

Product Introduction

1.1 Motherboard overview

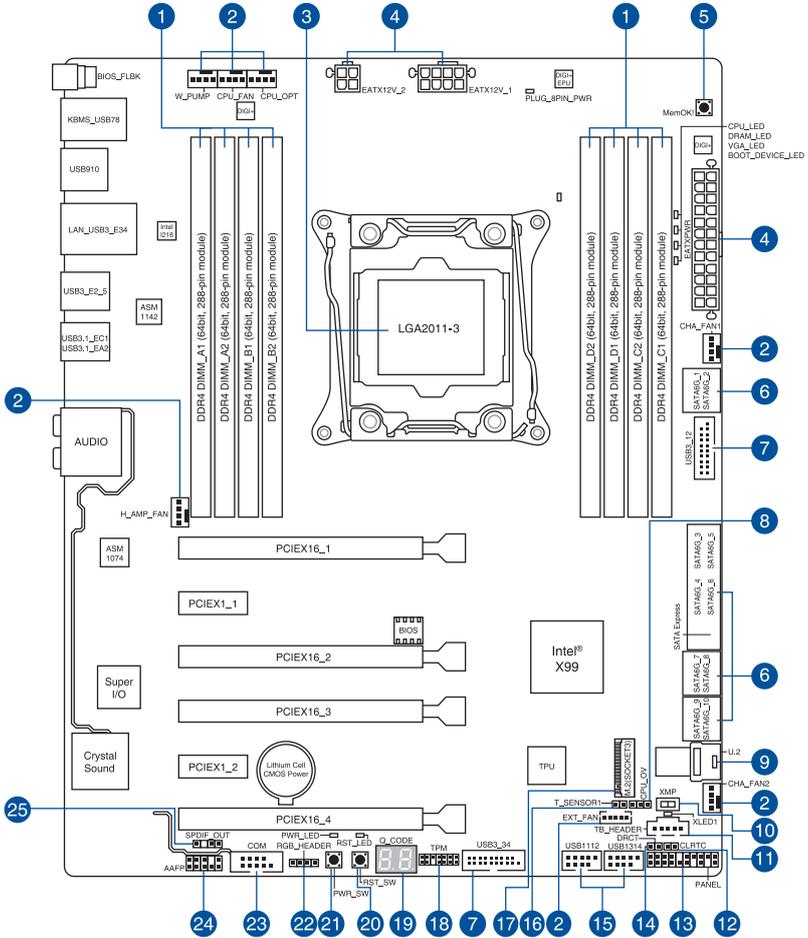
1.1.1 Before you proceed

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



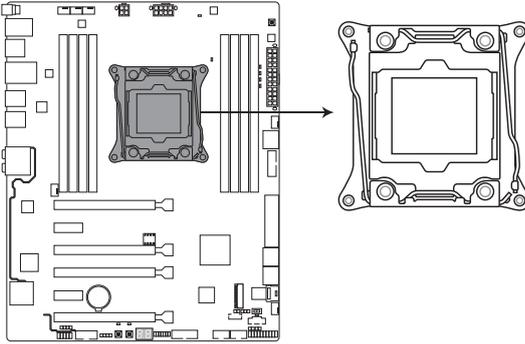
Refer to **1.1.9 Internal connectors** and **2.3.1 Rear I/O connection** for more information about rear panel connectors and internal connectors.

