.
Configuration options: [Disabled] [Enabled]

C-State Auto Demotion [C1 and C3]

Allows you to enable or disable the Auto Demotion of C-State.
Configuration options: [Disabled] [C1] [C3] [C1 and C3]

C-State Un-demotion [C1 and C3]

Allows you to enable or disable the Un-demotion of C-State.

Configuration options: [Disabled] [C1] [C3] [C1 and C3]

Package C state demotion [Enabled]

Allows you to enable or disable the Package C state demotion.

Configuration options: [Disabled] [Enabled]

Package C state undemotion [Enabled]

Allows you to enable or disable the Package C state undemotion.

Configuration options: [Disabled] [Enabled]

CState Pre-Wake [Enabled]

Allows you to enable or disable the CState Pre-Wake. Selecting **[Disabled]** will set bit 30 of POWER_CTL MSR(0x1FC) to 1 to disable the CState Pre-Wake.

Configuration options: [Disabled] [Enabled]

Package C State limit [C8]

Allows you set the Package C State limit.

Configuration options: [C0/C1] [C2] [C3] C6] [C7] [C7s] [C8] [AUTO]

CFG lock [Enabled]

Allows you to configure MSR 0xE2[15], CFG lock bit.

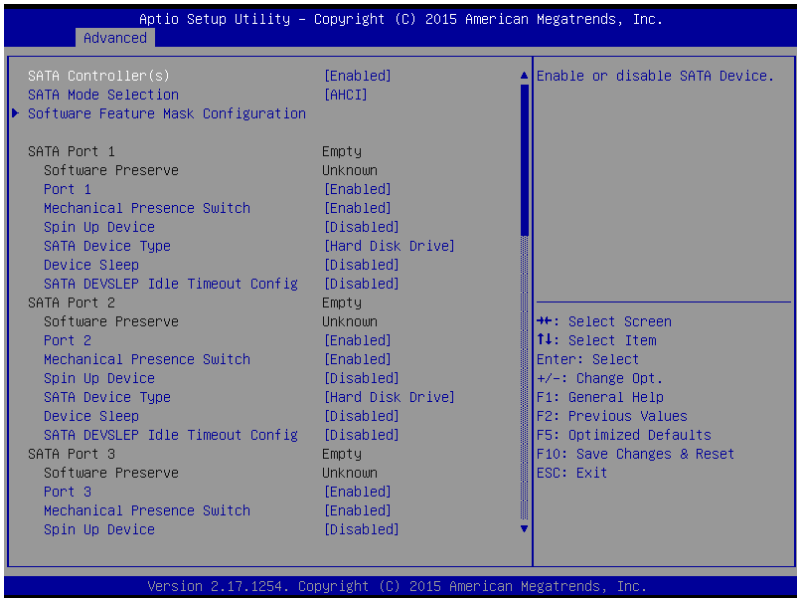
Configuration options: [Disabled] [Enabled]

Intel TXT(LT) Support [Disabled]

Allows you to enable or disable the Intel(R) TXT(LT) support.

Configuration options: [Disabled] [Enabled]

5.4.5 SATA Configuration



SATA Controller(s) [Enabled]

Allows you to enable or disable the SATA Device.

Configuration options: [Enabled] [Disabled]



The following items appear only when you set **SATA Controller(s)** to **[Enabled]**.

SATA Mode Selection [AHCI]

This item allows you to set the SATA configuration.

[AHCI] Set to **[AHCI]** when you want the SATA hard disk drives to use the AHCI (Advanced Host Controller Interface). The AHCI allows the onboard storage driver to enable advanced Serial ATA features that increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.

[RAID] Set to **[RAID]** when you want to create a RAID configuration from the SATA hard disk drives.



The following item appears only when you set **SATA Mode Selection** to **[RAID]**.

Software Feature Mask Configuration

Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.		
Advanced		
RAID0	[Enabled]	Enable or disable RAID0 feature.
RAID1	[Enabled]	
RAID10	[Enabled]	
RAID5	[Enabled]	
Intel Rapid Recovery Technology	[Enabled]	
OROM UI and BANNER	[Enabled]	
HDD Unlock	[Enabled]	
LED Locate	[Enabled]	
IRRT Only on eSATA	[Enabled]	
Smart Response Technology	[Enabled]	
OROM UI Normal Delay	[4 sec]	
RST Force Form	[Disabled]	

RAID0 [Enabled]

Allows you to enable or disable the RAID0 feature.

Configuration options: [Disabled] [Enabled]

RAID1 [Enabled]

Allows you to enable or disable the RAID1 feature.

Configuration options: [Disabled] [Enabled]

RAID10 [Enabled]

Allows you to enable or disable the RAID10 feature.

Configuration options: [Disabled] [Enabled]

RAID5 [Enabled]

Allows you to enable or disable the RAID5 feature.

Configuration options: [Disabled] [Enabled]

Intel Rapid Recovery Technology [Enabled]

Allows you to enable or disable the Intel Rapid Recovery Technology.

Configuration options: [Disabled] [Enabled]

OROM UI and BANNER [Enabled]

[Disabled] No OROM banner or information will be displayed if all disks and RAID volumes are Normal.

[Enabled] OROM UI is shown.

HDD Unlock [Enabled]

Selecting [Enabled] will indicate that the HDD password unlock in the OS is enabled.

Configuration options: [Disabled] [Enabled]

LED Locate [Enabled]

Selecting [Enabled] will indicate that the LED/SGPIO hardware is attached and ping to locate feature is enabled on the OS.

Configuration options: [Disabled] [Enabled]

IRRT Only on eSATA [Enabled]

[Disabled] Any RAID volume can span internal and eSATA drives.

[Enabled] Only IRRT volumes can span internal and eSATA drives.

Smart Response Technology [Enabled]

Allows you to enable or disable the Smart Response Technology.

Configuration options: [Disabled] [Enabled]

OROM UI Normal Delay [4 sec]

Allows you to select the delay time of the OROM UI Splash Screen in a normal status.

Configuration options: [2 sec] [4 sec] [6 sec] [8 sec]

RST Force Form [Disabled]

Allows you to enable or disable Form for Intel Rapid Storage Technology.
Configuration options: [Disabled] [Enabled]

SATA Port 1–8**Port 1–8 [Enabled]**

Allows you to enable or disable the SATA port.
Configuration options: [Disabled] [Enabled]

Mechanical Presence Switch [Enabled]

Allows you to enable or disable reporting if the port has an Mechanical Presence Switch.

Configuration options: [Disabled] [Enabled]

Spin Up Device [Disabled]

Enable this option to start a COMERSET initialization sequence to the device on an edge detect from 0 to 1.

Configuration options: [Disabled] [Enabled]

SATA Device Type [Hard Disk Drive]

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

Configuration options: [Hard Disk Drive] [Solid State Drive]

Device Sleep [Disabled]

Allows you to enable or disable the mSata for RTD3.

Configuration Options: [Disabled] [Enabled]

SATA DEVSLEP Idle Timeout Config [Disabled]

Allows you to enable or disable SATA DTIO Config.

Configuration options: [Disabled] [Enabled]

5.4.6 Network Stack Configuration

Aptio Setup Utility - Copyright (C) 2016 American Megatrends, Inc.		
Advanced		
Network Stack	[Enabled]	Enable/Disable UEFI Network Stack
Ipv4 PXE Support	[Enabled]	
Ipv6 PXE Support	[Enabled]	
PXE boot wait time	0	
Media detect count	1	

Network Stack [Disabled]

Allows you to enable or disable UEFI Network Stack.

Configuration options: [Disabled] [Enabled]



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

Ipv4 PXE Support [Enabled]

Enables or disables the Ipv4 PXE Boot Support. If disabled, Ipv4 PXE boot option will not be created.

Configuration options: [Disable] [Enable]

Ipv6 PXE Support [Enabled]

Enables or disables the Ipv6 PXE Boot Support. If disabled, Ipv6 PXE boot option will not be created.

Configuration options: [Disable] [Enable]

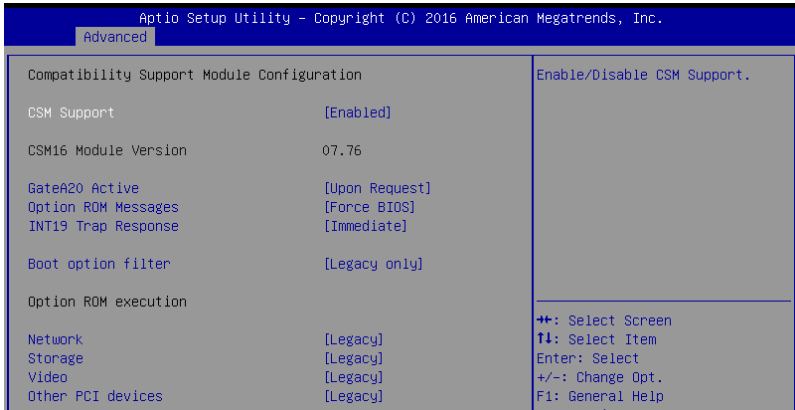
PXE boot wait time [0]

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.

