Motherboard Installation Guide

Motherboard

E13591
First Edition
November 2017

Contents

Contents

Safety information

Electrical safety

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

Operation safety

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

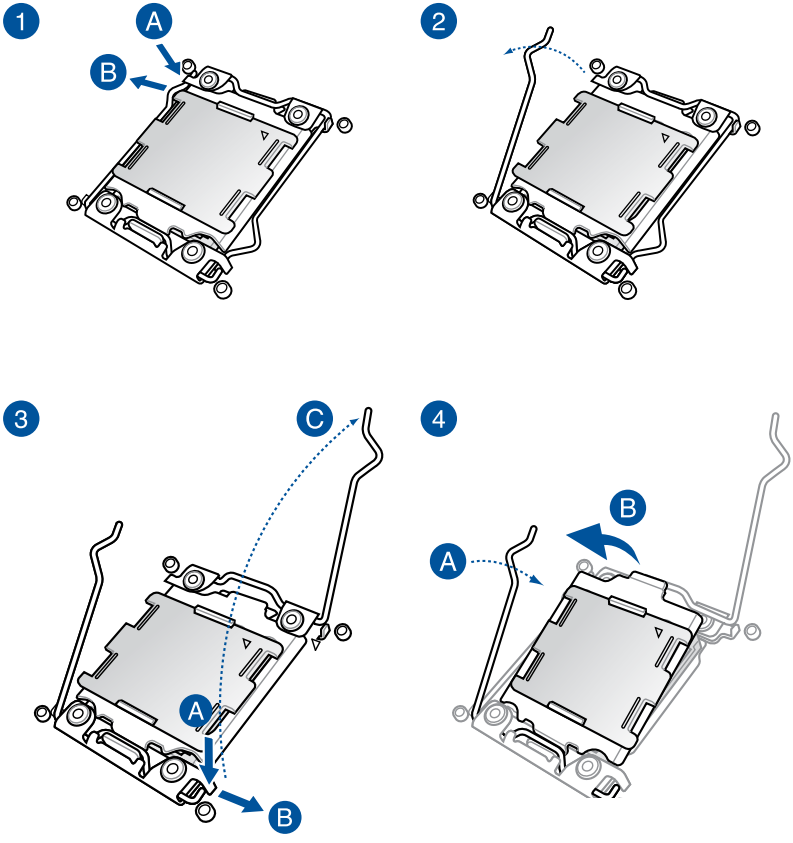
Chapter 1: Quick Start

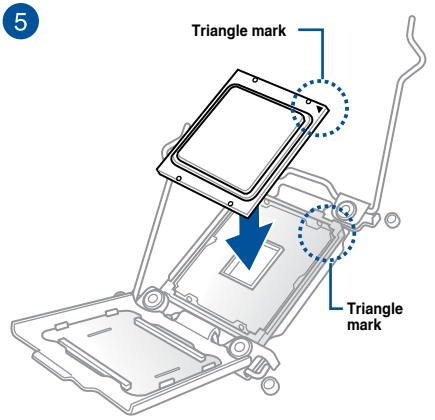
1.1 Installing the CPU

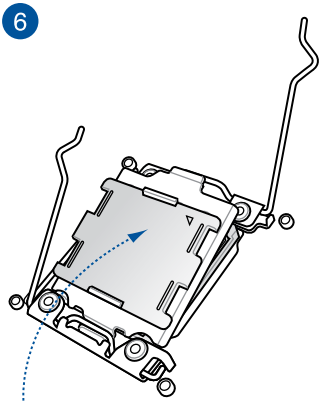
1.1.1 Intel® LGA2066 socket

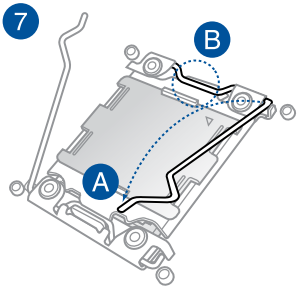
Please note the order in opening/closing the double latch. Follow the instructions printed on the metal sealing hatch or the illustrations shown below in this manual. The plastic cap will pop up automatically once the CPU is in place and the hatch properly sealed down.

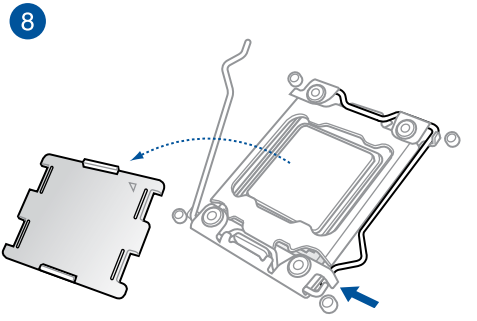
Unplug all power cables before installing the CPU.

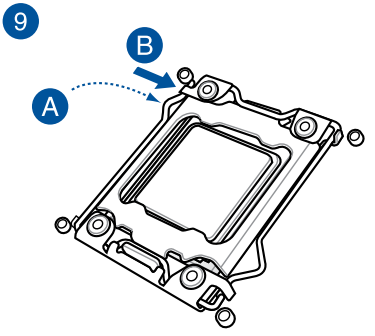


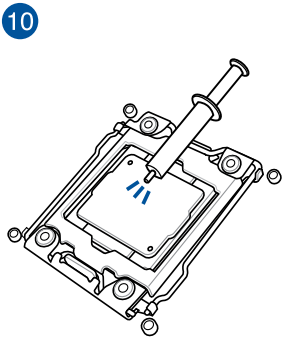












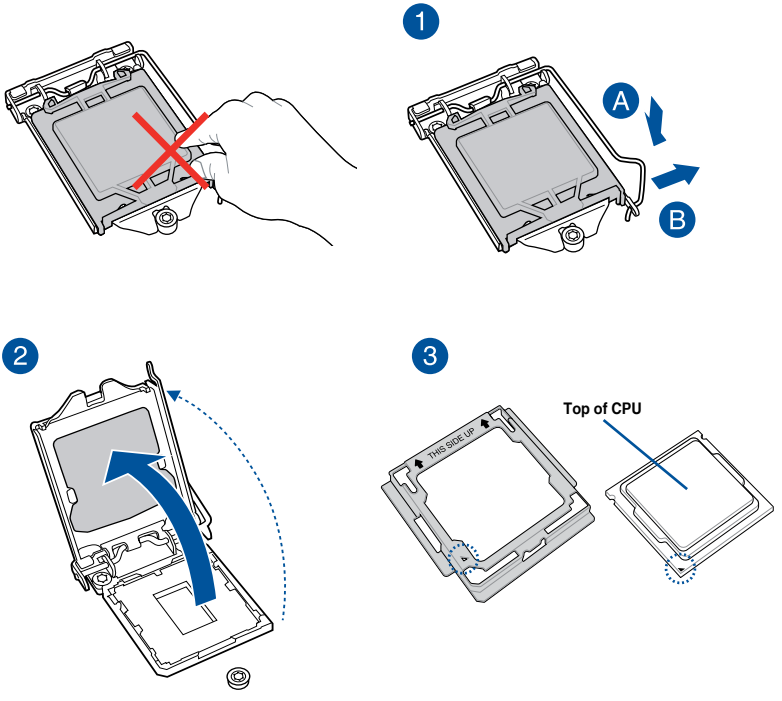
Some heatsinks come with pre-applied thermal paste. If so, skip this step.

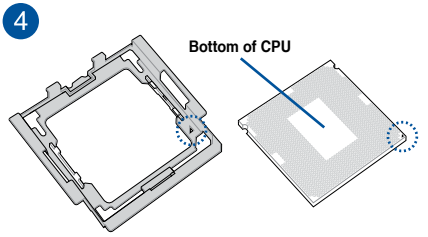
1.1.2 Intel® LGA1151 socket

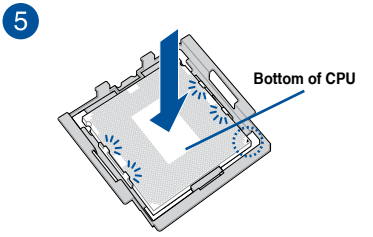
With CPU installation tool

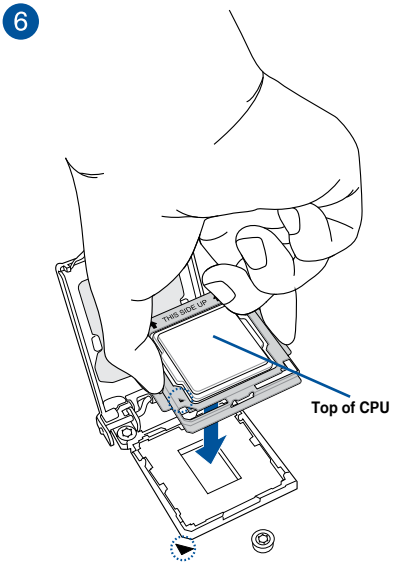
- The CPU Installation Tool is only compatible on ASUS motherboards with a Intel® LGA1151 socket.
- Ensure that the CPU is firmly clicked into place before installing it onto the CPU socket on the motherboard.
- Use the CPU Installation Tool for installing the CPU only. DO NOT damage or bend the CPU Installation Tool.
- Always firmly hold both sides of the CPU Installation Tool when installing, removing, or picking up the CPU Installation Tool.
- Ensure to use a soft stable surface when installing the CPU to the CPU Installation Tool to prevent CPU damage.
- ASUS will not cover damages resulting from incorrect CPU installation/removal, incorrect CPU orientation/placement, or other damages resulting from negligence by the user.

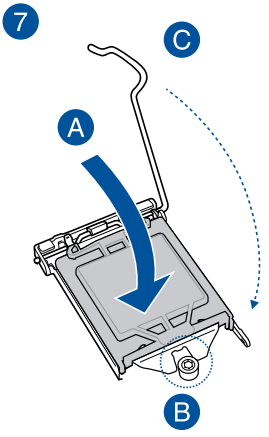
Unplug all power cables before installing the CPU.

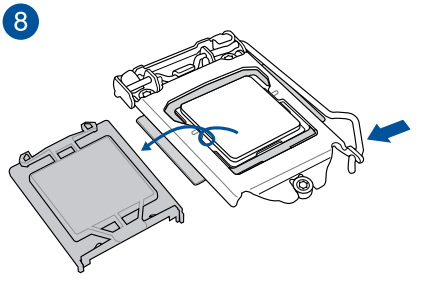


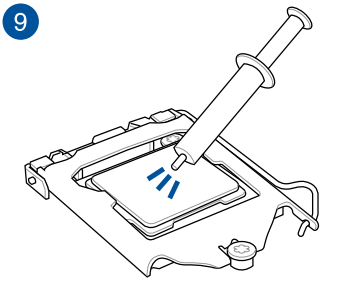






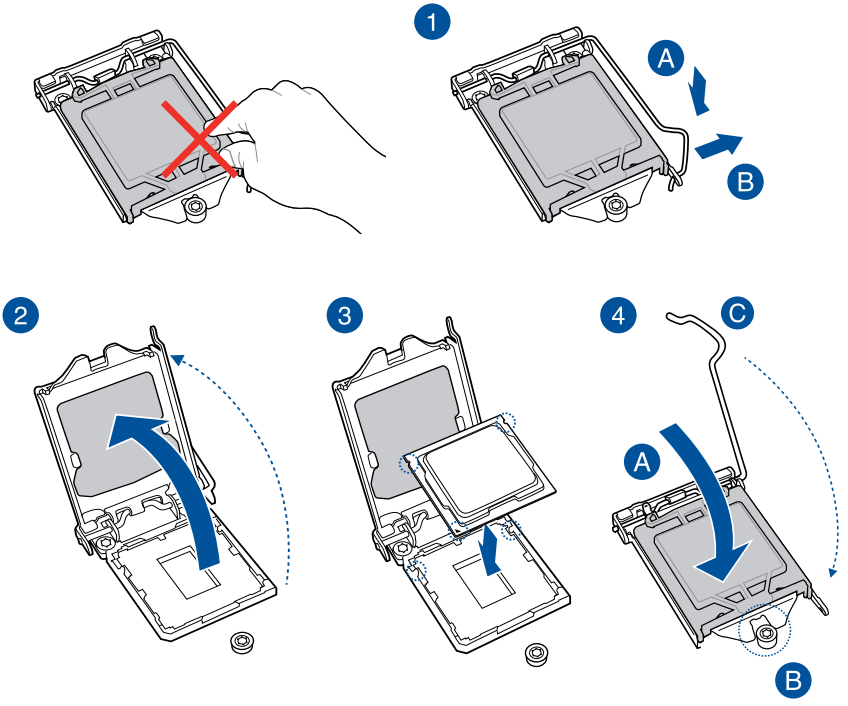






Some heatsinks come with pre-applied thermal paste. If so, skip this step.

