ESC500 G4 SFF

Workstation
User Guide

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Notices

Federal Communications Commission Statement

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

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

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

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

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

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This Class B digital apparatus complies with Canadian ICES-003.

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

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, contact a qualified service technician or your dealer. 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 service.

- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your dealer.

Operation Safety

- Servicing of this product or units is to be performed by trained service personnel only.

- Before operating the server, carefully read all the manuals included with the server package.

- Before using the server, make sure 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.

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 workstation, including sections on front panel and rear panel specifications.

2. **Chapter 2: Hardware Setup**

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

3. **Chapter 3: Motherboard Information**

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

4. **Chapter 4: BIOS Setup**

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

5. **Chapter 5: RAID Configuration**

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

Conventions used in this guide

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

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

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

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

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

Typography

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

References

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

1. ASUS websites

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

1

Product Introduction

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

1.1 System package contents

Check your system package for the following items.

Model Name	ESC500 G4 SFF
Accessories	1 x DisplayPort to VGA Dongle (default for Taiwan, optional for other regions) 1 x ESC500 G4 SFF Support CD 1 x Windows 10 Recovery DVD (for OS bundled SKU) 1 x Windows 7 Recovery DVD (for OS bundled SKU) 1 x AC Power Cable 1 x VGA Support CD (for Windows 10) 1 x VGA Support CD (for Windows 7)
Optional Items	Smart Card Reader Anti-Virus CD pack

> 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 xxS0xxxxxxxx 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 ESC500 G4 SFF specifications summary

The ASUS ESC500 G4 SFF is a workstation featuring the ASUS P10S-M WS Workstation board.

Processor / System Bus		1 x Socket LGA1151
		Intel® Xeon® E3-1200 v5/v6 Processor Family
		Intel® 7th/6th Generation Core™ i7/i5/i3 processors
		Intel® 7th/6th Generation Pentium™ processors
		Intel® 7th/6th Generation Celeron™ processors
Core Logic		Intel® C236 Chipset
Memory	**Total Slots**	4 (2-channel per CPU, 4 DIMM per CPU)
	Capacity	Maximum up to 64GB (UDIMM)
	Memory Type	4 x DIMM, Max 64GB, DDR4 2133/2400 MHz, ECC/ non-ECC UDIMM
		* **Refer to ASUS server AVL for the latest update**
		** **Memory frequency supported depends on the CPU installed**
	Memory Size	4GB, 8GB, 16GB (UDIMM)
Expansion Slots	**Total PCI/PCI-X /PCI-E Slots**	3
	Slot Type	PCIEX1_1: PCI-E x1 slot, x1 Gen3 Link, from PCH
		PCIEX16_1: PCI-E x16 slot, x16 Gen3 Link
		PCIEX8_1: PCI-E x8 slot, x4 Gen3 Link, from PCH
Disk Controller	**SATA Controller**	**Intel® C236 Chipset:**
		8 x SATA 6Gb/s ports or
		7 x SATA 6Gb/s with 1 x M.2 (SATA 6Gb/s & PCI-E Gen3 x4 link, NGFF 22110/2280/2260/2242)
		Intel® RSTe (Windows & Linux)
		(Support software RAID 0, 1, 10 & 5)
Storage Bays	**I = internal A or S will be hot-swappable**	2 x Internal 3.5" HDD Bays (Or switch to 2 x internal 2.5" SSD with cage by requests)
Networking	**LAN**	2 x Intel® I210 GbE LAN
Graphic	**VGA**	Integrated Graphics Processor x 1
		Multi-VGA output support: DVI-D/HDMI/DisplayPort
		- Supports DVI-D with Max resolution 1920 x 1200@60 Hz
		- Supports HDMI with Max resolution 4096 x 2160@60/24 Hz
		- Supports DisplayPort with Max resolution 4096 x 2304@60 Hz
		- Supports Intel® HD Graphics, InTru™ 3D, Quick Sync Video, Clear Video HD Technology, Insider™
		- Maximum shared memory of 512MB
Auxiliary Storage Device Bay (Floppy / Optical Drive)		1 x 5.25" media bays
		(Options: No DVD-ROM/DVD-RW)

ESC500 G4 SFF specifications summary

Rear I/O	2 x USB 3.0 ports
	2 x USB 2.0 ports
	1 x Optical S/PDIF Out
	1 x HDMI
	1 x DisplayPort
	2 x RJ-45 ports
	1 x DVI-D
	1 x 8-channel Audio I/O ports (6 x Audio jacks)
	1 x USB Flashback button
Front I/O	2 x USB 3.0 ports
	2 x USB 2.0 ports
Onboard I/O	1 x M.2 Socket (Support SATA 6Gb/s & PCIE Gen3 x 4 link, NGFF 22110/2280/2260/2242)
	1 x TPM header
OS Support	Windows 10
	Windows 7 32bit/64bit
	* Refer to http://www.asus.com/ for the latest OS support.
Dimension (HH x WW x DD)	410 mm x 96 mm x 330 mm
Net Weight Kg (CPU, DRAM & HDD not included)	6 Kg
Power Supply	- 250W 80PLUS Single Power Supply, (100-240Vac, 6-3A, 50/60Hz, Class I)
Environment	Operating temperature: 10°C ~ 35°C
	Non operating temperature: -40°C ~ 70°C
	Non operating humidity: 20% ~ 90% (Non condensing)

Specifications are subject to change without notice.

1.4 Front panel features

The ESC500 G4 SFF workstation features a simple yet stylish front panel design. The power and reset buttons, optical drive, and USB ports are all conveniently located at the front panel for easy access.

Card readers (Optional)

Optical Drive (Optional)

Headphone port

Microphone port

USB 2.0 ports

HDD access LED

Power LED

USB 3.0 ports

Reset button

Power button
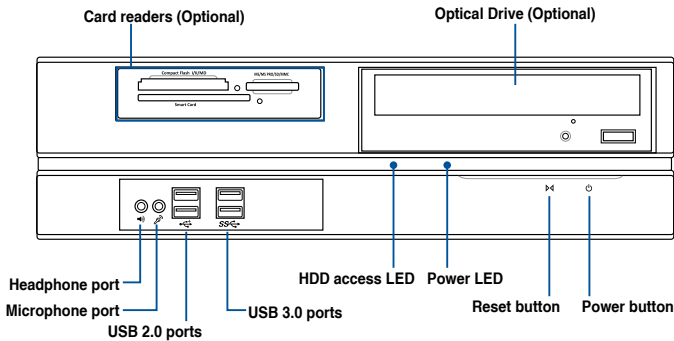
1.5 Rear panel features

The rear panel includes a slot for the motherboard rear I/O ports, expansion slots, and the power supply module.

Power connector

Expansion slots

Single power supply

DVI-D port

USB 2.0 ports

HDMI 1.4b port

DisplayPort

USB 3.0 ports

BIOS Flashback button

Optical S/PDIF Out port

Intel® LAN port 1 and 2

Audio ports
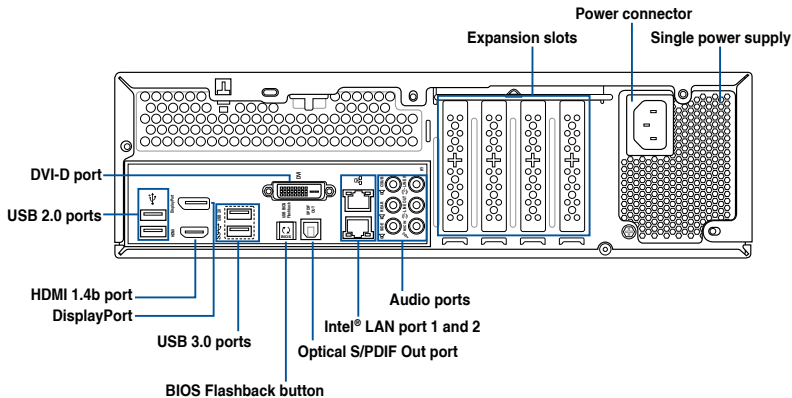
Refer to **1.7 LED Information** for the LED descriptions.

1.6 Internal features

The ASUS ESC500 G4 SFF Pedestal server system includes the basic components as shown:
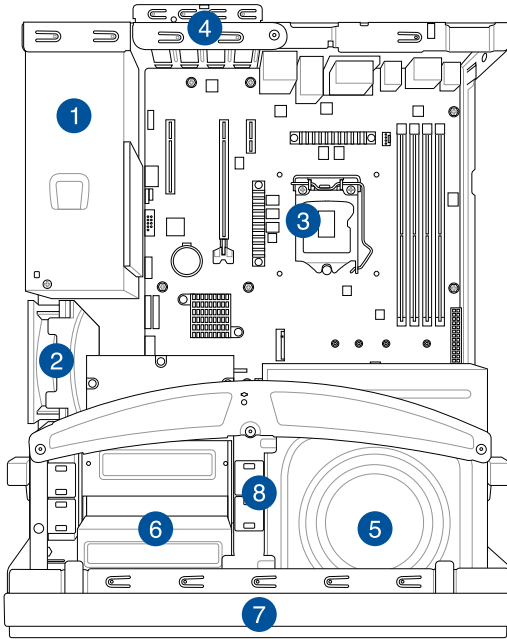
1. Power supply unit

2. System fan

3. ASUS P10S-M WS Workstation Board

4. Expansion card locks

5. Optical drive (Optional)

6. Card readers (Optional)

7. Front I/O board (hidden)

8. 2 x 3.5-inch Internal HDD bays (hidden)

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

WARNING
HAZARDOUS MOVING PARTS
KEEP FINGERS AND OTHER BODY PARTS AWAY

1.7 LED information

1.7.1 Front panel LEDs

HDD Access LED (hidden)   Power LED (hidden)
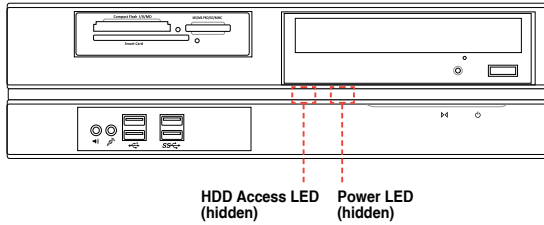
LED	Color	Display status	Description
Power LED	Blue	ON	System power ON
HDD Access LED	Orange	OFF Blinking	No activity Read/write data into the HDD

1.7.2 Rear panel LEDs
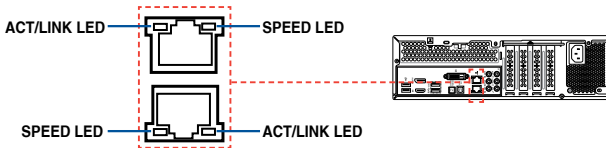
ACT/LINK LED   SPEED LED

SPEED LED   ACT/LINK LED

ACT/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

Hardware Setup

2

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

2.1 Chassis cover

2.1.1 Removing the chassis cover

- Ensure that you unplug the power cord before removing the chassis cover.

- Take extra care when removing the chassis 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.

- The images of the workstation shown in this section are for reference purposes only and may not exactly match the model you purchase.

To remove the chassis cover:

1. Remove the four (4) screws that secure the chassis cover.

2. Slightly pull the chassis cover toward the rear just enough to detach it from the chassis, then lift to remove the chassis cover.
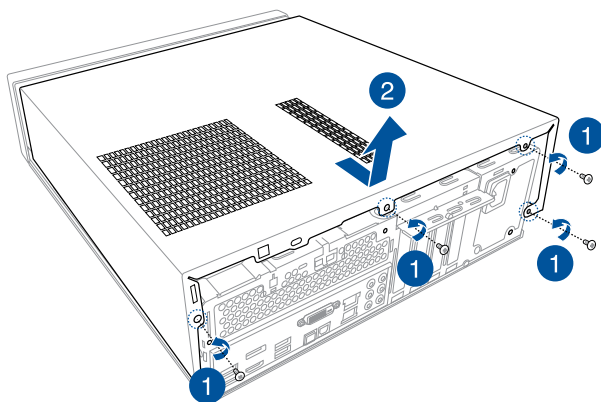
2.2 CPU installation

The motherboard comes with a surface mount LGA1151 socket designed for the 7th/6th Generation Intel® Core™ i7 / Intel® Core™ i5 / Intel® Core™ i3, Pentium®, Celeron®, and Intel® Xeon® E3-1200 v6/v5 processors.
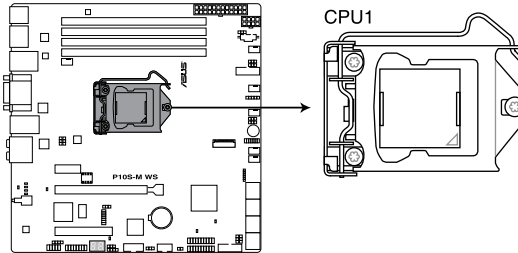
P10S-M WS Series CPU LGA1151

Ensure that you install the correct CPU designed for LGA1151 socket only. DO NOT install a CPU designed for other sockets on the LGA1151 socket.

- Ensure that all power cables are unplugged before installing the CPU.

- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.

- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1151 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.

1 Load lever
A
B
Retention tab

2 Load plate

3 CPU notches
Gold triangle mark
Alignment key
Alignment key

4 Load lever
C
A
B
Retention lock

5 Load lever
Retention tab
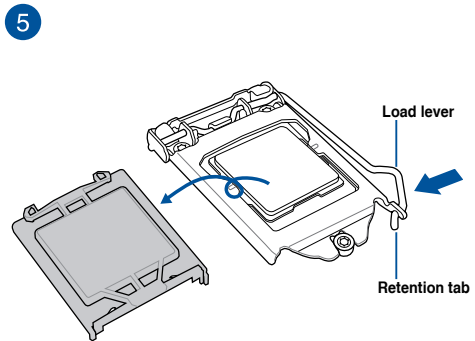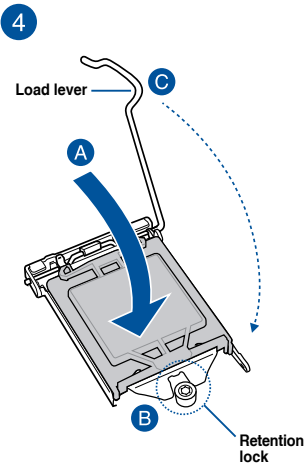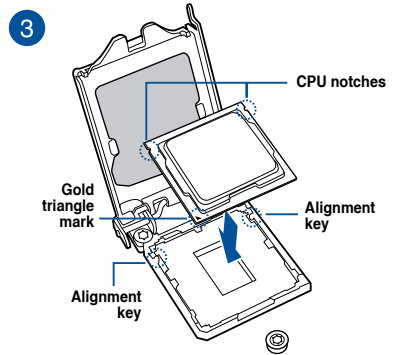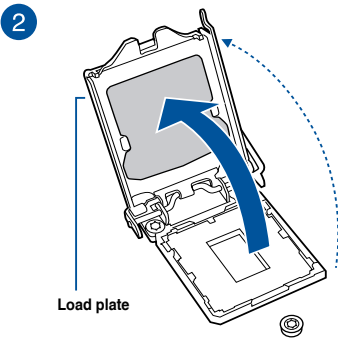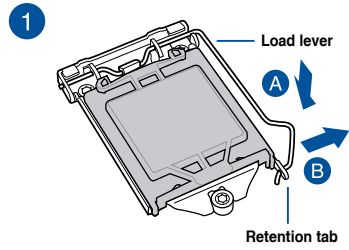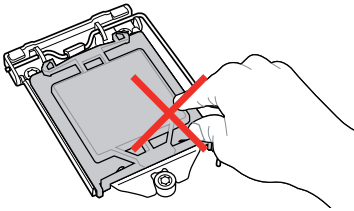
2.3 CPU heatsink and fan assembly installation
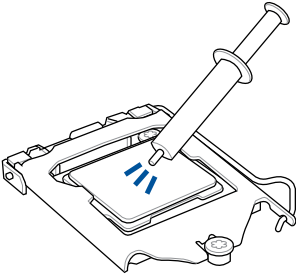
Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan, if necessary.

To install the CPU heatsink and fan assembly
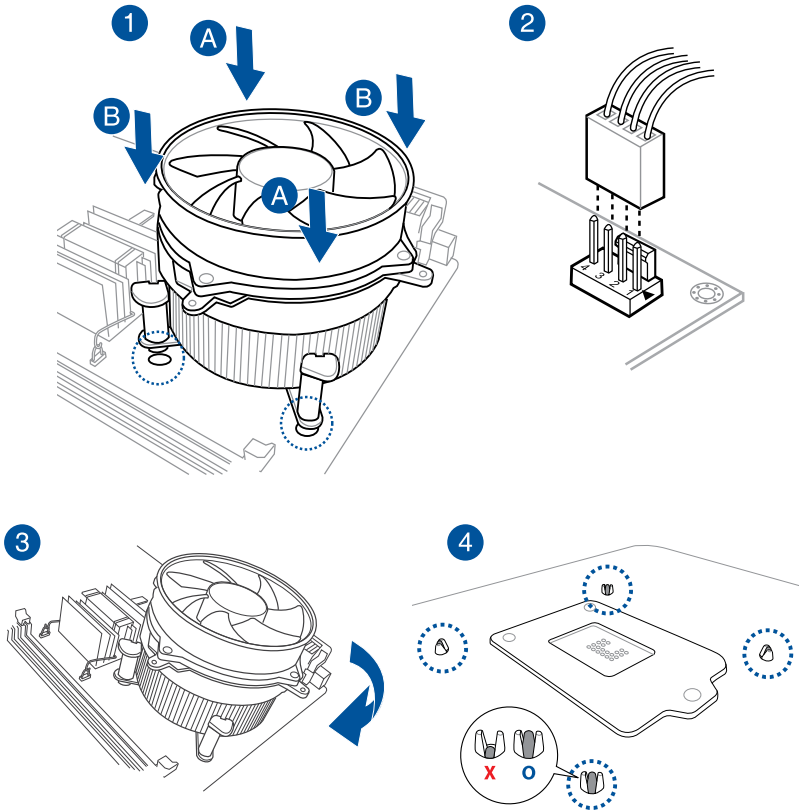
2.4   System memory

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

> 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.
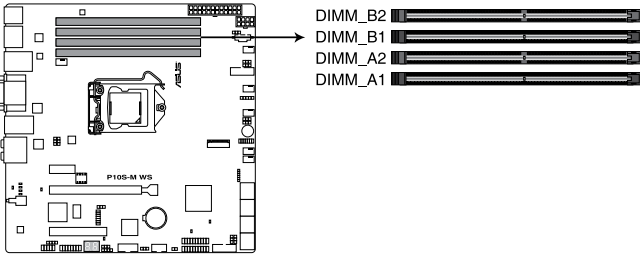
P10S-M WS Series 288-pin DDR4 DIMM sockets

Recommended memory configurations
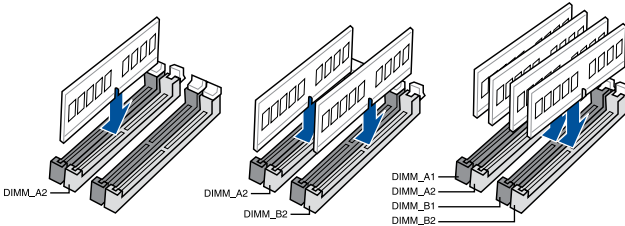
Memory configurations

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	up to 2400	Single Rank, Dual Rank
2	2	Unbuffered DDR4	up to 2400	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 (Gray).

