

Technical Specification

Workstation Creator! Extreme Rev3

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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.

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 (+).

specifications summary

CPU	<p>Intel® Core™ X-Series Processors Family on LGA 2066 Socket*</p> <p>Supports 14nm CPU</p> <p>Supports Intel® Turbo Boost Max Technology 3.0**</p> <p>** Support of these features depends on the CPU types.</p>
Chipset	Intel® X299 Chipset
Memory	<p>Intel® Core™ X-Series Processors (6-core or above)</p> <p>- 8 x DIMM, max. 128GB DDR4 4000(O.C.)* / 3600(O.C.)* / 3400(O.C.)* / 3333(O.C.)* / 3300(O.C.)* / 3200(O.C.)* / 3000(O.C.)* / 2800(O.C.)* / 2666 MHz, non-ECC, un-buffered memory</p> <p>- Quad channel memory architecture</p> <p>Intel® Core™ X-Series Processors (4-core)</p> <p>- 4 x DIMM, max. 64GB, DDR4 4000(O.C.)* / 3600(O.C.)* / 3400(O.C.)* / 3333(O.C.)* / 3300(O.C.)* / 3200(O.C.)* / 3000(O.C.)* / 2800(O.C.)* / 2666 MHz, non-ECC, un-buffered memory</p> <p>- Dual channel memory architecture</p> <p>Supports Intel® Extreme Memory Profile (XMP)</p> <p>* Hyper DIMM support is subject to the physical characteristics of individual CPUs. Please refer to Memory QVL (Qualified Vendors List) for details.</p>
Expansion slots	<p>44-Lane CPU</p> <p>3 x PCI Express 3.0/2.0 x16 slots (single@x16, dual@x16/x16, triple@x16/x16/x8 mode)</p> <p>2 x PCI Express 3.0/2.0 x4 slots (PCIEx4_1 max. at x1 mode, PCIEx4_2 max. at x4 mode, compatible with PCIe x1 and x4 devices)*</p> <p>1 x PCI Express 3.0/2.0 x1 slot (compatible with PCIe x1 devices)**</p> <p>28-Lane CPU</p> <p>3 x PCI Express 3.0/2.0 x16 slots (single@x16, dual@x16/x8 mode)</p> <p>2 x PCI Express 3.0/2.0 x4 slots (PCIEx4_1 max. at x1 mode, PCIEx4_2 max. at x4 mode, compatible with PCIe x1 and x4 devices)*</p> <p>1 x PCI Express 3.0/2.0 x1 slot (compatible with PCIe x1 devices)**</p> <p>16-Lane CPU</p> <p>3 x PCI Express 3.0/2.0 x16 slots (single@x16, dual@x8/x8 mode)</p> <p>2 x PCI Express 3.0/2.0 x4 slots (PCIEx4_1 max. at x1 mode, PCIEx4_2 max. at x4 mode, compatible with PCIe x1 and x4 devices)*</p> <p>1 x PCI Express 3.0/2.0 x1 slot (compatible with PCIe x1 devices)**</p> <p>* PCIe4_1 shares bandwidth with PCIe16_3 when using 28-lane & 16-lane CPUs. PCIe4_2 shares bandwidth with SATA6G_5/6/7/8 ports. It is disabled by default.</p> <p>** PCIe1_1 shares bandwidth with USB 3.1 Gen 2 front panel connector. It is disabled by default.</p>
Multi-GPU support	<p>Supports NVIDIA® Supports NVIDIA® 2-Way/Quad-GPU SLI™ Technology (with 2 PCIe16 graphics card)/ 3-Way SLI™ Technology*</p> <p>Supports AMD® 3-Way/Quad-GPU CrossFireX™ Technology</p> <p>* Support depends on the CPU types and VGA cards.</p>

(continued on the next page)

specifications summary

Storage	<p>Intel® X299 Chipset with RAID 0, 1, 5, 10 and Intel Rapid Storage Technology 15 support</p> <ul style="list-style-type: none">- 1 x M.2_1 Socket 3 with M key, type 2242/2260/2280 storage devices support (both SATA & PCIe 3.0 x 4 mode)- 1 x M.2_2 Socket 3 with vertical M Key, type 2242/2260/2280/22110 (Support PCIe storage device only)- Ready for Intel® Optane™ Memory- 8 x SATA 6.0 Gb/s ports*- Supports Intel® Smart Response Technology <p>* SATA6G_5/6/7/8 ports share bandwidth with PCIe4_2.</p>
Audio	<p>Realtek® S1220A 8-channel high definition audio CODEC featuring Crystal Sound 3</p> <ul style="list-style-type: none">- Power pre-regulator reduces power input noise to ensure consistent performance- Separate layer for left and right track, ensuring both sound deliver equal quality- Impedance sense for front and rear headphone outputs- Audio shielding ensures precise analog/digital separation and greatly reduced multi-lateral interference- EMI protection cover to prevent electrical noise to affect the amplifier quality- Internal audio Amplifier to enhance the highest quality sound for headphone and speakers- Unique de-pop circuit to reduce start-up popping noise to audio outputs- Premium Japan-made audio capacitors provides warm, natural, and immersive sound with exceptional clarity and fidelity- High quality 120dB SNR stereo playback output (Line-out@back) & 113dB SNR input (Line-in) support- Supports up to 32-Bit/192kHz playback*- DTS® Headphone:X™- DTS® Connect- Supports jack-detection, multi-streaming, front panel jack-retasking (MIC)- Optical S/PDIF out port at back I/O <p>* Due to limitations in HDA bandwidth, 32-Bit/192kHz is not supported for 8-Channel audio. 32-Bit/192kHz is only available under Windows® 10.</p>

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specifications summary

Exclusive Features

<Performance>

OC Design: PRO Clock II Technology

- Full BCLK range for extreme overclocking performance.

5-Way Optimization

- Whole system optimization with a single click! Perfectly consolidates better CPU performance, power saving, digital power control, system cooling and app usages.

DIGI+ Power Control

- CPU Power: Digital 8-phase power design
- DRAM Power: Digital 2-phase power design

TPU

- Auto Tuning, TPU

EPU

Fan Xpert 4 with FAN Extension Card support

Turbo Core App

UEFI BIOS

CrashFree BIOS 3

EZ Flash 3

EZ Tuning Wizard

<Connectivity>

Intel® VROC Ready

Front USB 3.1 Gen 2 Support

Thunderbolt 3 Support- blistering-fast 40Gb/s data transfers upgrades with ThunderboltEX 3 Card.

<Gaming>

AURA SYNC

3D Printing Friendly design

Turbo LAN

<EZ Management>

File Transfer

- Cloud GO!
- File Transfer

PC Cleaner

<EZ DIY>

Q-Design

- Q-Code
- Q-Connector
- Q-DIMM
- Q-LED (CPU, DRAM, VGA, Boot Device LED)
- Q-Shield
- Q-Slot

(continued on the next page)

specifications summary

<p>LAN</p>	<p>Gigabit Intel LAN connection- 802.3az Energy Efficient Ethernet (EEE) appliance</p> <p>Intel® I219-V Gigabit LAN- Dual interconnect between the integrated Media Access Controller (MAC) and physical layer (PHY)</p> <p>LAN Guard</p> <p>Turbo LAN Utility</p>
<p>Back Panel I/O Ports</p>	<p>1 x BIOS Flashback button</p> <p>1 x Optical S/PDIF out</p> <p>1 x Intel LAN (RJ45) port</p> <p>1 x USB 3.1 Gen 2 port (teal blue, Type-A)</p> <p>1 x USB 3.1 Gen 2 port (USB Type-C™)</p> <p>4 x USB 3.0 Gen 1 ports</p> <p>2 x USB 2.0 ports</p> <p>8-channel Audio I/O ports</p>
<p>Special Features</p>	<p>Special Features:</p> <p>SafeSlot</p> <ul style="list-style-type: none"> - Protect your graphics card Investment <p>5X Protection III</p> <ul style="list-style-type: none"> - SafeSlot Core - Fortified PCIe with solid soldering - LANGuard - Protects against LAN surges, lightning strikes and static-electricity discharges! - Overvoltage Protection - World-class circuit-protecting power design - DIGI+ VRM - 8+2 Phase digital power design - DRAM Overcurrent Protection: Enhanced DRAM overcurrent protection - Stainless-Steel Back I/O: 3X corrosion-resistance for greater durability! <ul style="list-style-type: none"> - AI Suite 3 - Ai Charger - MemOK!
<p>Quiet Thermal Solution</p>	<p>Quiet Thermal Design:</p> <ul style="list-style-type: none"> - Fan Xpert 4 - Fanless M.2 heatsink Design

(continued on the next page)

specifications summary

<p>USB</p>	<p>Intel® X299 Chipset</p> <ul style="list-style-type: none"> - 8 x USB 3.1 Gen 1 ports (4 ports at back panel, 4 ports at mid-board) - 4 x USB 2.0 ports (2 ports at back panel, 2 ports at mid-board) <p>ASMedia® USB 3.1 Gen 2 controllers</p> <ul style="list-style-type: none"> - 1 x USB 3.1 Gen 2 front panel connector* - 1 x USB 3.1 Gen 2 ports@back panel (teal blue, Type A) - 1 x USB 3.1 Gen 2 port@back panel (USB Type C™) <p>* The USB 3.1 Gen 2 front panel connector shares bandwidth with PCIe1_1 slot.</p>
<p>Internal I/O connectors</p>	<ul style="list-style-type: none"> 1 x USB 3.1 Gen2 front panel connector 2 x USB 3.0 Gen 1 connectors support additional 4 USB ports (19-pin) 1 x USB 2.0 connectors support additional 2 USB ports 1 x M.2_1 Socket 3 with M key, type 2242/2260/2280 storage devices support (both SATA & PCIe 3.0 x 4 mode) 1 x M.2_2 Socket 3 with vertical M Key, type 2242/2260/2280/22110 (Support PCIe storage device only) 8 x SATA 6.0Gb/s connectors 1 x 4-Pin W_PUMP+ connector 1 x 4-Pin AIO_PUMP fan connector 1 x 4-Pin CPU Fan connector 1 x 4-Pin CPU_OPT fan connector 2 x 4-Pin Chassis Fan connectors 1 x 4-Pin M.2 Fan connector 1 x 5-pin EXT_FAN(Extension Fan) connector 1 x 2-pin Thermal sensor header 1 x 24-pin EATX Power connector 1 x 8-pin EATX 12V Power connector 1 x 4-pin EATX 12V Power connector 2 x RGB header 1 x Front panel audio connector (AAFP) 1 x VROC_HW_KEY 1 x Thunderbolt header (5-pin) for ASUS ThunderboltEX 3 support 1 x System Panel connector (Q-Connector) 1 x 3-pin CPU_OV header 1 x Q_Code 1 x MemOK! button 1 x Clear CMOS header 1 x Power-on button