Without CPU installation tool



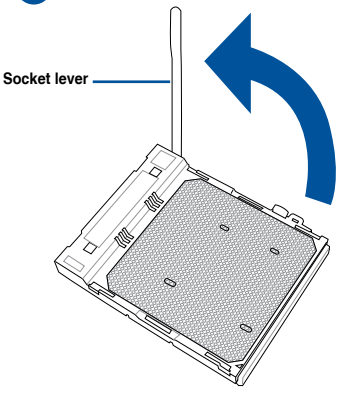
Some heatsinks come with pre-applied thermal paste. If so, skip this step.

1.1.3 AMD® AM3+ socket

The AMD® AM3+ socket is compatible with AMD® AM3+ and AM3 processors. Only certain AM3 motherboard models support AM3+ processors by upgrading BIOS. Refer to ASUS support site for details.

Unplug all power cables before installing the CPU.

1



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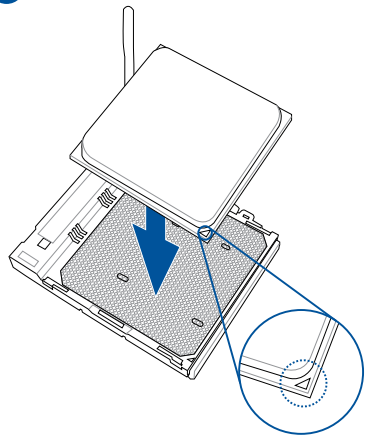
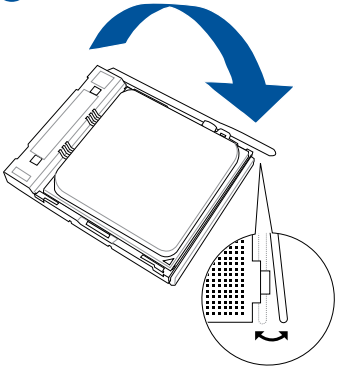


Ensure that the socket lever is lifted up to a 90° angle; otherwise, the CPU will not fit in completely.

3



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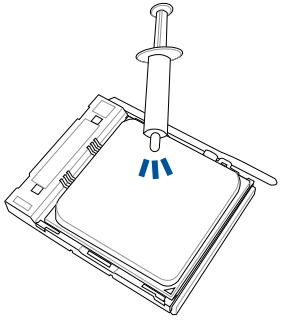
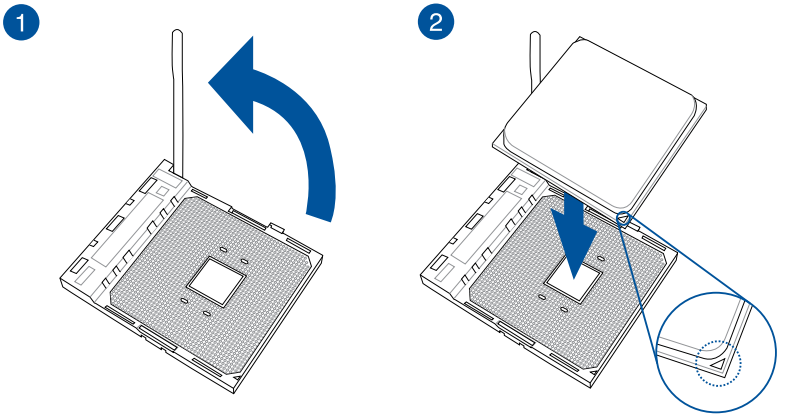


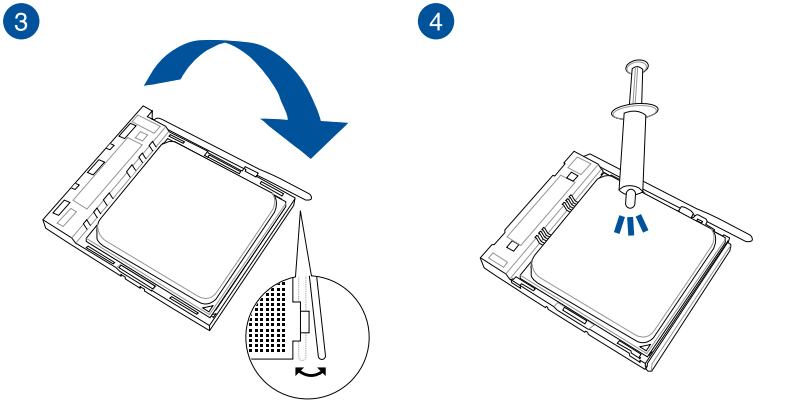
Some heatsinks come with pre-applied thermal paste. If so, skip this step.

1.1.4 AMD® AM4 socket

Ensure that you use a CPU designed for the AM4 socket. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the pins and damaging the CPU

Unplug all power cables before installing the CPU.





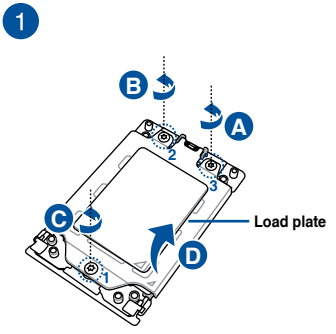
Some heatsinks come with pre-applied thermal paste. If so, skip this step.

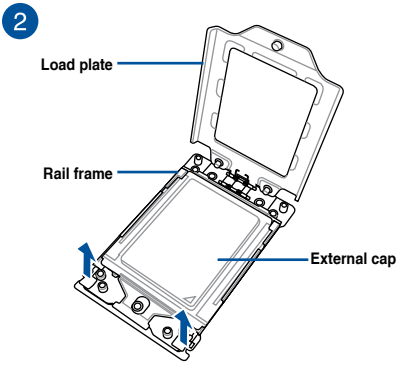
1.1.5 AMD® SocketTR4

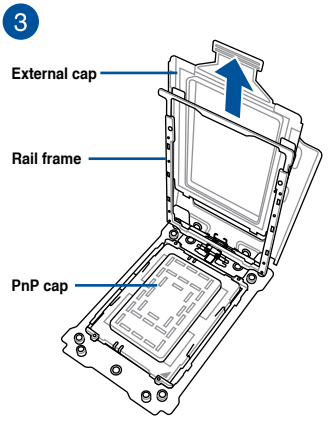
The AMD® SocketTR4 is compatible with AMD® SocketTR4 processors. Ensure you use a CPU designed for the SocketTR4. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

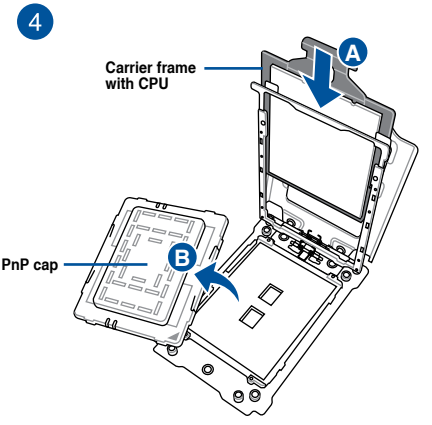
Unplug all power cables before installing the CPU.

If a screwdriver is bundled, ensure to use the bundled screwdriver.









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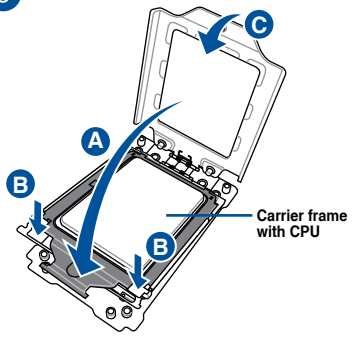

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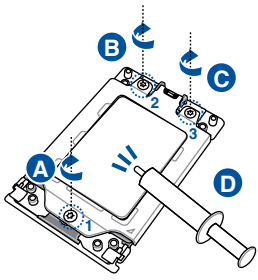
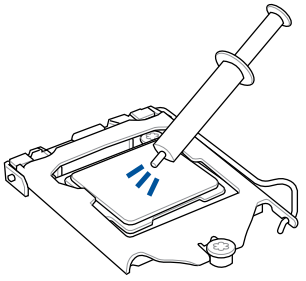


Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

The load plate screws are Torx T20 models. A torque value of 12 inch-lbf is recommended.

1.2 Cooling system installation



Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan, if necessary.

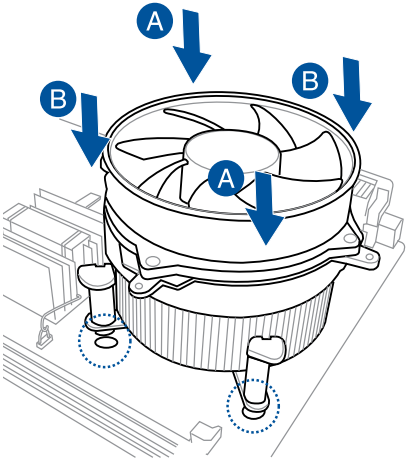
The Thermal Interface Material is toxic and inedible. DO NOT eat it. If it gets into your eyes or touches your skin, wash it off immediately, and seek professional medical help.

To prevent contaminating the paste, DO NOT spread the paste with your finger directly.