2.4.1   DIMM installation
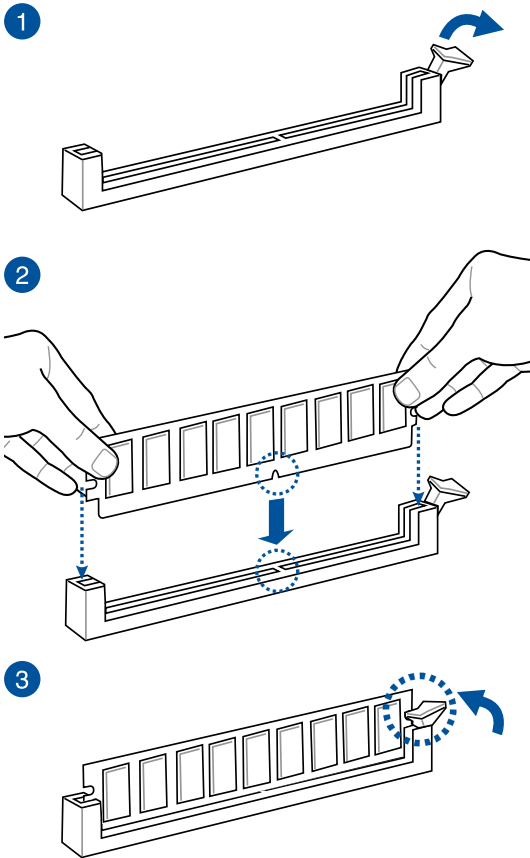
To remove a DIMM
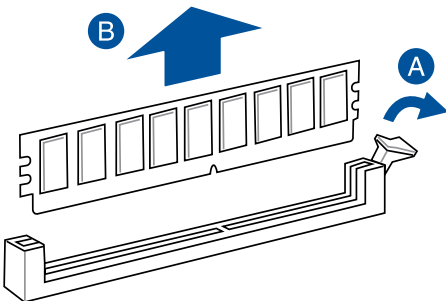
2.5 Assembly module

Before you can install a 5.25-inch drive, card reader, and 3.5" HDD, you should first remove the front panel cover and assembly module.

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!

2.5.1 Removing the assembly module

To remove the assembly module:

1. Locate the front panel cover latches and lift both latches gently to remove the front panel cover.
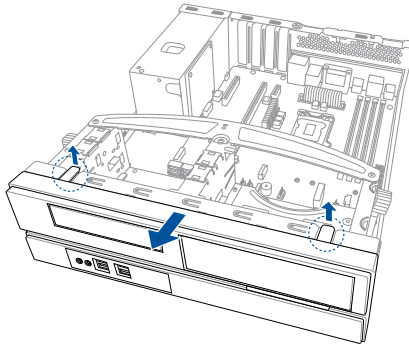
2. Pull the assembly module lock towards the front (A) to release the assembly module from the chassis, then lift the assembly module to remove it (B).
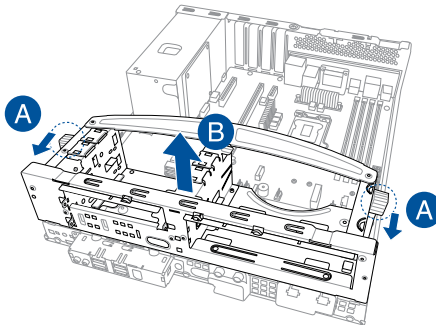
2.5.2   Replacing the assembly module and front cover

To replace the assembly module and front panel cover:

1.   Align the assembly module with the chassis and insert it into the chassis.
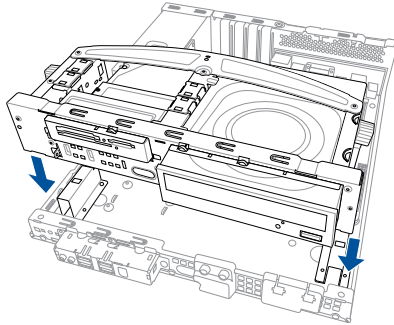
2.   Push the assembly module lock towards the rear ton secure the assembly module.
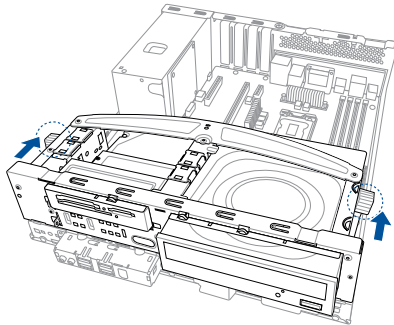
3.   Align the front panel cover to the chassis and replace the front panel cover. Ensure the front panel cover latches are secure.
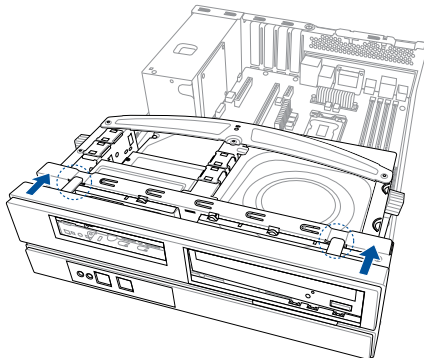
2.6   5.25-inch drive

To install a 5.25-inch drive to the assembly module:

1. Remove the assembly module from the chassis. Refer to *2.5.1 Removing the assembly module* for more information.

2. Insert and carefully push the drive into the bay until its screw holes align with the holes on the bay.
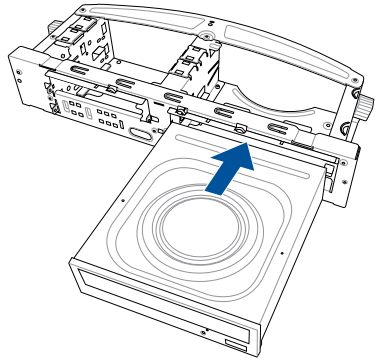
3. Secure the 5.25-inch drive with two (2) screws into the screw holes on the left side of the assembly module.
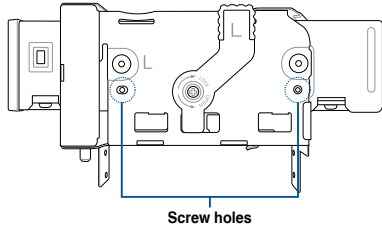
Screw holes

4. Connect the SATA cable to the SATA connector of the drive.

5. Connect a SATA power cable from the power supply to the power connector of the drive.

6. Reinstall the assembly module and front panel cover. Refer to *2.5.2 Replacing the assembly module and front cover* for more information.
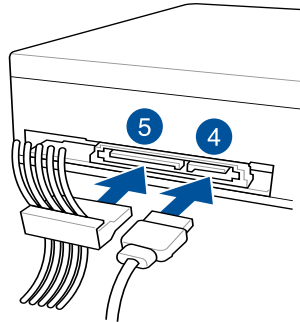
2.7 Card reader

To install a card reader to the assembly module:

1. Remove the assembly module from the chassis. Refer to *2.5.1 Removing the assembly module* for more information.

2. Insert and carefully push the card reader into the bay until its screw holes align with the holes on the bay.
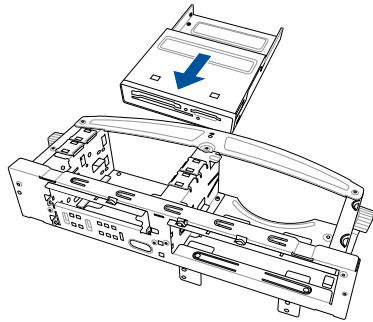
3. Secure the card reader with two (2) screws into the screw holes on the right side of the assembly module, and one (1) screw on the left side of the assembly module.

Screw holes
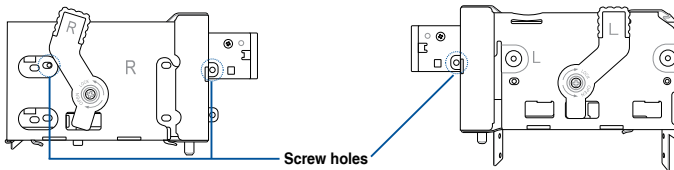
4. Connect the connector to the bundled USB 3.0 cable, then connect the USB 3.0 cable to the USB3_34 connector on the motherboard.
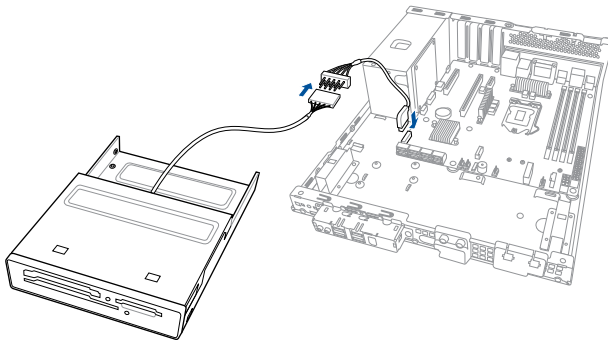
Refer to section **3.4 Internal connectors** for the location of the USB3_34 connector.

2.8   Hard disk drives (HDD)

The server system supports two (2) 3.5-inch Serial ATA hard disk drives via the assembly module.

To install a 3.5-inch Serial ATA hard disk drive to the right HDD bay:

1.   Remove the assembly module from the chassis. Refer to *2.5.1 Removing the assembly module* for more information.

2.   Insert and carefully push the HDD into the bay until its screw holes align with the holes on the bay.
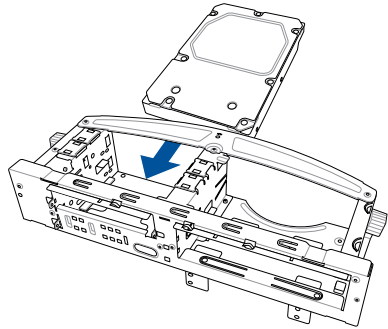
3.   Secure the HDD with two (2) screws into the screw holes on the right side of the assembly module.
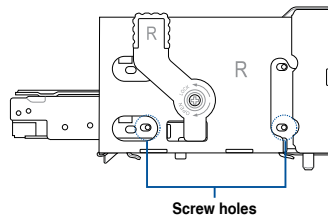
Screw holes

4.   Connect the SATA cable to the SATA connector of the drive.

5.   Connect a SATA power cable from the power supply to the power connector of the drive.

6.   Reinstall the assembly module and front panel cover. Refer to *2.5.2 Replacing the assembly module and front cover* for more information.
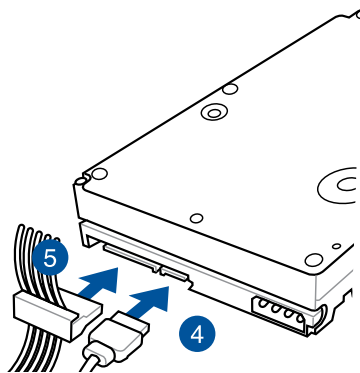
To install a 3.5-inch Serial ATA hard disk drive to the left HDD bay:

1.   Remove the assembly module from
      the chassis. Refer to *2.5.1 Removing
      the assembly module* for more
      information.

2.   Insert and carefully push the HDD
      into the bay until its screw holes align
      with the holes on the bay.
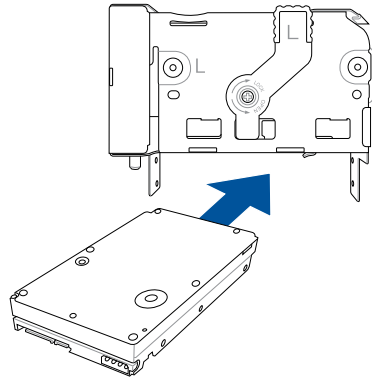
3.   Secure the HDD with four (4) screws
      into the screw holes shown in the
      illustration.
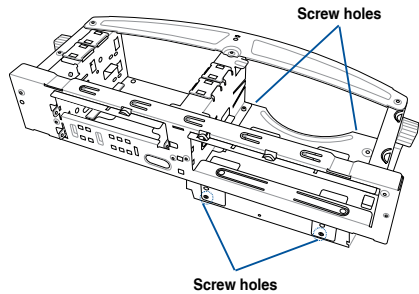
Screw holes

Screw holes

4.   Connect the SATA cable to the
      SATA connector of the drive.

5.   Connect a SATA power cable from
      the power supply to the power
      connector of the drive.

6.   Reinstall the assembly module and
      front panel cover. Refer to *2.5.2
      Replacing the assembly module and
      front cover* for more information.
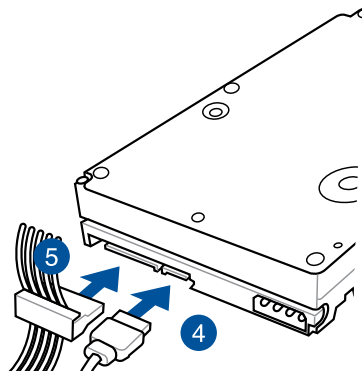
2.9 Expansion slots

⚠️ Unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.
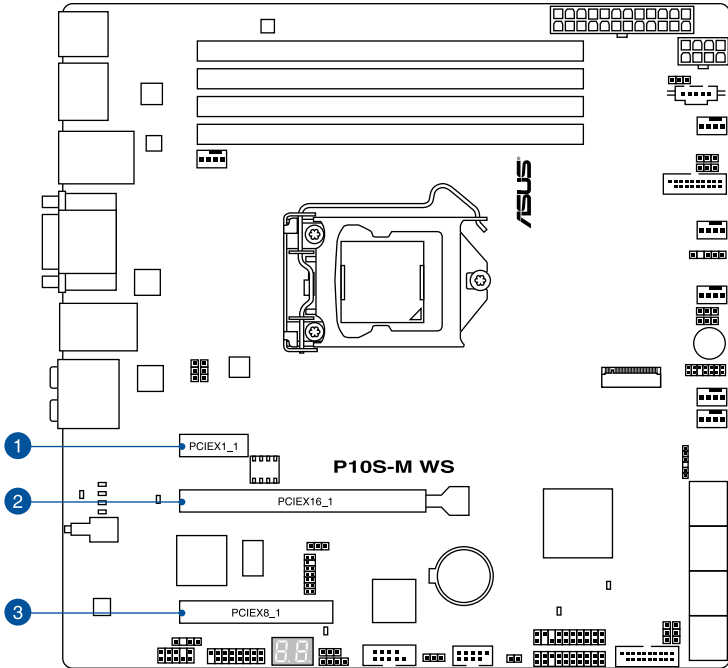
Slot No.	Slot Description
1	PCIE 3.0 x1_1 slot
2	PCIE 3.0 x16_1 slot
3	PCIE 3.0 x8_1 slot (max at x4 mode)

2.9.1   Installing an expansion card

To install an expansion card:

1.   Remove the screw from the metal bracket lock.
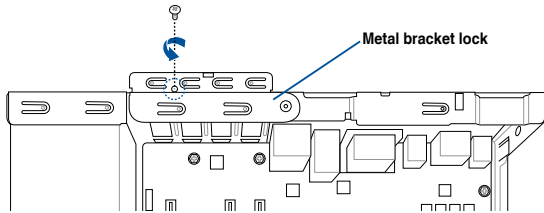
Metal bracket lock

2.   Push the metal bracket lock outwards (A), then remove the metal bracket (B).
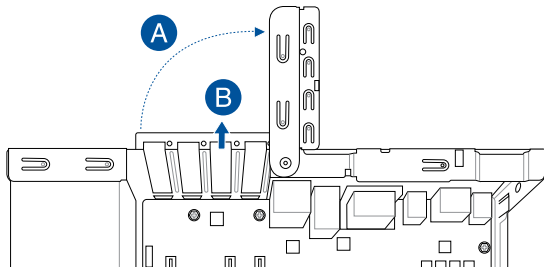
3.   Align and insert the expansion card into the PCI-E slot, then secure it with a screw.

Expansion card

PCI-E slot
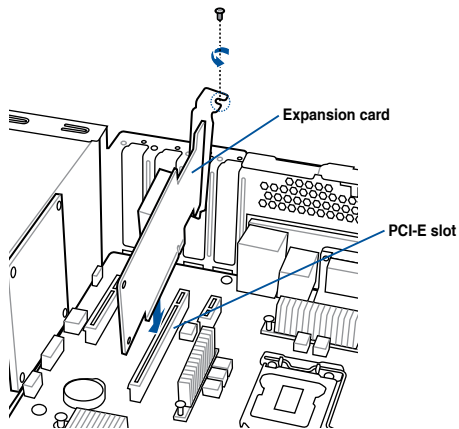
4.   Push the metal bracket lock back and secure it with the screw removed previously.