5.4.7 CSM Configuration



CSM Support [Enabled]

This option allows you to enable or disable CSM Support.

Configuration options: [Disabled] [Enabled]

GateA20 Active [Upon Request]

This allows you to set the GA20 option.

[Upon Request] GA20 can be disabled using BIOS services.

[Always] Do not allow disabling GA20; this option is useful when any RT code is executed above 1MB

Option ROM Messages [Force BIOS]

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

Configuration options: [Force BIOS] [Keep Current]

INT19 Trap Response [Immediate]

This option allows you to control the BIOS reaction on INT19 trapping by Option ROM.

[Immediate] Execute the trap right away.

[Postponed] Execute the trap during legacy boot.

Boot Option filter [Legacy only]

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

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

Network / Storage / Video [Legacy]

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

Configuration options: [UEFI] [Legacy]

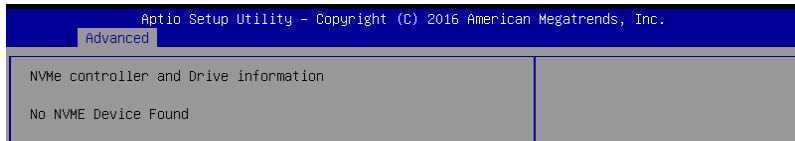
Other PCI devices [Legacy]

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

Configuration options: [UEFI] [Legacy]

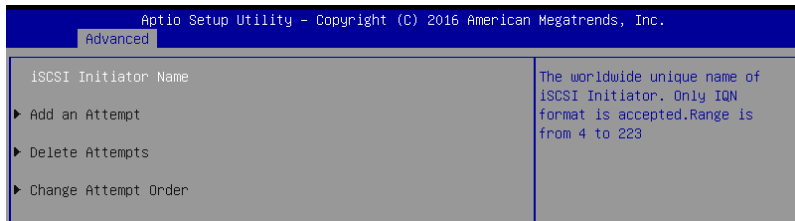
5.4.8 NVMe controller and Drive information

You may view the NVMe controller and Drive information if an NVMe device is connected.



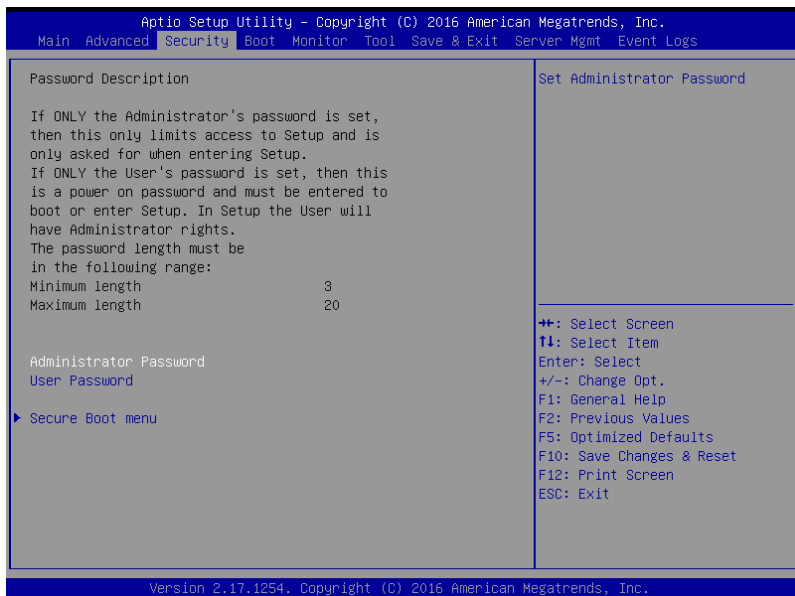
5.4.9 iSCSI Configuration

Allows you to configure the iSCSI parameters.



5.5 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 Administrator 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 Administrator Password box, key in the current password, then press <Enter>.
3. From the Create New Administrator 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 User Password box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change a user password:

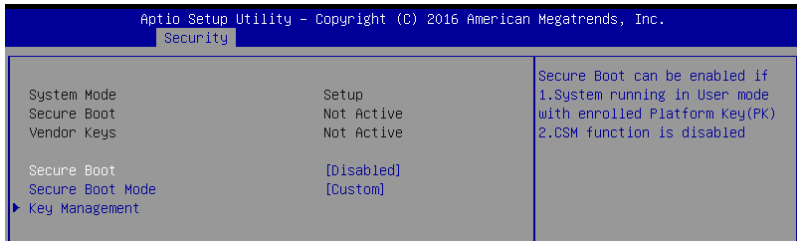
1. Select the User Password item and press <Enter>.
2. From the Enter Current User Password box, key in the current password, then press <Enter>.
3. From the Create New User Password box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.



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.

Secure Boot Menu

This item allows you to customize the Secure Boot settings.



Secure Boot [Disabled]

This item allows you to enable or disable the Secure Boot flow control.

Configuration options: [Disabled] [Enabled]

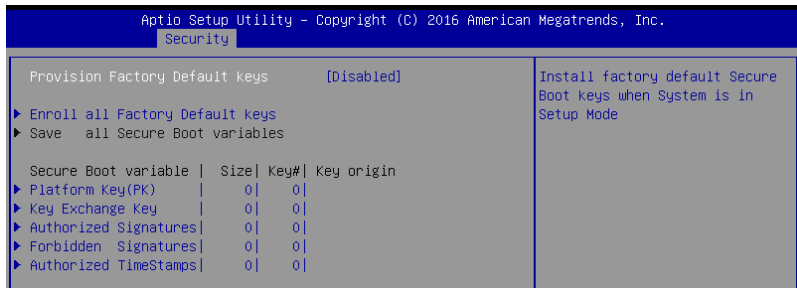
Secure Boot Mode [Custom]

This item allows you to select the mode of the Secure Boot to change Image Execution policy and manage Secure Boot Keys.

Configuration options: [Standard] [Custom]

Key Management

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



Provision Factory Default Keys [Disabled]

Configuration options: [Disabled] [Enabled]

Enroll All Factory Default Keys / Delete all Secure Boot variables

This item will ask you if you want to Install Factory Default secure variables. Select Yes if you want to load the default secure variables, otherwise select No. This option will change to **Delete all Secure Boot variables** once default keys are loaded, selecting this will then ask to delete all variables and reset the Platform to Setup Mode.



The following item is only available when default secure variables are loaded.

Save all Secure Boot variables

Save the secure boot variables to a selected file system.

Platform Key (PK)

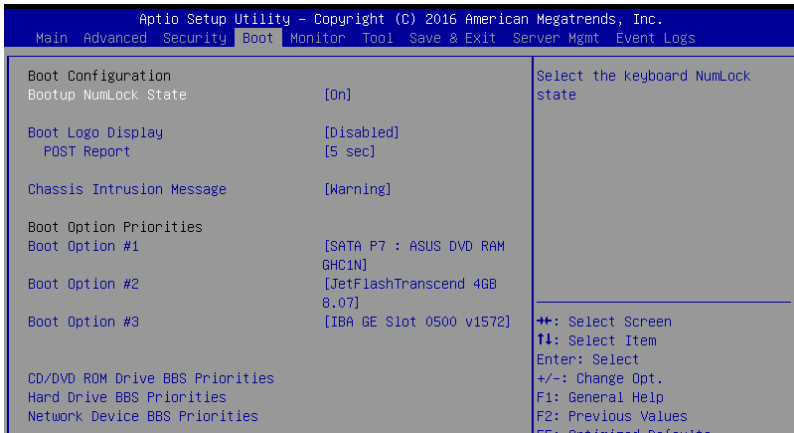
Configuration options: [Set New Key] [Delete Key]

Key Exchange Keys / Authorized Signatures / Forbidden Signatures / Authorized TimeStamps

Configuration options: [Set New Key] [Delete Key] [Append Key]

5.6 Boot menu

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



Bootup NumLock State [On]

Allows you to select the power-on state for the NumLock.

Configuration options: [On] [Off]

Boot Logo Display [Disabled]

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

[Auto] Auto adjustment for Windows requirements.