To install Intel-certified heatsinks:

Type 1

1



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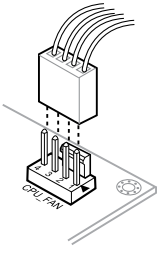

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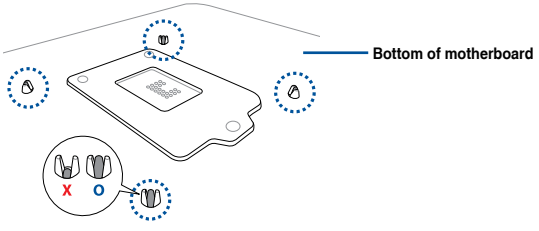

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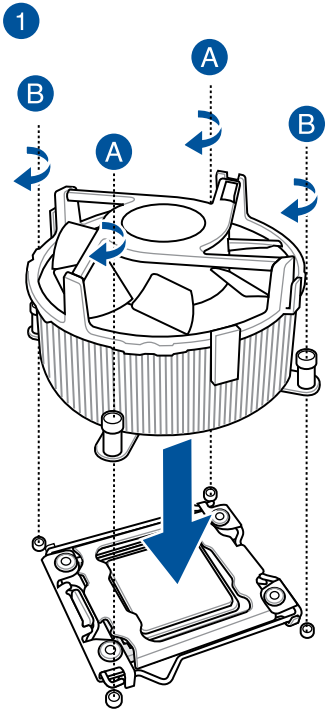
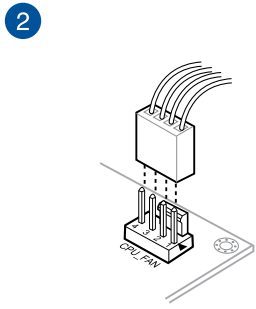
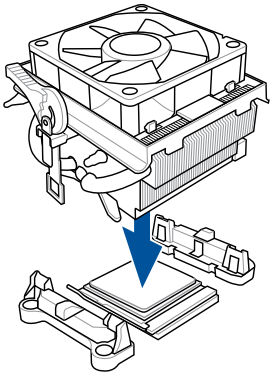




To install AMD-certified heatsinks:

Type 1

1



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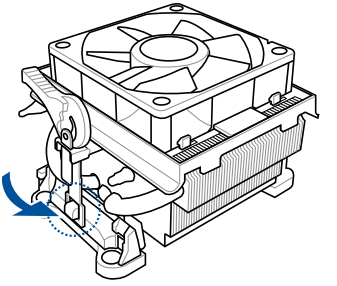

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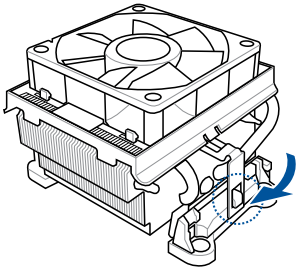

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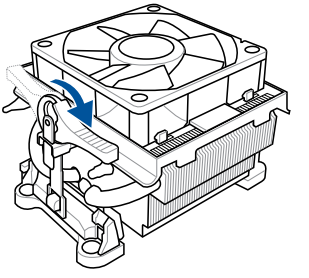

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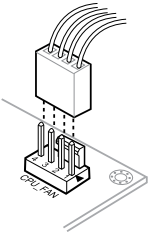

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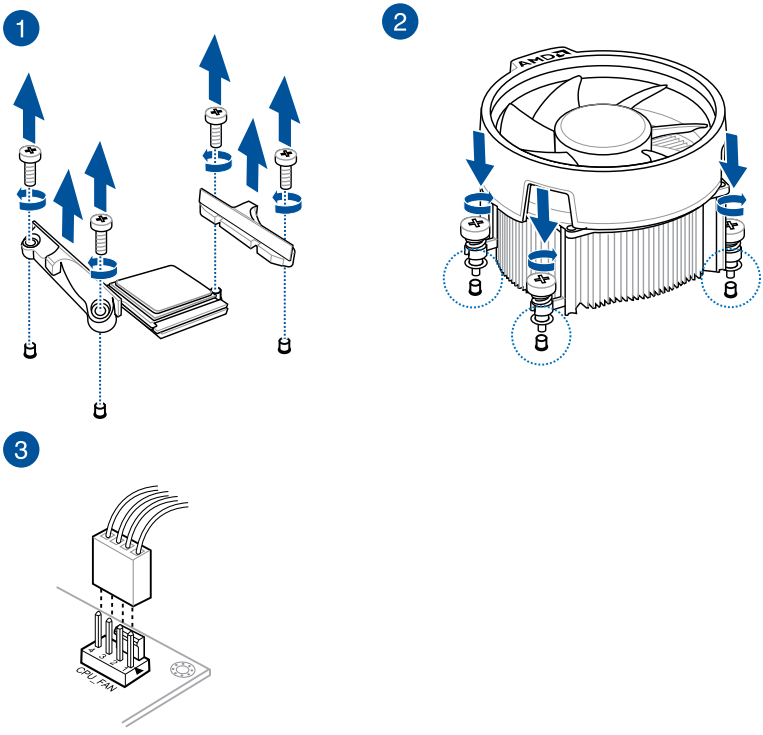
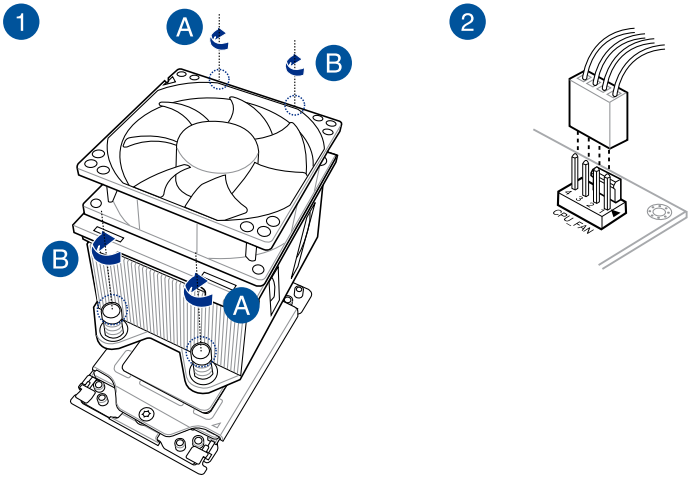
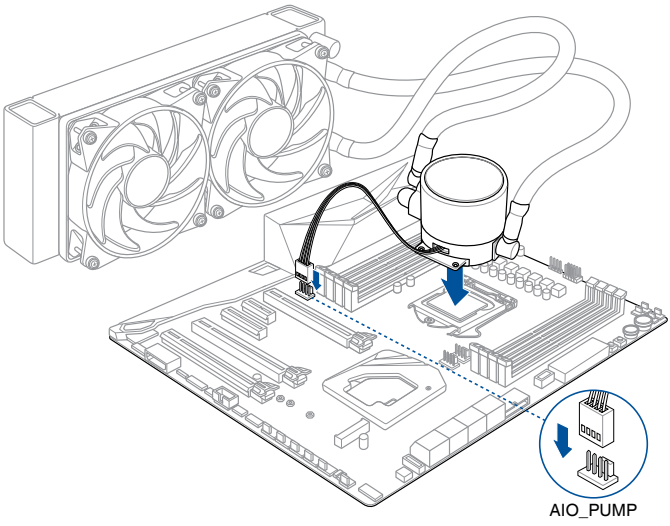


SocketTR4



To install an AIO cooler:

1



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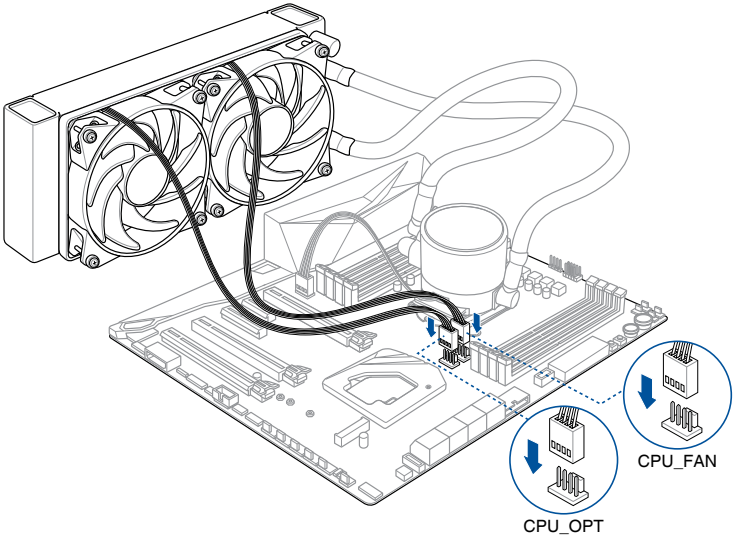
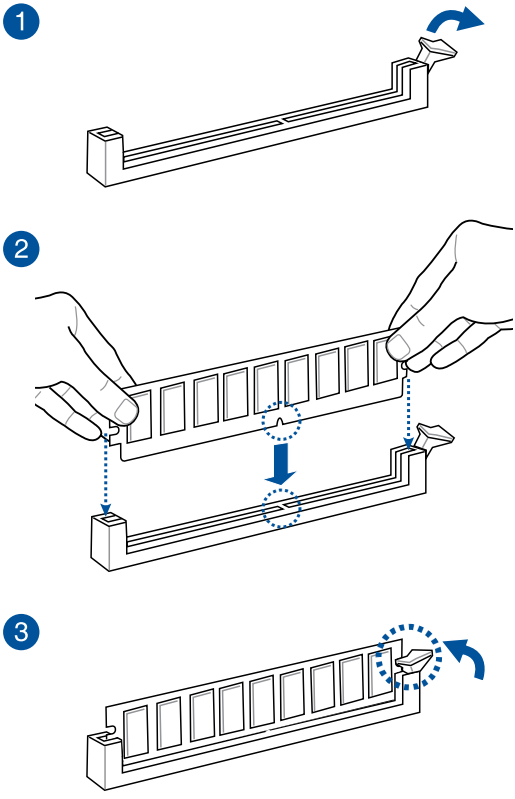
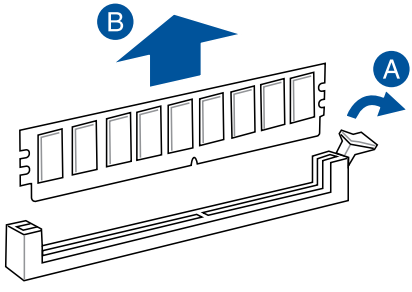


1.3 DIMM installation

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.



To remove a DIMM



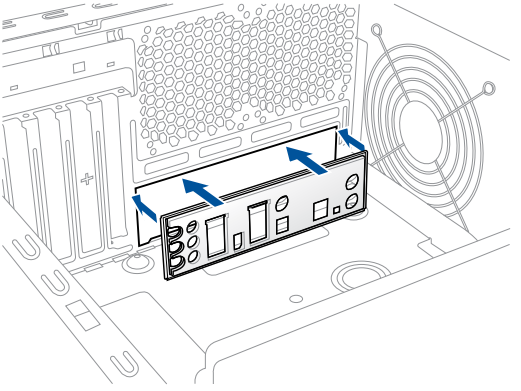
1.4 Installing the motherboard

The illustrations in this section are for reference only. The motherboard layout may vary with models, but the installation steps are the same for all models.

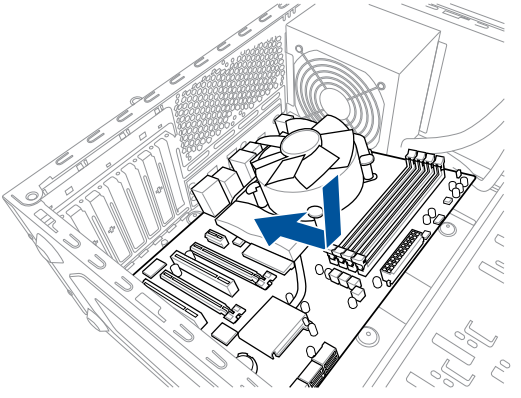
1. Install the ASUS I/O Shield to the chassis rear I/O panel.

Skip this step if the ASUS I/O Shield is pre-installed on your motherboard.

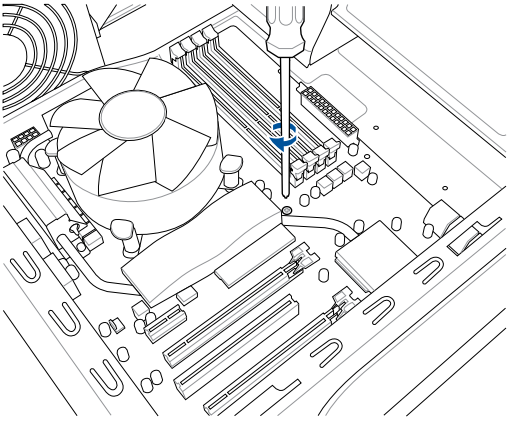
Some sharp edges and points might cause physical injury. We recommend you put on cut or puncture resistant gloves before motherboard and I/O shield installation.