Layout contents

Connectors/Jumpers/Buttons and switches/Slots	Page
1. DDR4 DIMM slots	1-5
2. CPU, CPU optional, extension, and chassis fan connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin W_PUMP; 4-pin H_AMP_FAN; 5-pin EXT_FAN, 4-pin CHA_FAN1-2)	1-25
3. LGA2011-3 CPU socket	1-4
4. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V_1; 4-pin EZTX12V_2)	1-26
5. MemOK! button	1-10
6. Intel® X99 Serial ATA 6 Gb/s connectors (7-pin SATA6G_12, SATA6G_34, SATA6G_56/SATAEXPRESS, SATA6G_78, SATA6G_910)	1-21
7. USB 3.0 connectors (20-1 pin USB3_12, USB3_34)	1-23
8. CPU Over Voltage jumper (3-pin CPU_OV)	1-13
9. U.2 connector (U.2)	1-33
10. EZ XMP switch	1-11
11. Thunderbolt header (5-pin TB_HEADER)	1-29
12. Clear RTC RAM jumper (2-pin CLRRTC)	1-12
13. System panel connector (20-8 pin PANEL)	1-27
14. DirectKey connector (2-pin DRCT)	1-28
15. USB 2.0 connectors (10-1 pin USB1112; USB1314)	1-24
16. T_Sensor connector (2-pin T_SENSOR1)	1-29
17. M.2 socket 3	1-22
18. TPM connector (14-1 pin TPM)	1-28
19. Q-Code LEDs	1-15
20. Reset button	1-9
21. Power-on button	1-9
22. Aura Strip Headers (4-pin RGB_HEADER)	1-32
23. Serial port connector (10-1 pin COM)	1-30
24. Front panel audio connector (10-1 pin AAFFP)	1-31
25. Digital audio connector (4-1 pin SPDIF_OUT)	1-22

1.1.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA2011-3 socket designed for Intel® Core™ i7 processors.



CPU LGA2011-3 Socket



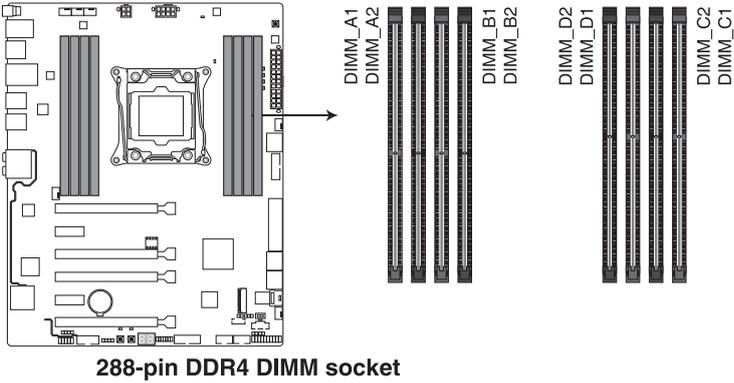
-
- Ensure that all power cables are unplugged before installing the CPU.
 - Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard 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 LGA2011-3 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

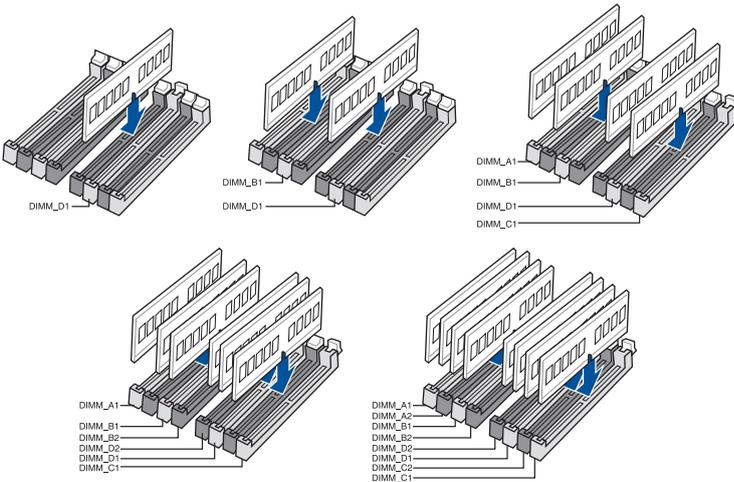
The motherboard comes with eight (8) DDR4 (Double Data Rate 4) Quad Inline Memory Modules (DIMM) slots.



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.