(continued on the next page)

specifications summary

BIOS Features	128 Mb Flash ROM, UEFI AMI BIOS, PnP, WfM2.0, SM BIOS 3.0, ACPI 6.0, Multi-language BIOS, EZ Flash 3, CrashFree BIOS 3, F11 EZ Tuning Wizard, F6 Qfan Control, F3 My Favorites, Last Modified log, F12 PrintScreen, and DRAM SPD (Serial Presence Detect) memory information.
Manageability	WfM 2.0, DMI 3.0, WOL by PME, PXE
Support DVD contents	Drivers Utilities EZ Update Anti-virus software (OEM version)
Operating system support	Windows® 10 64-bit
Form factor	ATX Form Factor, 12"x 9.6" (30.5 cm x 24.4 cm)



-
- Specifications are subject to change without notice.
 - Visit the [website](#) for the software manual.
-

Package contents

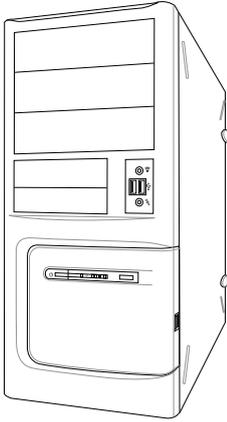
Check your motherboard package for the following items.

Motherboard	motherboard
Cables	4 x Serial ATA 6.0 Gb/s cables
	1 x SLI HB BRIDGE (2-WAY-M) 1 x Q-Connector
Accessories	1 x M.2 vertical bracket 1 x M.2 screw package 1 x Q-Shield
Application DVD	Motherboard support DVD
Documentation	User manual

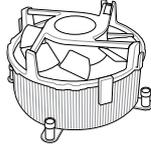


If any of the above items is damaged or missing, contact your retailer.

Installation tools and components



PC chassis



Intel® LGA 2066 compatible CPU Fan



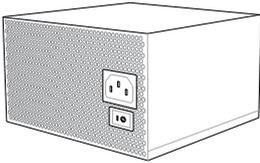
Intel® LGA 2066 CPU



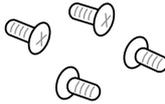
SATA hard disk drive



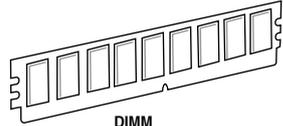
Phillips (cross) screwdriver



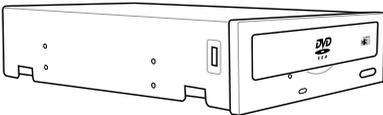
Power supply unit



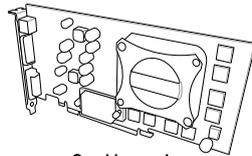
1 bag of screws



DIMM



SATA optical disc drive (optional)



Graphics card



M.2 SSD module (optional)



The tools and components in the table above are not included in the motherboard package.

Product Introduction

1

1.1 Motherboard overview

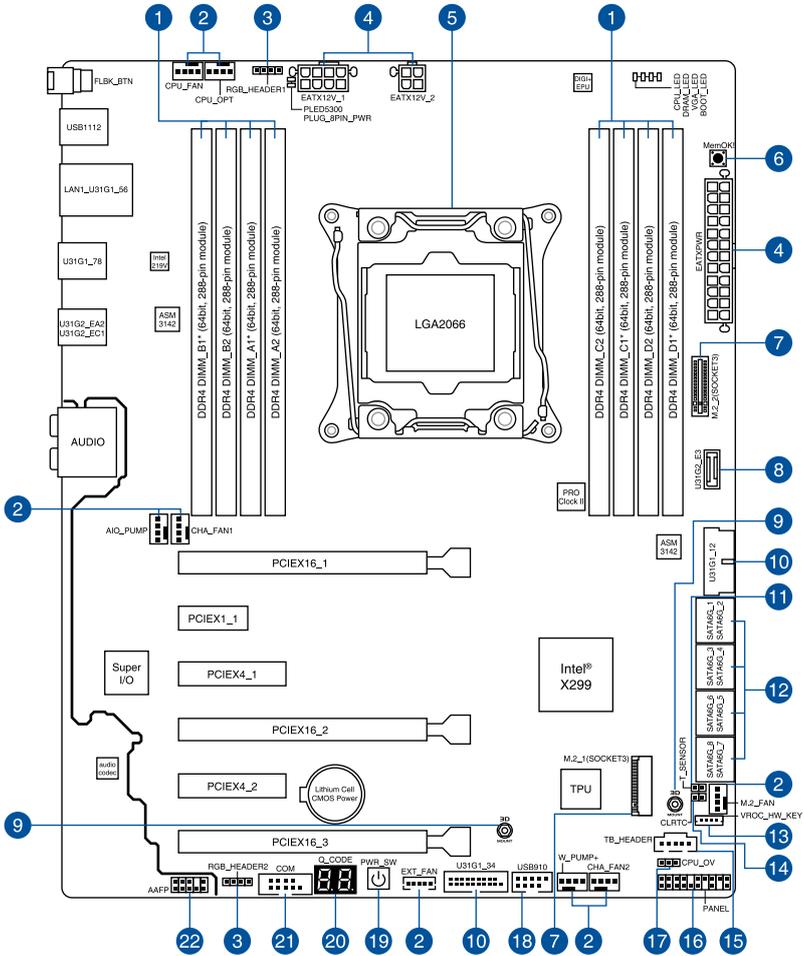
1.1.1 Before you proceed

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



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

1.1.2 Motherboard layout



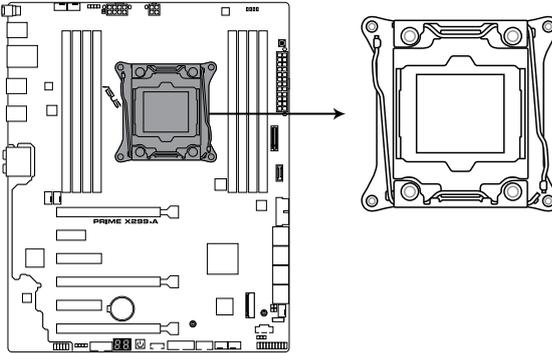
Refer to 1.1.9 Internal connectors and 2.3.1 Rear I/O connection for more information about rear panel connectors and internal connectors.

Layout contents

Connectors/Jumpers/Buttons and switches/Slots	Page
1. DDR4 DIMM slots	1-5
2. CPU, CPU optional, AIO pump, water pump+, extension, M.2, and chassis fan connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin AIO_PUMP; 4-pin W_PUMP+; 4-pin M.2_FAN; 5-pin EXT_FAN; 4-pin CHA_FAN1-2)	1-21
3. RGB header (4-pin RGB_HEADER1-2)	1-26
4. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V_1; 4-pin EATX12V_2)	1-22
5. LGA2066 CPU socket	1-4
6. MemOK! button	1-9
7. M.2 sockets (M.2_1(Socket 3); M.2_2(Socket 3))	1-24
8. USB 3.1 Gen 2 front panel connector (U31G2_E3)	1-18
9. 3D Mount	1-12
10. USB 3.1 Gen 1 connectors (20-1 pin U31G1_12; U31G1_34)	1-19
11. Thermal sensor connector (2-pin T_SENSOR)	1-25
12. Intel® Serial ATA 6 Gb/s connectors (7-pin SATA6G_12; SATA 6G_34; SATA 6G_65; SATA 6G_87)	1-17
13. VROC_HW_KEY connector (4-pin VROC_KEY)	1-25
14. Clear RTC RAM jumper (2-pin CLRTC)	1-11
15. Thunderbolt header (5-pin TB_HEADER)	1-20
16. System panel connector (20-3 pin PANEL)	1-23
17. CPU Over Voltage jumper (3-pin CPU_OV)	1-12
18. USB 2.0 connector (10-1 pin USB910)	1-20
19. Power-on button	1-10
20. Q-Code LEDs	1-13
21. Serial port connector (10-1 pin COM)	1-27
22. Front panel audio connector (10-1 pin AAFP)	1-18

1.1.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA2066 socket designed for the Intel® Core™ X-series Processors.



LGA2066 Socket



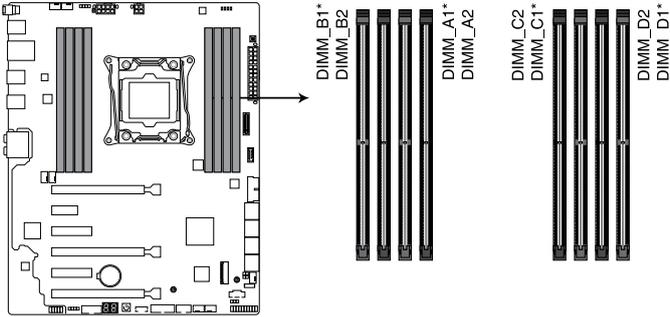
- Ensure that all power cables are unplugged before installing the CPU.
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA2066 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.