[Full Screen] Maximize the boot logo size.

[Disabled] Hide the logo during POST.

POST Report [5 sec]

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

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

Chassis Intrusion Message [Warning]

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

[Warning] Warning beep and pause at intrusion message for 3 seconds.

[Halt] Halt at intrusion message.

Boot Option Priorities

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



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

Boot Option #1–2 [IBA GE Slot 0600 v1556]

Configuration options: [IBA GE Slot 0600 v1566] [Disabled]

CD/DVD ROM Drive BBS Priorities

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

Network Device BBS Priorities

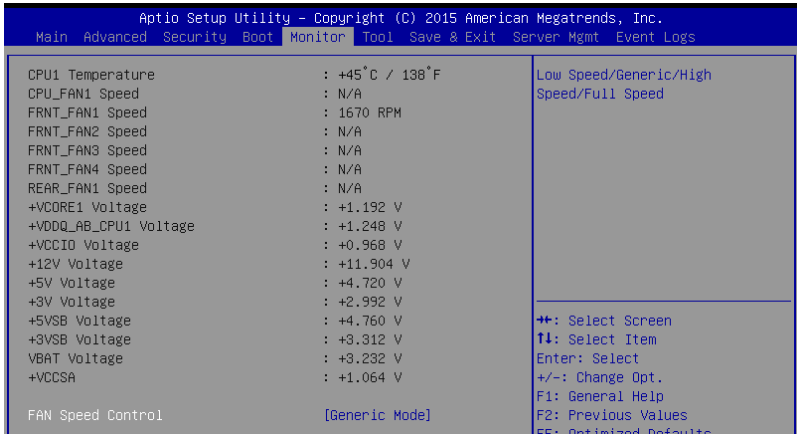
These items appear only when you connect SATA ODD or hard drive to the SATA ports and allow you to set the booting order of the SATA devices.

Hard Drive BBS Priorities

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

5.7 Monitor menu

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



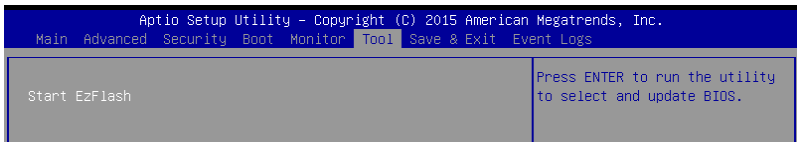
Fan Speed Control [Generic Mode]

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

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

5.8 Tool menu

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



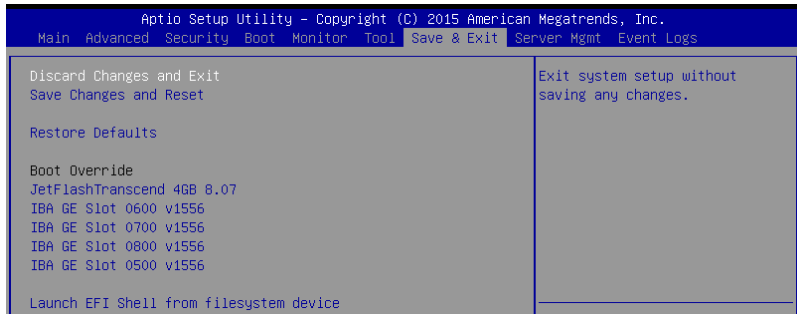
ASUS EZ Flash

Allows you to run the Start EzFlash utility. For more information, see section

5.1.2 ASUS EzFlash Utility.

5.9 Save & 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 the system setup after saving the changes.

Restore Defaults

Restore/Load default values for all the setup options.

Boot Override

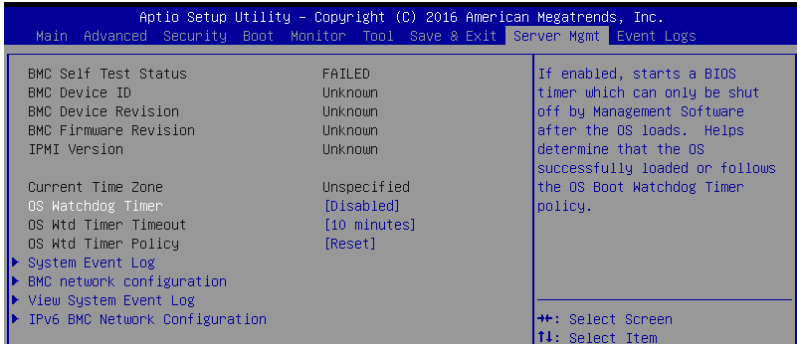
These items display the available devices. The device items that appear on the screen depend on the number of devices installed in the system. Click an item to start booting from the selected device.

Launch EFI Shell from filesystem device

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

5.10 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.

Configuration options: [Enabled] [Disabled]



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

OS Wtd Timer Timeout [10 minutes]

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

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

OS Wtd Timer Policy [Reset]

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

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

System Event Log

Allows you to change the SEL event log configuration.



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

Erase SEL [No]

Allows you to choose options for erasing SEL.

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

When SEL is Full [Do Nothing]

Allows you to choose options for reactions to a full SEL.

Configuration options: [Do Nothing] [Erase Immediately]

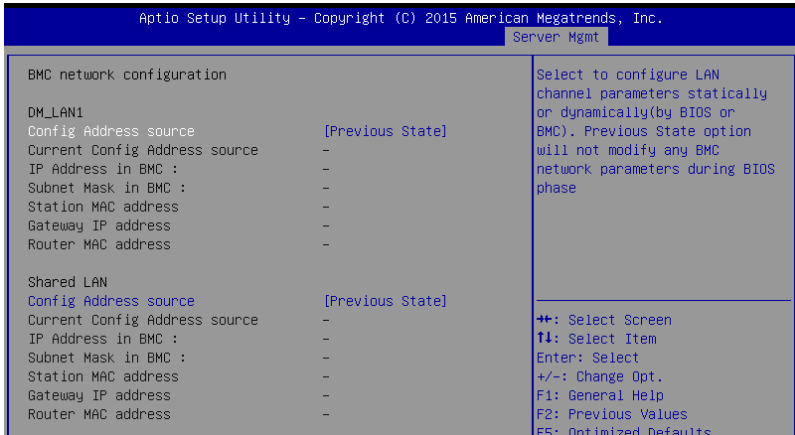
Log EFI Status Codes [Error code]

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

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

BMC network configuration

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



Configuration Address source DM_LAN1 / Shared LAN [Previous State]

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

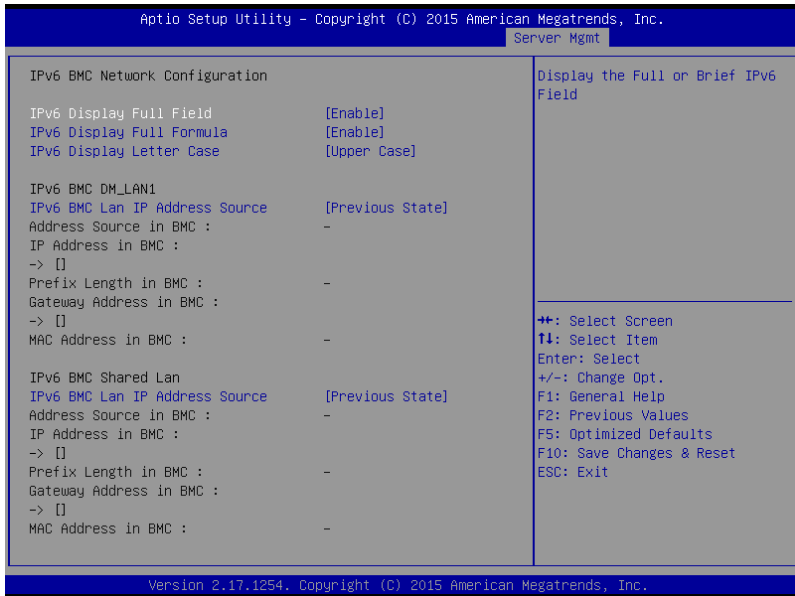
Configuration options: [Previous State] [Static] [DynamicBmcDhcp]

View System Event Log

This item allows you to view the System Event Log Records.

IPv6 BMC Network Configuration

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



IPv6 Display Full Field [Enable]

Displays the Full or Brief IPv6 Field.

Configuration options: [Disable] [Enable]

IPv6 Display Full Formula [Enable]

Displays the Full or Brief IPv6 Formula.