Recommended memory configurations



Memory configurations

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



-
- 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 dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
 - According to Intel® CPU spec, DIMM voltage below 1.65 V is recommended to protect the CPU.
 - Due to the memory address limitation on 32-bit Windows® OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you do any of the following:
 - a) Use a maximum of 3GB system memory if you are using a 32-bit Windows® OS.
 - b) Install a 64-bit Windows® OS when you want to install 4 GB or more on the motherboard.
 - c) For more details, refer to the Microsoft® support site at <http://support.microsoft.com/kb/929605/en-us>.
-

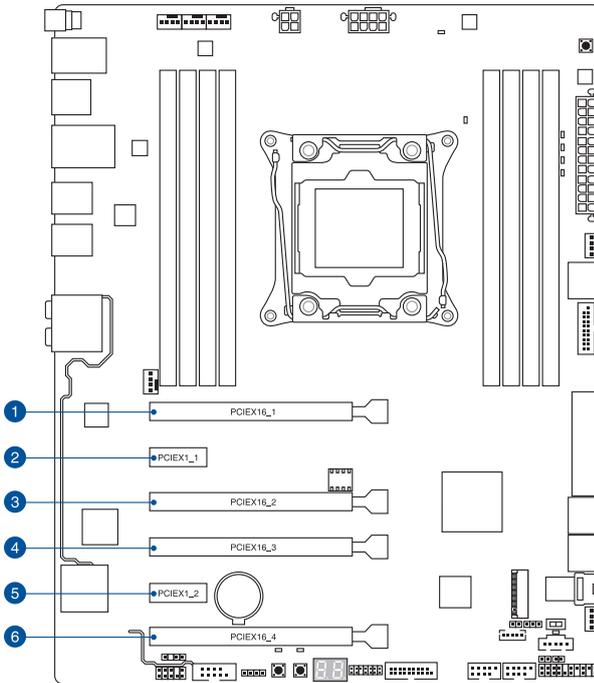


-
- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value. To operate at the vendor-marked or at a higher frequency, refer to section **3.5 Ai Tweaker menu** for manual memory frequency adjustment.
 - 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.
 - The design of the DIMM fan may vary. Ensure that the DIMM fan fits to the motherboard.
-

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	
	40-LANE	28-LANE
1	PCIe 3.0/2.0 x16_1 slot	PCIe 3.0/2.0 x16_1 slot
2	PCIe 2.0 x1_1 slot	PCIe 2.0 x1_1 slot
3	PCIe 2.0 x16_2 slot	PCIe 2.0 x16_2 slot
4	PCIe 3.0/2.0 x16_3 slot	PCIe 3.0/2.0 x16_3 slot
5	PCIe 2.0 x1_2 slot	PCIe 2.0 x1_2 slot
6	PCIe 3.0/2.0 x16_4 slot	PCIe 3.0/2.0 x16_4 slot

40-LANE CPU		PCI Express 3.0 operating mode		
VGA configuration	PCIe 3.0/2.0 x16_1	PCIe 3.0/2.0 x16_3	PCIe 3.0/2.0 x16_4	
Single VGA/PCIe card	x16 (single VGA recommended)	N/A	N/A	
Dual VGA/PCIe cards	x16	x16	N/A	
Triple VGA/PCIe cards	x8	x16	x8	

28-LANE CPU		PCI Express 3.0 operating mode		
VGA configuration	PCIe 3.0/2.0 x16_1	PCIe 3.0/2.0 x16_3	PCIe 3.0/2.0 x16_4	
Single VGA/PCIe card	x16 (single VGA recommended)	N/A	N/A	
Dual VGA/PCIe cards	x16	x8	N/A	
Triple VGA/PCIe cards	x8	x8	x8	



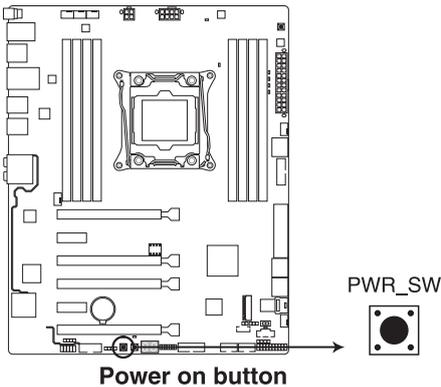
- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode.
- Connect a chassis fan to the motherboard connector labeled CHA_FAN1-2 when using multiple graphics cards for better thermal environment.

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.

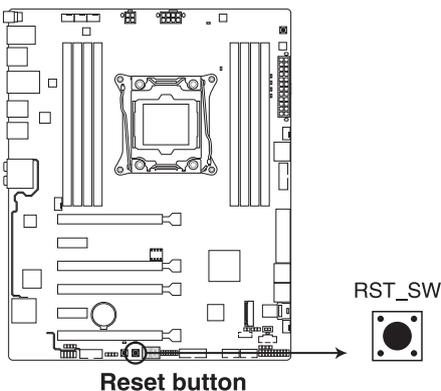
1. Power-on button

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.