1.1.4 System memory

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



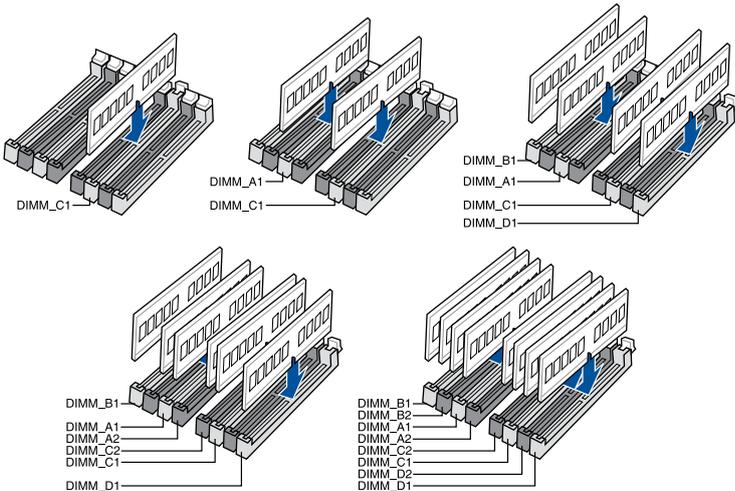
A DDR4 module is notched differently from a DDR, DDR2, or DDR3 module. DO NOT install a DDR, DDR2, or DDR3 memory module to the DDR4 slot.

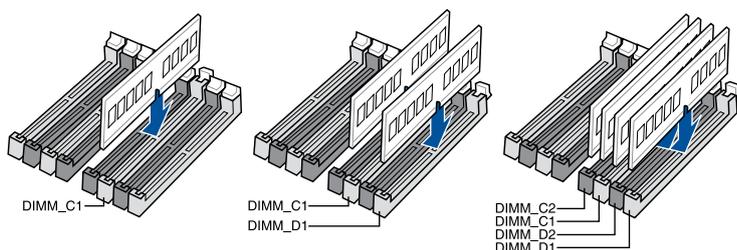


288-pin DDR4 DIMM socket

Recommended memory configurations

Intel® Core™ X-series Processors (6-core or above)





Memory configurations

You may install 2 GB, 4 GB, 8 GB and 16 GB unbuffered and non-ECC DDR4 DIMMs into the DIMM sockets.



- For Intel® Core™ X-Series Processors (4-core), you may install varying memory sizes in Channel C and Channel D. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
- For Intel® Core™ X-Series Processors (6-core or above), you may install varying memory sizes in Channel A, Channel B, Channel C, and Channel D. The system maps the total size of the lower-sized channel for the quad-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.

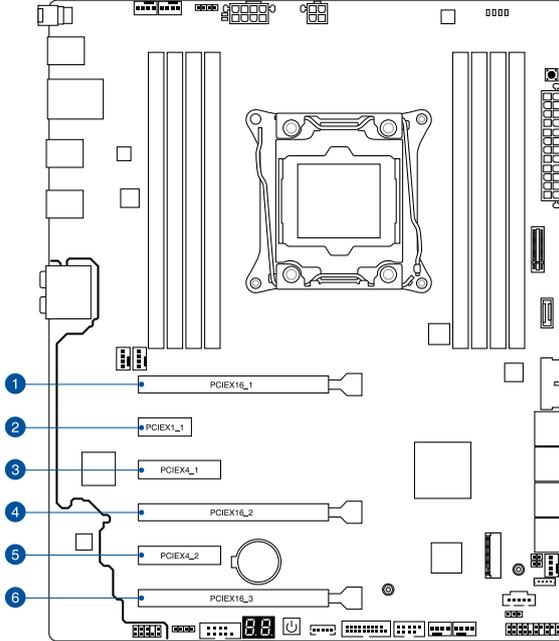


- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value.
- For system stability, use a more efficient memory cooling system to support a full memory load (8 DIMMs) or overclocking condition.
- Always install the DIMMS with the same CAS Latency. For an optimum compatibility, we recommend that you install memory modules of the same version or data code (D/C) from the same vendor. Check with the vendor to get the correct memory modules.
- Visit the [website](#) for the latest QVL.

1.1.5 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 3.0/2.0 x16_1 slot
2	PCIe 3.0/2.0 x1_1 slot
3	PCIe 3.0/2.0 x4_1 slot
4	PCIe 3.0/2.0 x16_2 slot
5	PCIe 3.0/2.0 x4_2 slot
6	PCIe 3.0/2.0 x16_3 slot

44-Lane CPUs

VGA / PCIe configuration	PCI Express 3.0 operating mode		
	Single VGA / PCIe card	Dual VGA / PCIe cards	Triple VGA / PCIe cards
PCIe 3.0/2.0 x16_1	x16 (single VGA recommended)	x16	x16
PCIe 3.0/2.0 x16_2	N/A	x16	x16
PCIe 3.0/2.0 x16_3	N/A	N/A	x8

28-Lane CPUs

VGA / PCIe configuration	PCI Express 3.0 operating mode	
	Single VGA / PCIe card	Dual VGA / PCIe cards
PCIe 3.0/2.0 x16_1	x16 (single VGA recommended)	x16
PCIe 3.0/2.0 x16_2	N/A	x8
PCIe 3.0/2.0 x16_3	N/A	N/A

16-Lane CPUs

VGA / PCIe configuration	PCI Express 3.0 operating mode	
	Single VGA / PCIe card	Dual VGA / PCIe cards
PCIe 3.0/2.0 x16_1	x16 (single VGA recommended)	x8
PCIe 3.0/2.0 x16_2	N/A	x8
PCIe 3.0/2.0 x16_3	N/A	N/A



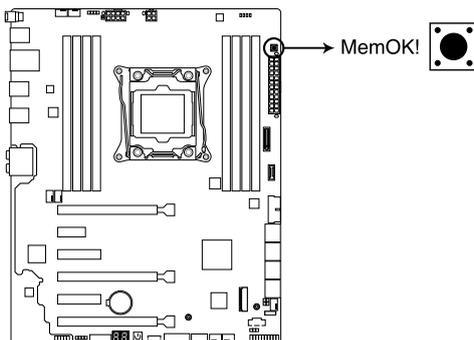
- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode.
- The PCIe 3.0/2.0 x16_2 slot is not recommended for VGA cards or PCIe cards running at x8 mode or above.

1.1.6 Onboard buttons and switches

Onboard buttons and switches allow you to fine-tune performance when working on a bare or open-case system. This is ideal for overclockers and gamers who continually change settings to enhance system performance.

1. 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 near the MemOK! button lights continuously, press the MemOK! button until the DRAM_LED starts blinking. System will begin automatic memory compatibility tuning and reboot for successful boot.



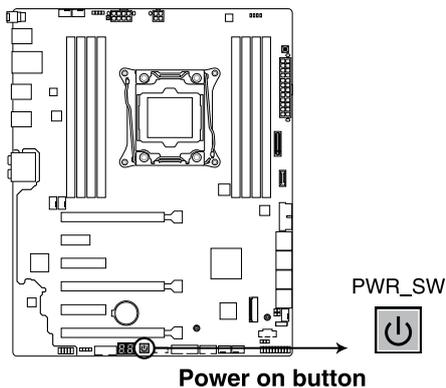
MemOK! button



- Refer to section **1.1.8 Onboard LEDs** for the exact location of the DRAM_LED.
- The DRAM_LED also lights up when the DIMM is not properly installed. Turn off the system and reinstall the DIMM before using the MemOK! function.
- The MemOK! button does not function under Windows® OS environment.
- During the tuning process, the system loads and tests failsafe memory settings. It takes about 30 seconds for the system to test one set of failsafe settings. If the test fails, the system reboots and tests the next set of failsafe settings. The blinking speed of the DRAM_LED increases, indicating different test processes.
- Due to memory tuning requirement, the system automatically reboots when each timing set is tested. If the installed DIMMs still fail to boot after the whole tuning process, the DRAM_LED lights continuously. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) at www..com.
- If you turn off the computer and replace DIMMs during the tuning process, the system continues memory tuning after turning on the computer. To stop memory tuning, turn off the computer and unplug the power cord for about 5–10 seconds.
- If your system fails to boot up due to BIOS overclocking, press the MemOK! button to boot and load the BIOS default settings. A message will appear during POST reminding you that the BIOS has been restored to its default settings.
- We recommend that you download and update to the latest BIOS version from www..com after using the MemOK! function.

2. Power-on button

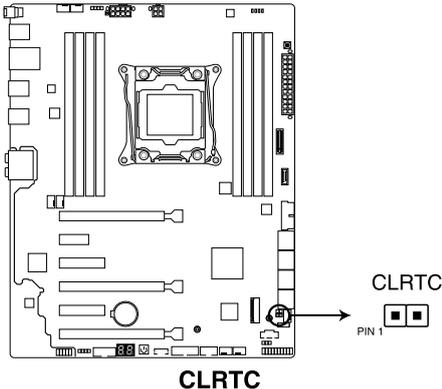
The motherboard comes with a power-on button that allows you to power up or wake up the system. The button also lights up when the system is plugged to a power source indicating that you should shut down the system and unplug the power cable before removing or installing any motherboard component.



1.1.7 Jumpers and holes

1. Clear RTC RAM jumper (2-pin CLRTC)

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



To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Short-circuit pin 1-2 with a metal object or jumper cap for about 5-10 seconds.
3. Plug the power cord and turn ON the computer.
4. Hold down the <Delete> key during the boot process and enter BIOS setup to re-enter data.