Configuration options: [Disable] [Enable]

IPv6 Display Letter Case [Upper Case]

Displays the uppercase or lowercase letters of the alphabet.

Configuration options: [Lower Case] [Upper Case]

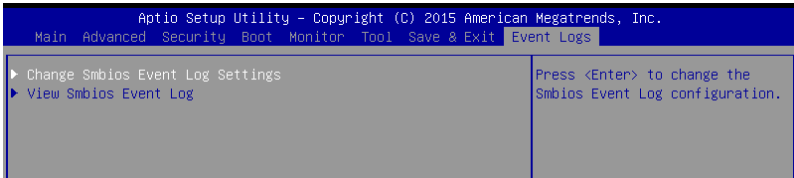
IPv6 BMC LAN IP Address source [Previous State]

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

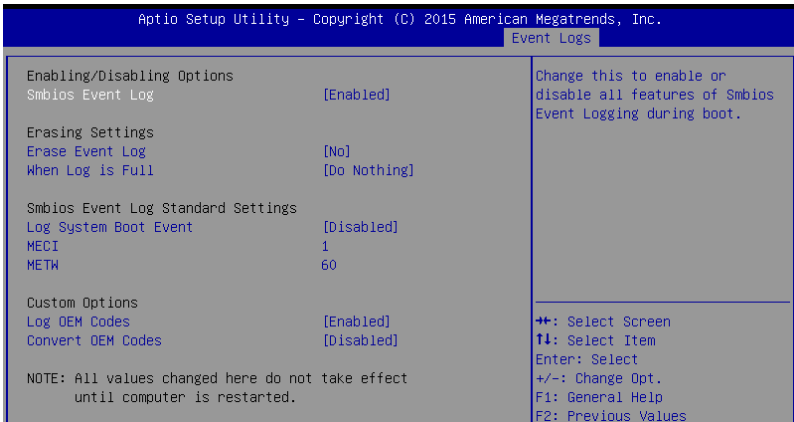
Configuration options: [Previous State] [Static] [Dynamic-Obtained by BMC running DHCP]

5.11 Event Logs menu

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



Change Smbios Event Log Settings



Smbios Event Log [Enabled]

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

Configuration options: [Disabled] [Enabled]

Erase Event Log [No]

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

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

When Log is Full [Do Nothing]

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

Configuration options: [Do Nothing] [Erase Immediately]

Log System Boot Event [Disabled]

Allows you to enable or disable logging of System boot event.

Configuration options: [Enabled] [Disabled]

MECI [1]

Allows you to set the value for the number of occurrences of a duplicate event that must pass before the multiple-event counter of log entry is updated. Use the <+> and <-> keys to adjust the value.

Configuration options: [1] - [255]

METW [60]

Allows you to set the value for the number of minutes which must pass between duplicate log entries which utilize a multiple-event counter. Use the <+> and <-> keys to adjust the value.

Configuration options: [0] - [99]

Log OEM Codes [Enabled]

Allows you to enable or disable the logging of EFI Status Codes as OEM codes (if not already converted to legacy).

Configuration options: [Disabled] [Enabled]

Convert OEM Codes [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]

RAID Configuration

6

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

6.1 Setting up RAID

The motherboard comes with the Intel® C236 controller that supports Intel® Rapid Storage Technology enterprise Option ROM Utility with RAID 0, RAID 1, RAID 10, and RAID 5 support (for Windows® OS only).

6.1.1 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.



If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support DVD to a floppy disk before you install an operating system to the selected hard disk drive.

6.1.2 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.

6.1.3 Setting the RAID mode in BIOS

You must set the RAID mode in the BIOS Setup to be able to launch the RAID utilities before you can create a RAID set from the SATA hard disk drives attached to the SATA connectors supported by Intel® C236 chipset.

To do this:

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



Refer to **Chapter 5** for details on entering and navigating through the BIOS Setup.

6.1.4 RAID configuration utilities

Depending on the RAID connectors that you use, you can create a RAID set using the utilities embedded in each RAID controller. For example, use the **Intel® Rapid Storage Technology enterprise SATA Option ROM Utility** if you installed Serial ATA hard disk drives on the Serial ATA connectors supported by the Intel® C236 chipset.

6.2 Intel® Rapid Storage Technology enterprise SATA Option ROM Utility

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



Before you proceed, ensure that you have installed the Serial ATA hard disk drives, and have set the correct SATA mode in the BIOS setup. You can refer to sections **5.1.2 Installing hard disk drives** and **5.1.3 Setting the RAID mode in BIOS** for more information.

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

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

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

[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit

[ DISK/VOLUME INFORMATION ]

RAID Volumes:
None defined.

Physical Disks:
ID Drive Model Serial # Size Type/Status (Vol ID)
0 ST3300656SS HWSA0000991753TR 279.3GB Non-RAID Disk
1 ST3300656SS 37VN00009846RAJ1 279.3GB Non-RAID Disk
2 ST3300656SS 397600009846UEDY 279.3GB Non-RAID Disk
3 ST3300656SS GWC50000991756G6 279.3GB Non-RAID Disk

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

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

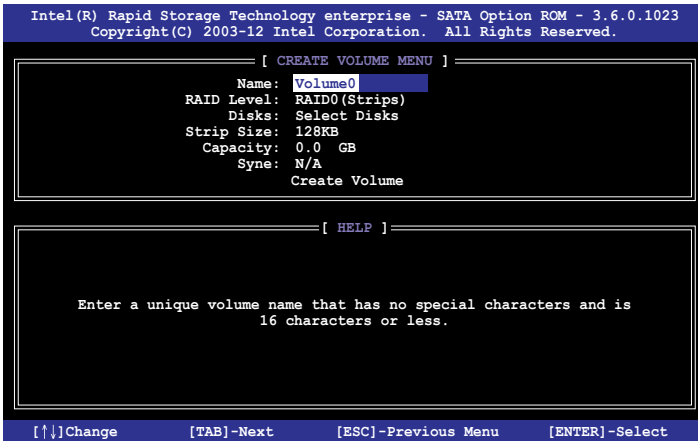


The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

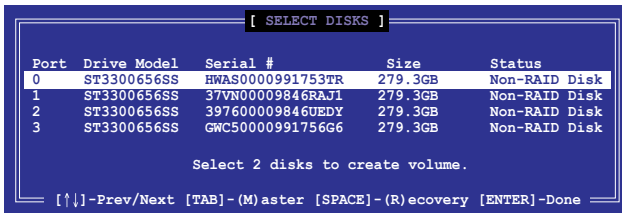
6.2.1 Creating a RAID set

To create a RAID set:

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



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



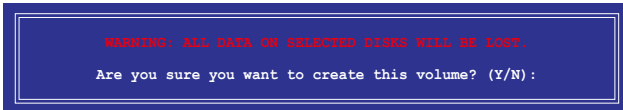
5. Use the up/down arrow keys to move the selection bar then press <Space> to select a disk. A small triangle before the Port number marks the selected drive. Press <Enter> when you are done.

- Use the up/down arrow keys to select the stripe size for the RAID array (for RAID 0, 10 and 5 only) then press <Enter>. The available stripe size values range from 4 KB to 128 KB. The following are typical values:
RAID 0: 128KB
RAID 10: 64KB
RAID 5: 64KB



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

- In the **Capacity** field item, key in the RAID volume capacity that you want to use and press <Enter>. The default value field indicates the maximum allowed capacity.
- Press <Enter> to start creating the RAID volume.
- From the following warning message, press <Y> to create the RAID volume and return to the main menu, or press <N> to go back to the **CREATE VOLUME** menu.