2. Place the motherboard into the chassis, ensuring that its rear I/O ports are aligned to the chassis' rear I/O panel.



3. Place the bundled screws into the holes indicated by circles to secure the motherboard to the chassis.



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

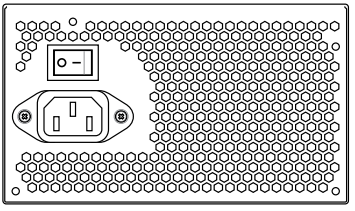
1.5 Installing the power supply unit

There are two kinds of commonly-used power supply units. One is with Active Power Factor Correction (PFC) and the other with passive PFC.

1. Select a power supply unit.

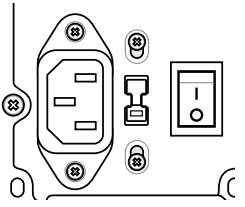
Power supply with active PFC:

Active PFC automatically corrects the AC input voltage.

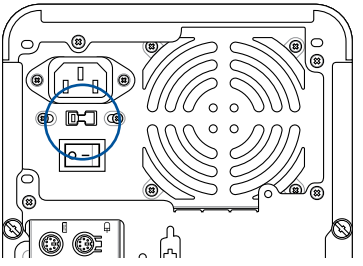


Power supply with passive PFC:

Passive PFC requires user to manually adjust the AC input voltage.



2. If you are using a power supply with passive PFC, adjust to the correct AC input voltage in your area.



Failure to adjust the power supply to the correct AC input voltage will seriously damage the system.

Use power supply units with safety certification only. Using unstable power supply units can damage your motherboard and other components. Refer to the user guide for power supply units that meet the motherboard requirements.

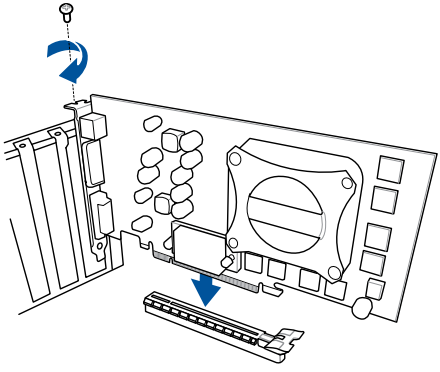
1.6 Installing an expansion card

To install an expansion card:

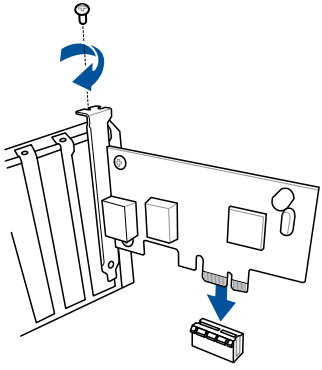
1. Remove the metal slot cover opposite the expansion card slot where you wish to install an expansion card.
2. Install the expansion card and ensure that it is properly seated on the slot.
3. Screw to secure the card on the slot.
4. Repeat the previous steps to install another expansion card.

The illustrations in this section are for reference only. The motherboard layout may vary with models, but the installation steps are the same for all models.

To install PCIE x16 card



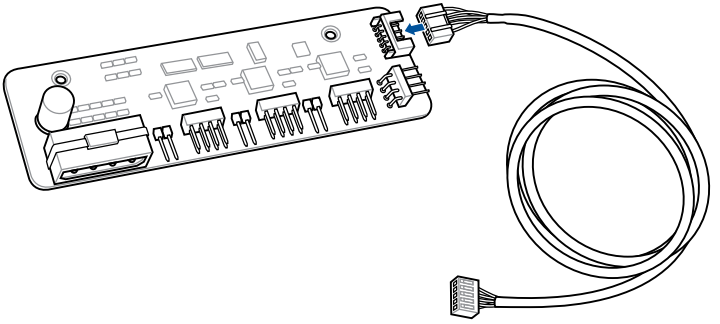
To install PCIE x1 card



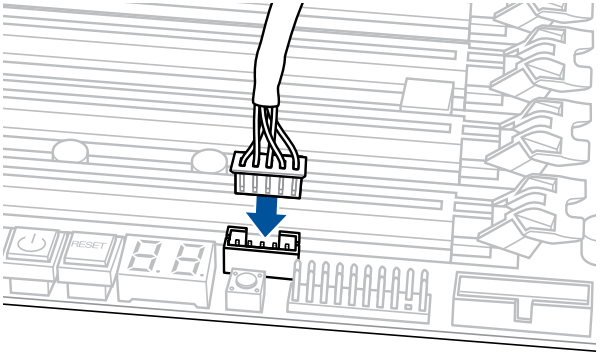
- Refer to the card documentation for the card configuration details, and to the motherboard user guide in case you need to configure any jumpers after installing the expansion card.
- Refer to the motherboard user guide for the instructions of the expansion card signal cable connection.

To install a Fan Extension Card

1

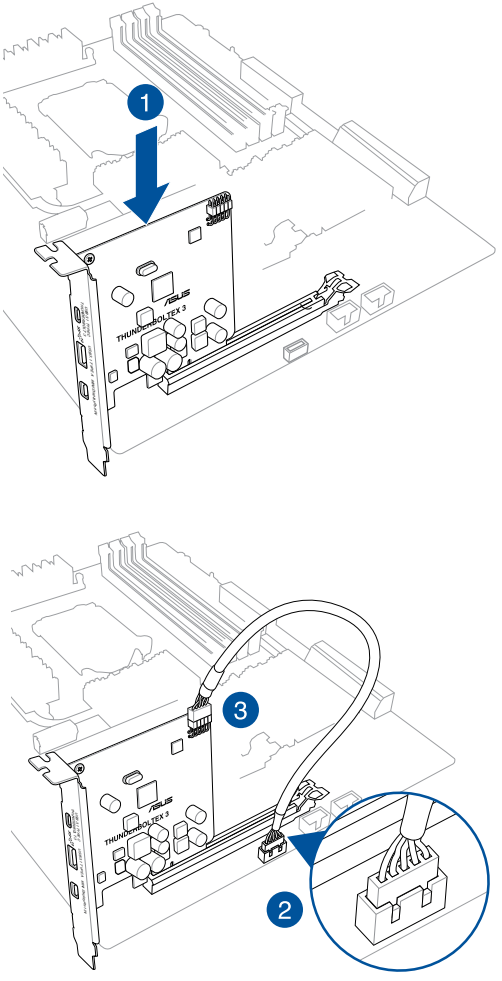


2



The FAN Extension card is purchased separately.

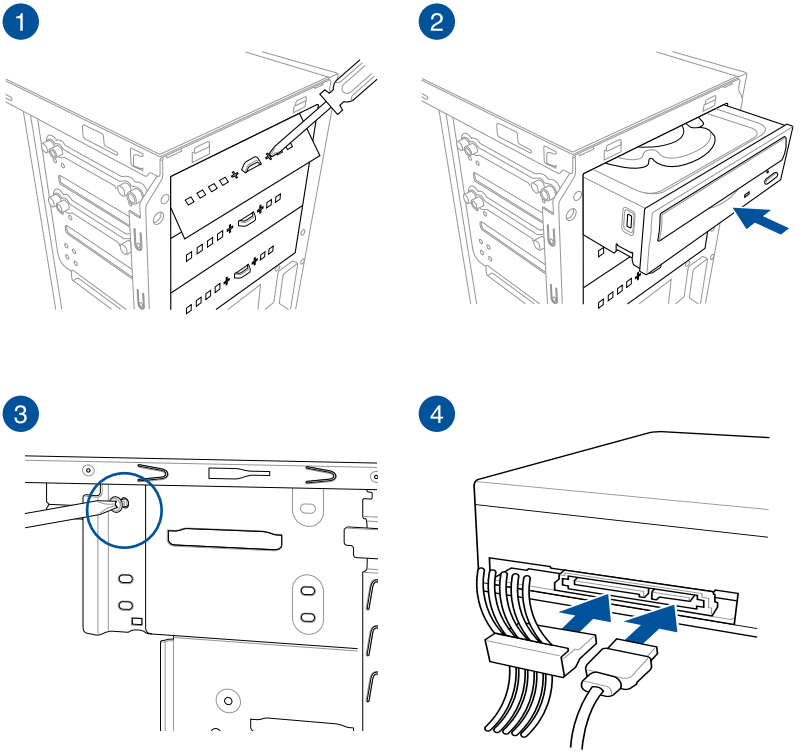
To install a ThunderboltEX 3 card



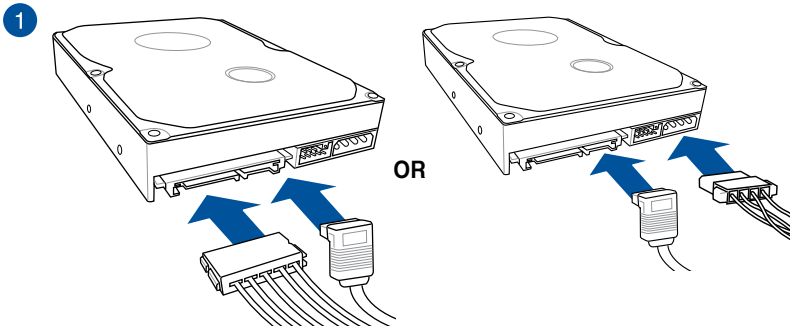
1.7 Installing disk drives

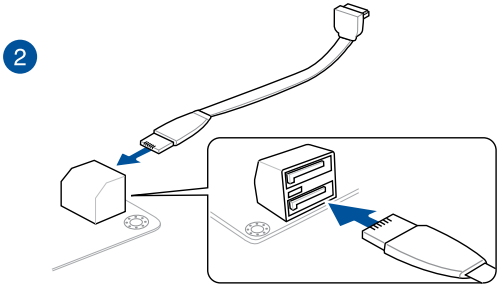
The illustrations in this section are for reference only. The chassis may vary with models, but the installation steps are the same for all models.

1.7.1 SATA optical disk drive

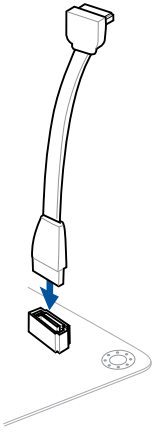


1.7.2 SATA hard disk drive



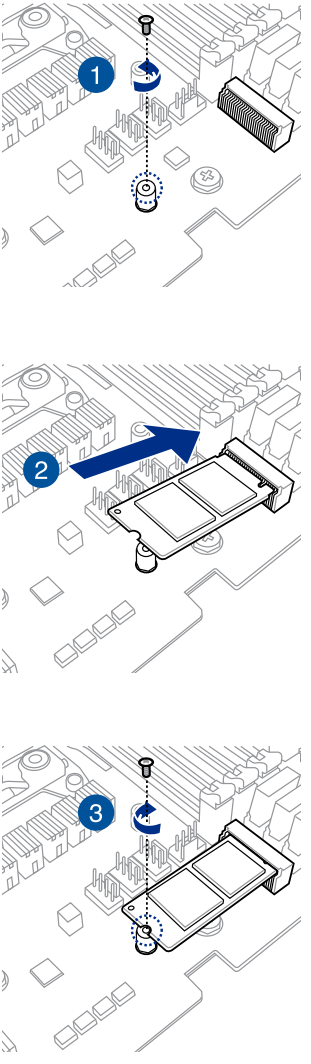


OR

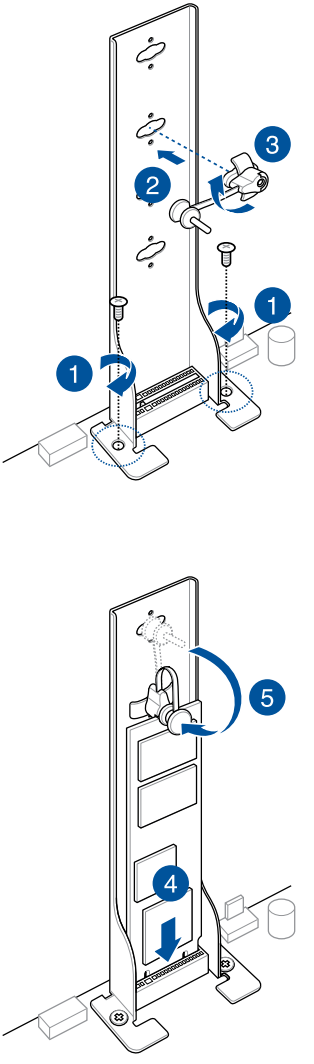


1.8 M.2 installation

Some motherboards may require you to remove the heatsink before installing the M.2. Refer to the motherboard user guide for more details on removing the heatsink.