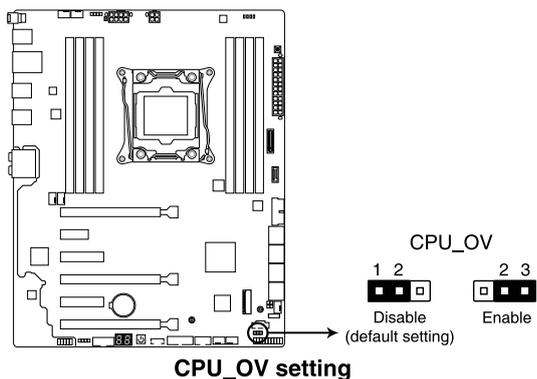
Except when clearing the RTC RAM, never place a metal object or jumper cap on the CLRTC jumper. Placing a metal object or jumper cap will cause system boot failure!



- If the steps above do not help, remove the onboard battery and place a metal object or jumper cap again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.
- You do not need to clear the RTC when the system hangs due to overclocking. For system failure due to overclocking, use the C.P.R. (CPU Parameter Recall) feature. Shut down and reboot the system so the BIOS can automatically reset parameter settings to default values.
- Due to the chipset behavior, AC power off is required to enable C.P.R. function. You must turn off and turn on the power supply or unplug and plug the power cord before rebooting the system.

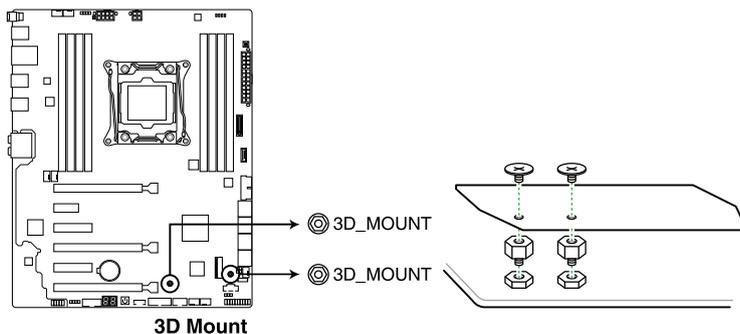
2. CPU Over Voltage jumper (3-pin CPU_OV)

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.



3. 3D Mount

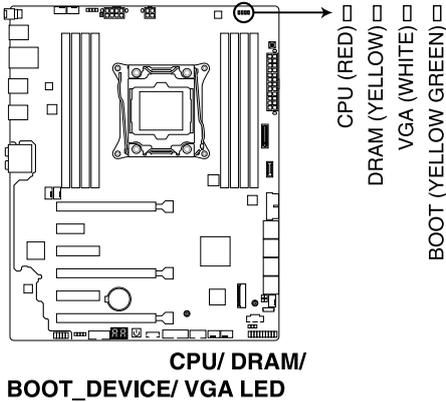
Secure 3D printed parts to these 3D Mount holes for a personalized motherboard.



1.1.8 Onboard LEDs

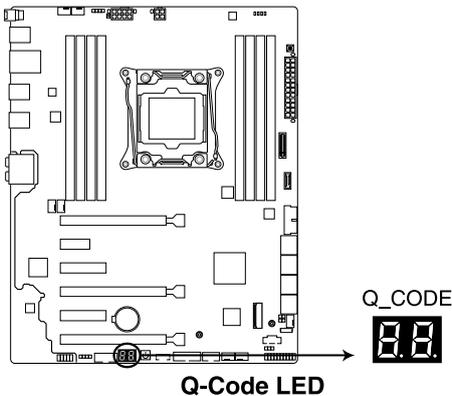
1. POST State LEDs

The POST State 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.



2. Q-Code LEDs

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.



Q-Code table

Code	Description
00	Not used
02	microcode
03	CACHE_ENABLED
04	PCH initialization
06	CPU_EARLY_INIT
10	PEI Core is started
11 – 14	Pre-memory CPU initialization is started
15 – 18	Pre-memory System Agent initialization is started
19 – 1C	Pre-memory PCH initialization is started
2B – 2F	Memory initialization
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32 – 36	CPU post-memory initialization
37 – 3A	Post-Memory System Agent initialization is started
3B – 3E	Post-Memory PCH initialization is started
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
4F	DXE IPL is started
54	Unspecified memory initialization error
55	Memory not installed
56	Invalid CPU type or Speed
57	CPU mismatch
58	CPU self test failed or possible CPU cache error
59	CPU micro-code is not found or micro-code update is failed
5A	Internal CPU error
5B	Reset PPI is not available
5C – 5F	Reserved for future AML error codes
E0	S3 Resume is started (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 AML progress codes
E8	S3 Resume Failed
E9	S3 Resume PPI not Found
EA	S3 Resume Boot Script Error
EB	S3 OS Wake Error
EC – EF	Reserved for future AML 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 AML progress codes
F8	Recovery PPI is not available
F9	Recovery capsule is not found

(continued on the next page)

Code	Description
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
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

(continued on the next page)

Code	Description
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 AML 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)

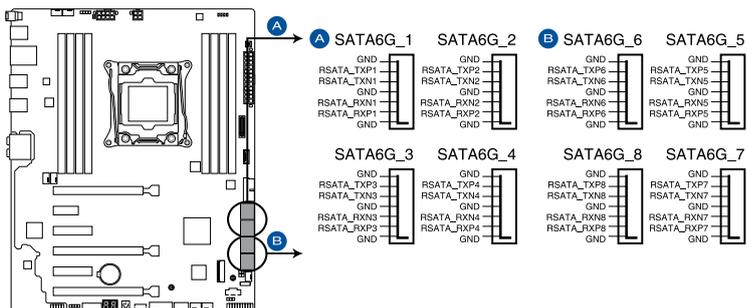
Code	Description
03	System is entering S3 sleep state
04	System is entering S4 sleep state
05	System is entering S5 sleep state
30	System is waking up from the S3 sleep state
40	System is waking up from the S4 sleep state
AC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.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

1.1.9 Internal connectors

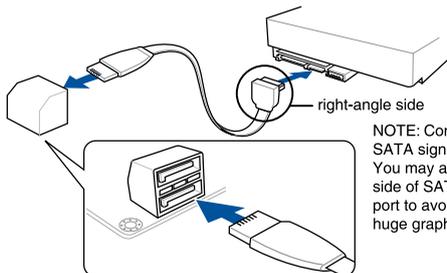
1. Intel® Serial ATA 6 Gb/s connectors (7-pin SATA6G_12; SATA 6G_34; SATA 6G_65; SATA 6G_87)

These connectors connect to Serial ATA 6 Gb/s hard disk drives via Serial ATA 6 Gb/s signal cables.

If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® X299 chipset.



Intel® Serial ATA 6 Gb/s connectors



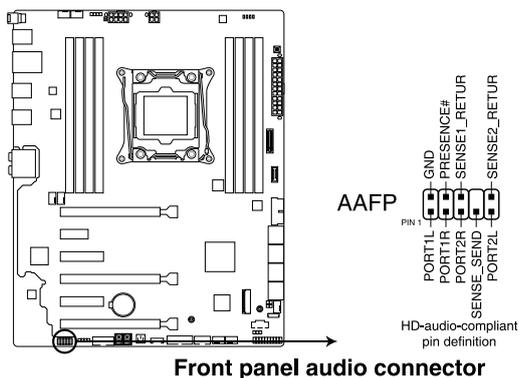
NOTE: Connect the right-angle side of SATA signal cable to SATA device. You may also connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.



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 **[Intel RST Premium With Intel Optane System Acceleration (RAID)]**.

2. Front panel audio connector (10-1 pin AAFP)

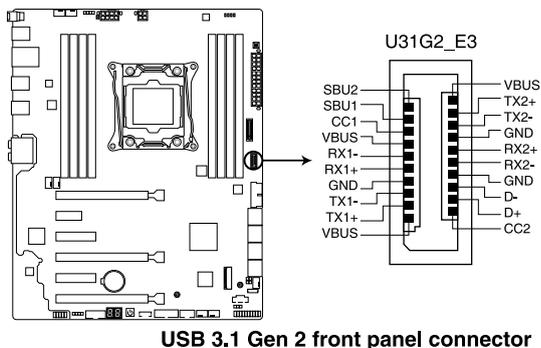
This connector is for a chassis-mounted front panel audio I/O module that supports HD Audio. Connect one end of the front panel audio I/O module cable to this connector.



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.

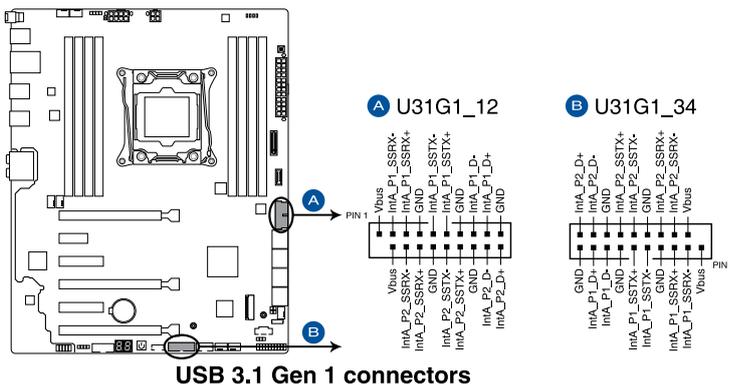
3. USB 3.1 Gen 2 front panel connector (U31G2_E3)

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.



4. USB 3.1 Gen 1 connectors (20-pin U31G1_12; U31G1_34)

These connectors allow 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 Gb/s, faster charging time for USB-chargeable devices, optimized power efficiency, and backward compatibility with USB 2.0.