2.9.2   Installing M.2 (NGFF) cards

To install an M.2 card:

1.   Locate the M.2 connector (NGFF1) on the motherboard.

2.   Remove the screw on the stand screw.

3.   Prepare the M.2 card.

4.   Align and insert the M.2 card into the M.2 connector (NGFF1).

5.   Secure the M.2 card with the screw you removed in step 2.
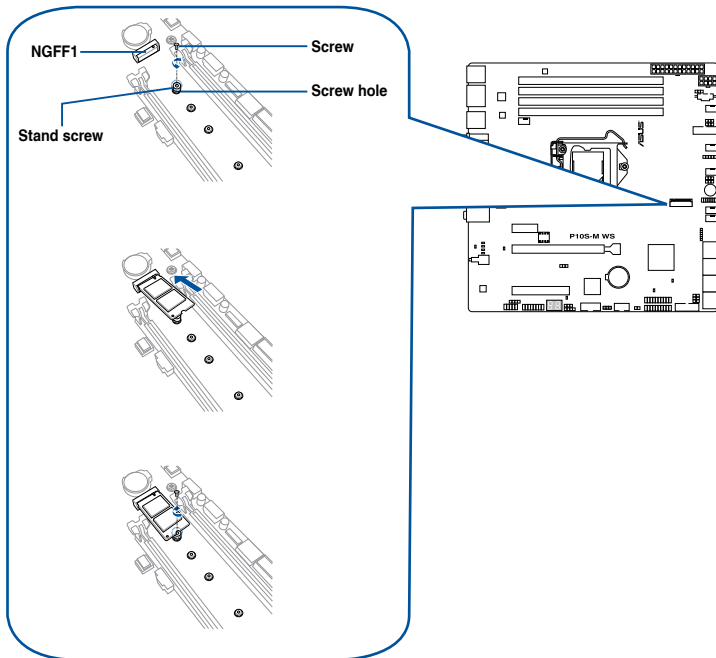
> • Please pay attention when removing the screw, the stand screw might be removed together with it.
>
> • Ensure that the M.2 card is positioned between the screw and the stand screw before securing it.

2.10   System fan

This section describes how to remove the system fan in the event that you need to install or remove previously installed or new system components, or when the system fan needs to be replaced because it was damaged or became defective.

To remove the system fan:

1.   Disconnect the system fan cable from the FRNT_FAN4 connector on the motherboard.
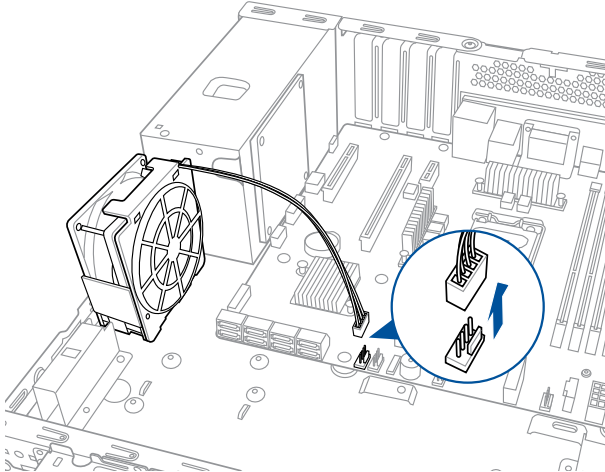
2.   Slide the system fan away from the power supply unit, then lift the system fan to remove it from the chassis.

Power supply unit
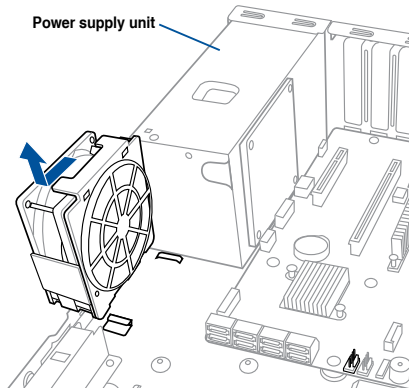
Follow the previous instructions in reverse order if you want to reinstall the system fan.

2.11   BIOS update utility

USB BIOS Flashback

USB BIOS Flashback allows you to easily update the BIOS without entering the existing BIOS or operating system. Simply insert a USB storage device to the USB port (the USB port hole marked in green on the I/O shield) then press the USB BIOS Flashback button for three seconds to automatically update the BIOS.

To use USB BIOS Flashback:

1.   Download the latest BIOS from the support site at www.asus.com/support/ and save it to as USB storage device.

> • We recommend you to use a USB 2.0 storage device to save the latest BIOS version for better compatibility and stability.
>
> • When downloading or updating the BIOS file, rename it as **P10SMWSI.CAP** for this motherboard.

2.   Insert the USB storage device to the USB Flashback port.

3.   Shut down your computer.

4.   Press the BIOS Flashback button for three seconds until the Flashback LED blinks three times, indicating that the BIOS Flashback function is working.

USB BIOS Flashback port   BIOS Flashback button
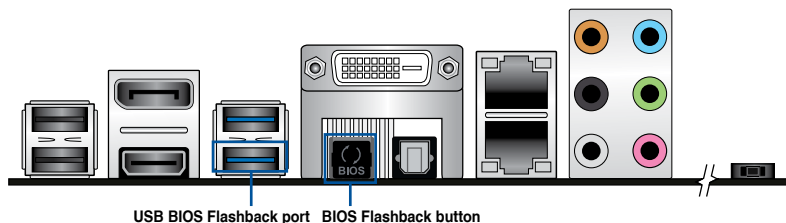
5.   Wait until the light goes out, indicating that the BIOS updating process is completed.

> For more BIOS update utilities in BIOS setup, refer to the section **4.1 Managing and updating your BIOS** in Chapter 4.

> • Do not unplug portable disk, power system, or press the CLR_CMOS button while BIOS update is ongoing, otherwise update will be interrupted. In case of interruption, please follow the steps again.
>
> • If the light flashes for five seconds and turns into a solid light, this means that the BIOS Flashback is not operating properly. This may be caused by improper installation of the USB storage device and filename/file format error. If this scenario happens, please restart the system to turn off the light.
>
> • Updating BIOS may have risks. If the BIOS program is damaged during the process and results to the system's failure to boot up, please contact your local ASUS Service Center.

2.12 Motherboard rear and audio connection

2.12.1 Rear I/O connection
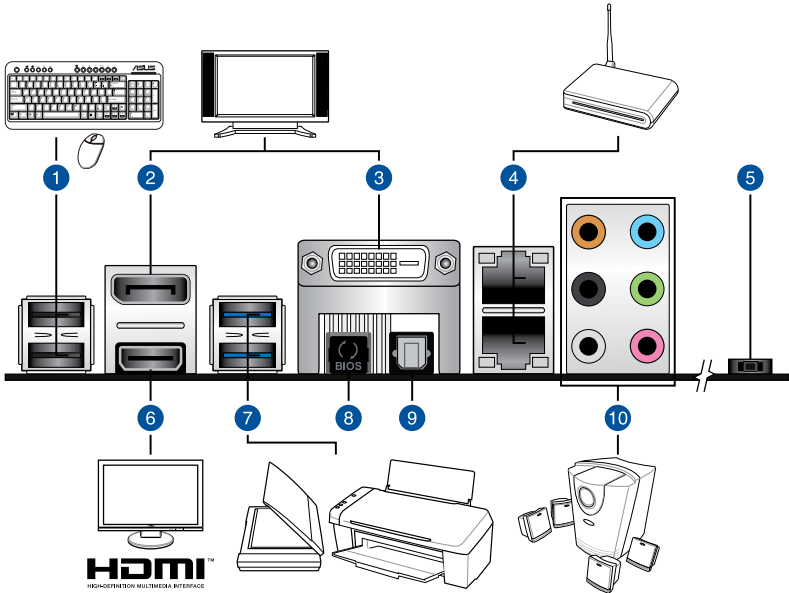
Rear panel connectors			
1.	USB 2.0 ports 12	6.	HDMI port
2.	DisplayPort	7.	USB 3.0 ports 56. Lower port supports USB BIOS Flashback function
3.	DVI-D port	8.	USB BIOS Flashback button
4.	Intel® LAN port (LAN12)*	9.	Optical S/PDIF Out port
5.	Power-on Button	10.	Audio I/O ports**

* and **: Refer to the tables on the next page for LAN port LEDs and audio port definitions.

- The plugged USB 3.0 device may run on xHCI mode or EHCI mode, depending on the operating system's setting.

- USB 3.0 devices can only be used as data storage only.

- We strongly recommend that you connect USB 3.0 devices to USB 3.0 ports for faster and better performance for your USB 3.0 devices.

* LAN ports 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

ACT/LINK LED   SPEED LED

SPEED LED   ACT/LINK LED
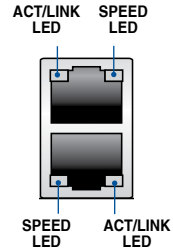
** Audio 2, 4, 6, or 8-channel configuration

Port	Headset 2-channel	4-channel	6-channel	8-channel
Light Blue	Line In	Line In	Line In	Line In
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	–	–	Center/Subwoofer	Center/Subwoofer
Black	–	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out
Gray	–	–	Side Speaker Out*	Side Speaker Out

2.12.2   Audio I/O connection

Audio I/O ports

orange — light blue
black — lime
gray — pink
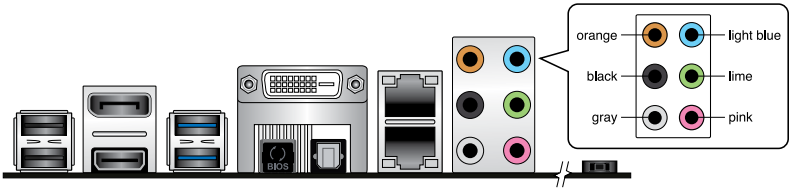
Connect to Headphone and Mic
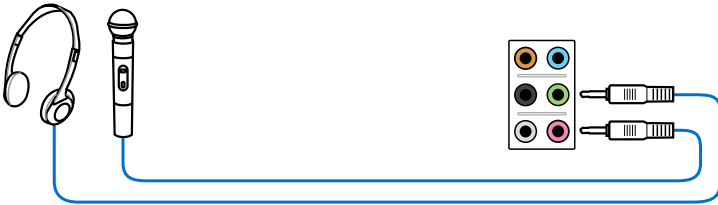
Connect to Stereo Speakers
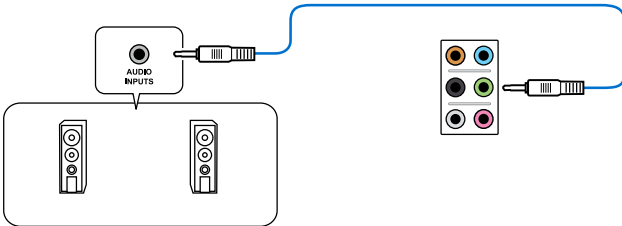
Connect to 2.1 channel Speakers
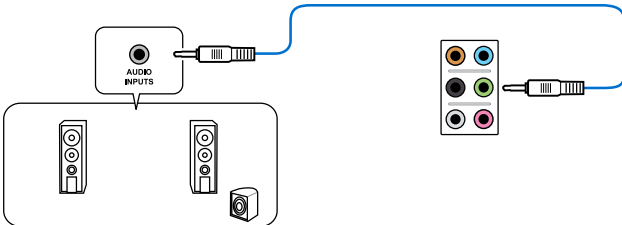
Connect to 4.1 channel Speakers
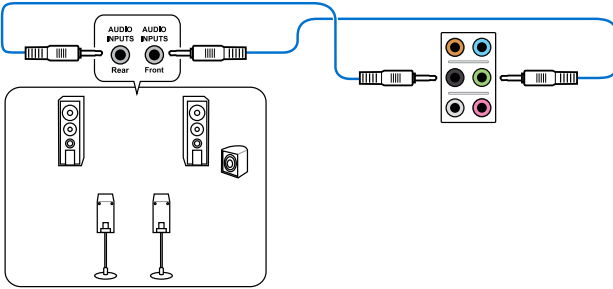
Connect to 5.1 channel Speakers
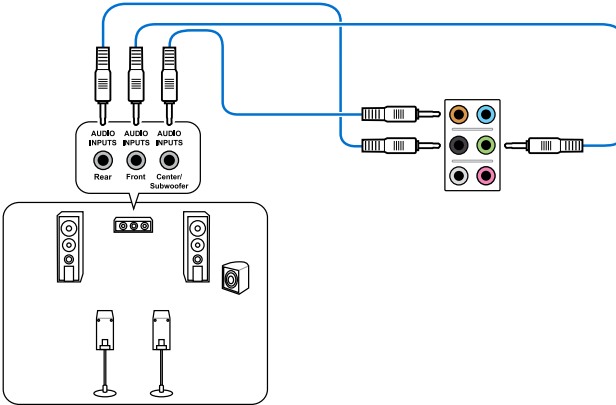
Connect to 7.1 channel Speakers
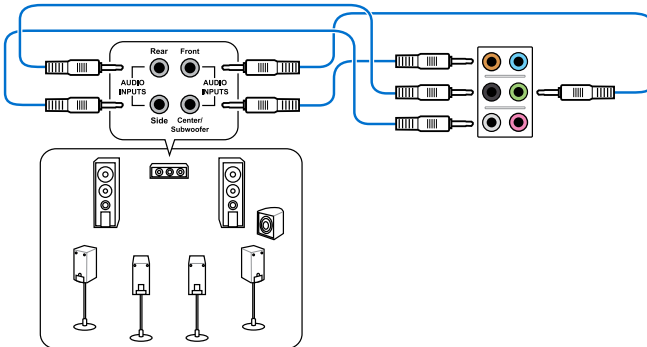
2.13   Starting up for the first time

1.   After making all the connections, replace the system case cover.

2.   Ensure that all switches are off.

3.   Connect the power cord to the power connector at the back of the system chassis.

4.   Connect the power cord to a power outlet that is equipped with a surge protector.

5.   Turn on the devices in the following order:

    a.   Monitor

    b.   External SCSI devices (starting with the last device on the chain)

    c.   System power

6.   After applying power, the system power LED on the system front panel case lights up. For systems with ATX power supplies, the system LED lights up when you press the ATX power button. If your monitor complies with the "green" standards or if it has a "power standby" feature, the monitor LED may light up or change from orange to green after the system LED turns on.

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

BIOS Beep	Description
One short beep	VGA detected
	Quick boot set to disabled
	No keyboard detected
One continuous beep followed by two short beeps then a pause (repeated)	No memory detected
One continuous beep followed by three short beeps	No VGA detected
One continuous beep followed by four short beeps	Hardware component failure

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

2.14   Turning off the computer

While the system is ON, press the power button for less than four seconds to put the system on sleep mode or soft-off mode, depending on the BIOS setting. Press the power switch for more than four seconds to let the system enter the soft-off mode regardless of the BIOS setting.

Motherboard Information

3

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

3.1 Motherboard layout
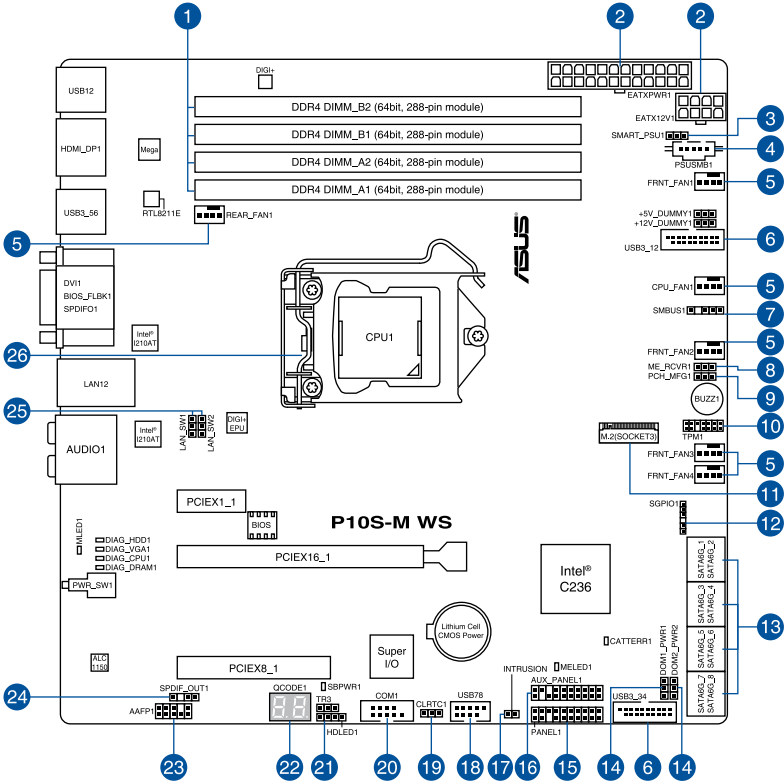
Refer to **3.4 Internal connectors** and **2.12.1 Rear I/O connection** for more information about rear panel connectors and internal connectors.

Layout contents

Connectors/Jumpers/Buttons and switches/Slots	Page
1. DDR4 sockets	2-6
2. ATX power connectors (24-pin EATXPWR1, 8-pin EATX12V1)	3-20
3. Smart Ride Through (SmaRT) setting (3-pin SMART_PSU1)	3-6
4. Power Supply SMBus connector (5-pin PSUSMB1)	3-24
5. CPU, front, and rear fan connectors (4-pin CPU_FAN1; 4-pin REAR_FAN1; 4-pin FRNT_FAN1-4)	3-19
6. USB 3.0 connectors (20-1 pin USB3_12, USB3_34)	3-18
7. System Management Bus (SMBUS) connector (5-1 pin SMBUS1)	3-16
8. ME firmware force recovery setting (3-pin ME_RCVR1)	3-6
9. PCH_MFG1 Setting (3-pin PCH_MFG1)	3-5
10. TPM connector (14-1 pin TPM1)	3-19
11. M.2 socket 3	3-21
12. Serial General Purpose Input/Output connector (6-1 pin SGPIO1)	3-20
13. Serial ATA 6.0 Gbps connectors (7-pin SATA 6Gbps_1-8 connectors [Gray])	3-16
14. SATADOM power setting (3-pin DOM1_PWR1, DOM2_PWR2)	3-7
15. System panel connector (20-1 pin PANEL1)	3-22
16. Auxiliary panel connector (20-2 pin AUX_PANEL1)	3-23
17. Chassis intrusion connector (2-pin INTRUSION)	3-21
18. USB 2.0 connector (10-1 pin USB78)	3-17
19. Clear RTC RAM (3-pin CLRTC1)	3-4
20. Serial port connector (10-1 pin COM1)	3-15
21. Hard disk activity LED connector (4-pin HDLED1)	3-18
22. Q-Code LEDs (QCODE1)	3-10
23. Front panel audio connector (10-1 pin AAFP1)	3-17
24. Digital audio connector (4-1 pin SPDIF_OUT1)	3-15
25. LAN controller setting (3-pin LAN_SW1, LAN_SW2)	3-5
26. CPU sockets	2-3

3.2 Jumpers

1. **Clear RTC RAM (3-pin CLRTC1)**

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

   P10S-M WS Clear RTC RAM
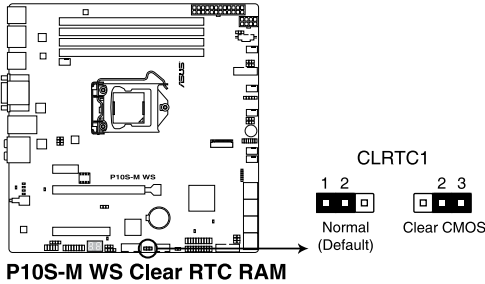
   To erase the RTC RAM:

   1. Turn OFF the computer and unplug the power cord.

   2. Move the jumper cap from pins 1–2 (default) to pins 2–3. Keep the cap on pins 2–3 for about 5–10 seconds, then move the cap back to pins 1–2.