OR



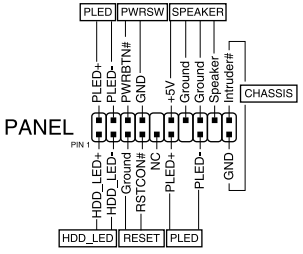
Supported M.2 type varies per motherboard.

1.9 Front I/O connector

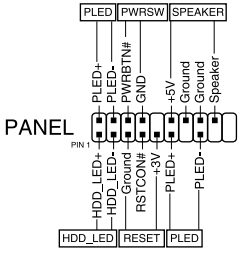
Front panel connector pins

- RESET (Reset Switch)
- PLED (Power LED)
- PWRSW / PWRBTN (Power Switch)
- SPEAKER (Speaker Connector)
- CHASSIS (Chassis intrusion)
- HDD_LED / HDLED (Hard disk drive activity LED)

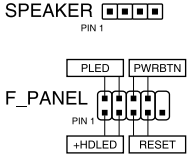
20-3 pin front panel connector



20-5 pin front panel connector



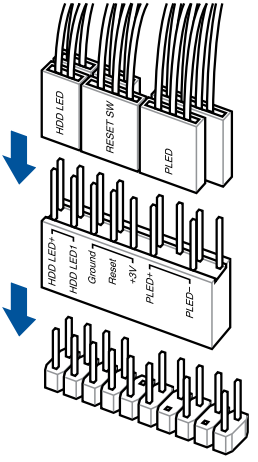
10-1 pin front panel connector and 4-pin speaker connector

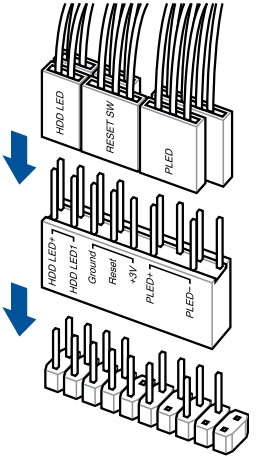


- The front panel cables of your chassis may differ with models or designs. Connect these connectors to the motherboard according to the label.
- If the LEDs do not light up and the pin location is correct, you might have mistaken the ground pins with the signal pins. Usually the white wire stands for the ground pins and the color-coded wire for the signal pins.
- The SPEAKER, RESET and PWRSW front panel cables have no specific orientation, while PLED cables do. Connect the cable PIN1 to the connector PIN1 on the motherboard.
- The front panel connector varies with your motherboard model, refer to the user guide for more details.

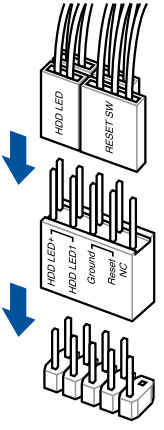
To install ASUS Q-Connector

20-3 pin front panel connector and 20-5 pin front panel connector

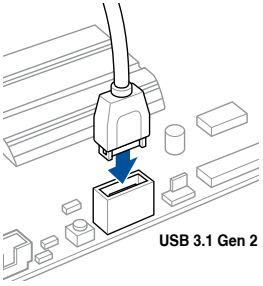




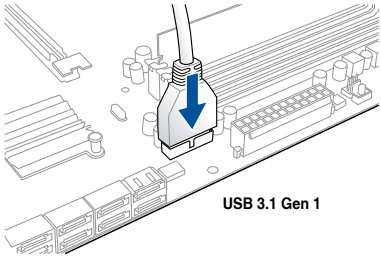
10-1 pin front panel connector



To install USB 3.1 Gen 2 connector

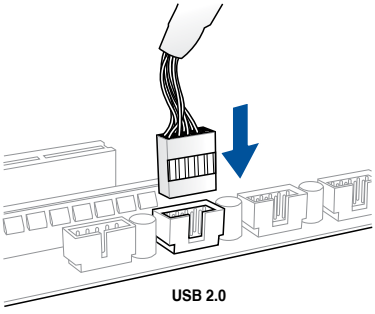


To install USB 3.1 Gen 1 connector

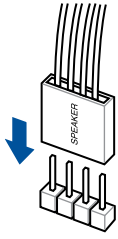


This connector will only fit in one orientation. Push the connector until it clicks into place.

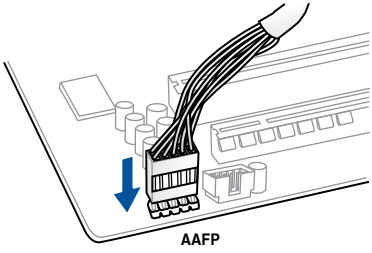
To install USB 2.0 connector



To install system speaker connector



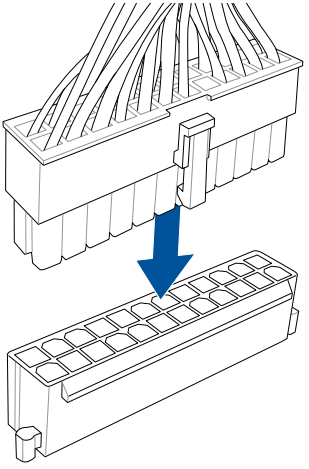
To install front panel audio connector



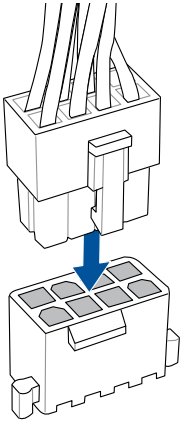
1.10 Connecting the ATX power

The ATX power connectors can fit in only one orientation. Use the side clip to hook the connectors to the motherboard. DO NOT force the male power connectors into the female counterparts on the motherboard.

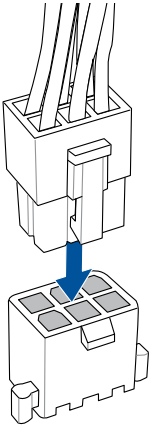
24-pin power connector



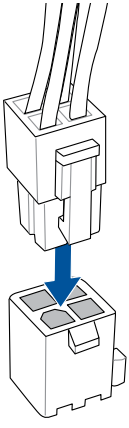
8-pin power connector



6-pin power connector

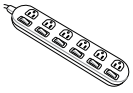
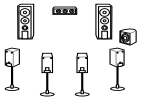


4-pin power connector



1.11 List of peripheral devices and accessories

Refer to the following list for the rear I/O port, and the peripheral devices and accessories.

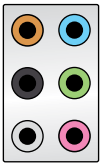
1. AC Power plug + power extension cord 
2. PS/2 keyboard port + keyboard 
3. S/PDIF out port + speaker system 
4. USB port + USB devices 
5. Audio I/O port + speaker system 
6. PS/2 mouse port + mouse 
7. LAN (RJ45) port + modem 
8. DVI / HDMI / DP / VGA port + LCD monitor 
9. Serial port + Printer 

The rear I/O connectors may vary with models. Refer to the motherboard user guide for details.

1.12 Audio I/O connections

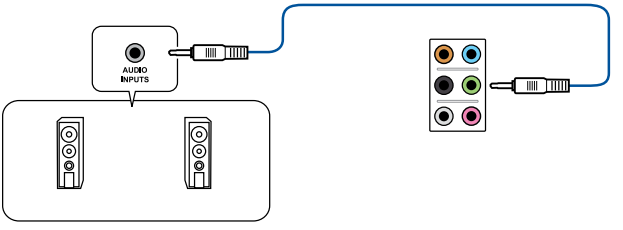
The audio I/O ports may vary with models. Refer to the motherboard user guide for details.

8-channel audio jacks (Variation 1)

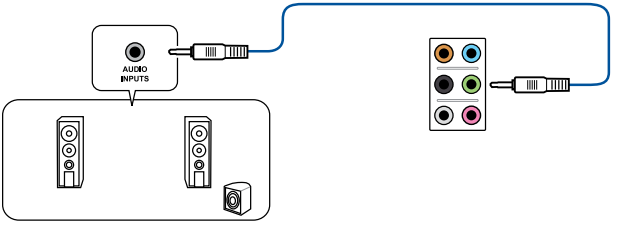


Connect to Headphone and Mic

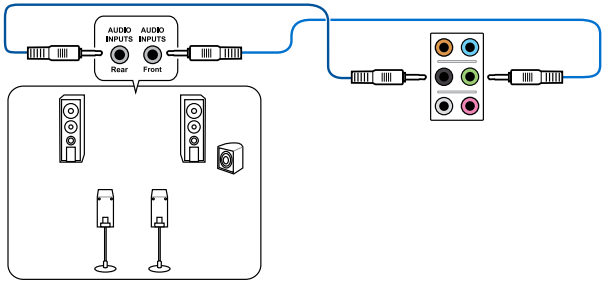
Connect to Stereo Speakers



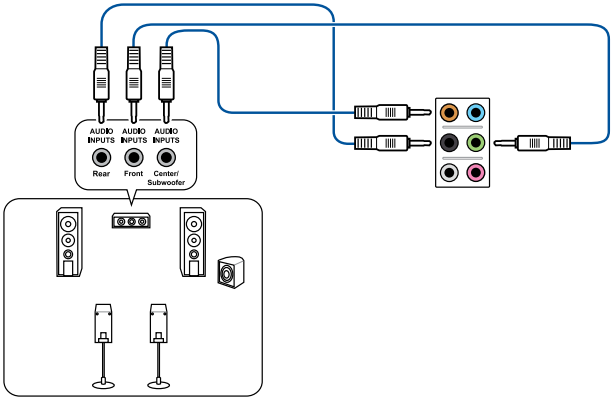
Connect to 2.1 channel Speakers



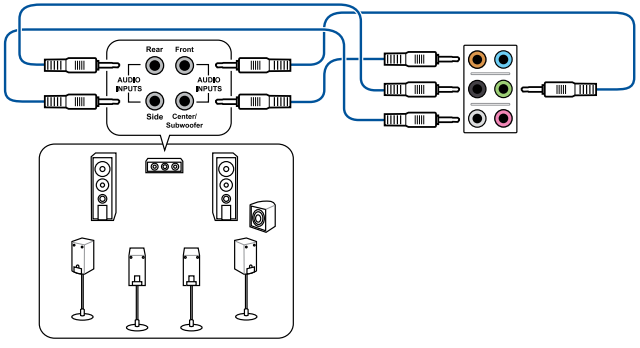
Connect to 4.1 channel Speakers



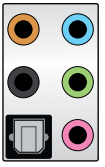
Connect to 5.1 channel Speakers



Connect to 7.1 channel Speakers

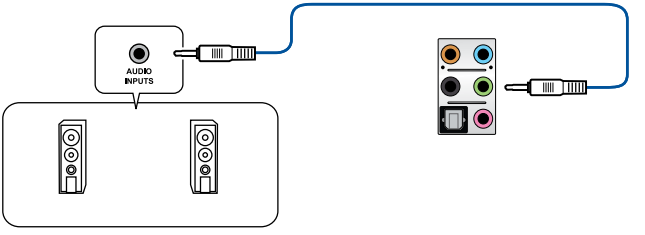


Gold-plated audio jacks (Variation 2)