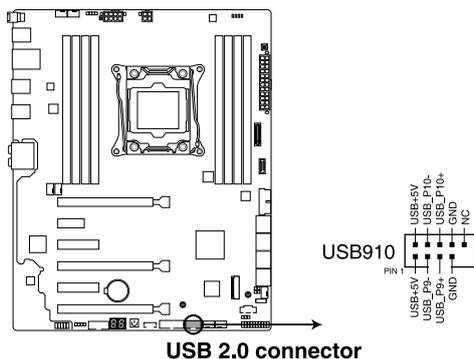
The USB 3.1 Gen 1 module is purchased separately.



The plugged USB 3.1 Gen 1 device may run on xHCI or EHCI mode depending on the operating system's setting.

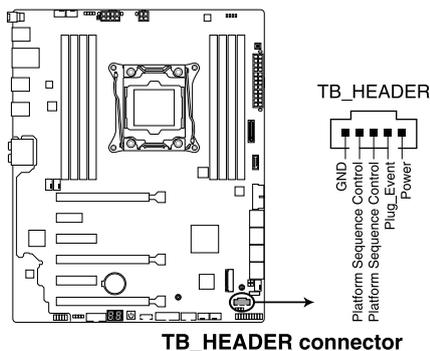
5. USB 2.0 connector (10-1 pin USB910)

This connector is for USB 2.0 ports. Connect the USB module cable to this connector, then install the module to a slot opening at the back of the system chassis. This USB connector complies with USB 2.0 specification that supports up to 480 Mb/s connection speed.



6. Thunderbolt header (5-pin TB_HEADER)

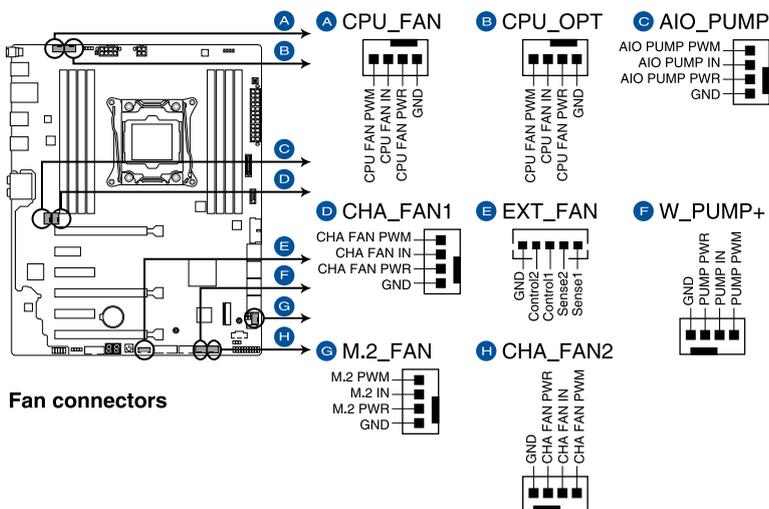
This connector is for the add-on Thunderbolt I/O card that supports Intel's Thunderbolt Technology, allowing you to connect up to six Thunderbolt-enabled devices and a DisplayPort-enabled display in a daisy-chain configuration.



The add-on Thunderbolt I/O card and Thunderbolt cables are purchased separately.

7. CPU, CPU optional, AIO pump, water pump+, extension, M.2, and chassis fan connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin AIO_PUMP; 4-pin W_PUMP+; 4-pin M.2_FAN; 5-pin EXT_FAN; 4-pin CHA_FAN1-2)

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.



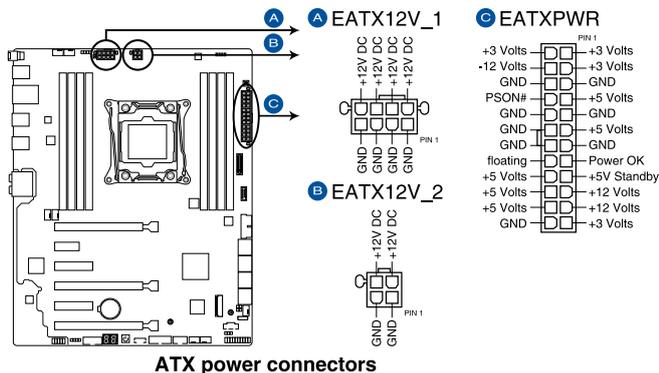
- DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!
- Ensure that the CPU fan cable is securely installed to the CPU fan connector.



- The CPU_FAN connector supports the CPU fan of maximum 1A (12 W) fan power.
- W_PUMP+ function support depends on water cooling device.
- Connect the fan of your water cooling kit to the AIO_PUMP connector.

8. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V_1; 4-pin EATX12V_2)

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.



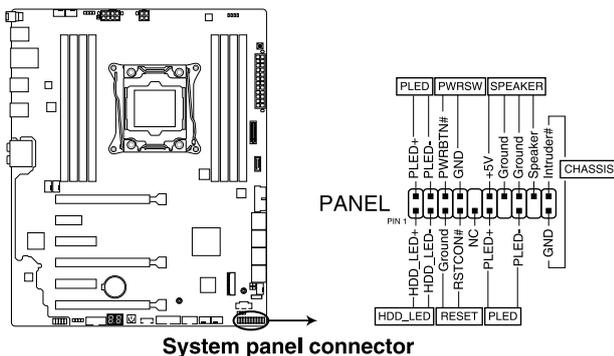
- DO NOT connect the 4-pin power plug only, the motherboard may overheat under heavy usage.
- Ensure to connect the 8-pin power plug, or connect both the 8-pin and 4-pin power plugs.



- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12V Specification 2.0 (or later version) and provides a minimum power of 350 W.
- We recommend that you use a PSU with a higher power output when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- If you want to use two or more high-end PCI Express x16 cards, use a PSU with 1000W power or above to ensure the system stability.

9. System panel connector (20-3 pin PANEL)

This connector supports several chassis-mounted functions.



- **System power LED (2-pin or 3-1 pin PLED)**

The 2-pin or 3-1 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.

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

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

- **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.

- **ATX 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 operating system settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

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

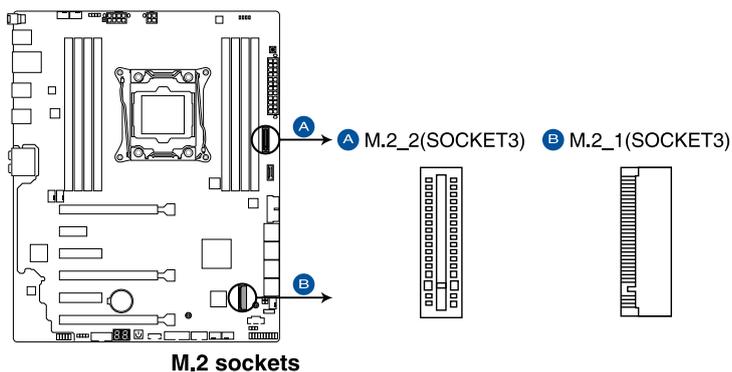
This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

- **Chassis intrusion connector (2-pin CHASSIS)**

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

10. M.2 sockets (M.2_1(Socket 3); M.2_2(Socket 3))

These sockets allow you to install M.2 SSD modules.



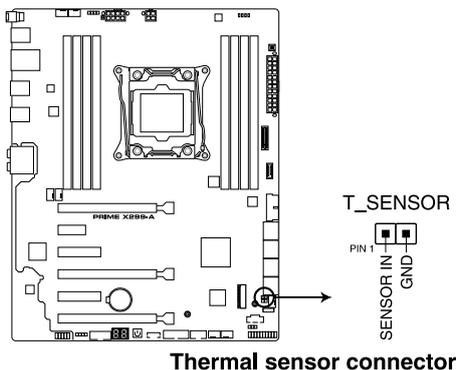
- M.2_1 socket supports PCIe 3.0 x4 and SATA mode M Key design and type 2242 / 2260 / 2280 PCIe and SATA storage devices.
- M.2_2 socket supports PCIe 3.0 x4 M Key design and type 2242 / 2260 / 2280 / 22110 PCIe storage devices.
- These sockets support IRST (Intel® Rapid Storage Technology).



The M.2 SSD module is purchased separately.

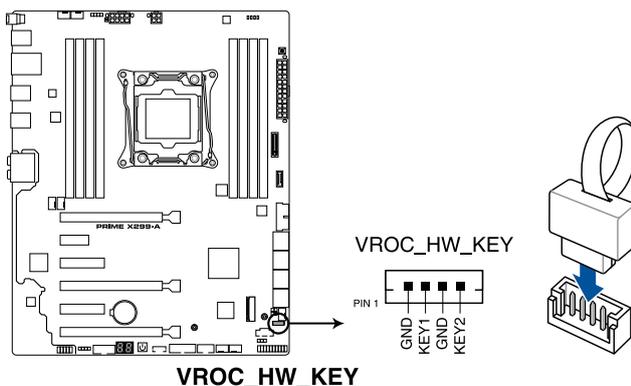
11. Thermal sensor connector (2-pin T_SENSOR)

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.



12. VROC_HW_KEY connector (4-pin VROC_KEY)

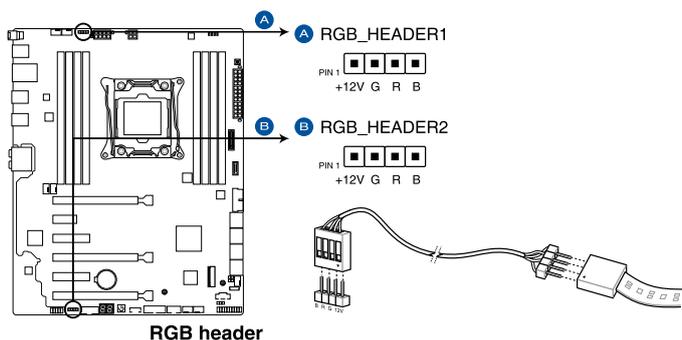
This connector allows you to connect a KEY module to enable CPU RAID functions with Intel® CPU RSTe.