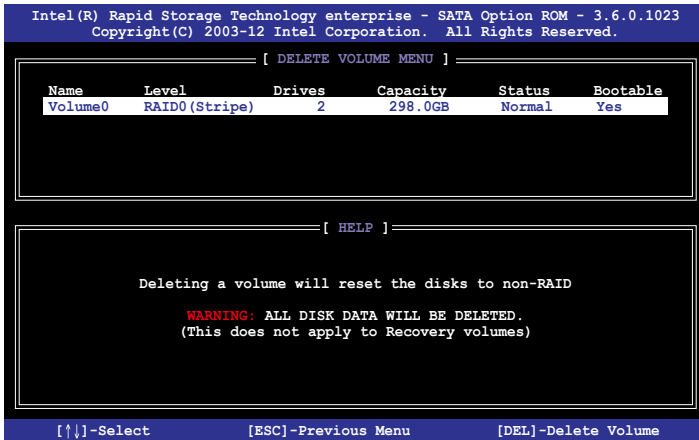
6.2.2 Deleting a RAID set



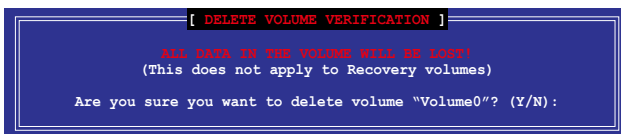
Take caution when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

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



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



6.2.3 Resetting disks to Non-RAID



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

To reset a RAID set:

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

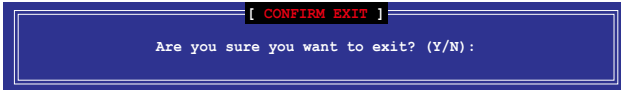
```
[ RESET RAID DATA ]
Resetting RAID disk will remove its RAID structures
and revert it to a non-RAID disk.
WARNING: Resetting a disk causes all data on the disk to be lost.
(This does not apply to Recovery volumes)
Port  Drive Model  Serial #          Size      Status
 0  ST3300656SS  HWAS0000991753TR  279.3GB  Member Disk
 1  ST3300656SS  37VN00009846RAJ1  279.3GB  Member Disk
Select the disks that should be reset.
[↑↓]-Previous/Next [SPACE]-Selects [ENTER]-Selection Complete
```

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

6.2.4 Exiting the Intel® Rapid Storage Technology enterprise SATA Option ROM utility

To exit the utility:

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



6.2.5 Rebuilding the RAID



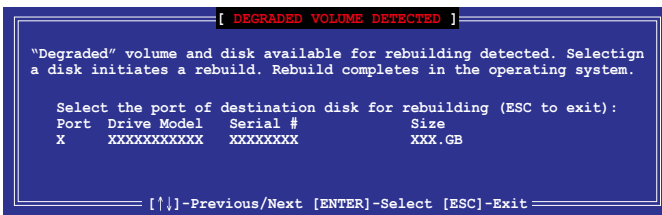
This option is only for the RAID 1 set.

Rebuilding the RAID with other non-RAID disk

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

To rebuild the RAID with other non-RAID disk:

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



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

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

```

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

[ MAIN MENU ]
1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Exit

[ DISK/VOLUME INFORMATION ]

RAID Volumes:
ID Name Level Strip Size Status Rootable
1 Volume0 RAID1(Mirror) N/A 149.0GB Rebuild Yes

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

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

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

```

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

Rebuilding the RAID with a new hard disk

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

To rebuild the RAID with a new hard disk:

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



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

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

6.2.6 Setting the Boot array in the BIOS Setup Utility

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

To set the boot array in the BIOS:



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

1. Reboot the system and press to enter the BIOS setup utility during POST.
2. Go to the **Boot** menu and select the boot option priority.
3. Use up/down arrow keys to select the boot priority and press <Enter>. See the **Boot menu** section of Chapter 4 for more details.
4. From the **Exit** menu, select **Save Changes & Exit**, then press <Enter>.
5. When the confirmation window appears, select **Yes**, then press <Enter>.

6.3 Intel® Rapid Storage Technology enterprise (Windows)

The Intel® Rapid Storage Technology enterprise allows you to create RAID 0, RAID 1, RAID 10 (RAID 1+0), and RAID 5 set(s) from Serial ATA hard disk drives that are connected to the Serial ATA connectors supported by the Southbridge.

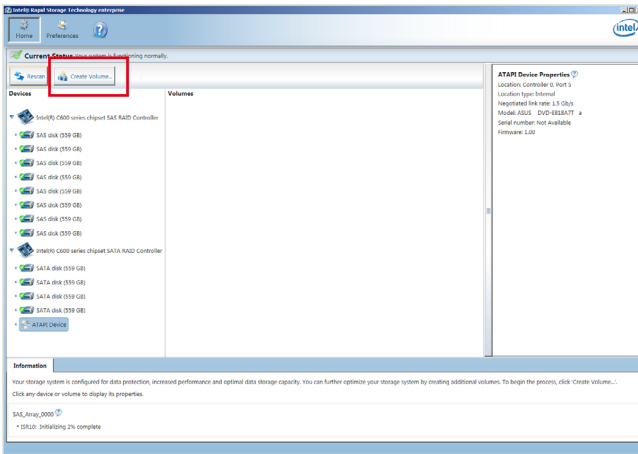


You need to manually install the Intel® Rapid Storage Technology enterprise utility on a Windows® operating system. Please refer to the installation instructions in **Chapter 6**.

To enter the Intel® Rapid Storage Technology enterprise utility under Windows operating system:

1. Turn on the system to windows desktop.
2. Click the **Intel® Rapid Storage Technology enterprise** icon to display the main menu.

Your storage system is configured for data protection, increased performance and optimal data storage capacity. You can create additional volumes to further optimize your storage system.

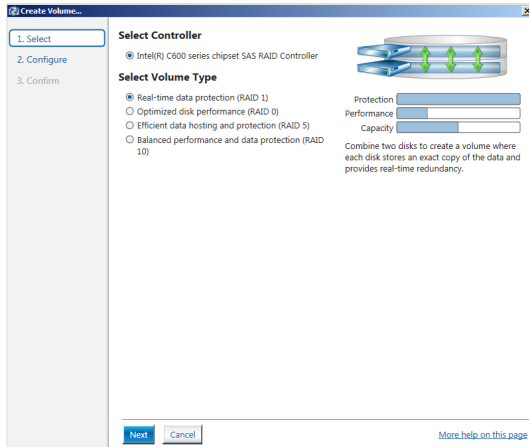


You can click **Rescan** to re-scan any attached hard disks.

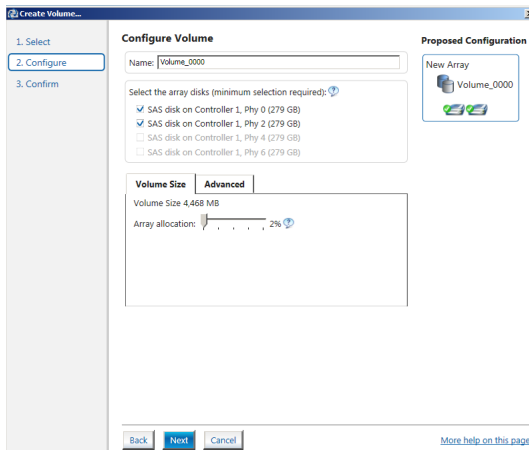
6.3.1 Creating a RAID set

To create a RAID set:

1. From the utility main menu, select **Create Volume** then select volume type and click **Next**.



2. Key in a name for the RAID set, then select the array disks.
3. Select the **Volume Size** tab then drag the bar to set the volume size.
4. Click **Next**.

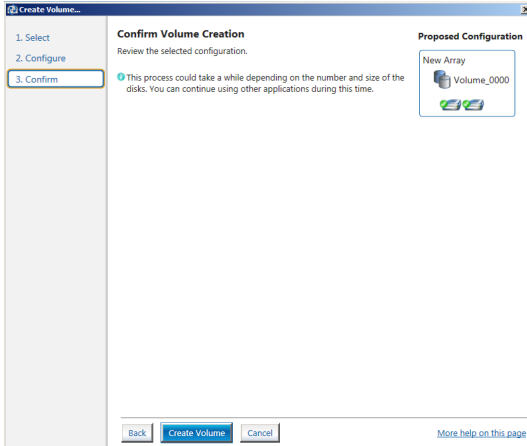


- If you do not want to keep the data on one of the selected disks, select **NO** when prompted.
- If you want to **Enable volume write-back cache** or **Initialize volume**, click **Advanced**.

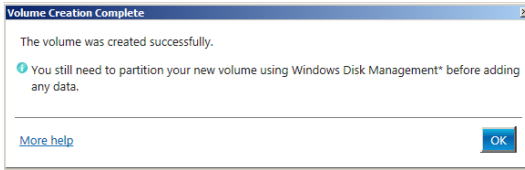
5. Confirm the volume creation, then click **Create Volume** to continue.



This process could take a while depending on the number and size of the disks. You can continue using other applications during this time.

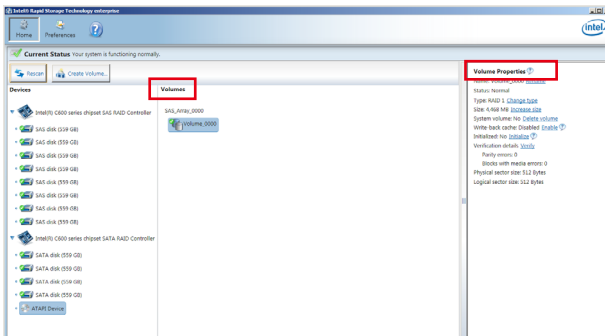


6. Wait until the process is completed, then click **OK** when prompted.



You still need to partition your new volume using Windows Disk Management before adding any data.