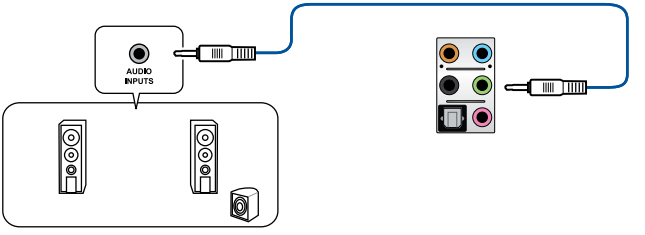


Connect to Headphone and Mic

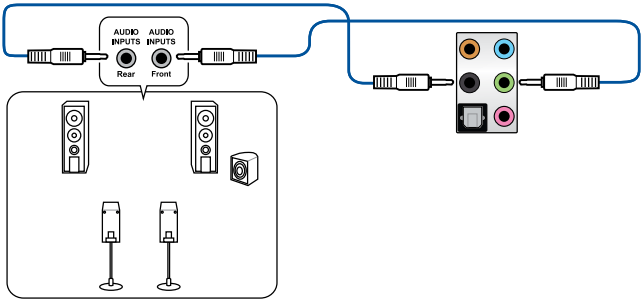
Connect to Stereo Speakers



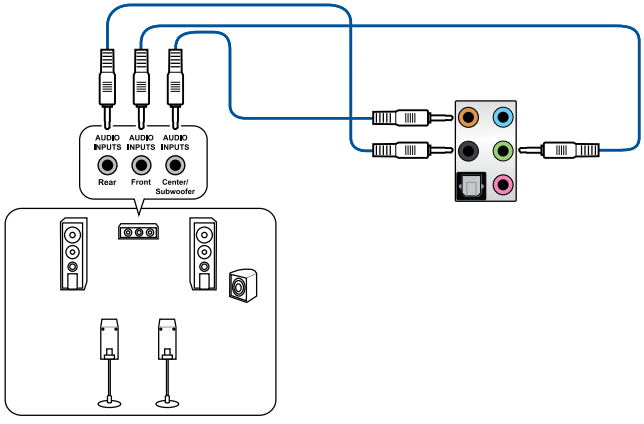
Connect to 2.1 channel Speakers



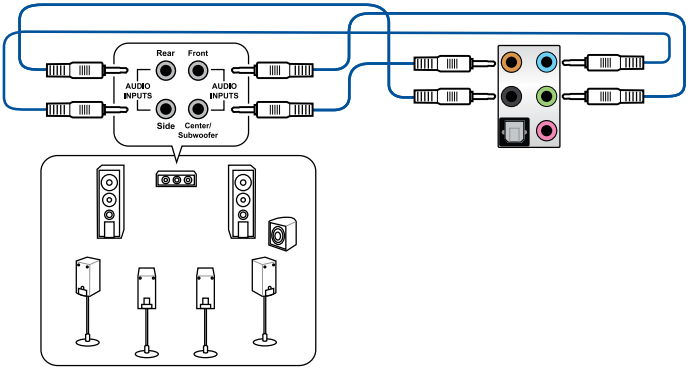
Connect to 4.1 channel Speakers



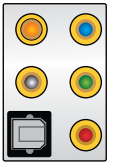
Connect to 5.1 channel Speakers



Connect to 7.1 channel Speakers

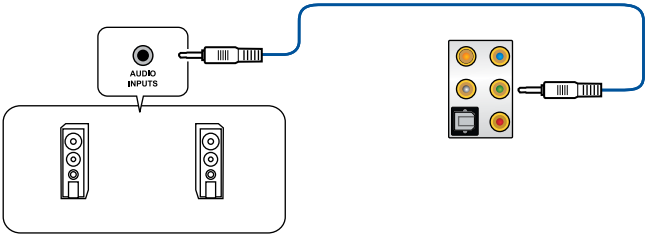


LED-illuminated audio jacks (Variation 3)

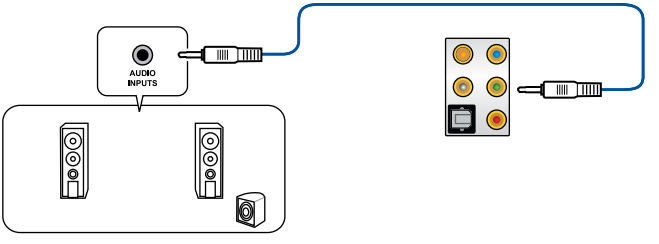


Connect to Headphone and Mic

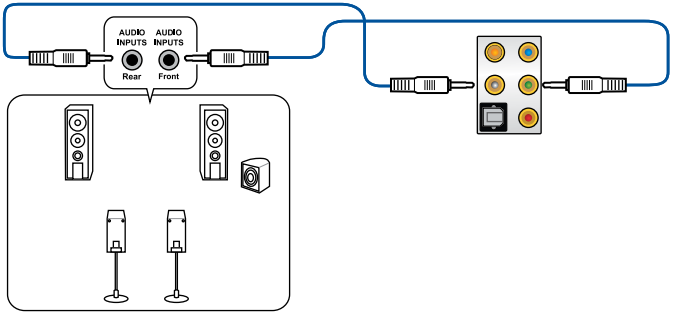
Connect to Stereo Speakers



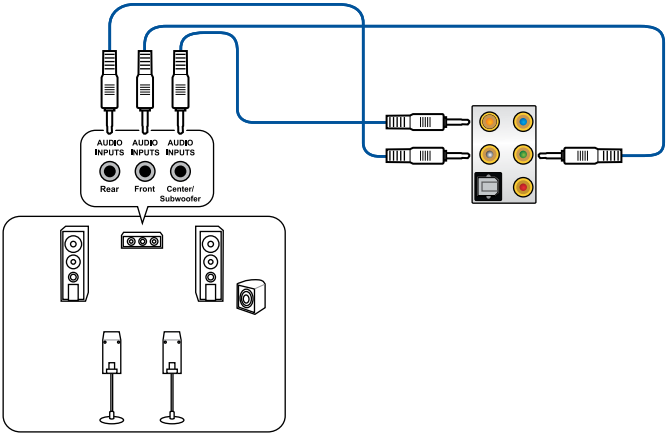
Connect to 2.1 channel Speakers



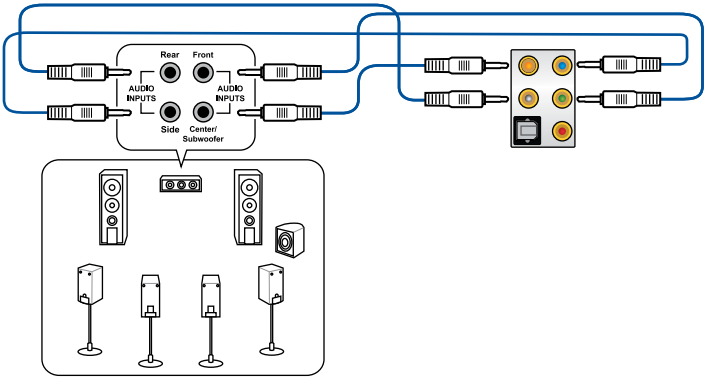
Connect to 4.1 channel Speakers



Connect to 5.1 channel Speakers



Connect to 7.1 channel Speakers



1.13 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. For more details on the BIOS options, please refer to the motherboard user guide.

Troubleshooting

Issue	Action
• Cannot turn on the computer • Power LED is not lit. • Power supply fan is not working.	• Ensure the power cord is connected correctly. • Ensure the power connectors are installed firmly on the motherboard.
The computer is on but the monitor is black.	• Ensure the monitor power is on and the VGA cable is connected correctly. • Adjust the monitor brightness and contrast. • Shut down the computer and remove the power cord. Check whether the VGA card is installed firmly.
No memory detected	• Ensure the memory module is correct. • Ensure the DIMMS are firmly seated on the DIMM socket. • Ensure the memory module is from the qualified vedor list. Refer to the ASUS website for the QVL.
Hard/optical disk drive error (not recognized or detected)	• Ensure the jumper setting is correct. (Master/Slave) • Check the BIOS configuration about hard/optical disk drive. • Ensure the device cables are firmly attached. • Ensure the device drivers are installed.

1.14 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.

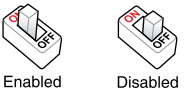
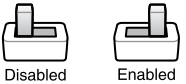
Chapter 2: Motherboard Overview

The diagrams in this section are for reference only. For more details on the layout of your motherboard, please refer to the motherboard user guide.

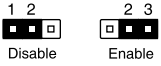
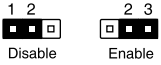
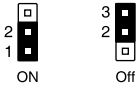
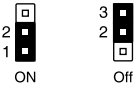
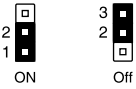
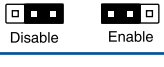
2.1 Onboard buttons and switches

Items	Name	Description
PWR_SW  START 	Power-on button	The motherboard comes with a power-on button that allows you to power up or wake up the system. The button also lights up when the system is plugged to a power source indicating that you should shut down the system and unplug the power cable before removing or installing any motherboard component.
RST_SW  RESET  RESET 	Reset button	Press the reset button to reboot the system.
MemOK! 	MemOK! button	Installing DIMMs that are not compatible with the motherboard may cause system boot failure. If the system fails to boot during POST stage and the DRAM_LED lights continuously, press the MemOK! button until the DRAM_LED starts blinking. System will begin automatic memory compatibility tuning and reboot for successful boot.
SAFE_BOOT 	Safe Boot button	The Safe Boot button can be pressed anytime to force the system to reboot into the BIOS safe mode. This button temporarily applies safe settings to the BIOS while retaining any overclocked settings allowing you to modify the settings causing boot failure. Use this button when overclocking or tweaking the settings of your system.
CLR_CMOS  	Clear CMOS button	Press this button to clear the BIOS setup information only when the systems hangs due to overclocking.

(continued on the next page)

Items	Name	Description
BIOS_FLBK 	BIOS Flashback button	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 then press the USB BIOS Flashback button for three seconds to automatically update the BIOS.
RETRY_BUTTON 	ReTry button	The ReTry button is specially designed for overclockers and is most useful during the booting process where the Reset button is rendered useless. When pressed, it forces the system to reboot while retaining the same settings to be retried in quick succession to achieve a successful POST.
BIOS_SWITCH 	BIOS Switch button	The motherboard comes with two BIOS chips. Press the BIOS button to switch BIOS and load different BIOS settings. The nearby BIOS_LEDs indicate the currently selected BIOS.
PAUSE  Enabled Disabled	Pause switch	The pause switch allows you to freeze the cooling system at a hardware level, thus allowing you to adjust your system settings under heavy overclocking.
SLOW_MODE  Enabled Disabled	Slow Mode switch	Slow Mode Switch is employed during LN2 benching. The system may crash due to the CPU being unstable when using extreme overclocking, enabling slow mode will decrease the processor frequency and stabilize the system, allowing overclockers to keep track of their overclocking data.
EZ_XMP  Disabled Enabled	EZ XMP switch	Enable this switch to overclock the installed DIMMs, allowing you to enhance the DIMM's speed and performance.
PCIEX16_SW 	PCIe x16 Lane switch	These slide switches allows you to enable and disable the corresponding PCIe x16 slots. When one of the installed PCIe x16 cards is out of order, you can use the slide switch to find the faulty one without removing the cards.