- The KEY module is purchased separately.
- Due to CPU behavior, CPU RAID functions with Intel® CPU RSTe only supports Intel® Core™ X-series Processors (6-core or above) and Intel® SSD modules.

13. RGB header (4-pin RGB_HEADER1-2)

This connector is for RGB LED strips.



The RGB header supports 5050 RGB multi-color LED strips (12V/G/R/B), with a maximum power rating of 2A (12V), and no longer than 2 m.



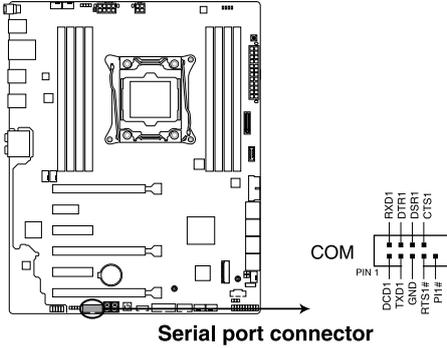
Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.



- Actual lighting and color will vary with LED strip.
- If your LED strip does not light up, check if the RGB LED extension cable and the RGB LED strip is connected in the correct orientation, and the 12V connector is aligned with the 12V header on the motherboard.
- The LED strip will only light up under the operating system.
- The LED strip is purchased separately.

14. Serial port connector (10-1 pin COM)

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.



The COM module is purchased separately.

Basic Installation

2

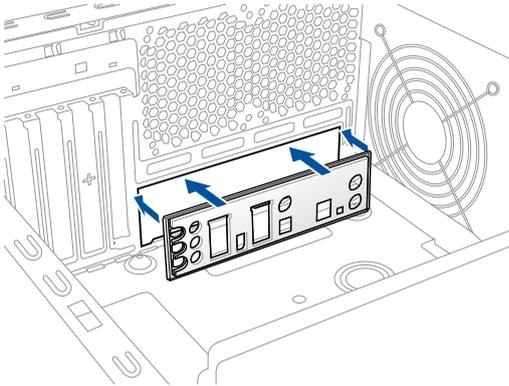
2.1 Building your PC system



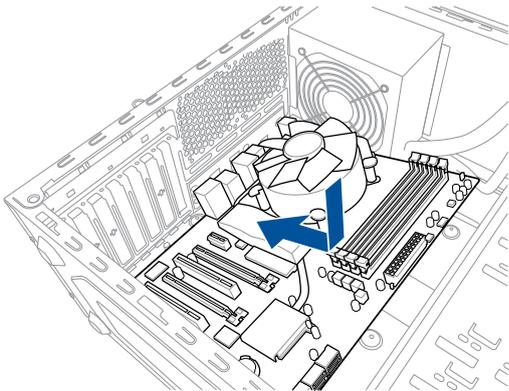
The diagrams in this section are for reference only. The motherboard layout may vary with models, but the installation steps are the same for all models.

2.1.1 Motherboard installation

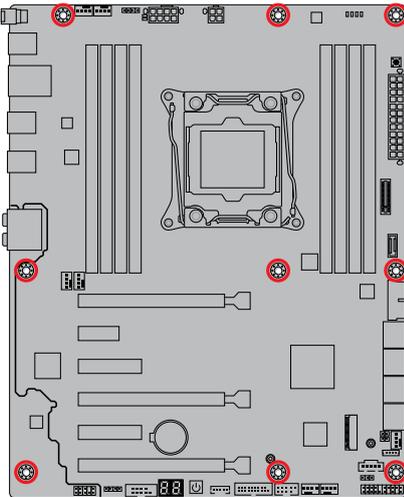
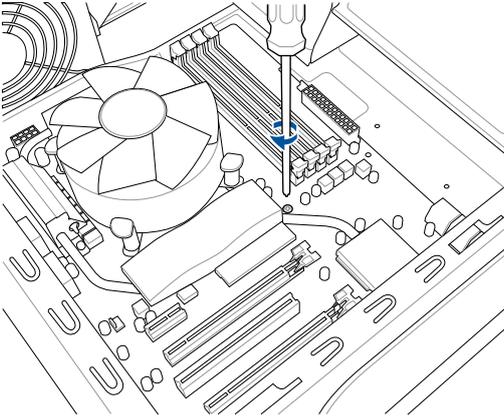
1. Install the Q-Shield to the chassis rear I/O panel.



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 nine screws into the holes indicated by circles to secure the motherboard to the chassis.

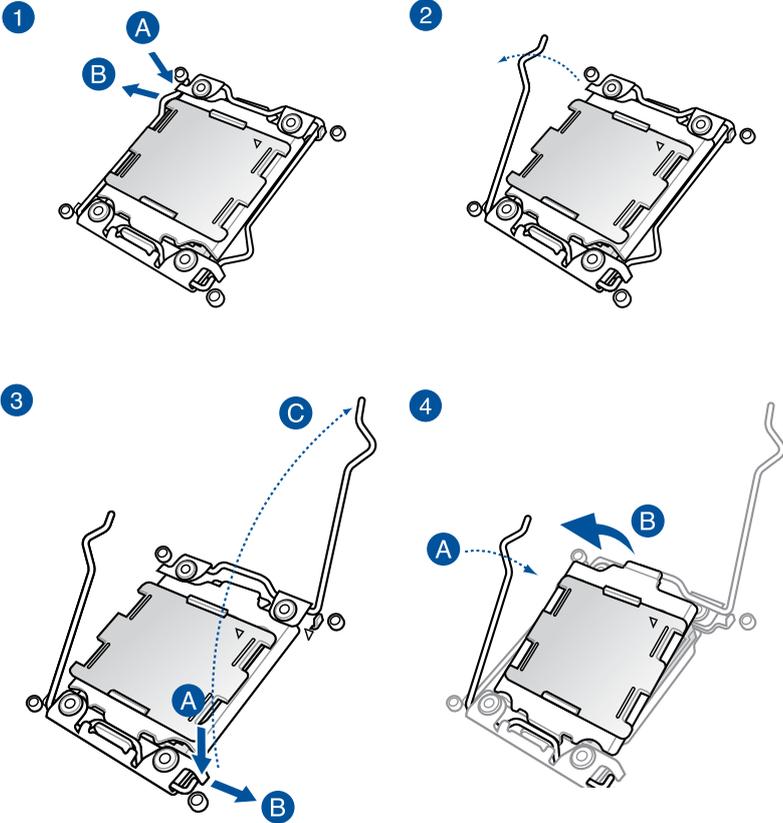


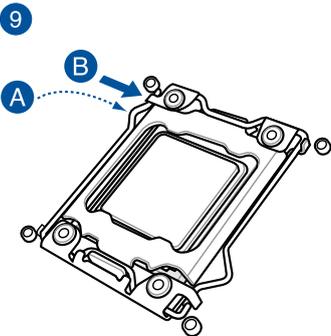
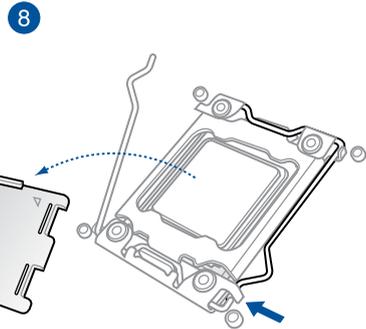
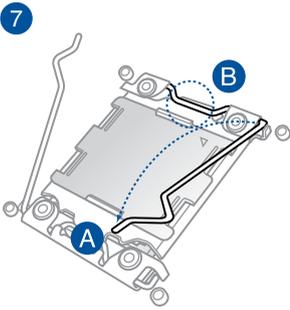
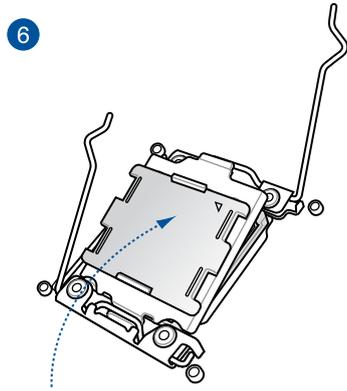
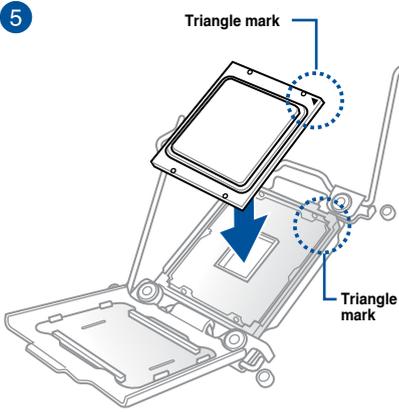
DO NOT overtighten the screws! Doing so can damage the motherboard.

2.1.2 CPU installation

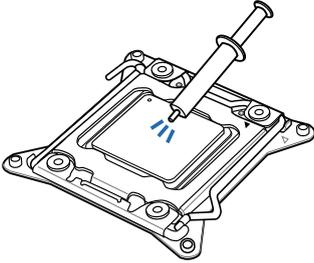


Please note the order in opening/ closing the double latch. Follow the instructions printed on the metal sealing hatch or the illustrations shown below in this manual. The plastic cap will pop up automatically once the CPU is in place and the hatch properly sealed down.