   3. Plug the power cord and turn ON the computer.

   4. Hold down the <Del> key during the boot process and enter BIOS setup to reenter 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 short the two pins again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the battery.
   >
   > • Due to chipset behavior, AC power off is required to enable C.P.R. function. You must turn off and on the power supply or unplug and plug the power cord before rebooting the system.

2.   **PCH_MFG1 setting (3-pin PCH_MFG1)**

   This jumper allows you to update the BIOS ME block.
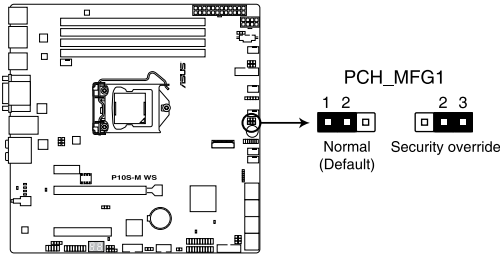
P10S-M WS PCH_MFG setting

3.   **LAN controller setting (3-pin LAN_SW1, LAN_SW2)**

   These jumpers allows you to enable or disable the onboard Intel® I210 Gigabit LAN controllers. Set to pins 1-2 to activate the Gigabit LAN feature.
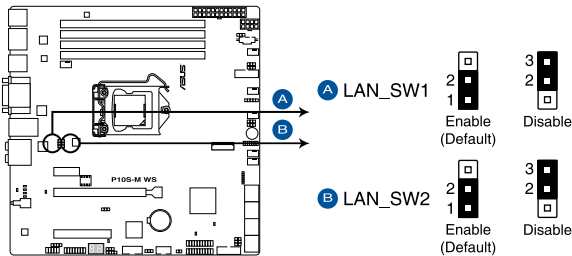
P10S-M WS LAN setting

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.

ME_RCVR1

1 2   2 3

Normal   ME force update
(Default)
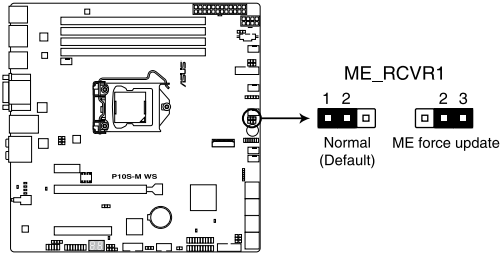
P10S-M WS ME recovery setting

5. **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.

SMART_PSU1

1 2   2 3

PMBus1.2   Others
(Default)
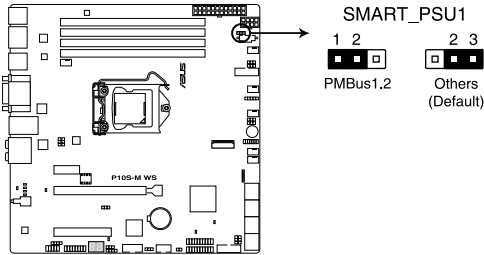
P10S-M WS PMBus 1.2 PSU setting

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

This jumper allows SATA5 and SATA6 to support SATADOM which do not need external power connections. Set to pins 2-3 to activate the SATA5 and SATA6 support feature.

P10S-M WS DOM_PWR setting
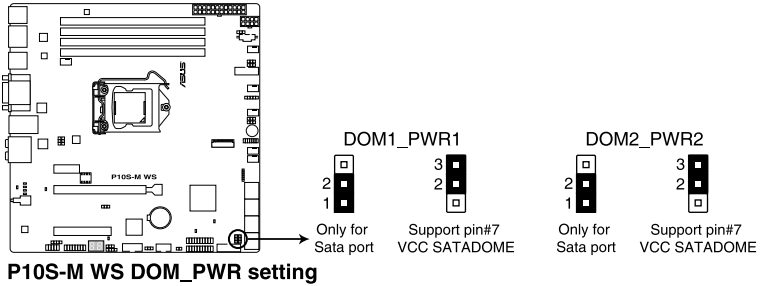
- DOM1_PWR1 activates SATA5 support feature.
- DOM2_PWR2 activates SATA6 support feature.

3.3   Onboard LEDs

1.   **Diagnosis LEDs**

The Diagnosis LEDs provide the status of these key components during POST (Power-On-Self Test): CPU, memory modules, VGA card, and hard disk drives. If an error is found, the critical component's LED stays lit up until the problem is solved.

DIAG_HDD1
DIAG_VGA1
DIAG_CPU1
DIAG_DRAM1

P10S-M WS Diagnosis LED
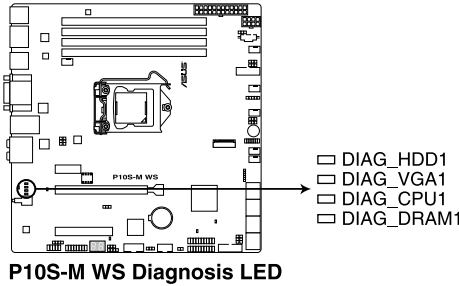
2.   **CATT ERR LED (CATTERR1)**

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

CATTERR1

P10S-M WS CATTERR1 LED
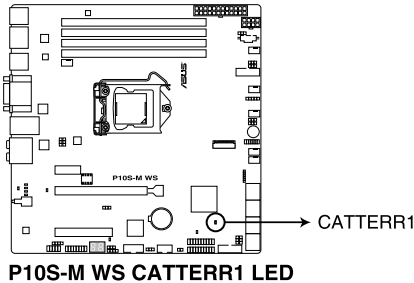
3.   **ME LED (MELED1)**

This onboard LED shows the status of ME. The LED will either remain lit or remain off when ME has entered recovery mode.
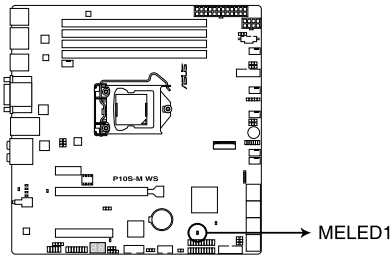
P10S-M WS MELED1

4.   **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.
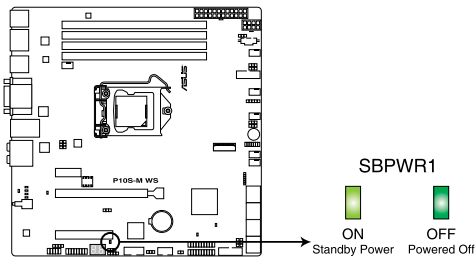
P10S-M WS Standby Power LED

5. Q-Code LEDs (QCODE1)

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

P10S-M WS Q-Code LED
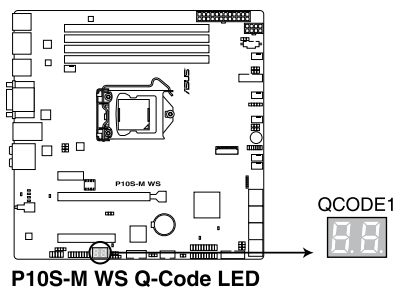
Q-Code table

Code	Description
00	Not used
01	Power on. Reset type detection (soft/hard).
02	AP initialization before microcode loading
03	System Agent initialization before microcode loading
04	PCH initialization before microcode loading
06	Microcode loading
07	AP initialization after microcode loading
08	System Agent initialization after microcode loading
09	PCH initialization after microcode loading
0B	Cache initialization
0C – 0D	Reserved for future AMI SEC error codes
0E	Microcode not found
0F	Microcode not loaded
10	PEI Core is started
11 – 14	Pre-memory CPU initialization is started
15 – 18	Pre-memory System Agent initialization is started
19 – 1C	Pre-memory PCH initialization is started
2B – 2F	Memory initialization
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32 – 36	CPU post-memory initialization
37 – 3A	Post-Memory System Agent initialization is started
3B – 3E	Post-Memory PCH initialization is started
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
54	Unspecified memory initialization error
55	Memory not installed
56	Invalid CPU type or Speed
57	CPU mismatch
58	CPU self test failed or possible CPU cache error
59	CPU micro-code is not found or micro-code update is failed
5A	Internal CPU error
5B	Reset PPI is not available
5C – 5F	Reserved for future AMI error codes
E0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
E1	S3 Boot Script execution
E2	Video repost
E3	OS S3 wake vector call
E4 – E7	Reserved for future AMI progress codes
E8	S3 Resume Failed

(continued on the next page)

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

(continued on the next page)

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

ACPI/ASL Checkpoints (under OS)

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

3.4 Internal connectors

1. **Serial port connector (10-1 pin COM1)**

   This connector is for the serial (COM) port. Connect the serial port module cable to one of these connectors, then install the module to a slot opening at the back of the system chassis.
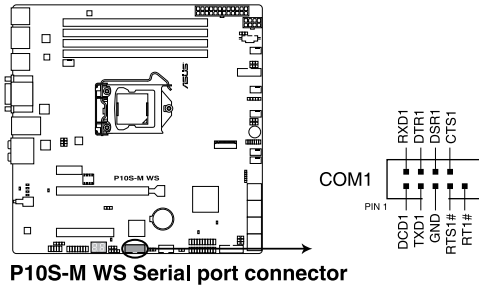
   P10S-M WS Serial port connector

2. **Digital audio connector (4-1 pin SPDIF_OUT1)**

   This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port. Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.
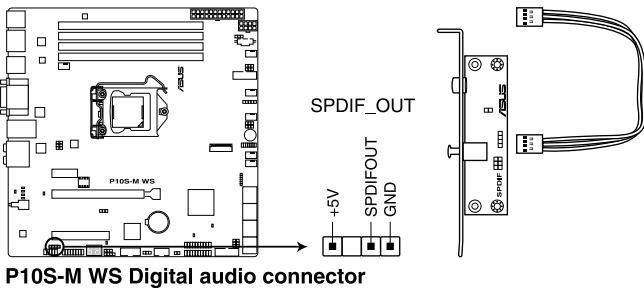
   P10S-M WS Digital audio connector

   The S/PDIF module is purchased separately.

3. **Serial ATA 6.0 Gbps connectors (7-pin SATA 6Gbps_1-8 connectors [Gray])**

    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.
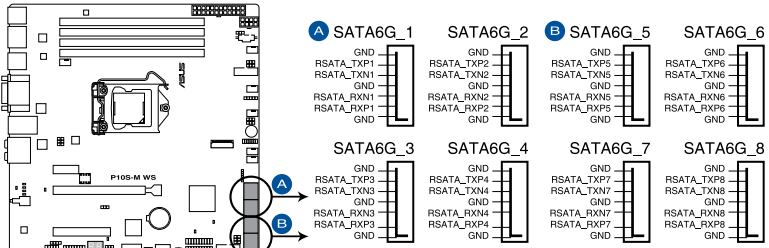
P10S-M WS Intel® SATA 6 Gb/s connectors
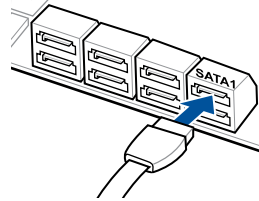
• These connectors are set to **[AHCI Mode]** by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to **[RAID Mode]**. Refer to section **5.1.3 Setting the RAID mode in BIOS** for details.

• Before creating a RAID set, refer to the manual bundled in the motherboard support DVD.

4. **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.
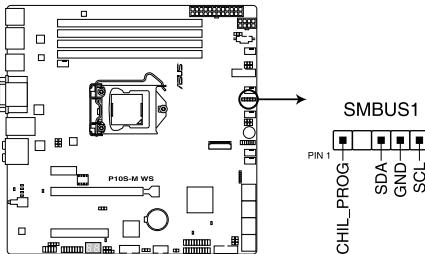
P10S-M WS SMBUS connector

5. Front panel audio connector (10-1 pin AAFP1)

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

P10S-M WS Analog front panel connector
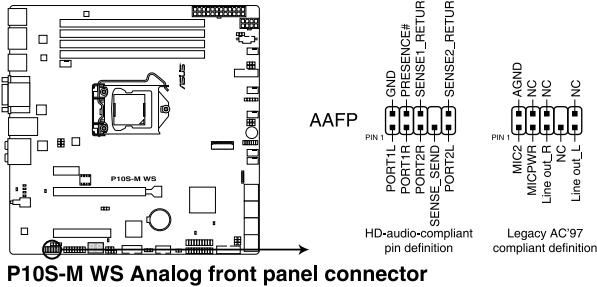
- We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.

- If you want to connect a high-definition or an AC'97 front panel audio module to this connector, set the Front Panel Type item in the BIOS setup to **[HD]** or **[AC97]**.

6. USB 2.0 connector (10-1 pin USB78)

This connector is for USB 2.0 ports. Connect the USB module cable to this connector. This USB connector complies with USB 2.0 specification that supports up to 480 Mbps connection speed.

P10S-M WS USB2.0 connector
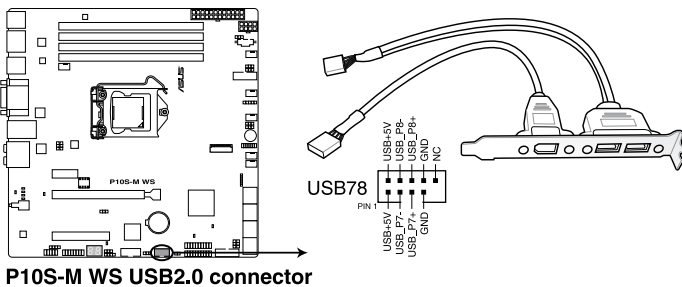
DO NOT connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!

The USB 2.0 module is purchased separately.

7.   **USB 3.0 connectors (20-1 pin USB3_12, USB3_34)**

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 5Gbps, faster charging time for USB-chargeable devices, optimized power efficiency, and backward compatibility with USB 2.0.
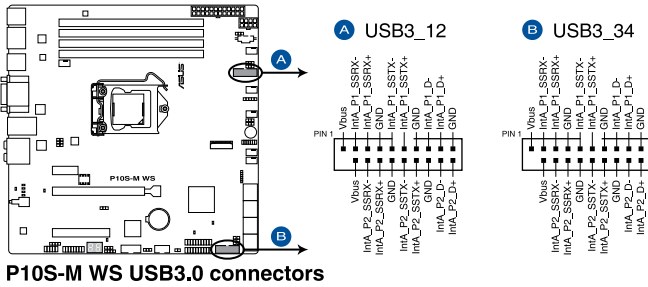
P10S-M WS USB3.0 connectors

The USB 3.0 module is purchased separately.

- Ensure to install the related driver to fully use the USB 3.0 ports under Windows® 7.
- The plugged USB 3.0 device may run on xHCI or EHCI mode depending on the operating system's setting.
- These USB 3.0 ports support native UASP transfer standard in Windows® 8 / Windows® 8.1 and Turbo Mode when using USB 3.0 Boost feature.

8.   **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.
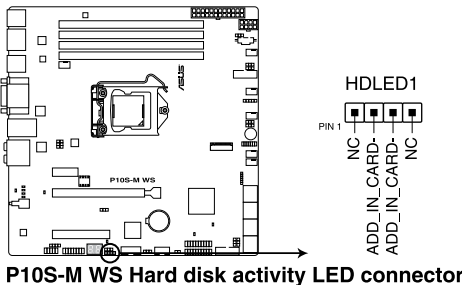
P10S-M WS Hard disk activity LED connector

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

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-M WS Fan connectors

A REAR_FAN1   B FRNT_FAN1   C CPU_FAN1

D FRNT_FAN2   E FRNT_FAN3   F FRNT_FAN4

(Fan connector pins: PWM Control, FAN Speed, FAN Power, GND)
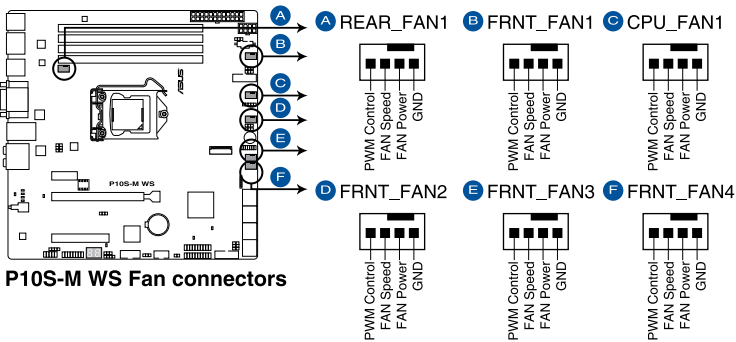
10. **TPM connector (14-1 pin TPM1)**

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

P10S-M WS TPM connector

TPM1

(Top pins: F_CLKRUN, F_SERIRQ, F_FRAME#, F_LAD3, F_LAD2, F_LAD1, F_LAD0, PIN 1)
(Bottom pins: S_PCIRST#, +3VSB, _TBD, GND, C_PCICLK_TPM, +3V, +3V)
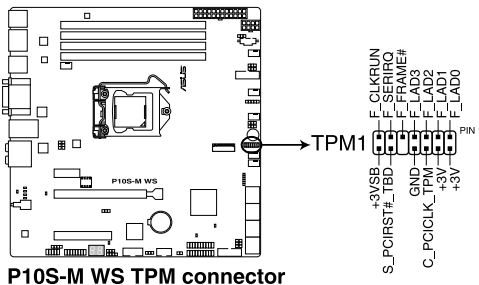
> The TPM module is purchased separately.

11. 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.

P10S-M WS ATX power connectors

> • 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.

12. 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.

P10S-M WS SGPIO connector

13.   M.2 socket 3

This socket allows you to install an M.2 (NGFF) SSD module.

M.2(SOCKET3)

P10S-M WS M.2(SOCKET3)
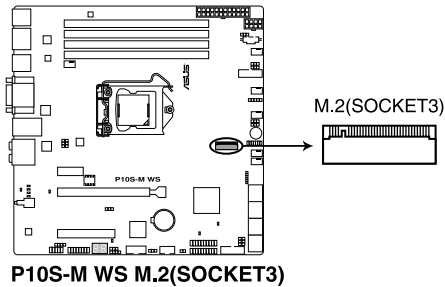
- This socket supports M Key and type 22110/2280/2260/2242 storage devices.