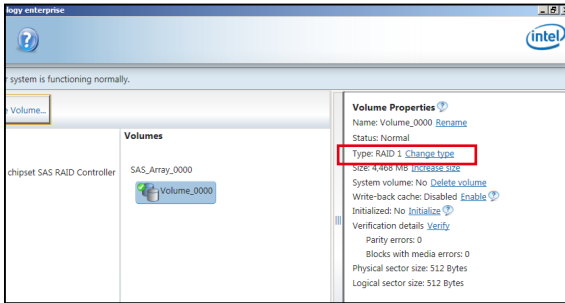
The created RAID set is displayed in the **Volumes** list. If you wish to change the settings, go to **Volume Properties**.



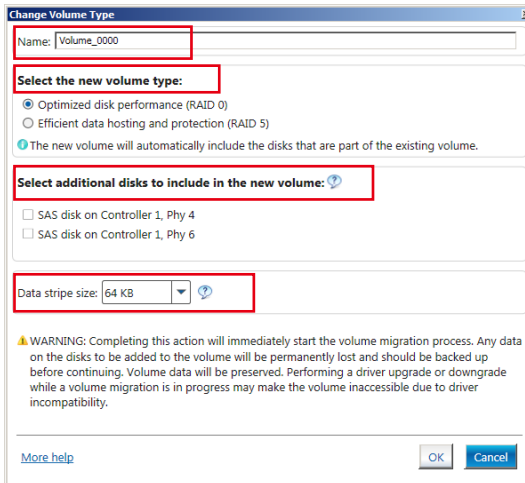
6.3.2 Changing a Volume Type

To change the volume type in **Volume Properties**:

1. Click the SATA array items you want to change in **Volumes** field.
2. From the **Volume Properties** field, select **Type: RAID 1 Change type**.



3. You can also change the **Name**, **Select the new volume type**, and **Select additional disks to include in the new volume** if needed.
4. Select the **Data stripe size** for the RAID array (for RAID 0, 10 and 5 only) and click **OK**. The available stripe size values range from 4 KB to 128 KB. The following are typical values:
RAID 0: 128KB
RAID 10: 64KB
RAID 5: 64KB



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

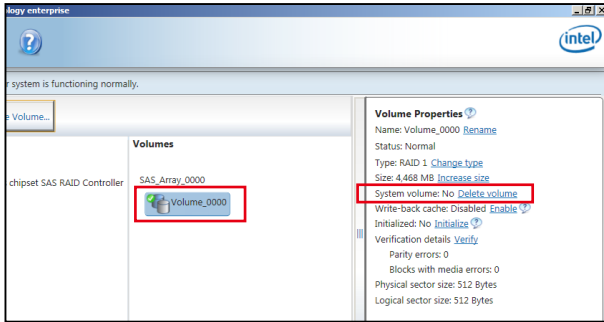
6.3.3 Deleting a volume



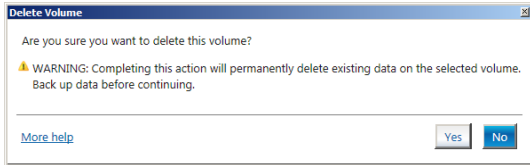
Be cautious when deleting a volume. You will lose all data on the hard disk drives. Before you proceed, ensure that you back up all your important data from your hard drives.

To delete a volume:

1. From the **Volumes** field in the utility main menu, select the volume that you want to delete.



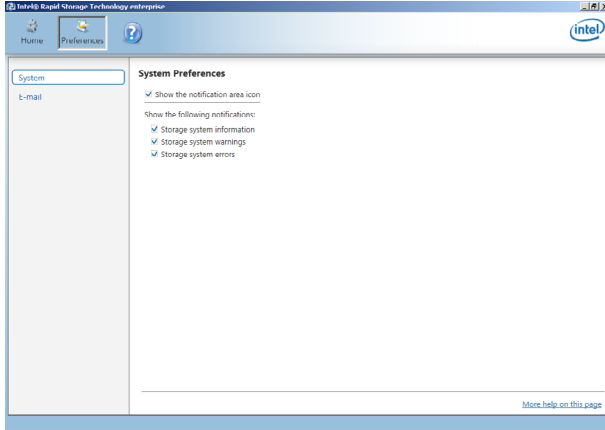
2. From the **Volume Properties** field, select **Delete volume**.
3. Click **Yes** to delete the volume and return to the utility main menu, or click **No** to return to the main menu.



6.3.4 Preferences

System Preferences

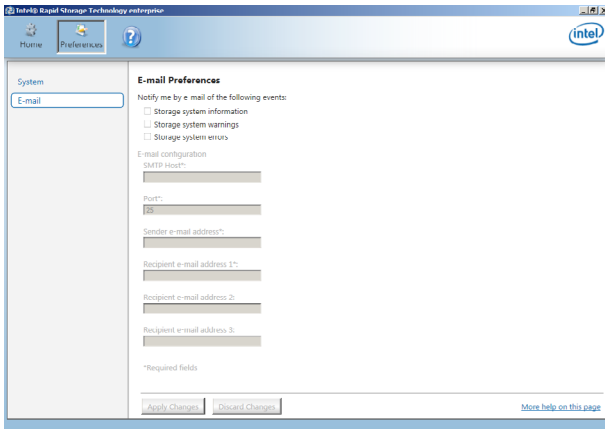
Allow you to set to show the notification area icon and show system information, warning, or errors here.



E-Mail Preferences

Allow you to set to sent e-mail of the following events:

- Storage system information
- Storage system warnings
- Storage system errors



Driver Installation

7

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

7.1 RAID driver installation

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

7.1.1 Creating a USB flash drive with RAID driver

When installing Windows® Server OS, you can load the RAID driver from a USB flash drive. You can create a USB flash drive with RAID driver in Windows by copying the files from the support DVD to the USB flash drive.

To copy the RAID driver to a USB flash drive in Windows environment:

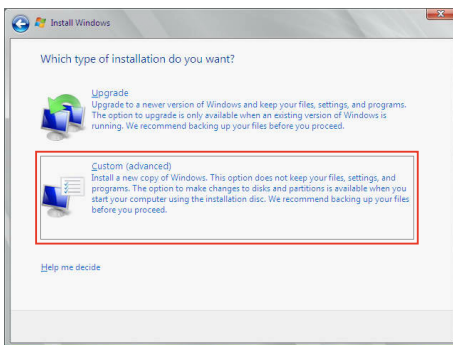
1. Place the motherboard support DVD in the optical drive.
2. Connect a USB flash drive to your system.
3. Click on the optical drive to browse the contents of the support DVD.
4. Click **Drivers > C23x INTEL RAID > Driver > Windows** and then copy the **SATA_RAID** driver folder to the USB flash drive.

7.1.2 Installing the RAID controller driver

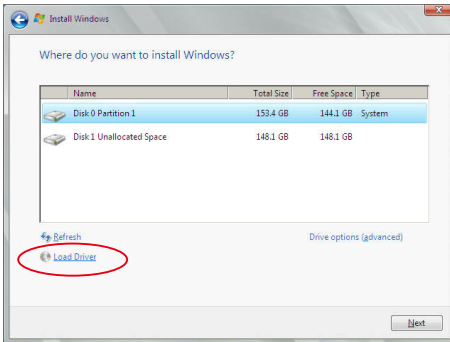
During Windows® Server 2008 R2 OS installation

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

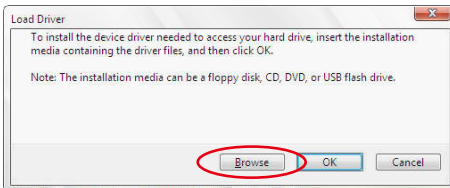
1. Boot the computer using the Windows® Server 2008 R2 OS installation disc. Follow the screen instructions to start installing Windows Server 2008 R2.
2. When prompted to choose a type of installation, click **Custom (advanced)**.



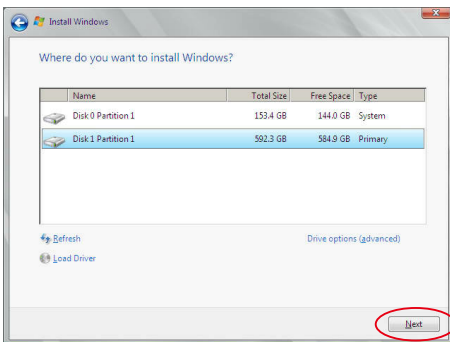
3. Click **Load Driver**.