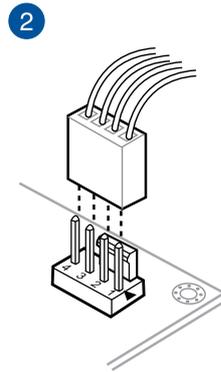
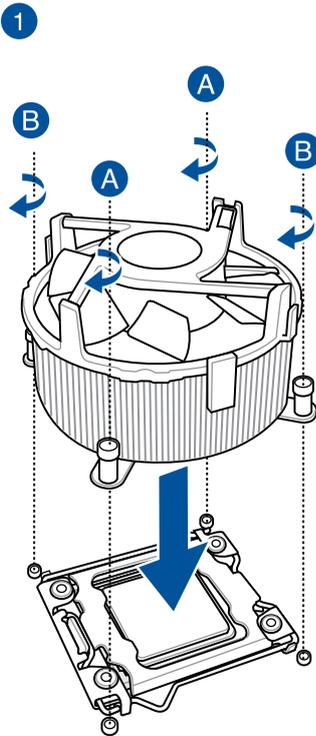


2.1.3 CPU heatsink and fan assembly installation



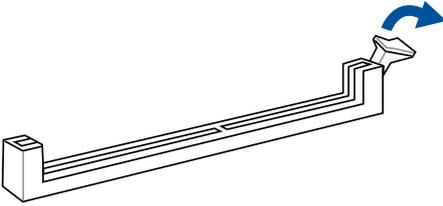
Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan, if necessary.

To install the CPU heatsink and fan assembly

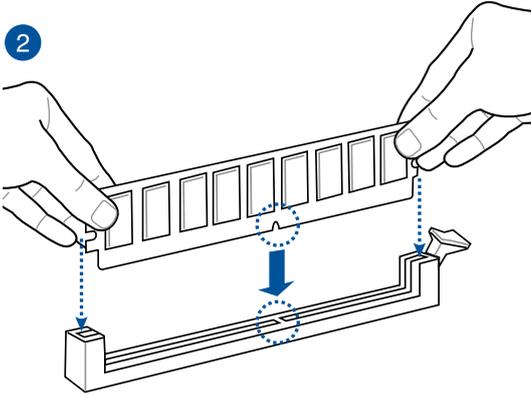


2.1.4 DIMM installation

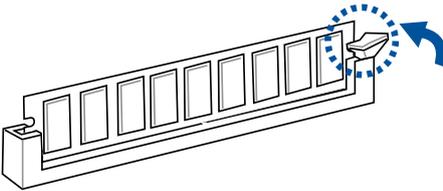
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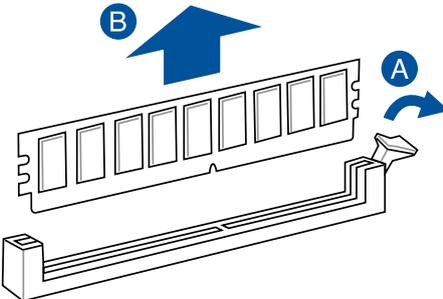
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3

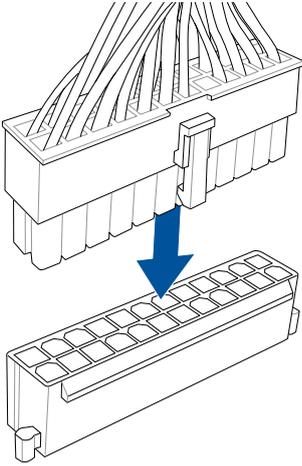


To remove a DIMM

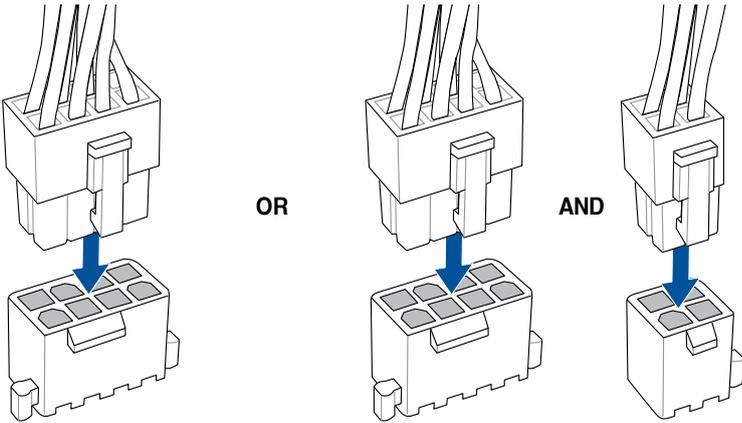


2.1.5 ATX power connection

1



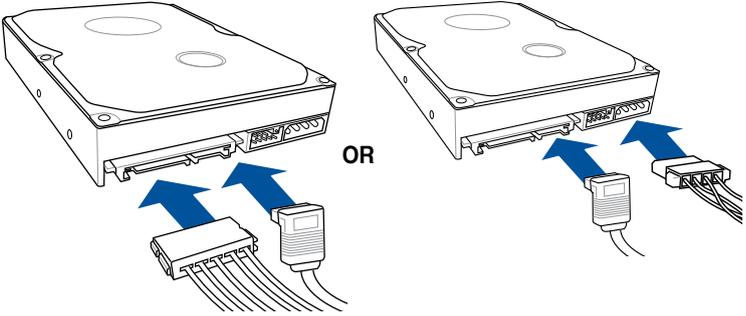
2



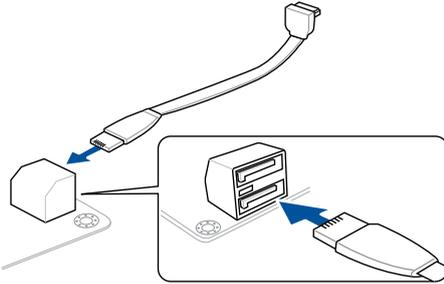
- DO NOT connect the 4-pin power plug only, the motherboard may overheat under heavy usage.
- Ensure to connect the 8-pin power plug, or connect both the 8-pin and 4-pin power plugs.

2.1.6 SATA device connection

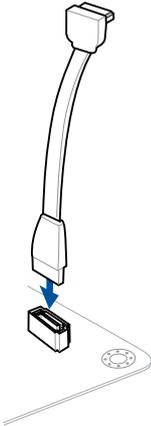
1



2

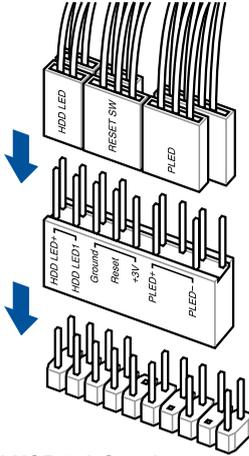


OR

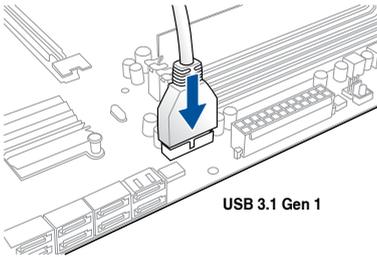


2.1.7 Front I/O connector

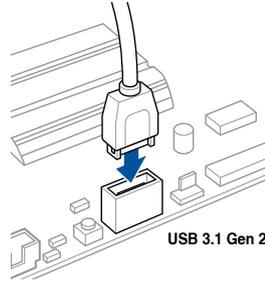
To install Q-Connector



To install USB 3.1 Gen 1 connector

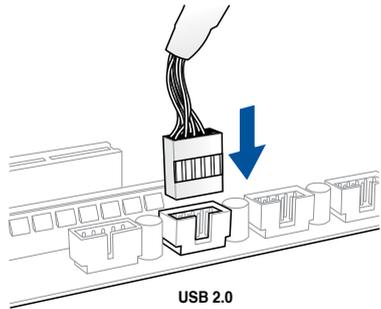


To install USB 3.1 Gen 2 connector

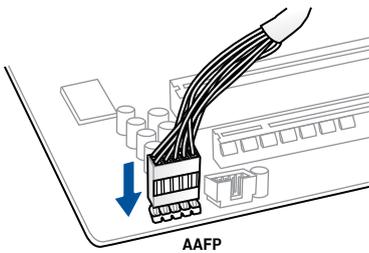


This connector will only fit in one orientation. Push the connector until it clicks into place.