- This socket supports PCIe and SATA modes.

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

- When the M.2 connector is operating in SATA mode, SATA connector 8 (SATA6G_8) will be disabled.

14.   Chassis intrusion connector (2-pin INTRUSION)

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

INTRUSION

PIN 1

CHASSIS#   GND

P10S-M WS Chassis Intrusion connector
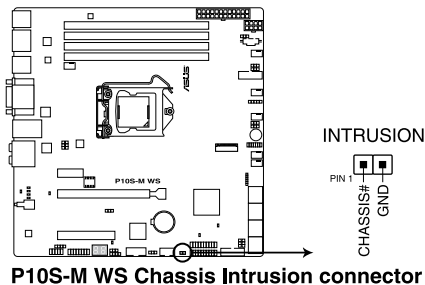
15. **System panel connector (20-1 pin PANEL1)**

This connector supports several chassis-mounted functions.

P10S-M WS System panel connector
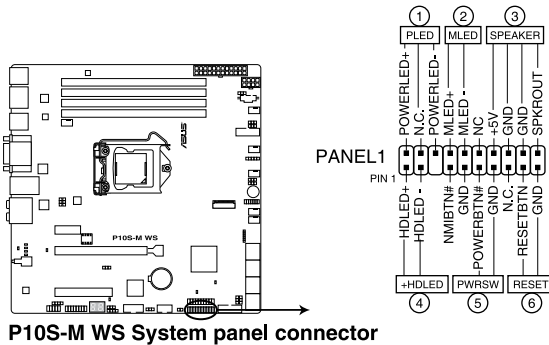
1. **System power LED (3-pin PLED)**

   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 (4) 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.
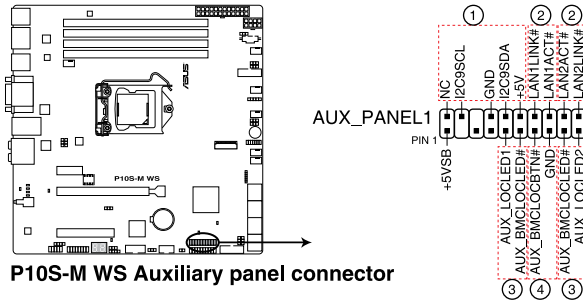
P10S-M WS Auxiliary panel connector

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_LOCLED1 and 2-pin AUX_LOCLED2)**

   These connectors are for the Locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connectors. 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. Power Supply SMBus connector (5-pin PSUSMB1)

This connector allows you to connect SMBus (System Management Bus) to the PSU (power supply unit) to read PSU information. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface.
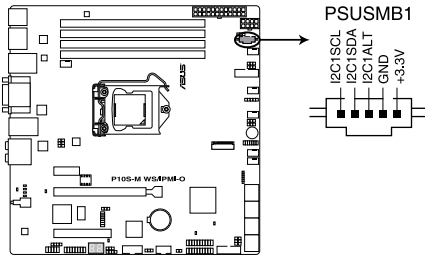
P10S-M WS Series Power supply SMBus connector

BIOS Setup

4

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

4.1 Managing and updating your BIOS

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

1. ASUS CrashFree BIOS 3

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

2. ASUS EzFlash

    Updates the BIOS using a USB flash disk.

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.

4.1.1 ASUS CrashFree BIOS 3 utility

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

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

Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

1. Insert the USB flash drive with the original or updated BIOS file to one USB port on the system.

2. The utility will automatically recover the BIOS. It resets the system when the BIOS recovery finished.

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

> The recovered BIOS may not be the latest BIOS version for this motherboard. Visit the ASUS website at www.asus.com to download the latest BIOS file.

4.1.2 ASUS EzFlash Utility

The ASUS EzFlash Utility feature allows you to update the BIOS using a USB flash disk without having to use a DOS-based utility.

> Download the latest BIOS from the ASUS website at www.asus.com before using this utility.

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

To update the BIOS using EzFlash Utility:

1. Insert the USB flash disk that contains the latest BIOS file to the USB port.

2. Enter the BIOS setup program. Go to the **Tool** menu to select **Start EzFlash** and press <Enter> to enable it.

```
                    ASUS Tek. EzFlash Utility

     Current Platform                     New Platform
Platform : P10S-M WS           Platform : P10S-M WS
Version :  3022                Version :  3301
Build Date :04/10/2017         Build Date :05/17/2017

FS0          System Volume Information          <DIR>
             P10S-M WS BIOS                     <DIR>
             Windows                            <DIR>




[Up/Down/Left/Right]:Switch [Enter]:Choose [q]:Exit

```
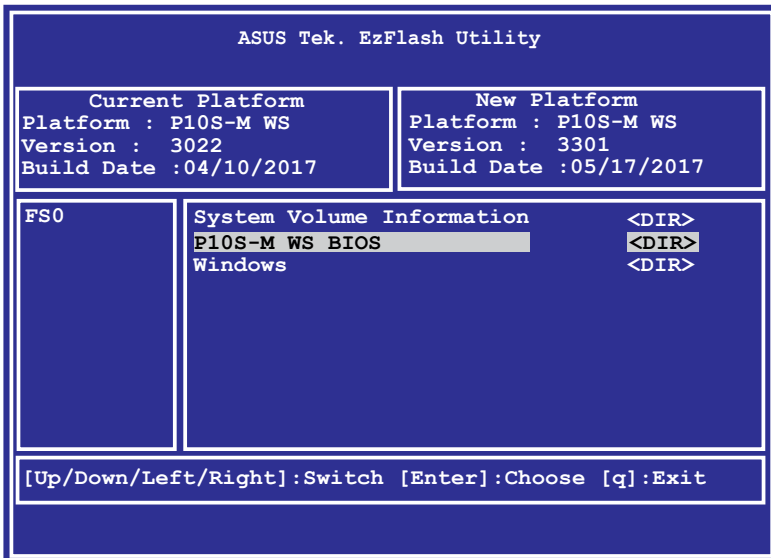
3. Press <Tab> to switch to the **Drive** field.

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 then press <Enter>.

7. Reboot the system when the update process is done.

• This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.

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

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

4.1.3   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 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.   Download 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
```

The utility verifies the file, then starts updating the BIOS file.
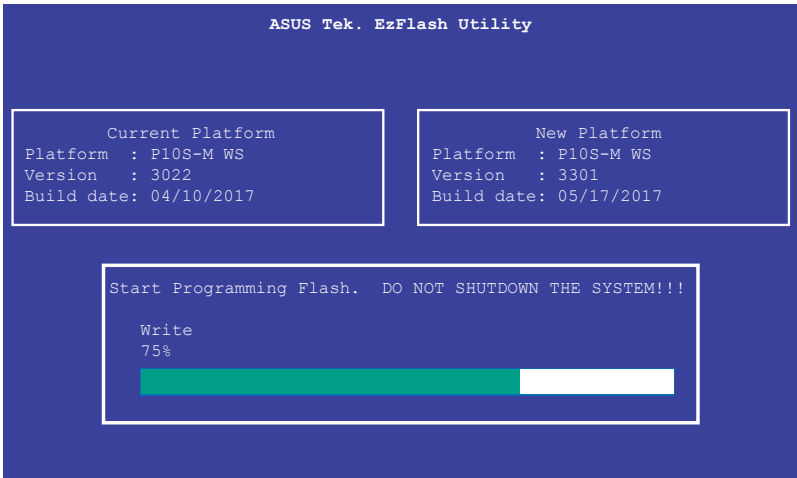
```
                        ASUS Tek. EzFlash Utility


        Current Platform                       New Platform
Platform  : P10S-M WS              Platform  : P10S-M WS
Version   : 3022                   Version   : 3301
Build date: 04/10/2017            Build date: 05/17/2017


        Start Programming Flash.  DO NOT SHUTDOWN THE SYSTEM!!!

           Write
           75%

```

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

The utility returns to the DOS prompt after the BIOS update process is completed.

4. Reboot the system from the hard disk drive.

```
   The BIOS update is finished! Please restart your system.

   C:\>
```
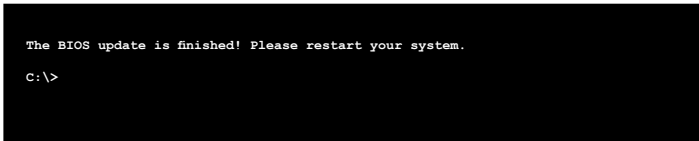
4.2 BIOS setup program

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

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

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

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

If you wish to enter Setup after POST, restart the system by pressing <Ctrl>+<Alt>+<Del>, or by pressing the reset button on the system chassis. You can also restart by turning the system off 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.

4.2.1   BIOS menu screen

Menu items   Menu bar   Configuration fields   General help

```
                Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main   Advanced   Security   Boot   Monitor   Tool   Save & Exit   Event Logs

    BIOS Information                                              Choose the system default
    Model Name                        P10S-M WS Series            language
    BIOS Version                      3301 x64
    Build Date                        05/05/2017 17:12:01

    Processor Information
    Brand String                      Intel(R) Core(TM)
                                      i7-7700K CPU @ 4.20GHz
    Frequency                         4200 MHz
    Number of Processors              4Core(s) / 8Thread(s)

    Memory Information
    Total Memory                      32768 MB
    Memory Frequency                  2400 MHz

    System Language                   [English]                   ++: Select Screen
                                                                  ↑↓: Select Item
    System Time                       [14:04:22]                  Enter: Select
    System Date                       [Wed 05/17/2017]            +/-: Change Opt.
                                                                  F1: General Help
    Access Level                      Administrator               F2: Previous Values
                                                                  F5: Optimized Defaults
                                                                  F10: Save Changes & Reset
                                                                  F12: Print Screen
                                                                  ESC: Exit



                Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Navigation keys

4.2.2   Menu bar

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

Main   For changing the basic system configuration

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

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.

4.2.3 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, and Event Logs) on the menu bar have their respective menu items.

4.2.4 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>.

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Main   Advanced   Security   Boot   Monitor   Tool   Save & Exit   Event Logs

  ▶ Trusted Computing                                        Trusted Computing Settings
  ▶ Runtime Error Logging Settings
  ▶ Chipset Configuration
  ▶ Platform Configuration
  ▶ CPU Configuration
```
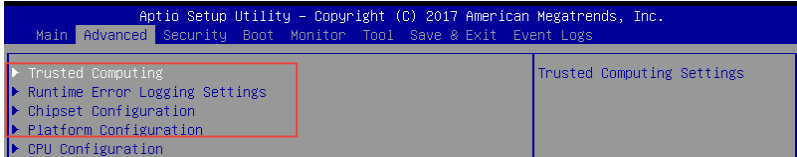
4.2.5 Navigation keys

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.

4.2.6 General help

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

4.2.7 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.

4.2.8 Pop-up window

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

4.2.9 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.

4.3 Main menu

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

```
         Aptio Setup Utility - Copyright (C) 2015 American Megatrends, Inc.
  Main  Advanced  Security  Boot  Monitor  Tool  Save & Exit  Server Mgmt  Event Logs

  BIOS Information                                      Choose the system default
  Model Name                    P10S-M WS Series        language
  BIOS Version                  0203 x64
  Build Date                    12/11/2015 16:49:25

  Processor Information
  Brand String                  Intel(R) Xeon(R) CPU
                                E3-1230 v5 @ 3.40GHz
  Frequency                     3600 MHz
  Number of Processors          4Core(s) / 8Thread(s)

  Memory Information
  Total Memory                  8192 MB
  Memory Frequency              2133 MHz                →←: Select Screen
                                                        ↑↓: Select Item
  System Language               [English]               Enter: Select
                                                        +/-: Change Opt.
  System Time                   [09:29:29]              F1: General Help
  System Date                   [Fri 12/18/2015]        F2: Previous Values
                                                        F5: Optimized Defaults
  Access Level                  Administrator           F10: Save Changes & Reset
                                                        ESC: Exit



         Version 2.17.1254. Copyright (C) 2015 American Megatrends, Inc.
```

4.3.1 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

4.3.2 System Time [xx:xx:xx]

Allows you to set the system time.

4.4 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.

```
                    Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Main   Advanced   Security   Boot   Monitor   Tool   Save & Exit   Event Logs

  ▶ Trusted Computing                                    Trusted Computing Settings
  ▶ Runtime Error Logging Settings
  ▶ Chipset Configuration
  ▶ Platform Configuration
  ▶ CPU Configuration
  ▶ SATA Configuration
  ▶ Network Stack Configuration
  ▶ CSM Configuration

  ▶ NVMe controller and Drive information
  ▶ iSCSI Configuration
```

4.4.1 Trusted Computing

```
                    Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
         Advanced

   Configuration                                         Enables or Disables BIOS
     Security Device Support          [Enable]           support for security device.
     NO Security Device Found                            O.S. will not show Security
                                                         Device. TCG EFI protocol and
                                                         INT1A interface will not be
                                                         available.
```

Configuration

Security Device Support [Enabled]

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

4.4.2 Runtime Error Logging Settings

```
                    Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
         Advanced

   Runtime Error Logging Settings                        Runtime Error Logging System
                                                         Enable/Disable
   Runtime Error Logging System       [Enabled]
   Enabling
     Memory Error Enabling            [Enabled]
     PCI/PCI Error Enabling           [Enabled]
       Corrected Error Enable         [Enabled]
       Uncorrected Error Enable       [Enabled]
       Fatal Error Enable             [Enabled]
       Enable SERR propagation        [No]
       Enable PERR propagation        [No]
```

Runtime Error Logging System Enabling [Enabled]

Allows you to enable or disable the Runtime Error Logging System.
Configuration options: [Disabled] [Enabled]

Memory Error Enabling [Enabled]

Allows you to enable or disable the Memory Error Enabling.
Configuration options: [Disabled] [Enabled]

PCI/PCI Error Enabling [Enabled]

Allows you to enable or disable the PCI/PCI Error Enabling.
Configuration options: [Disabled] [Enabled]

The following items appear only when you set **PCI/PCI Error Enabling** to **[Enabled]**.

Corrected Error Enable [Enabled]

Configuration options: [Disabled] [Enabled]

Uncorrected Error Enable [Enabled]

Configuration options: [Disabled] [Enabled]

Fatal Error Enable [Enabled]

Configuration options: [Disabled] [Enabled]

Enable SERR propagation [No]

Configuration options: [Yes] [No]

Enable PERR propagation [No]

Configuration options: [Yes] [No]

4.4.3   Chipset Configuration

```
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          Advanced

 ▶ System Agent (SA) Configuration                          System Agent (SA) Parameters
 ▶ PCH-IO Configuration
 ▶ Intel Server Platform Services
 ▶ Intel TXT Information
 ▶ PCI/PCIE Subsystem Settings
```
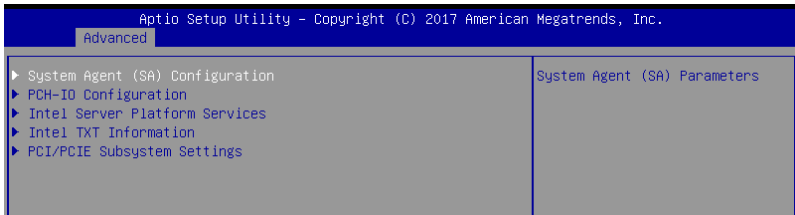
System Agent (SA) Configuration

Allows you to set System Agent (SA) parameters.

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

   System Agent Bridge Name          Skylake                  VT-d capability
   SA PCIe Code Version              4.1.0.0
   VT-d                              Supported

   VT-d                              [Enabled]
   Above 4GB MMIO BIOS assignment    [Disabled]

 ▶ Graphics Configuration
 ▶ DMI/OPI Configuration
 ▶ PEG Port Configuration
 ▶ Memory Configuration
```

VT-d [Enabled]

Allows you to enable virtualization technology function on memory control hub.
Configuration options: [Disabled] [Enabled]

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]

Graphics Configuration

Allows you to select a primary display from graphical devices.

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

   Graphics Configuration                                     Keep IGFX enabled based on the
                                                              setup options.