4. A message appears, reminding you to insert the installation media containing the driver of the RAID controller driver. If you have only one optical drive installed in your system, eject the Windows OS installation disc and replace with the motherboard Support DVD into the optical drive. Click **Browse** to continue.



5. Locate the driver in the corresponding folder of the Support DVD then click **OK** to continue.
6. Select the RAID controller driver you need from the list and click **Next**.
7. When the system finishes loading the RAID driver, replace the motherboard Support DVD with the Windows Server installation disc. Select the drive to install Windows and click **Next**.



8. Setup then proceeds with the OS installation. Follow screen instructions to continue.

7.2 Management applications and utilities installation

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



- The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website (www.asus.com) for the latest updates on software and utilities.
- The support DVD is supported on Windows® Server 2008 R2 and Windows® Server 2012.

7.3 Running the Support DVD

When you place the support DVD into the optical drive, the DVD automatically displays the main screen if Autorun is enabled in your computer. By default, the Drivers tab is displayed.



If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file **ASSETUP.EXE** from the **BIN** folder. Double-click the **ASSETUP.EXE** to run the support DVD.

The main screen of the Support DVD contains the following tabs:

1. Drivers
2. Utilities
3. Manual
4. Contact



The main screen of the Support DVD looks exactly the same on the Windows® Server 2008 R2 and on the Windows® Server 2012 Operating System (OS).

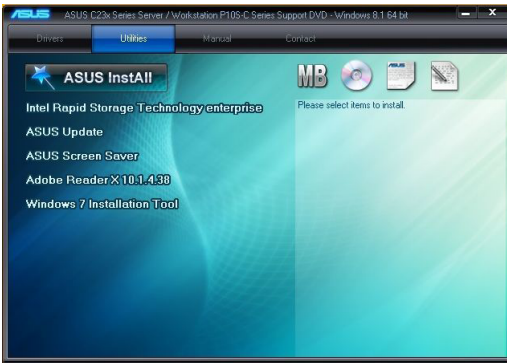
7.3.1 Drivers menu tab

The Drivers Menu shows the available device drivers if the system detects installed devices. Install the necessary drivers to activate the devices.



7.3.2 Utilities menu tab

The Utilities menu displays the software applications and utilities that the motherboard supports.



7.3.3 Manual menu tab

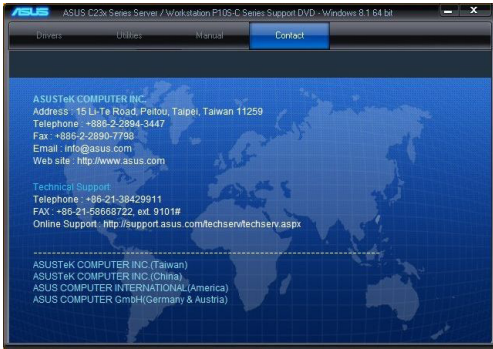


You need an internet browser installed in your OS to view the User Guide.



7.3.4 Contact information menu

The Contact menu displays the ASUS contact information, e-mail addresses, and useful links if you need more information or technical support for your motherboard.



7.4 Installing the Intel® Chipset device Software driver

This section provides the instructions on how to install the Intel® chipset device software on the system. You need to manually install the Intel® chipset device software on a Windows® Operating System. To install the Intel® chipset device software on Windows® Server 2008 R2:

1. Restart the computer.
2. Log in with **Administrator** privileges.
3. Insert the Motherboard Support DVD to the optical drive.

The support DVD automatically displays the **Drivers** menu if Autorun is enabled in your computer.

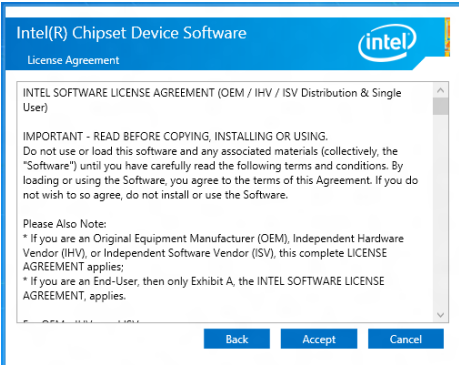


If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file **ASSETUP.EXE** from the **BIN** folder. Double-click the **ASSETUP.EXE** to run the support DVD.

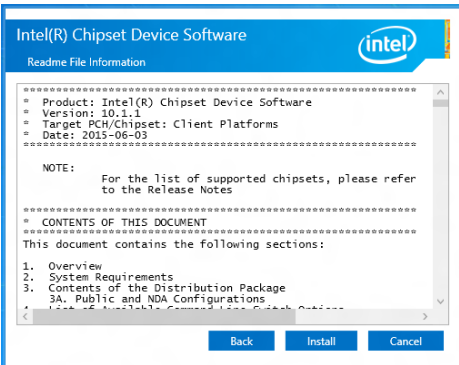
4. Click **Intel® Chipset Device Software** from the Drivers menu to start the installation.
5. The **Intel(R) Chipset Device Software** window appears. Click **Next** to start installation.



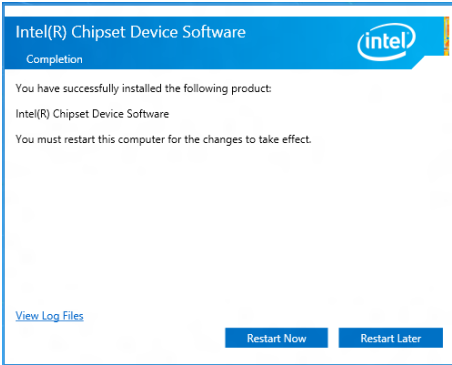
- 6. Select **Yes** to accept the terms of the **License Agreement** and continue the process.



- 7. Read the **Readme File Information** and press **Install** to continue the installation.



8. Press **Restart Now** to complete the setup process.



7.5 Installing the Intel® I210 Gigabit Adapters driver

This section provides the instructions on how to install the **Intel® I210 Gigabits Adapter Driver** on the system.

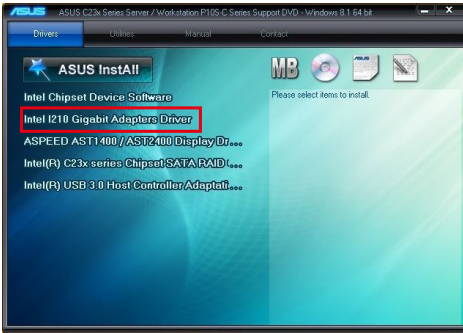
To install the **Intel® I210 Gigabit Adapters Driver** on the Windows® operating system:

1. Restart the computer.
2. Log on with **Administrator** privileges.
3. Insert the motherboard/system support DVD to the optical drive.

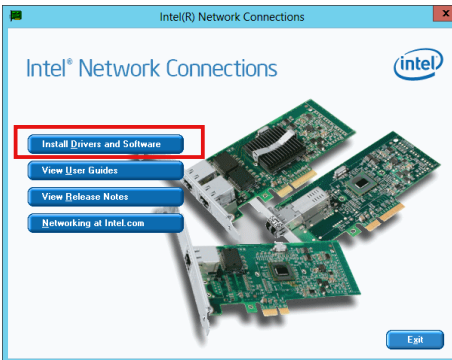


If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file **ASSETUP.EXE** from the **BIN** folder. Double-click the **ASSETUP.EXE** to run the support DVD.

4. Click **Intel® I210 Gigabit Adapters Drivers** in the **Drivers** menu of the main screen to start the installation.



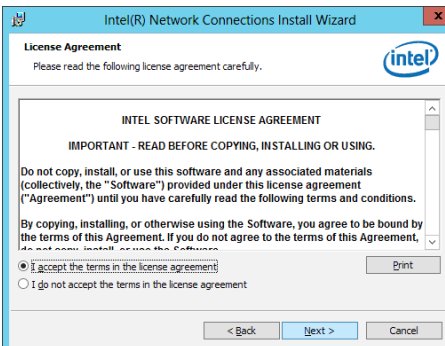
5. Click **Install Drivers and Software** option to begin installation.



- Click **Next** when the **Intel(R) Network Connections–InstallShield Wizard** window appears.