To install USB 2.0 connector

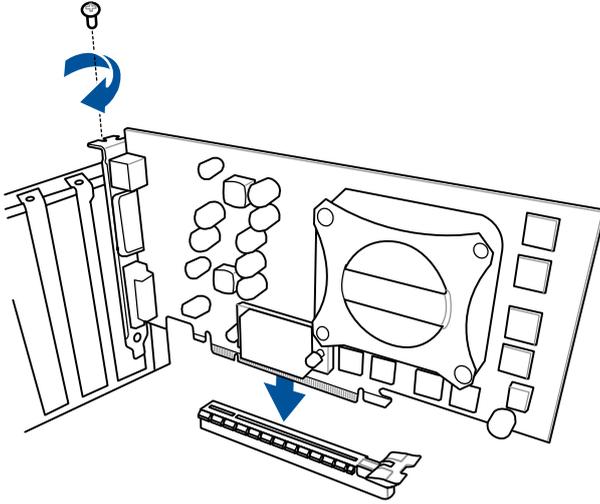


To install front panel audio connector

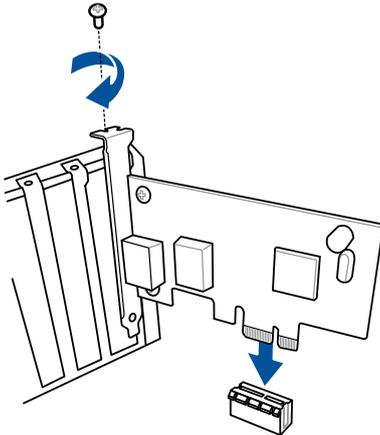


2.1.8 Expansion card installation

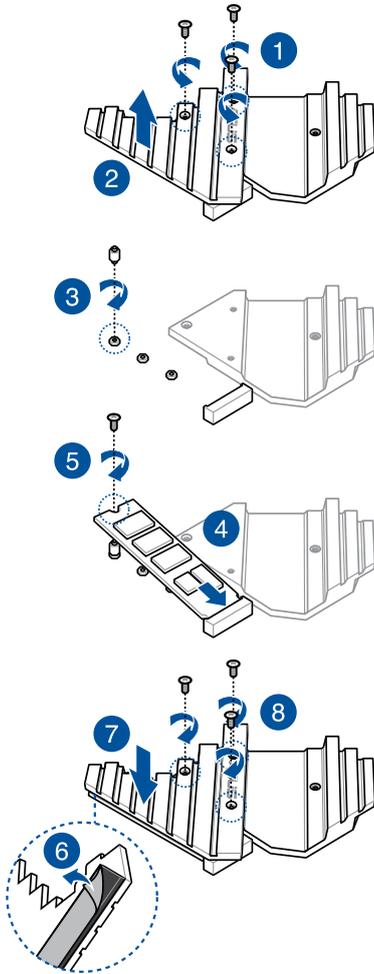
To install PCIe x16 cards



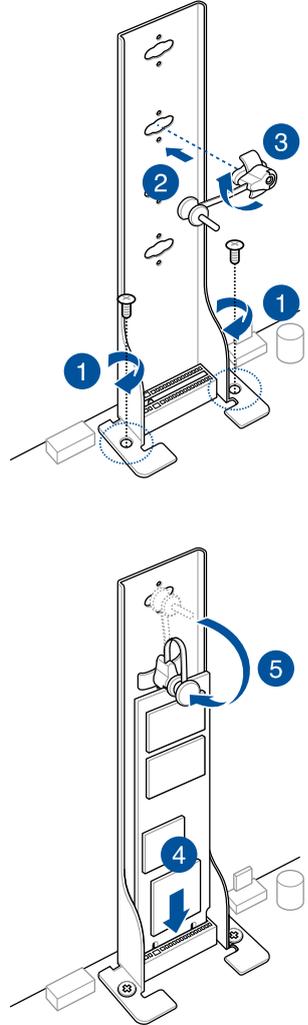
To install PCIe x1 cards



2.1.9 M.2 installation



OR



Supported M.2 type varies per motherboard.

2.2 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.

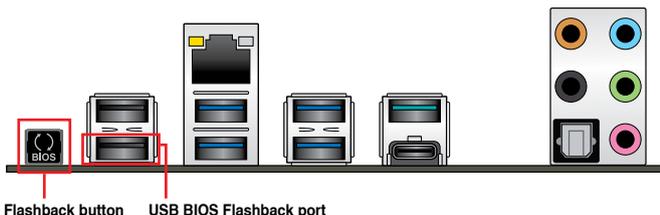
To use USB BIOS Flashback:

1. Insert a USB storage device to the USB Flashback port.



- We recommend you to use a USB 2.0 storage device to save the latest BIOS version for better compatibility and stability.
- Refer to section **2.3.1 Rear I/O connection** for the location of the USB port that supports USB BIOS Flashback.

2. Visit <https://www.asus.com/support/download> and download the latest BIOS version for this motherboard.
3. Rename the file as **X299A.CAP**, then copy it to your USB storage device.
4. Shut down your computer.
5. Press the BIOS Flashback button for three seconds until the Flashback LED blinks three times, indicating that the BIOS Flashback function is enabled.



6. Wait until the light goes out, indicating that the BIOS updating process is completed.



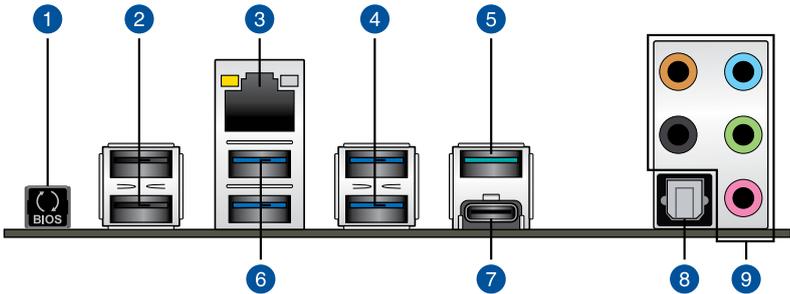
For more BIOS update utilities in BIOS setup, refer to the section **3.11 Updating BIOS** in Chapter 3.



- 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 Service Center.

2.3 Motherboard rear and audio connections

2.3.1 Rear I/O connection



Rear panel connectors	
1. USB BIOS Flashback button	6. USB 3.1 Gen 1 ports 56
2. USB 2.0 ports 1112 (bottom port supports USB BIOS Flashback)	7. USB 3.1 Gen 2 Type-C™ port EC1
3. Intel® LAN port (LAN1)*	8. Optical S/PDIF Out port
4. USB 3.1 Gen 1 ports 78	9. Audio I/O ports**
5. USB 3.1 Gen 2 Type-A ports EA2	

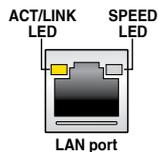
* and **: Refer to the tables on the next page for LAN port LEDs and audio port definitions.



- USB 3.1 Gen 1/Gen 2 devices can only be used as data storage only.
- We strongly recommend that you connect your devices to ports with matching data transfer rate. Please connect your USB 3.1 Gen 1 devices to USB 3.1 Gen 1 ports and your USB 3.1 Gen 2 devices to USB 3.1 Gen 2 ports for faster and better performance for your devices.

* LAN ports LED indications

Activity Link LED		Speed LED	
Status	Description	Status	Description
Off	No link	Off	10 Mbps connection
Orange	Linked	Orange	100 Mbps connection
Orange (Blinking)	Data activity	Green	1 Gbps connection
Orange (Blinking then steady)	Ready to wake up from S5 mode		



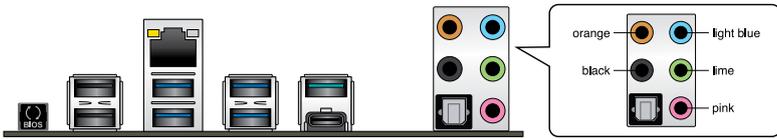
You can disable the LAN controllers in BIOS. Due to hardware design, the LAN1 port's LEDs may continue to blink even when disabled.

** 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	Side Speaker Out
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	–	–	Center/Sub woofer	Center/Sub woofer
Black	–	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out

2.3.2 Audio I/O connections

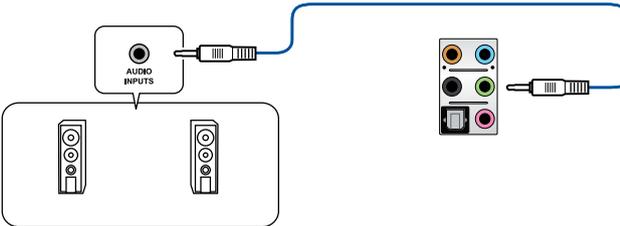
Audio I/O ports



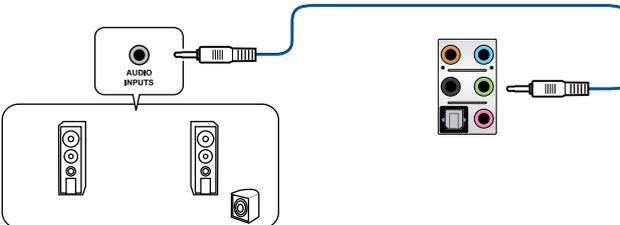
Connect to Headphone and Mic



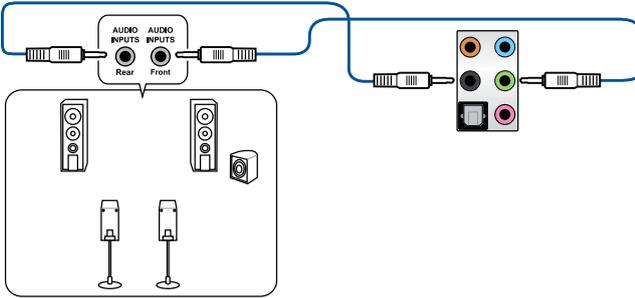
Connect to Stereo Speakers



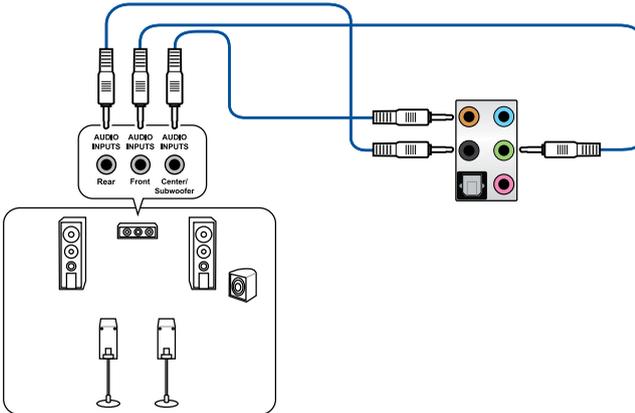
Connect to 2 Speakers



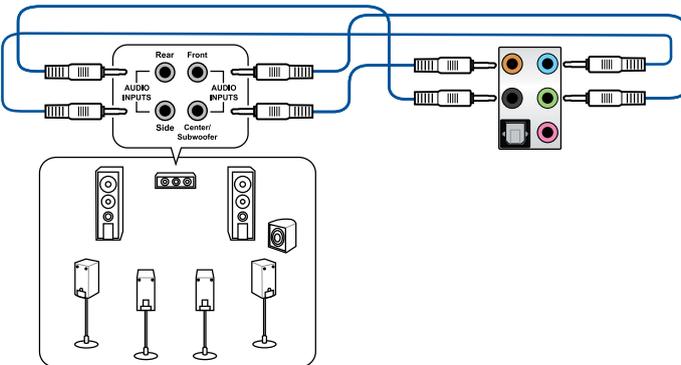
Connect to 4 Speakers



Connect to 6 Speakers



Connect to 8 Speakers



2.4 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 3.

2.5 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.