2.2 Jumpers

Items	Name	Description
CLRTC 	Clear RTC RAM jumper	This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.
LN2_MODE 	LN2 Mode jumper	With LN2 mode activated, the ROG motherboard is optimized to remedy the cold-boot bug during POST and help the system boot successfully.
CPU_OV 	CPU Over Voltage jumper	The CPU Over Voltage jumper allows you to set a higher CPU voltage for a flexible overclocking system, depending on the type of the installed CPU. To gain more CPU voltage setting, insert the jumper to pins 2-3. To go back to its default CPU voltage setting, insert the jumper to pins 1-2.
80_LIGHT 	80 light jumper	This jumper allows you to enable or disable the onboard Q-CODE LED.
MB_LIGHT_BAR 	Motherboard light bar jumper	This jumper allows you to enable and disable the motherboard back light.
PCH_LIGHT_BAR 	PCH light bar jumper	This jumper allows you to enable or disable the onboard PCH and light bar 2 LED.
LIGHT_BAR 	Light bar jumpers	These jumpers allow you to enable or disable the onboard light bar.

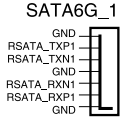
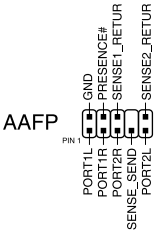
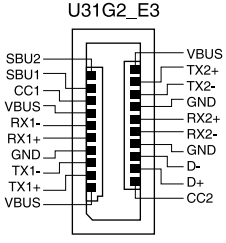
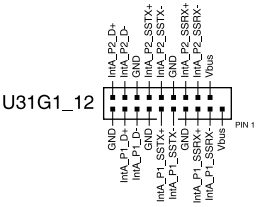
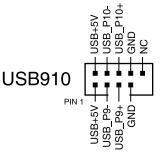
2.3 Onboard LEDs

Items	Name	Description
QLED ▭ BOOT ▭ VGA ▭ DRAM ▭ CPU	Q LED (CPU, DRAM, VGA, BOOT)	Q LED checks key components (CPU, DRAM, VGA card, and booting devices) in sequence during motherboard booting process. If an error is found, the corresponding LED remains lit until the problem is solved. This user-friendly design provides an intuitive way to locate the root problem within seconds.
▭ C_DET_CPU ▭ C_DRAM ▭ C_PCIE	Condensation detection LEDs	These LEDs will light up when water condensation is detected on the corresponding critical key components (CPU, DRAM, and PCIE). This user-friendly design helps you quickly identify possible damages caused by condensation.
▭ XLED1	EZ XMP LED	This LED lights up when you enable the EZ XMP switch.
▭ DIMM_B_LED ▭ DIMM_A_LED ▭ DIMM_C_LED ▭ DIMM_D_LED	DIMM LEDs	The DIMM LED indicates when the corresponding memory channel is enabled.
▭ PWR_LED	Standby Power LED	The motherboard comes with a standby power LED. The 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
BIOS_LED1 ▭ ▭ BIOS_LED2	BIOS LEDs	The BIOS LEDs help indicate the BIOS activity. Press the BIOS button to switch between BIOS1 and BIOS2 and the LED lights up when the corresponding BIOS is in use.
▭ HD_LED	Hard Disk LED	The Hard Disk LED is designed to indicate the hard disk activity. It blinks when data is being written into or read from the hard disk drive. The LED does not light up when there is no hard disk drive connected to the motherboard or when the hard disk drive does not function.

(continued on the next page)

Items	Name	Description
CPU_STATUS  Red (not ready)	CPU status LED	This LED will indicate the current status of your CPU. A red light indicates that the CPU is not ready to boot, and the LED will turn off once the problem is solved. This user-friendly design helps you quickly identify whether your CPU is ready to boot or not.

2.4 Onboard connectors

Items	Name	Description
	Serial ATA 6 Gb/s connectors	These connectors connect to Serial ATA 6 Gb/s hard disk drives via Serial ATA 6 Gb/s signal cables.
	Front panel audio connector	This connector is for a chassis-mounted front panel audio I/O module that supports HD Audio. Connect one end of the front panel audio I/O module cable to this connector.
	USB 3.1 Gen 2 front panel connector	This connector allows you to connect a USB 3.1 Gen 2 module for additional USB 3.1 Gen 2 ports. The latest USB 3.1 Gen 2 connectivity provides data transfer speeds of up to 10 Gbps. The next-generation standard is completely backward-compatible with your existing USB devices.
	USB 3.1 Gen 1 connector	This connector allows you to connect a USB 3.1 Gen 1 module for additional USB 3.1 Gen 1 front or rear panel ports. With an installed USB 3.1 Gen 1 module, you can enjoy all the benefits of USB 3.1 Gen 1 including faster data transfer speeds of up to 5 Gbps, faster charging time for USB-chargeable devices, and optimized power efficiency.
	USB 2.0 connectors	These connectors are for USB 2.0 ports. Connect the USB module cable to any of these connectors, then install the module to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 480 MBps connection speed.

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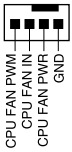
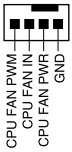
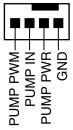
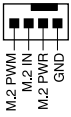
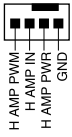
Items	Name	Description
CPU_FAN  CPU_OPT  CHA_FAN  EXT_FAN  W_PUMP+  AIO_PUMP  M.2_FAN  H_AMP  FS_FAN 	CPU, CPU optional, M.2, high amp, extension, and chassis fan connectors; water pump+, and AIO pump connectors	Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector. The EXT_FAN connector is only for the fan extension card. For more details on the fan extension card, please refer to the *To install FAN EXTENSION CARD* section in this guide.
W_IN  W_OUT  W_FLOW 	Water in, water out, and water flow connectors	These connectors allow you to connect sensors to monitor the temperature and flow rate of your liquid cooling system. You can manually adjust the fans and water pump to optimize the thermal efficiency of your liquid cooling system.

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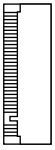
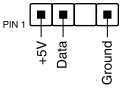
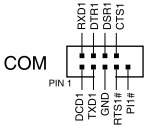
Items	Name	Description
T_SENSOR 	Thermal sensor connector	This connector is for the thermistor cable that monitors the temperature of the devices and the critical components inside the motherboard. Connect the thermistor cable and place the sensor on the device or the motherboard's component to detect its temperature.
U.2 	U.2 connector	This motherboard comes with a U.2 connector which supports PCIe 3.0 x4 NVM Express storage.
M.2_1(SOCKET3) 	M.2 sockets	This socket allows you to install an M.2 SSD module.
RGB_HEADER 	AURA RGB headers	These connectors are for RGB LED strips. The RGB header supports 5050 RGB multi-color LED strips (12V/G/R/B), with a maximum power rating of 3A (12V), and no longer than 3 m. The maximum power rating and strip lengths may vary by models, please refer to the motherboard user guide for more details.
ADD_HEADER 	Addressable RGB header	This connector is for individually addressable RGB WS2812B LED strips (5V/Data/Ground), with a maximum power rating of 3A (5V) and a maximum of 60 LEDs, or WS2812B based LED strips.
COM 	Serial port connector	This connector is for a serial (COM) port. Connect the serial port module cable to this connector, then install the module to a slot opening at the back of the system chassis.

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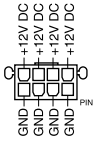
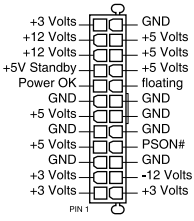
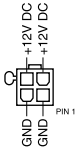
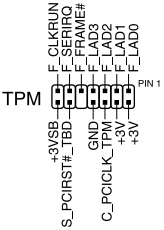
Items	Name	Description
EATX12V (8-PIN)  EATXPWR  EATX12V (4-PIN)  EZ_PLUG  	ATX power connectors	These connectors are for ATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.
TPM  	TPM connector	This connector supports a Trusted Platform Module (TPM) system, which securely stores keys, digital certificates, passwords and data. A TPM system also helps enhance network security, protect digital identities, and ensures platform integrity.

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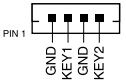
Items	Name	Description
VROC_HW_KEY 	VROC_HW_KEY connector	This connector allows you to connect a KEY module to enable CPU RAID functions with Intel® CPU RSTe.
TB_HEADER 	Thunderbolt header	This connector is for the add-on Thunderbolt I/O card that supports Intel's Thunderbolt Technology, allowing you to connect up to six Thunderbolt-enabled devices and a DisplayPort-enabled display in a daisy-chain configuration.

Chapter 3: Manage/update BIOS

3.1 Updating BIOS

The ASUS website publishes the latest BIOS versions to provide enhancements on system stability, compatibility,and performance. However, BIOS updating is potentially risky. If there is no problem using the current version of BIOS, DO NOT manually update the BIOS. Inappropriate BIOS updating may result to system's failure to boot. Carefully follow the instructions in this chapter to update your BIOS when necessary.

Visit http://www.asus.com to download the latest BIOS file for this motherboard.

The following utilities allow you to manage and update the motherboard BIOS setup program.

1. EZ Update: Updates the BIOS in Windows® environment.
2. ASUS EZ Flash 3: Updates the BIOS using a USB flash drive.
3. ASUS CrashFree BIOS 3: Restores the BIOS using the motherboard support DVD or a USB flash drive when the BIOS file fails or gets corrupted.

3.1.1 EZ Update

The EZ Update is a utility that allows you to update the motherboard BIOS in Windows® environment.

- EZ Update requires an Internet connection either through a network or an ISP (Internet Service Provider).
- This utility is available in the support DVD that comes with the motherboard package.

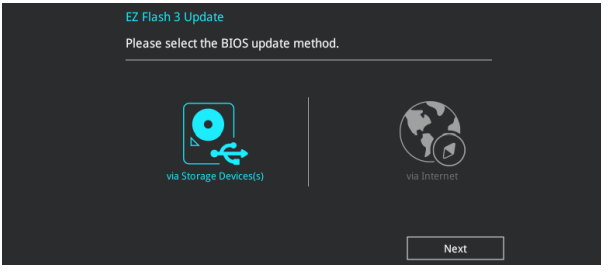
3.1.2 ASUS EZ Flash 3

ASUS EZ Flash 3 allows you to download and update to the latest BIOS through the Internet without having to use a bootable floppy disk or an OS-based utility.

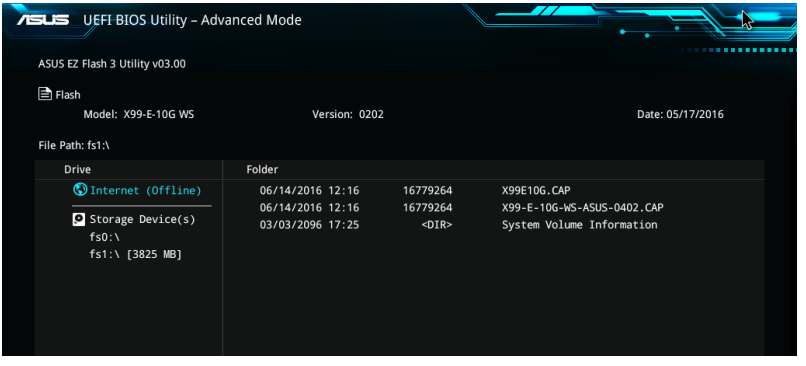
Updating through the Internet varies per region and Internet conditions. Check your local Internet connection before updating through the Internet.