   Internal Graphics                 [Enabled]
   Hyper-V DDA                       [Disabled]
   GTT Size                          [8MB]
   Aperture Size                     [256MB]
   DVMT Pre-Allocated                [64M]
   DVMT Total Gfx Mem                [256M]
   Gfx Low Power Mode                [Enabled]
   VDD Enable                        [Enabled]
   PM Support                        [Enabled]
   PAVP Enable                       [Enabled]       →←: Select Screen
   Cdynmax Clamping Enable           [Enabled]       ↑↓: Select Item
   Cd Clock Frequency                [675 Mhz]       Enter: Select
 ▶ LCD Control                                       +/-: Change Opt.
                                                     F1: General Help
```

Internal Graphics [Enabled]
This option allows you to keep IGFX enabled based on the setup options.
Configuration options: [Auto] [Disabled] [Enabled]

Hyper-V DDA [Disabled]

This option allows you to enable or disable the Windows Server 2016 Hyper-V Discrete Device Assignment for Intel Graphics.
Configuration options: [Disabled] [Enabled]

GTT Size [8MB]

This option allows you to select the GTT Size.
Configuration options: [2MB] [4MB] [8MB]

Aperture Size [256MB]

This option allows you to select the Aperture Size.
Configuration options: [128MB] [256MB] [512MB] [1024MB] [2048MB] [4096MB]

> The A**bove 4GB MMIO BIOS assignment** is automatically enabled when selecting
> **[2048MB]** aperture. To use this feature, please disable **CSM Support**.

DVMT Pre-Allocated [64MB]

This option allows you to select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size
used by the Internal Graphics Device.
Configuration options: [32M] [64M] [96M] [128M] [160M] [192M] [224M] [256M] [288M]
[320M] [352M] [384M] [416M] [448M] [480M] [512M] [1024M] [1536M] [2048M] [4M] [8M]
[12M] [16M] [20M] [24M] [28M] [32M/F7] [36M] [40M] [44M] [48M] [52M] [56M] [60M]

DVMT Total Gfx Mem [256M]

This option allows you to select DVMT 5.0 Total Graphic Memory size used by the
Internal Graphics Device.
Configuration options: [128M] [256M] [MAX]

Gfx Low Power Mode [Enabled]

This option is applicable for SFF only.
Configuration options: [Enabled] [Disabled]

VDD Enable [Enabled]

This option allows you to enable or disable forcing of VDD in the BIOS.
Configuration options: [Disabled] [Enabled]

PM Support [Enabled]

This option allow you to enable or disable PM Support.
Configuration options: [Enabled] [Disabled]

PAVP Enable [Enabled]

This option allows you to enable or disable PAVP.
Configuration options: [Enabled] [Disabled]

Cdynmax Clamping Enable [Enabled]

This option allows you to enable or disable Cdynmax Clamping.
Configuration options: [Enabled] [Disabled]

Cd Clock Frequency [675 Mhz]

This option allows you to select the highest Cd Clock frequency supported by the
platform.
Configuration options: [337.5 Mhz] [450 Mhz] [540 Mhz] [675 Mhz]

LCD Control

Primary IGFX Boot Display [VBIOS Default]

This option allows you to select the Video Device which will be activated during POST. This has no effect if external graphics present. Secondary boot display selection will appear based on your selection. VGA modes ill be supported only on primary display.

Configuration options: [VBIOS Default] [CRT] [EFP] [LFP] [EFP3] {EFP2} [LFP2]

LCD Panel Type [VBIOS Default]

This option allows you to select LCD panel used by Internal Graphics Device by selecting the appropriate setup item.

Configuration options: [VBIOS Default] [640x480 LVDS] [800x600 LVDS] [1024x768 LVDS] [1280x1024 LVDS] [1400x1050 LVDS1] [1400x1050 LVDS2] [1600x1200 LVDS] [1280x768 LVDS] [1680x1050 LVDS] [1920x1200 LVDS] [1600x900 LVDS] [1280x800 LVDS] [1280x600 LVDS] [2048x1536 LVDS] [1366x768 LVDS]

Panel Scaling [Auto]

This option allows you to select the LCD panel scaling option used by the Internal Graphics Device.

Configuration options: [Auto] [Off] [Force Scaling]

Backlight Control [PWM Normal]

Configuration options: [PWM Inverted] [PWm Normal]

BIA [Auto]

Configuration options: [Auto] [Disabled] [Level 1] [Level 2] [Level 3] [Level 4] [Level 5]

Spread Spectrum clock Chip [Off]

[Off]   Spread is disabled
[Hardware]   Spread is controlled by chip
[Software]   Spread is controlled by BIOS

Active LFP [eDP Port-A]

This option allows you to configure the LFP usage.

Configuration options: [No LVDS] [eDP Port-A] [eDP Port-D]

Panel Color Depth [18 Bit]

This option allows you to select the LFP Panel Color Depth.

Configuration options: [18 Bit] [24 Bit]

DMI/OPI Configuration

```
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      Advanced

  DMI/OPI Configuration                                 Set DMI Speed Gen1/Gen2/Gen3

  DMI                              X4  Gen3

  DMI Max Link Speed               [Auto]
  DMI Vc1 Control                  [Disabled]
  DMI Vcm Control                  [Enabled]
  DMI Link ASPM Control            [L1]
```

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) 2017 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]
  PEG0 Max Payload size            [Auto]
  Program PCIe ASPM after OpROM    [Disabled]
```

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 selected value.

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

Power Down Unused Lanes [Auto]

Allows you to power down unused lanes.

[Disabled]   No power saving.

[Auto]   BIOS will power down unused lanes based in the max possible link width.

ASPM [Auto]

Allows you to configure the PCIE ASPM.

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]

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

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
       Advanced

  Memory Configuration                                      Maximum Memory Frequency
                                                            Selections in MHz.
  Memory RC Version              4.1.0.2
  Memory Frequency               2400 MHz
  Total Memory                   32768 MB
  DIMM#A1                        16384 MB
  DIMM#A2                        Not Present
  DIMM#B1                        16384 MB
  DIMM#B2                        Not Present

  Maximum Memory Frequency       [Auto]
  Max TOLUD                      [Dynamic]
  Memory Scrambler               [Enabled]
  Memory Remap                   [Enabled]                ++: Select Screen
                                                          ↑↓: Select Item
                                                          Enter: Select
```

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.

```
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         Advanced

  Intel PCH RC Version              4.1.0.0                    PCI Express Configuration
                                                               settings
▶ PCI Express Configuration
▶ USB Configuration
▶ HD Audio Configuration

  DeepSx Power Policies             [Disabled]
  Disable DSX ACPRESENT PullDown    [Disabled]
  CLKRUN# Logic                     [Enabled]
  Serial IRQ Mode                   [Continuous]
  High Precision Timer              [Enabled]
```

PCI Express Configuration

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
         Advanced

  PCI Express Configuration                                    Enable or disable PCI Express
                                                               Clock Gating for each root
  PCI Express Clock Gating          [Enabled]                  port.
  DMI Link ASPM Control             [Enabled]
```

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

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Advanced

 USB Configuration                                     Precondition work on USB host
                                                       controller and root ports for
 USB Precondition              [Disabled]              faster enumeration.


 xDCI Support                  [Disabled]

 USB Port Disable Override     [Disabled]
```

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 Configuration

```
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     Advanced

 HD Audio Configuration                                Control Detection of the
                                                       HD-Audio device.
 HD Audio                      [Auto]                  Disabled = HDA will be
                                                       unconditionally disabled
```

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.

DeepSx Power Policies [Disabled]

Allows you to configure the DeepSx Mode configuraitons.
Configuration options: [Disabled] [Enabled in S4-S5]

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) 2017 American Megatrends, Inc.
      Advanced

   Intel Server Platform Services Configuration     The altitude of the platform
   ME BIOS Interface Version        1.2             location above the see level,
   SPS Version                      09:4.1.3.21     expressed in meters. The hex
                                                    number is decoded as 2's
   ME FW Status Value      :        0xF0345         complement signed integer.
   ME FW State             :        SPS ME FW Active Provide the 80000000 value if
   ME FW Operation State   :        M0 without UMA  the altitude is unknown.
   ME FW Error Code        :        No Error
   ME NM FW Status Value :          0x0
   BIOS Booting Mode       :        Power Optmized mode
   Cores Disabled          :        0
   ME FW SKU Information    :        SiEn
   End-of-POST Status       :       EOP disabled in POST
                                                    ++: Select Screen
   Altitude                         80000000        ↑↓: Select Item
   MCTP Bus Owner                   0               Enter: Select
                                                    +/-: Change Opt.
                                                    F1: General Help
                                                    F2: Previous Values
                                                    F5: Optimized Defaults
                                                    F10: Save Changes & Reset
                                                    F12: Print Screen
                                                    ESC: Exit

          Version 2.18.1263. Copyright (C) 2017 American Megatrends, Inc.
```

Intel TXT Information

```
         Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

   Intel TXT Information

   Chipset                          Production Fused
   BiosAcm                          Debug Fused
   Chipset Txt                      Not Supported
   Cpu Txt                          Not Supported
   Error Code                       None
     Class Code                     None
     Major Code                     None
     Minor Code                     None
```

PCI/PCIE Subsystem Settings

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

                                                              Value to be programmed into
      PCI Devices Common Settings:                            PCI Latency Timer Register.
      PCI Latency Timer                  [32 PCI Bus Clocks]
      PERR# Generation                   [Disabled]
      SERR# Generation                   [Disabled]
      Load RT32 Image                    [Enabled]
      VGA Priority                       [Offboard Device]
      SR-IOV Support                     [Disabled]


    ▶ PCIe slot opROM option
```
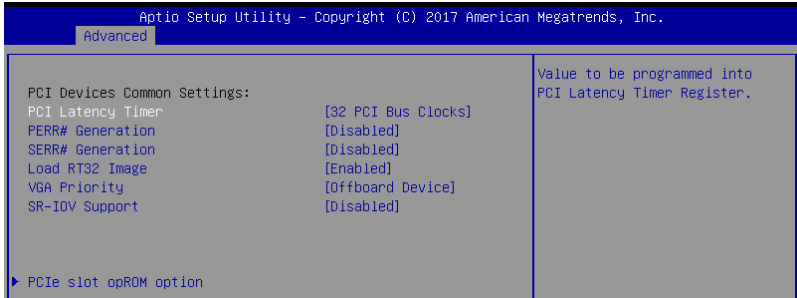
PCI Latency Timer [32 PCI Bus Clocks]

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 tp generation PERR#.
Configuration options: [Disabled] [Enabled]

SERR# Generation [Disabled]

Allows you to enable or disable PCI Device tp generation 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 the onboard and offboard video device to be found.
Configuration options: [Onboard Device] [Offboard Device] [Intel Onboard Device]

SR-IOV Support [Disabled]

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

PCIe slot opROM option

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced

      PCIE Slot Option Rom Setting                            Enabled/Disabled PCIE6 Option
      PCIE6  Option Rom                  [Enabled]            Rom
```

PCIE6 Option ROM [Enabled]

Allows you to enable or disable the PCIE6 Option ROM.
Configuration options: [Disabled] [Enabled]

4.4.4 Platform Configuration

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Advanced

  ▶ USB Configuration                             USB Configuration Parameters
  ▶ NVMe Configuration
  ▶ Onboard LAN Configuration
  ▶ Super IO Configuration
  ▶ Serial Port Console Redirection
  ▶ ACPI Settings
  ▶ APM
  ▶ SMART Settings
  ▶ WHEA Configuration
```

USB Configuration

```
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    Advanced

  USB Configuration                               Enables Legacy USB support.
                                                  AUTO option disables legacy
  USB Controllers:                                support if no USB devices are
      1 XHCI                                       connected. DISABLE option will
  USB Devices:                                     keep USB devices available
      5 Drives, 1 Keyboard, 1 Mouse               only for EFI applications.

  Legacy USB Support               [Enabled]
  XHCI Hand-off                    [Disabled]
  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]      ↑↓: Select Item
  Device power-up delay            [Auto]         Enter: Select
                                                  +/-: Change Opt.
  Mass Storage Devices:                           F1: General Help
  Generic-Compact Flash 1.00       [Auto]         F2: Previous Values
  JetFlashTranscend 4GB 8.07       [Auto]         F5: Optimized Defaults
  Generic-SM/xD-Picture 1.00       [Auto]         F10: Save Changes & Reset
  Generic-SD/MMC 1.00              [Auto]         F12: Print Screen
  Generic-MS/MS-Pro 1.00           [Auto]         ESC: Exit
```

Legacy USB Support [Enabled]

[Disabled]   The USB devices can be used only for the BIOS setup program. It cannot be recognized in boot devices list.

[Enabled]   Enables the support for USB devices on legacy operating systems (OS).

[Auto]   Allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.

XHCI Hand-off [Disabled]

🖉 This item is set to **[Disabled]** by default for the EHCI (enhanced host controller interface) support by XHCI drivers in operating systems.

[Enabled]   Support XHCI by BIOS for operating systems without XHCI support.

[Disabled]   Support XHCI by XHCI drivers for operating systems with XHCI support.

USB Mass Storage Driver Support [Enabled]

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

Port 60/64 Emulation [Enabled]

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

USB hardware delays and time-outs

USB transfer time-out [20 sec]

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]

Mass Storage Devices

Allows you to select the mass storage device emulation type for devices connected.
Configuration options: [Auto] [Floppy] [Forced FDD] [Hard Disk] [CD-ROM]

NVMe Configuration

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

```
         Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Advanced

  NVMe controller and Drive information

  No NVME Device Found
```
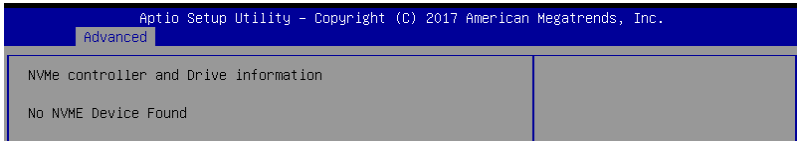
Onboard LAN Configuration

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
       Advanced

   Onboard LAN Configuration                                    Intel LAN Enable/Disable

   INTEL LAN1 MAC:              08:62:66:A0:64:BE
   INTEL LAN2 MAC:              08:62:66:A0:64:BF
   Intel LAN1 Enable           [Enabled]
   Intel LAN1 ROM Type         [PXE]
   Intel LAN2 Enable           [Enabled]
   Intel LAN2 ROM Type         [Disabled]
```

Intel LAN1 Enable [Enabled]

Allows you to enable or disable the Intel LAN.

Configuration options: [Disabled] [Enabled]

Intel LAN1 ROM Type [PXE]

Allows you to select the Intel LAN ROM type.

Configuration options: [Disabled] [PXE] [iSCSI]

Intel LAN2 Enable [Enabled]

Allows you to enable or disable the Intel LAN.

Configuration options: [Disabled] [Enabled]

Intel LAN2 ROM Type [Disabled]

Allows you to select the Intel LAN ROM type.

Configuration options: [Disabled] [PXE] [iSCSI]

Super IO Configuration

```
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       Advanced

   Super IO Configuration                                       Set Parameters of Serial Port 1

   Super IO Chip               NCT6791D
 ▶ Serial Port 1 Configuration
```

Serial Port 1 Configuration

Allows you to set the parameters of Serial Port 1.

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

   Serial Port 1 Configuration                         Enable or Disable Serial Port

   Serial Port                        [Enabled]
   Device Settings                    IO=3F8h; IRQ=4;

   Change Settings                    [Auto]
```

Serial Port [Enabled]

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

> The following item appears only when you set **Serial Port** to **[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 Console Redirection

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

   COM1                                                Console Redirection Enable or
   Console Redirection                [Disabled]       Disable.
 ▶ Console Redirection Settings

   COM2
   Console Redirection                [Disabled]
 ▶ Console Redirection Settings

   Legacy Console Redirection
 ▶ Legacy Console Redirection Settings

   Serial Port for Out-of-Band Management/
   Windows Emergency Management Services (EMS)          ←→: Select Screen
   Console Redirection                [Disabled]        ↑↓: Select Item
 ▶ Console Redirection Settings                         Enter: Select
```

COM1 / COM2

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

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

```
                 Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

  COM1                                                          Emulation: ANSI: Extended
  Console Redirection Settings                                  ASCII char set. VT100: ASCII
                                                                char set. VT100+: Extends
  Terminal Type                        [VT-UTF8]                VT100 to support color,
  Bits per second                      [57600]                 function keys, etc. VT-UTF8:
  Data Bits                            [8]                      Uses UTF8 encoding to map
  Parity                               [None]                   Unicode chars onto 1 or more
  Stop Bits                            [1]                      bytes.
  Flow Control                         [Hardware RTS/CTS]
  VT-UTF8 Combo Key Support            [Enabled]
  Recorder Mode                        [Disabled]
  Legacy OS Redirection Resolution     [80x24]
  Putty KeyPad                         [VT100]
  Redirection After BIOS POST          [Always Enable]        ++: Select Screen
                                                              ↑↓: Select Item
```

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]

Configuration options: [7] [8]

Parity [None]

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

[None]	None.
[Even]	parity bit is 0 if the num of 1's in the data bits is even.
[Odd]	parity bit is 0 if num of 1's in the data bits is odd.
[Mark]	parity bit is always 1.
[Space]	parity bit is always 0.

Stop Bits [1]

Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning.) The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Configuration options: [1] [2]

Flow Control [Hardware RTS/CTS]

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

Allows you to enable the VT-UTF8 Combo Key Support for ANSI/VT100 terminals.
Configuration options: [Disabled] [Enabled]

Recorder Mode [Disabled]

With this mode enabled only text will be sent. This is to capture Terminal data.
Configuration options: [Disabled] [Enabled]

Legacy OS Redirection Resolution [80x24]

Allows you to set the number of rows and columns supported on the Legacy OS.
Configuration options: [80x24] [80x25]

Putty Keypad [VT100]

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

Redirection After BIOS POST [Always Enable]

Allows you to specify if Bootloader is selected than Legacy console redirection.
Configuration options: [Always Enable] [Bootloader]

Legacy Console Redirection Settings

```
              Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
        Advanced

 Legacy Serial Redirection Port            [COM1]                    Select a COM port to display
                                                                    redirection of Legacy OS and
                                                                    Legacy OPROM Messages
```
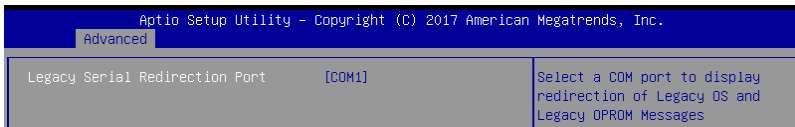
Legacy Serial Redirection Port [COM1]

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]

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
      Advanced

 Out-of-Band Mgmt Port          [COM1]                   Microsoft Windows Emergency
 Terminal Type                  [VT-UTF8]                Management Services (EMS)
 Bits per second                [115200]                 allows for remote management
 Flow Control                   [None]                   of a Windows Server OS through
 Data Bits                      8                        a serial port.
 Parity                         None
 Stop Bits                      1
```

Console Redirection Settings

Out-of-Band Mgmt Port [COM1]

Microsoft Windows Emergency Management Services (EMS) allows for 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]

Allows you to set the serial port transmission speed.
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) 2017 American Megatrends, Inc.
      Advanced

 ACPI Settings                                           Enables or Disables System
                                                         ability to Hibernate (OS/S4
 Enable Hibernation             [Enabled]                Sleep State). This option may
 ACPI Sleep State               [S3 (Suspend to RAM)]    be not effective with some OS.
```

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) 2017 American Megatrends, Inc.
      Advanced

   Restore AC Power Loss              [Last State]            Specify what state to go to
   Power On By PCIE                   [Disabled]              when power is re-applied after
   Power On By Ring                   [Disabled]              a power failure (G3 state).
   Power On By RTC                    [Disabled]
```

Restore AC Power Loss [Last State]

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

Power On By PCIE [Disabled]

[Disabled]   Disables the PCIE devices to generate a wake event.
[Enabled]   Enables the PCIE devices to generate a wake event.

Power On By Ring [Disabled]

[Disabled]   Disables the Ring devices to generate a wake event.
[Enabled]   Enables the Ring devices to generate a wake event.

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

Power On By RTC [Disabled]

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

SMART Settings

```
                 Aptio Setup Utility – Copyright (C) 2017 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.
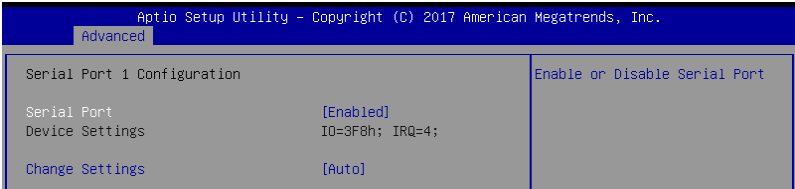
Configuration options: [Disabled] [Enabled]