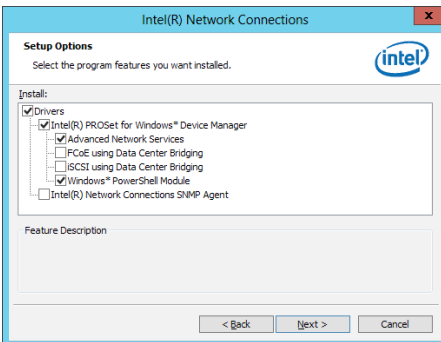
- Tick **I accept the terms in the license agreement** and click **Next** to continue.



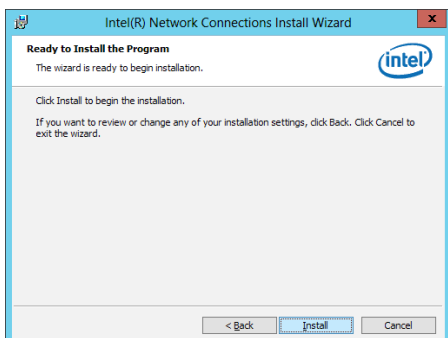
- From the **Setup Options** window, click **Next** to start the installation.



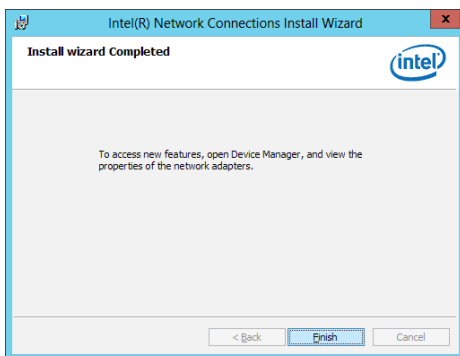
By default, **Intel(R) PROSet for Windows Device Manager** and **Windows PowerShell Module** are ticked.



9. Click **Install** to start the installation.



10. When the installation is done, press **Finish** to complete the installation.



7.6 Installing the VGA driver

This section provides the instructions on how to install the **ASPEED Video Graphics Adapter (VGA)** driver.

To install the **ASPEED VGA** driver:

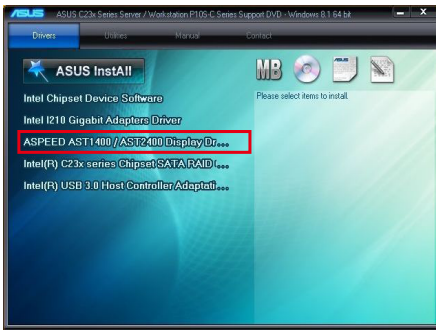
1. Restart the computer.
2. Log in with **Administrator** privileges.
3. Insert the Motherboard Support DVD to the optical drive.

The support DVD automatically displays the **Drivers** menu if Autorun is enabled in your computer.



If Autorun is **NOT** enabled in your computer, browse the contents of the support DVD to locate the file **ASSETUP.EXE** from the **BIN** folder. Double-click the **ASSETUP.EXE** to run the support DVD.

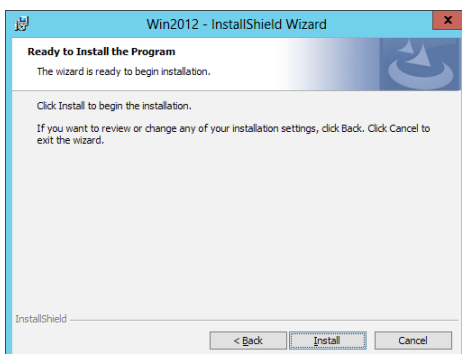
4. From the **Main Menu**, click **ASPEED AST1400/AST2400 Display Driver** on the **Drivers** tab to start the installation.



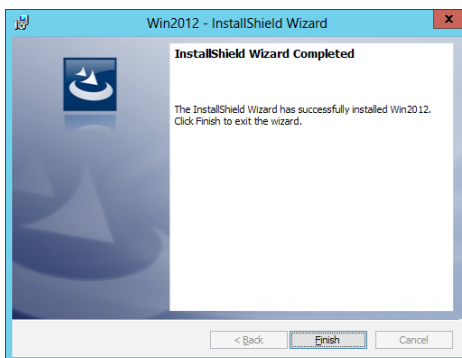
5. From the installation window, click **Next** to start the installation.



6. Click **Install** to proceed with the installation.



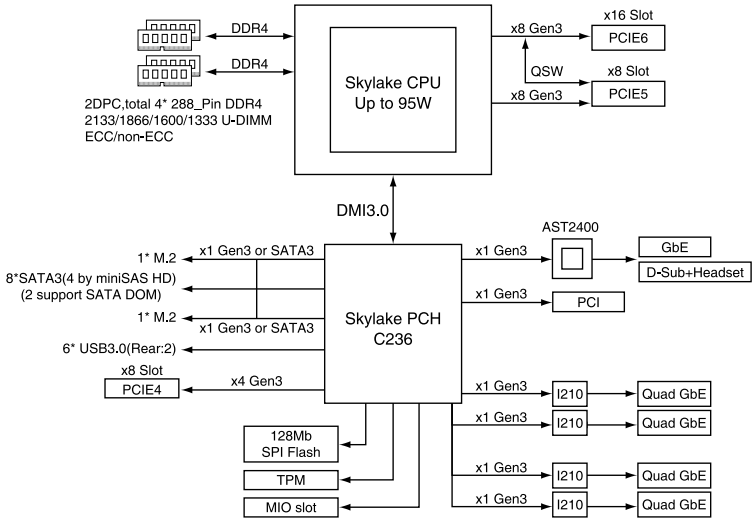
7. Click **Finish** to complete the installation.



Appendix

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

P10S-E/4L block diagram



ASUS contact information

ASUSTeK COMPUTER INC.

Address 4F, No. 150, Li-Te Rd., Peitou, Taipei 112, Taiwan
Telephone +886-2-2894-3447
Fax +886-2-2890-7798
Web site <https://www.asus.com>

Technical Support

Telephone +86-21-38429911
Fax +86-21-58668722 ext: 9101
Online Support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=en>

ASUSTeK COMPUTER INC. (Taiwan)

Address 4F, No. 150, Li-Te Rd., Peitou, Taipei 112, Taiwan
Telephone +886-2-2894-3447
Fax +886-2-2890-7798
Web site <https://www.asus.com/tw/>

Technical Support

Telephone +886-2-2894-3447 (0800-093-456)
Online Support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=zh-tw>

ASUSTeK COMPUTER INC. (China)

Address No. 5077, Jindu Road, Minhang District, Shanghai, China
Telephone +86-21-5442-1616
Fax +86-21-5442-0099
Web site <https://www.asus.com.cn>

Technical Support

Telephone +86-20-2804-7506 (400-620-6655)
Online Support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=zh-cn>

ASUS contact information

ASUS COMPUTER INTERNATIONAL (America)

Address 800 Corporate Way, Fremont, CA 94539, USA
Fax +1-510-608-4555
Web site <https://www.asus.com/us/>

Technical Support

Support fax +1-812-284-0883
General support +1-812-282-2787
Online support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=en-us>

ASUS COMPUTER GmbH (Germany and Austria)

Address Harkort Str. 21-23, 40880 Ratingen, Germany
Fax +49-2102-959911
Web site <https://www.asus.com/de/>

Technical Support

Telephone +49-1805-010923
Support Fax +49-2102-959911
Online support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=de-de>

ASUS Czech Service s.r.o. (Europe)

Address Na Rovince 887, 720 00 Ostrava – Hrabová,
Czech Republic
Telephone +420-596766888
Web site <https://www.asus.com/cz/>

Technical Support

Telephone +420-596-766-891
Fax +420-596-766-329
E-mail advance.rma.eu@asus.com
Online Support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=cs-cz>

ASUS contact information

ASUS Holland BV (The Netherlands)

Address Marconistraat 2, 7825GD EMMEN, The Netherlands
Web site <https://www.asus.com/nl/>

Technical Support

Telephone +31-(0)591-5-70292
Fax +31-(0)591-666853
E-mail advance.rma.eu@asus.com
Online Support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=nl-nl>

ASUS Polska Sp. z o.o. (Poland)

Address Ul. Postępu 6, 02-676 Warszawa, Poland
Web site <https://www.asus.com/pl/>

Technical Support

Telephone +48-225718033
Online Support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=pl-pl>

ASK-Service (Russia and CIS)

Address г.Москва, ул. Орджоникидзе, д.10, Россия
Telephone (495) 640-32-75
Web site <https://www.asus.com/ru/>

Technical Support

Telephone 008-800-100-ASUS (008-800-100-2787)
Online Support <https://www.asus.com/support/Product/ContactUs/Services/questionform/?lang=ru-ru>