To update the BIOS by USB:

1. Enter the Advanced Mode of the BIOS setup program. Go to the Tool menu to select **ASUS EZ Flash Utility** and press <Enter>.
2. Insert the USB flash disk that contains the latest BIOS file to the USB port.
3. Select **via Storage Device(s).**



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

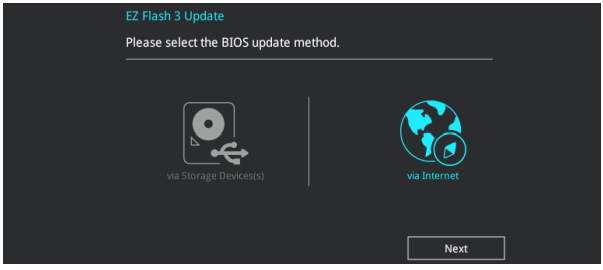


- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

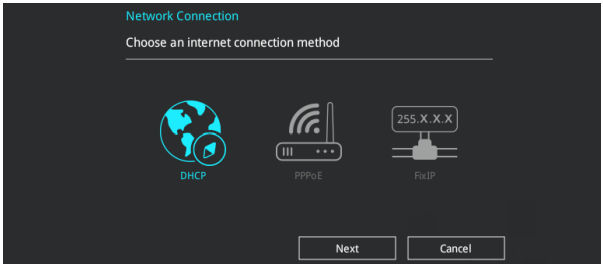
Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu, or press <F5> to load optimized defaults.

To update the BIOS by Internet:

1. Enter the Advanced Mode of the BIOS setup program. Go to the Tool menu to select **ASUS EZ Flash Utility** and press <Enter>.
2. Select **via Internet.**



3. Press the Left/Right arrow keys to select an Internet connection method, and then press <Enter>.



4. Follow the onscreen instructions to complete the update.
5. Reboot the system when the update process is done.

Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu, or press <F5> to load optimized defaults.

3.1.3 ASUS CrashFree BIOS 3

The ASUS CrashFree BIOS 3 utility 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 restore a corrupted BIOS file using the motherboard support DVD or a USB flash drive that contains the BIOS file.

The BIOS file in the motherboard support DVD may be older than the BIOS file published on the ASUS official website. If you want to use the newer BIOS file, download the file at https://www.asus.com/support/ and save it to a USB flash drive.

Recovering the BIOS

To recover the BIOS:

1. Turn on the system.
2. Insert the motherboard support DVD to the optical drive, or the USB flash drive containing the BIOS file to the USB port.
3. The utility automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and enters ASUS EZ Flash 3 automatically.
4. The system requires you to enter BIOS Setup to recover the BIOS setting. To ensure system compatibility and stability, we recommend that you press <F5> to load default BIOS values.

DO NOT shut down or reset the system while updating the BIOS! Doing so can cause system boot failure!

Chapter 4: Troubleshooting

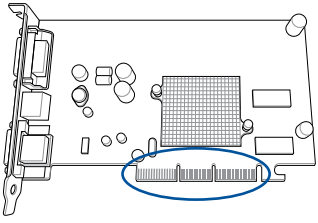
4.1 Troubleshooting for Motherboard DIY

After assembling your own computer, you might encounter troubles when starting it up. This chapter provides answers to some common questions about your PC before entering the operating system.

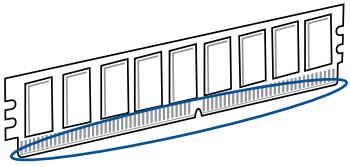
4.1.1 Basic troubleshooting

A. Bad connection

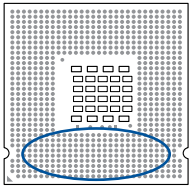
1. Ensure there is no contaminants on the gold contact or the pins.
2. Use a cotton bud or an eraser and gently rub the gold contact. Remember to brush away the eraser crumbs.



VGA card gold contact



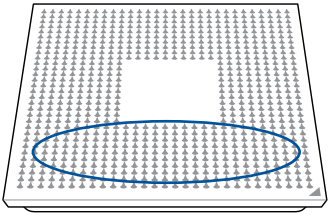
DIMM gold contact



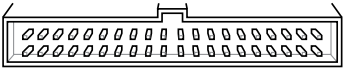
CPU gold contact points

Handle the card or the CPU by its edges and DO NOT touch the gold contact. Static electricity will seriously damage the device.

3. Ensure there are no broken or bent pins on your connector pins or CPU pins. A broken and/or bent pin will cause the component to malfunction. Contact your retailer for further support.



AMD CPU gold pins

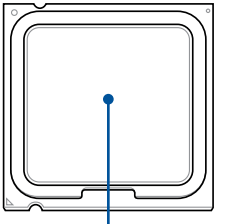


Connector pins

If the broken or bended pins are caused after the purchase, your retailer may ask for repair charge. Sometimes the broken or bended pins are NOT REPAIRABLE.

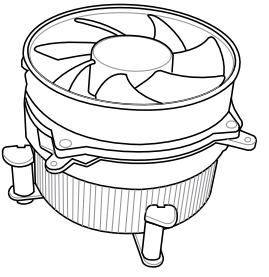
B. CPU overheating

1. Wipe CPU surface clean with a clean cloth. Apply several drops of thermal paste to the exposed area of the CPU that the heatsink will be in contact with. Ensure that it is spread in an even thin layer.



CPU surface

2. Ensure there are no contaminants on the heatsink and fan.



3. Follow the instructions of the heatsink and fan manufacturers to ensure your heatsink and fan are functioning properly. Contaminants may slow down fan rotation speed and cause the CPU to overheat.

4.2 Other common issues

- When removing devices from the system, ensure all the power cables are unplugged.
- All the error messages will be displayed on screen during the Power-On Self-Test (POST).
- If there are BIOS beeps, refer to section *1.13 Starting up for the first time* for details.
- Go over the checklist table below to check for other issues.

	Check Items				
	Power LED	Screen display	Heatsink and fan	BIOS beeps	Error messages
No power	Off	No	Stop	No	N/A
No screen display	On	No	Stop	No	N/A
	On	No	Running	No	N/A
	On	No	Running	Yes	N//A
Failure to enter OS	On	Yes	Running	Yes	Yes
	On	Yes	Running	No	Yes
	On	Yes	Running	No	No

If the problem has been fixed but a new problem emerges, go over the checklist again. If the problem persists, contact your retailer or ASUS technical support team for further help.

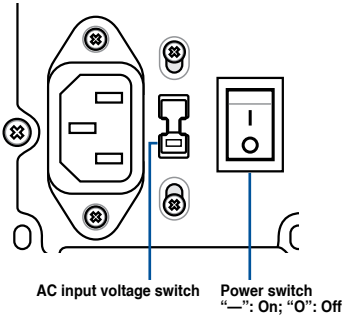
4.2.1 No power

ASUS motherboards come with a standby power LED. The LED lights up to indicate that the system is ON. If the LED stays unlit, follow the instructions below to fix the problem.

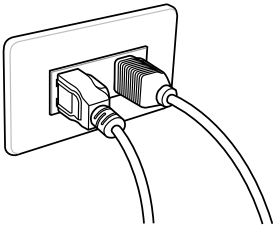
The location of the power LED may vary by model. Refer to the motherboard user guide for more details.

1. Ensure to adjust your power supply to the correct AC input voltage in your area, and the power supply is turned on.

- Before adjusting the AC input voltage, ensure to disconnect the power plug. Failure to do so will seriously damage the power supply unit.
- Failure to adjust the power supply to the correct AC input voltage will seriously damage the system.



2. Ensure you have attached the power cord to the wall outlet.
   - Connect the power plug directly to the wall outlet. DO NOT connect it to the power extension, uninterruptible power supply (UPS), or other devices.
   - Exchange the power plugs of the system and the monitor to check whether the wall outlet is working normally.



3. If the problem persists, you may need to contact your retailer for a new power supply unit. If the power supply unit functions, contact your ASUS motherboard retailer for motherboard warranty service.

4.2.2 Failure to boot-up; No screen display

Most boot-up failure and no screen display result from device defection or incorrect installation. Follow the instructions below to fix the problem:

1. Ensure that all the power cables are attached, including the system and the monitor.
2. Determine if the problem comes from expansion devices.
   - Remove all the expansion card and devices. Use only motherboard, monitor, VGA card, memory modules, power supply unit, heatsink and fan, keyboard, and mouse to reboot the system.
   - If the system is working normally, it is one of the expansion devices that causes the problem. Reinstall the expansion devices you removed back to the system one by one to find out which device is defective.
3. Determine if the problem comes from the basic system components.
   - If you have some spare components, you can replace the components in turn to locate the defective component in the order of "memory module, CPU, motherboard, hard/optical disk drive, keyboard/mouse."

When you locate the defective component, contact your device retailer for service.

4.2.3 Failure to enter the operating system

1. If the problem emerges after you add a new hardware component, remove the newly added hardware component and reboot the system. If the system is working normally without the hardware component, the hardware component may be defective or incompatible with the system. Contact the device retailer for help.
2. If the problem emerges after you install a software or driver, follow the instructions below to fix the problem.
   a. Enter the operating system in safe mode and remove the software or driver.
   b. Contact the operating system company for further support.
   c. If the previous instructions fail to fix the problem, you may need to reformat your hard disk drive and reinstall a new operating system.
3. If the problem emerges after you change the BIOS settings, reboot and enter the BIOS to load the setup defaults. Refer to the motherboard user guide for details.
4. If the problem comes from a computer virus or a corrupt file, follow the instructions below to fix the problem:
   a. Enter the operating system in safe mode and do a full system virus scan using an anti-virus application.
   b. Contact the operating system company for further support.
   c. If the previous instructions fail to fix the problem, you may need to reformat your hard disk drive and reinstall a new operating system.

Chapter 5: Computer care tips

5.1 Proper care of your PC

Your personal computer is like other home appliances. Keep your computer away from humidity, direct sun, and static electricity source. You should not move the computer when it is turned on in case of damage. Internal dust will affect the operating disk drive and contribute to overheating problems which will cause the computer to crash or damage the components.

5.2 Basic knowledge

1. Encase your computer with dust cover when not in use.
2. When using your computer, do not put anything on the monitor to block the ventilation holes. Excessive heat will cause the monitor to malfunction.
3. Do not place the computer close to a wall, and ensure to leave some space for heat dissipation. Overheating will cause the system to crash.
4. Place the computer on a stable surface.
5. Keep the computer away from areas of extreme temperature. 5°C to 30°C is the ideal ambient temperature. You may use an air conditioner or a electric fan for better heat dissipation.

5.3 Usage knowledge

1. Turn on and shut down your computer regularly. If your computer needs to be on for a long time, use a better system/CPU cooling system and a sustainable power supply unit.
2. A sudden power failure will damage the hard disk drive. When the power supply is unstable, adding an uninterruptible power supply to your computer is recommended.
3. Perform regular virus scans, anti-virus database updates, and defragment disks regularly, to ensure your computer's stability.
4. Ensure your computer's operating system is updated with the latest update.
5. Clean your computer regularly. (Unplug all the power cords before cleaning)
    - Disconnect and remove the motherboard and hard/optical disk drives, then clean them with canned air or a soft brush.
    - Remove dust and hair debris on the power supply unit with an anti-static vacuum.

5.4 Tips

1. If your computer will not be used for a long time, put some desiccant moisture absorbers in the chassis to prevent humidity damage.
2. In some hot and humid climatic areas, it is recommended to turn on your computer every other week. Doing so may help prevent humidity damage.