WHEA Configurations

```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
   Advanced

 WHEA Support                          [Enabled]          Enable or disable Windows
                                                          Hardware Error Architecture.
```
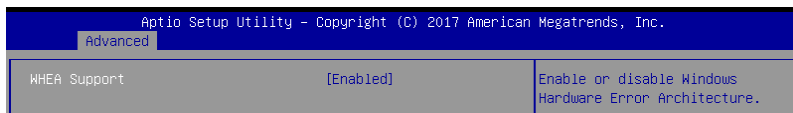
WHEA Support [Enabled]

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

4.4.5   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.

```
        Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
   Advanced

 CPU Configuration                                      ▲ Enabled for Windows XP and
                                                         Linux (OS optimized for
 Intel(R) Core(TM) i7-7700K CPU @ 4.20GHz                Hyper-Threading Technology)
 CPU Signature                       906E9               and Disabled for other OS (OS
 Microcode Patch                     48                  not optimized for
 Max CPU Speed                       4200 MHz            Hyper-Threading Technology).
 Min CPU Speed                       800 MHz             When Disabled only one thread
 CPU Speed                           4200 MHz            per enabled core is enabled.
 Processor Cores                     4
 Hyper Threading  Technology         Supported
 Intel VT-x Technology               Supported
 Intel SMX Technology                Not Supported
 64-bit                              Supported
 EIST Technology                     Supported
 CPU C3 state                        Supported
 CPU C6 state                        Supported          ➔←: Select Screen
 CPU C7 state                        Supported          ↑↓: Select Item
 CPU C8 state                        Supported          Enter: Select
                                                         +/-: Change Opt.
 L1 Data Cache                       32 kB x 4           F1: General Help
 L1 Code Cache                       32 kB x 4           F2: Previous Values
 L2 Cache                            256 kB x 4          F5: Optimized Defaults
 L3 Cache                            8 MB                F10: Save Changes & Reset
                                                         F12: Print Screen
 Hyper-threading                     [Enabled]         ▼ ESC: Exit

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```

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 select the number of CPU cores to activate in each processor package.
Configuration options: [All] [1] [2] [3]

Intel Virtualization Technology [Enabled]

When set to [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]

This item 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]

Allows you to select the CPU performance state during system boot before the operating system takes control. The CPU runs at a selected performance ratio based on CPU configuration.
Configuration options: [Max Battery] [Max Non-Turbo Performance] [Turbo Performance]

Intel(R) Speed Shift Technology [Disabled]

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.
[Disabled]   The CPU runs at its default speed.
[Enabled]   The system controls the CPU speed.

The following item appears only when you set **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] is selected, 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 demotion of the 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 the 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]

4.4.6   SATA Configuration

```
                 Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
       Advanced

  SATA Controller(s)                   [Enabled]         ▲  Enable or disable SATA Device.
  SATA Mode Selection                  [AHCI]

  SATA Port 1                          Empty
    Software Preserve                  Unknown
    Port 1                             [Enabled]
    Mechanical Presence Switch         [Enabled]
    Spin Up Device                     [Disabled]
    SATA Device Type                   [Hard Disk Drive]
    Device Sleep                       [Disabled]
    SATA DEVSLEP Idle Timeout Config   [Disabled]
  SATA Port 2                          Empty
    Software Preserve                  Unknown
    Port 2                             [Enabled]           ▶◀: Select Screen
    Mechanical Presence Switch         [Enabled]           ↑↓: Select Item
    Spin Up Device                     [Disabled]          Enter: Select
    SATA Device Type                   [Hard Disk Drive]   +/-: Change Opt.
    Device Sleep                       [Disabled]          F1: General Help
    SATA DEVSLEP Idle Timeout Config   [Disabled]          F2: Previous Values
  SATA Port 3                          ASUS DVD RAM G ATAPI F5: Optimized Defaults
    Software Preserve                  N/A                 F10: Save Changes & Reset
    Port 3                             [Enabled]           F12: Print Screen
    Mechanical Presence Switch         [Enabled]           ESC: Exit
    Spin Up Device                     [Disabled]
    SATA Device Type                   [Hard Disk Drive] ▼

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```

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) 2017 American Megatrends, Inc.
        Advanced

RAID0                              [Enabled]              Enable or disable RAID0
RAID1                              [Enabled]              feature.
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 / SATA Port 2 / SATA Port 3 / SATA Port 4 / SATA Port 5 / SATA Port 6 / SATA Port 7 / SATA Port 8

Port 1 / Port 2 / Port 3 / Port 4 / Port 5 / Port 6 / Port 7 / Port 8 [Enabled]

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

Mechanical Presence Switch [Enabled]

Allows control of reporting if this port has a Mechanical Presence Switch.
Configuration options: [Disabled] [Enabled]

Spin Up Device [Disabled]

Selecting [Enabled] will 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.
Conifguration Options: [Disabled] [Enabled]

SATA DEVSLEP Idle Timeout Config [Disabled]

Allows you to enable or disable SATA DTIO Config.
Configuration options: [Disabled] [Enabled]

4.4.7   Network Stack Configuration

Advanced		
Network Stack	[Disabled]	Enable/Disable UEFI Network Stack
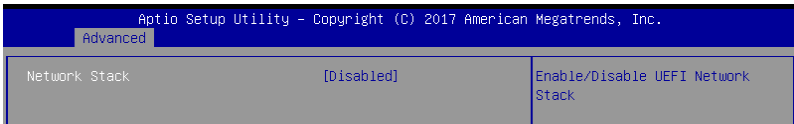
Network Stack [Disabled]

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.

4.4.8   CSM Configuration

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
   Advanced

   Compatibility Support Module Configuration                 Enable/Disable CSM Support.

   CSM Support                          [Enabled]

   CSM16 Module Version                 07.79

   GateA20 Active                       [Upon Request]
   Option ROM Messages                  [Force BIOS]
   INT19 Trap Response                  [Immediate]

   Boot option filter                   [Legacy only]

   Option ROM execution
                                                              ++: Select Screen
   Network                              [Legacy]              ↑↓: Select Item
   Storage                              [Legacy]              Enter: Select
   Video                                [Legacy]              +/-: Change Opt.
   Other PCI devices                    [Legacy]              F1: General Help
                                                              F2: Previous Values
```

CSM Support [Enabled]

This option allows you to enable or disable CSM Support.
Configuration options: [Disabled] [Enabled]

> 📝 The following items appear only when you set the **CSM Support** to **[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]

4.4.9 NVMe controller and Drive information

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

```
                  Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced
  NVMe controller and Drive information

  No NVME Device Found
```

4.4.10 iSCSI Configuration

Allows you to configure the iSCSi parameters.

```
                  Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
        Advanced
   iSCSI Initiator Name                              The worldwide unique name of
                                                     iSCSI Initiator. Only IQN
 ▶ Add an Attempt                                    format is accepted.Range is
                                                     from 4 to 223
 ▶ Delete Attempts

 ▶ Change Attempt Order
```
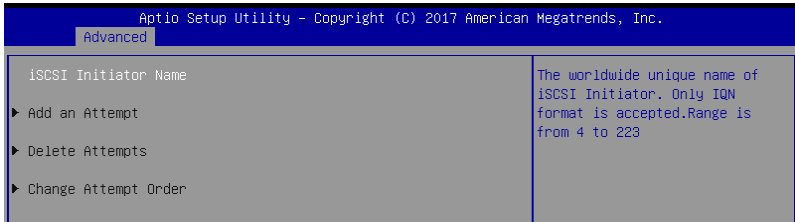
4.5 Security Menu

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.

```
                  Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
     Main  Advanced  Security  Boot  Monitor  Tool  Save & Exit  Event Logs

  Password Description                              Set Administrator Password

  If ONLY the Administrator's password is set,
  then this only limits access to Setup and is
  only asked for when entering Setup.
  If ONLY the User's password is set, then this
  is a power on password and must be entered to
  boot or enter Setup. In Setup the User will
  have Administrator rights.
  The password length must be
  in the following range:
  Minimum length                   3
  Maximum length                  20
                                                    →←: Select Screen
                                                    ↑↓: Select Item
                                                    Enter: Select
  Administrator Password                            +/-: Change Opt.
  User Password                                     F1: General Help
                                                    F2: Previous Values
 ▶ Secure Boot                                      F5: Optimized Defaults
```

Administrator Password

To set an administrator password:

1.   Select the Administrator Password item and press <Enter>.

2.   From the Create New Password box, key in a password, then press <Enter>.

3.   Confirm the password when prompted.

To change an administrator password:

1.   Select the Administrator Password item and press <Enter>.

2.   From the Enter Current Password box, key in the current password, then press <Enter>.

3.   From the Create New Password box, key in a new password, then press <Enter>.

4.   Confirm the password when prompted.

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

User Password

To set a user password:

1.   Select the User Password item and press <Enter>.

2.   From the Create New Password box, key in a password, then press <Enter>.

3.   Confirm the password when prompted.

To change a user password:

1.   Select the User Password item and press <Enter>.

2.   From the Enter Current Password box, key in the current password, then press <Enter>.

3.   From the Create New Password box, key in a new password, then press <Enter>.

4.   Confirm the password when prompted.

Secure Boot Menu

This item allows you to customize the Secure Boot settings.

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                        Security

  System Mode              Setup                    Secure Boot can be enabled if
  Secure Boot              Not Active               1.System running in User mode
  Vendor Keys              Not Active               with enrolled Platform Key(PK)
                                                    2.CSM function is disabled
  Secure Boot control      [Disabled]
  Secure Boot Mode         [Custom]
▶ Key Management
```
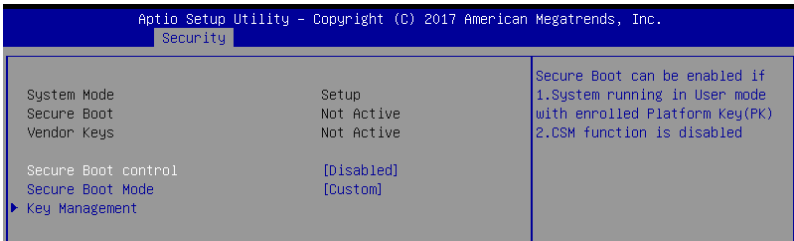
Secure Boot Control [Disabled]

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 Execution policy and Secure Boot Key management.
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.

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                        Security

  Provision Factory Default keys      [Disabled]         Install factory default Secure
                                                         Boot keys when System is in
▶ Enroll all Factory Default keys                        Setup Mode
▶ Save   all Secure Boot variables

  Secure Boot variable  | Size| Key#| Key origin
▶ Platform Key(PK)      |    0|    0|
▶ Key Exchange Key      |    0|    0|
▶ Authorized Signatures |    0|    0|
▶ Forbidden  Signatures |    0|    0|
▶ Authorized TimeStamps |    0|    0|
▶ OsRecovery Signatures |    0|    0|
```

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

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

Authorized TimeStamps

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

OsRecovery Signatures

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

4.6   Boot Menu

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

```
          Aptio Setup Utility – Copyright (C) 2017 American Megatrends, Inc.
    Main  Advanced  Security  Boot  Monitor  Tool  Save & Exit  Event Logs

    Boot Configuration                                  Select the keyboard NumLock
    Bootup NumLock State            [On]                state

    Boot Logo Display               [Disabled]
      POST Report                   [5 sec]

    Chassis Intrusion Message       [Warning]

    Boot Option Priorities
    Boot Option #1                  [Generic-Compact Flash
                                    1.00]
    Boot Option #2                  [SATA P3 : ASUS DVD RAM
                                    GHD1N]
    Boot Option #3                  [IBA GE Slot 0100 v1572]  →←: Select Screen
                                                              ↑↓: Select Item
                                                              Enter: Select
    Hard Drive BBS Priorities                                 +/-: Change Opt.
    CD/DVD ROM Drive BBS Priorities                           F1: General Help
    Network Device BBS Priorities                             F2: Previous Values
                                                              F5: Optimized Defaults
```

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]

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.

Chassis Intrusion Message [Warning]

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

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

- • 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.

Set the booting order of network devices.

Boot Option #1 [IBA GE Slot 0200 v1572]

Configuration options: [IBA GE Slot 0200 v1572] [Disabled]

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.

CD/DVD ROM Drive BBS Priorities

This item allows you to set the booting from CD/DVD ROM Drive.

Network Device BBS Priorities

This item allows you to set the booting from network.

4.7   Monitor Menu

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

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
   Main  Advanced  Security  Boot  Monitor  Tool  Save & Exit  Event Logs

   CPU1 Temperature              : +59°C / 163°F          Generic/High Speed/Full
   CPU_FAN1 Speed                : 1532 RPM               Speed/Manual Speed Mode
   FRNT_FAN1 Speed               : N/A
   FRNT_FAN2 Speed               : N/A
   FRNT_FAN3 Speed               : N/A
   FRNT_FAN4 Speed               : 1413 RPM
   REAR_FAN1 Speed               : N/A
   +VCORE1 Voltage               : +1.224 V
   +VDDQ_AB_CPU1 Voltage         : +1.208 V
   +VCCIO Voltage                : +0.968 V
   +12V Voltage                  : +12.192 V
   +5V Voltage                   : +5.000 V
   +3.3V Voltage                 : +3.392 V
   +5VSB Voltage                 : +5.000 V               →←: Select Screen
   +3.3VSB Voltage               : +3.392 V               ↑↓: Select Item
   VBAT Voltage                  : +3.168 V               Enter: Select
   +VCCSA                        : +1.056 V               +/-: Change Opt.
                                                          F1: General Help
   FAN Speed Control             [Generic Mode]           F2: Previous Values
                                                          F5: Optimized Defaults
```

Fan Speed Control [Generic Mode]

Allows you to set the fan speed.
Configuration options: [Generic Mode] [High Speed Mode] [Full Speed Mode] [Manual Mode]

4.8   Tool menu

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

```
            Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
   Main  Advanced  Security  Boot  Monitor  Tool  Save & Exit  Event Logs

   Start EzFlash                                          Press ENTER to run the utility
                                                          to select and update BIOS.
```
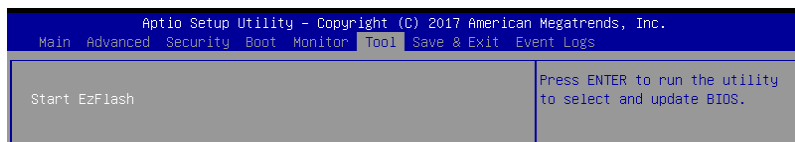
Start EzFlash

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

4.9 Save & Exit menu

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

```
              Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main   Advanced   Security   Boot   Monitor   Tool   Save & Exit   Event Logs

    Discard Changes and Exit                      Restore/Load Default values
    Save Changes and Reset                        for all the setup options.

    Restore Defaults


    Boot Override
    Generic-Compact Flash 1.00
    JetFlashTranscend 4GB 8.07
    Generic-SM/xD-Picture 1.00
    Generic-SD/MMC 1.00
    Generic-MS/MS-Pro 1.00
    SATA P3 : ASUS DVD RAM GHD1N
    IBA GE Slot 0100 v1572                        →←: Select Screen
                                                  ↑↓: Select Item
    Launch EFI Shell from filesystem device       Enter: Select
```

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

Launch EFI Shell from filesystem device

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

4.10   Event Logs menu

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

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
    Main   Advanced   Security   Boot   Monitor   Tool   Save & Exit   Event Logs

 ▶ Change Smbios Event Log Settings                         Press <Enter> to view the
 ▶ View Smbios Event Log                                    Smbios Event Log records.
```

4.10.1   Change Smbios Event Log Settings

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

```
          Aptio Setup Utility - Copyright (C) 2017 American Megatrends, Inc.
                                                                        Event Logs

   Enabling/Disabling Options                               Change this to enable or
   Smbios Event Log                  [Enabled]              disable all features of Smbios
                                                            Event Logging during boot.
   Erasing Settings
   Erase Event Log                   [No]
   When Log is Full                  [Do Nothing]

   Smbios Event Log Standard Settings
   Log System Boot Event             [Disabled]
   MECI                              1
   METW                             60

   Custom Options                                           →←: Select Screen
   Log OEM Codes                     [Enabled]              ↑↓: Select Item
   Convert OEM Codes                 [Disabled]             Enter: Select
                                                            +/-: Change Opt.
   NOTE: All values changed here do not take effect         F1: General Help
         until computer is restarted.                       F2: Previous Values
```

Enabling/Disabling Options

Smbios Event Log [Enabled]

Change this to enable or disable all features of Smbios Event Logging during boot.
Configuration options: [Disabled] [Enabled]

> • The following items appears only when you set Smbios Event Log to **[Enabled]**.
>
> • All values changed here do not take effect until computer is restarted.

Erasing Settings

Erase Event Log [No]

Choose options for erasing Smbios Event Log. Erasing is done prior to any logging activation during reset.
Configuration options: [No] [Yes, Next reset] [Yes, Every reset]

When Log is Full [Do Nothing]

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

Smbios Event Log Standard Settings

Log System Boot Event [Disabled]

Allows you to enable or disable logging of System boot event.
Configuration options: [Enabled] [Disabled]

MECI [1]

Also known as Multiple Event Count Increment, and allows you to set the value for the
number of occurences 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]

Also known as Multiple Time Event Window, and 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]

Custom Options

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

5

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

5.1 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 both Windows® OS and Linux).

5.1.1 RAID definitions

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

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

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

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

> 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.

5.1.2   Installing hard disk drives

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

To install the SATA hard disks for RAID configuration:

1.   Install the SATA hard disks into the drive bays following the instructions in the system user guide.

2.   Connect a SATA signal cable to the signal connector at the back of each drive and to the SATA connector on the motherboard.

3.   Connect a SATA power cable to the power connector on each drive.

5.1.3   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 4** for details on entering and navigating through the BIOS Setup.

5.1.4   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.

5.2 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            3. Reset Disks to Non-RAID
        2. Delete RAID Volume            4. Exit


════════════════════════ [ DISK/VOLUME INFORMATION]════════════════════
    RAID Volumes:
    None defined.

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




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

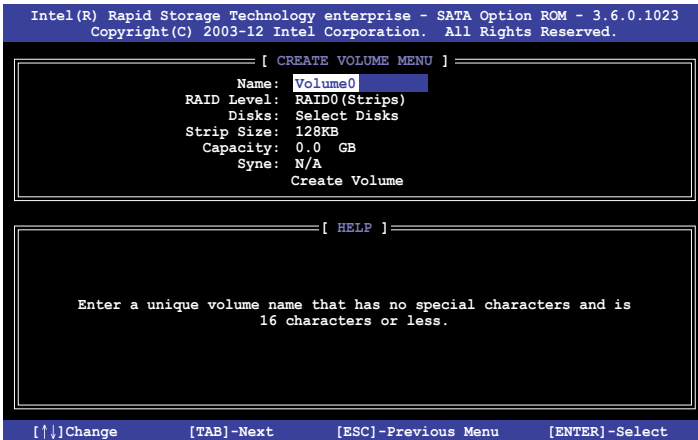The navigation keys at the bottom of the screen allow you to move through the menus and select the menu options.

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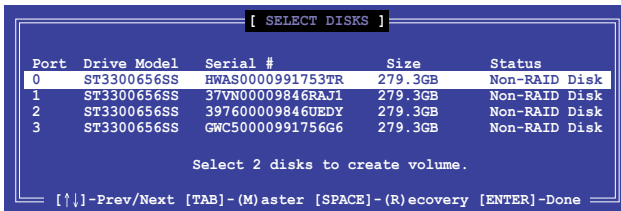
5.2.1 Creating a RAID set

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>.

```
Intel(R) Rapid Storage Technology enterprise - SATA Option ROM - 3.6.0.1023
          Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.
========================== [ CREATE VOLUME MENU ] ==========================
                        Name:  Volume0
                  RAID Level:  RAID0(Strips)
                       Disks:  Select Disks
                  Strip Size:  128KB
                    Capacity:  0.0  GB
                        Syne:  N/A
                             Create Volume

=============================== [ HELP ] ===============================



        Enter a unique volume name that has no special characters and is
                            16 characters or less.




===============================================================================
    [↑↓]Change        [TAB]-Next        [ESC]-Previous Menu      [ENTER]-Select
```

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.

```
=========================== [ SELECT DISKS ] ===========================

  Port  Drive Model    Serial #              Size        Status
  0     ST3300656SS    HWAS0000991753TR      279.3GB     Non-RAID Disk
  1     ST3300656SS    37VN00009846RAJ1      279.3GB     Non-RAID Disk
  2     ST3300656SS    397600009846UEDY      279.3GB     Non-RAID Disk
  3     ST3300656SS    GWC50000991756G6      279.3GB     Non-RAID Disk

                   Select 2 disks to create volume.

===== [↑↓]-Prev/Next [TAB]-(M)aster [SPACE]-(R)ecovery [ENTER]-Done =====
```

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

6.   Use the up/down arrow keys to select the stripe size for the RAID array (for RAID 0, 10 and 5 only) then press <Enter>. The available stripe size values range from 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.

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

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

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

```
        WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST.

     Are you sure you want to create this volume? (Y/N):
```

5.2.2 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 <Del>.

```
    Intel(R) Rapid Storage Technology enterprise - SATA Option ROM - 3.6.0.1023
          Copyright(C) 2003-12 Intel Corporation.  All Rights Reserved.
    ============================= [ DELETE VOLUME MENU ] =============================
     Name          Level          Drives       Capacity        Status       Bootable
     Volume0       RAID0(Stripe)      2          298.0GB         Normal         Yes




    =================================== [ HELP ] ===================================

            Deleting a volume will reset the disks to non-RAID

                    WARNING: ALL DISK DATA WILL BE DELETED.
                    (This does not apply to Recovery volumes)



      [↑↓]-Select            [ESC]-Previous Menu           [DEL]-Delete Volume
```

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.

```
    ====================== [ DELETE VOLUME VERIFICATION ] ======================
                        ALL DATA IN THE VOLUME WILL BE LOST!
                      (This does not apply to Recovery volumes)

          Are you sure you want to delete volume "Volume0"? (Y/N):
```

5.2.3   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.

5.2.4 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.

```
┌──────────────────[ CONFIRM EXIT ]──────────────────┐
│                                                     │
│         Are you sure you want to exit? (Y/N):       │
│                                                     │
└─────────────────────────────────────────────────────┘
```
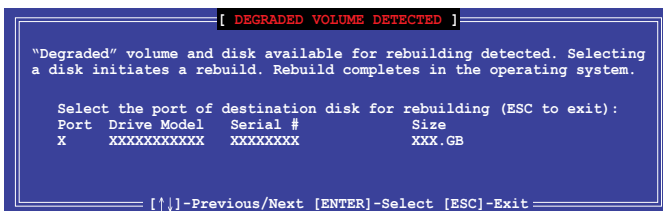
5.2.5 Rebuilding the RAID

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.

```
┌──────────[ DEGRADED VOLUME DETECTED ]──────────┐
│                                                 │
│ "Degraded" volume and disk available for rebuilding detected. Selecting │
│ a disk initiates a rebuild. Rebuild completes in the operating system.  │
│                                                 │
│   Select the port of destination disk for rebuilding (ESC to exit):     │
│   Port  Drive Model   Serial #          Size                            │
│   X     XXXXXXXXXXX   XXXXXXXX          XXX.GB                           │
│                                                 │
└────────[↑↓]-Previous/Next [ENTER]-Select [ESC]-Exit────────┘
```

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

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

```
    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              3. Reset Disks to Non-RAID
        2. Delete RAID Volume              4. Exit


    ══════════════════════[ DISK/VOLUME INFORMATION]══════════════════════
     RAID Volumes:                                *=Data is Encrypted
     ID    Name       Level1          Strip       Size   Status    Bootable
     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
```

4. Press <Esc> to exit Intel Rapid Storage Technology and reboot the system.

5. Select **Start > Programs > Intel Rapid Storage > Intel Rapid Storage Console** or click the **Intel Rapid Storage Technology** tray icon to load the Intel Rapid Storage Manager utility.

6. From the **View** menu, select **Advanced Mode** to display the details of the Intel Rapid Storage Console.

7. From the **Volumes view** option, select **RAID volume** to view 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:

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

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

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

5.2.6 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 <Del> to enter the BIOS setup utility during POST.

2.   Go to the **Boot** menu and select the boot option priority.

3.   Use up/down arrow keys to select the boot priority and press <Enter>. See the **Boot menu** section 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>.

5.3 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.

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.
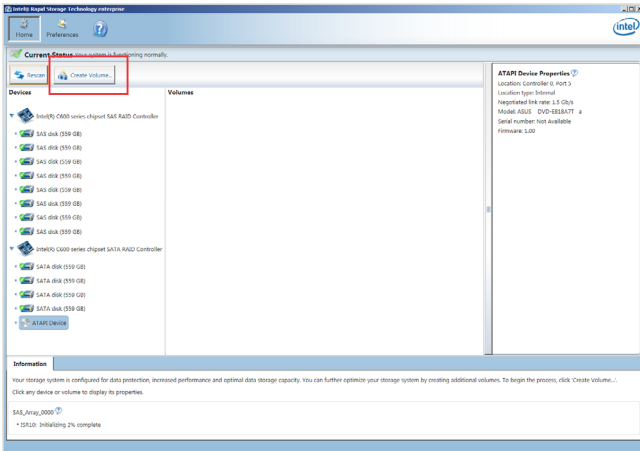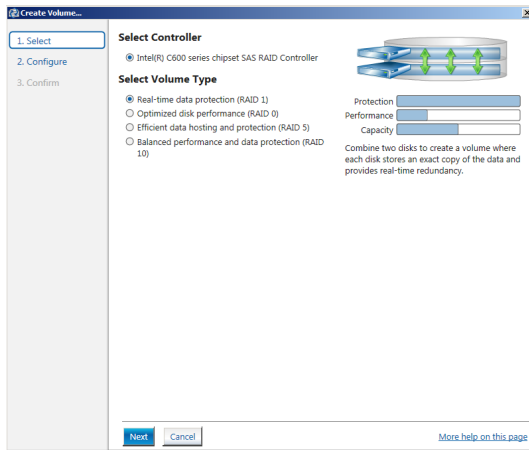

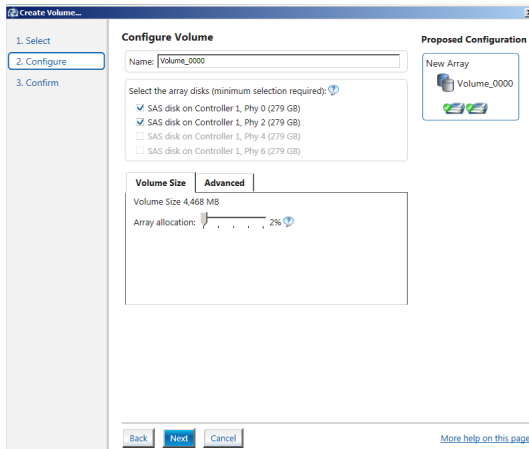You can click **Rescan** to re-scan any attached hard disks.

5.3.1   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**.
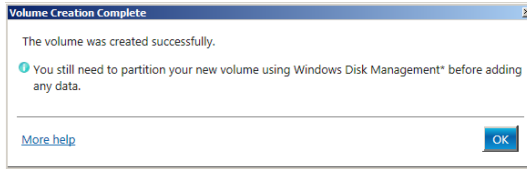
5.   Confirm the volume creation, then click **Create Volume** to continue.

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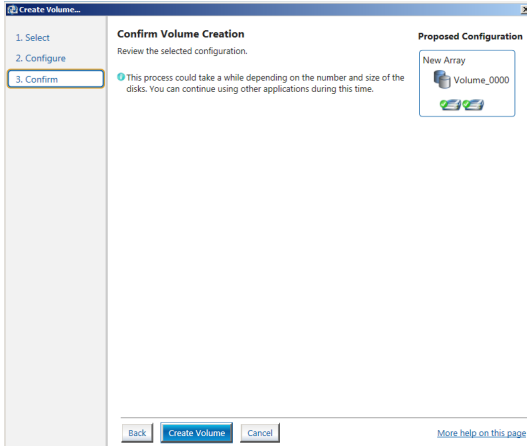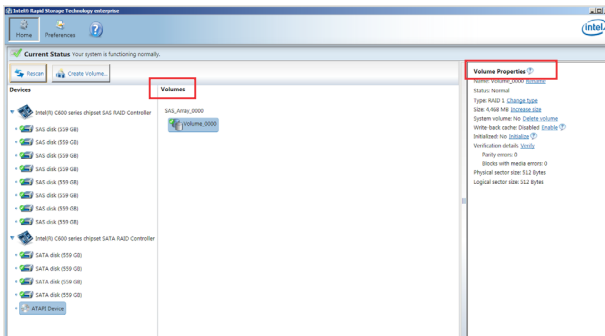

6.   Wait until the process is completed, then click **OK** when prompted.

You still need to partition your new volume using Windows Disk Management before adding any data.
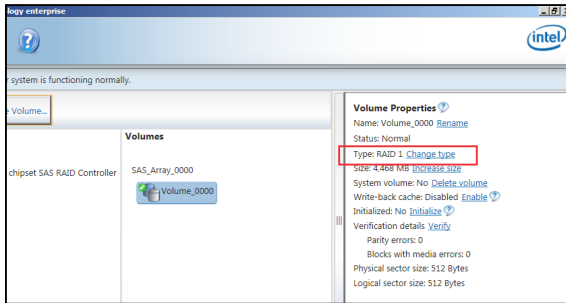
The created RAID set is displayed in the **Volumes** list. If you wish to change the settings, go to **Volume Properties**.

5.3.2   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
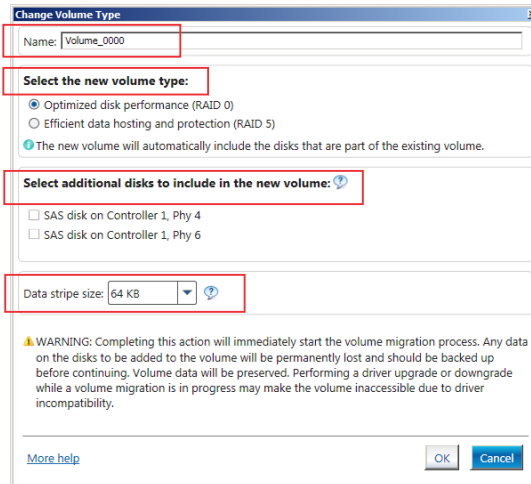
We recommend a lower stripe size for server systems, and a higher stripe size for multimedia computer systems used mainly for audio and video editing.

5.3.3   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.
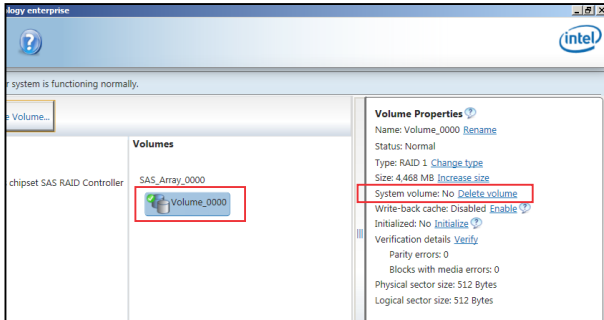
2.   From the **Volume Properties** field, select **Delete volume**.

3.   Click **Yes** to delete the volume and return to the utility main menu, or click **No** to return to the main menu.
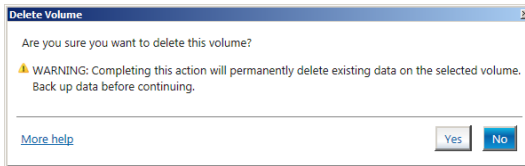
5.3.4   Preferences

System Preferences

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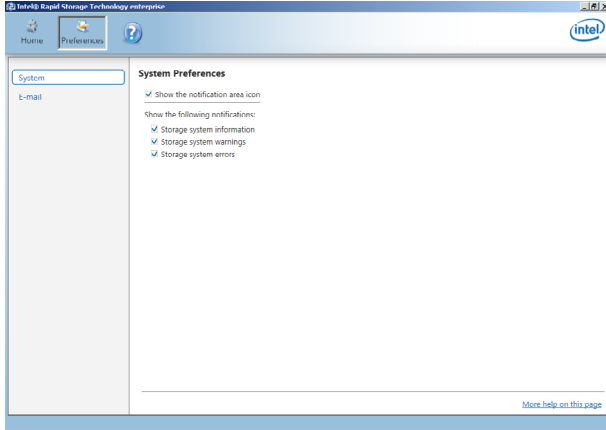
E-mail Preferences

Allow you to set to sent e-mail of the following events:
- Storage system information
- Storage system warnings
- Storage system errors

Appendix

A

P10S-M WS block diagram

```
                    ┌──────────────┐
  DDR4 ◄──────────► │              │
                    │  Kaby Lake/  │                    x16 Slot
  DDR4 ◄──────────► │  Skylake CPU │   x16 Gen3    ┌──────────┐
                    │  Up to 95W   │ ◄─────────►   │ PCIEX16_1│
  2DPC, total 4* 288_Pin DDR4      │               └──────────┘
  2400/2133 U-DIMM ECC/non-ECC     │
                    └──────┬───────┘
                           │ DMI3.0
                           ▼
  8*SATA3         ┌──────────────┐
  (SATA8 share with M.2) ◄──────┤              │
                                 │              │          I210
  1*M.2 ◄── x4 Gen3 ────────────┤              │   x1 Gen3  ┌────┐
  x8 Slot                        │ Skylake PCH  │ ◄───────►  │    │ ──► GbE
  ┌────────┐  x4 Gen3            │    C236      │            └────┘
  │PCIEX8_1│ ◄─────────────────┤              │
  └────────┘                     │              │          I210
  6* USB3.0(Rear :2) ◄──────────┤              │   x1 Gen3  ┌────┐
  x1 Slot                        │              │ ◄───────►  │    │ ──► GbE
  ┌────────┐  x1 Gen3            │              │            └────┘
  │PCIEX1_1│ ◄─────────────────┤              │
  └────────┘                     └──┬──────┬────┘
                                    │      │
            ┌──────────┐            │      │    ALC1150
            │  64Mb    │ ◄──────────┘      │    ┌────┐
            │ SPI Flash│                   └──► │    │ ──► ┌────────────┐
            └──────────┘                        └────┘    │7.1 HD Audio│
            ┌──────────┐                                  └────────────┘
            │   TPM    │ ◄──────┘
            └──────────┘
```
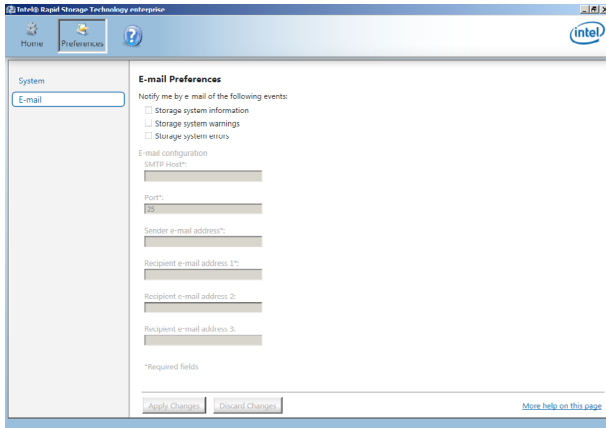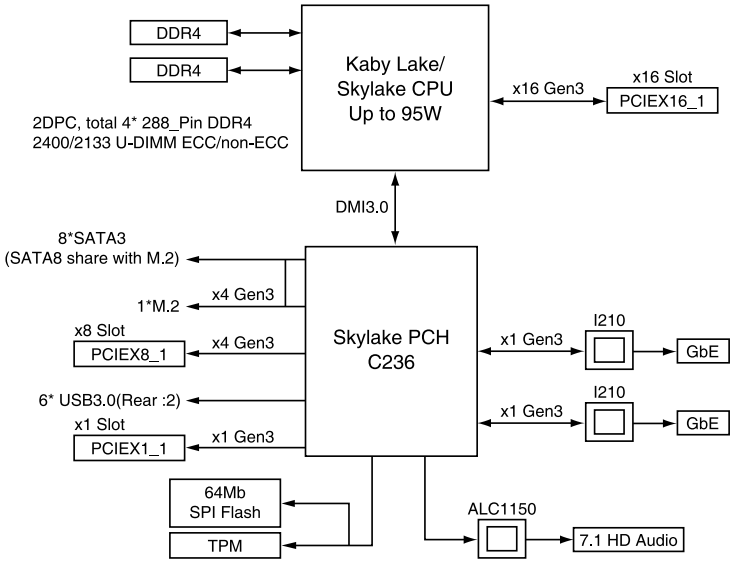
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