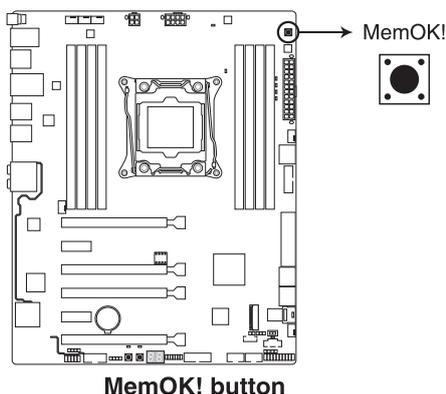
2. Reset button

Press the reset button to reboot the system.



3. MemOK! button

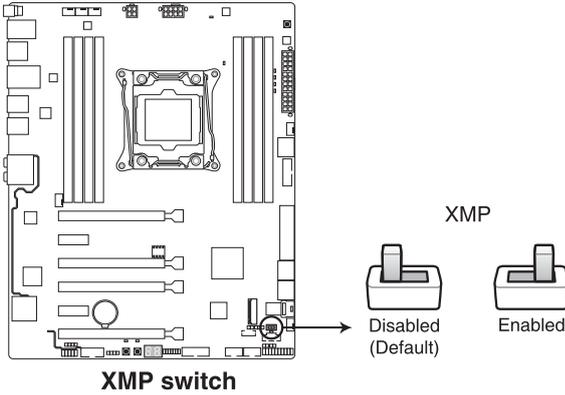
Installing DIMMs that are not compatible with the motherboard may cause system boot failure. If the system fail to boot during POST stage and the DRAM_LED near the MemOK! button lights continuously, press the MemOK! button until the DRAM_LED starts blinking. System will begin automatic memory compatibility tuning and reboot for successful boot.



- Refer to section **1.1.8 Onboard LEDs** for the exact location of the DIAG_DRAM LED.
- The DIAG_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 DIAG_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 DIAG_DRAM LED lights continuously. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) in this user manual or 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 overlocking, 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 after using the MemOK! function.

4. EZ XMP switch

Enable this switch to overclock the installed DIMMs, allowing you to enhance the DIMM's speed and performance.

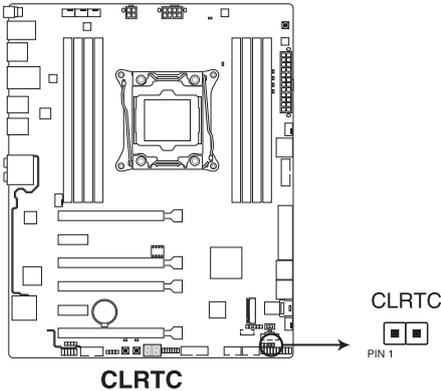


The EZ XMP LED (XLED1) lights up when you enable the EZ XMP switch. For the location of the EZ XMP LED, refer to section 1.1.8 Onboard LEDs.

1.1.7 Jumpers

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.



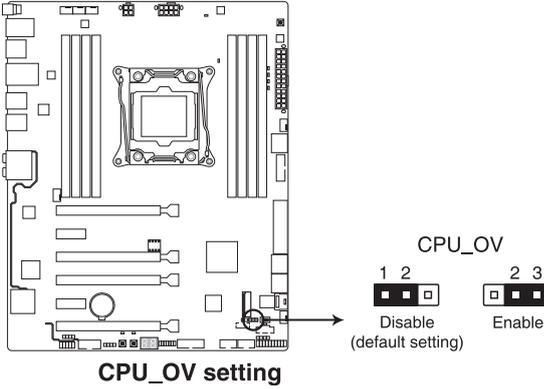
Except when clearing the RTC RAM, never remove the cap on CLRTC jumper default position. Removing the cap will cause system boot failure!



- If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.
 - 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 on the power supply or unplug and plug the power cord before rebooting the system.
-

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

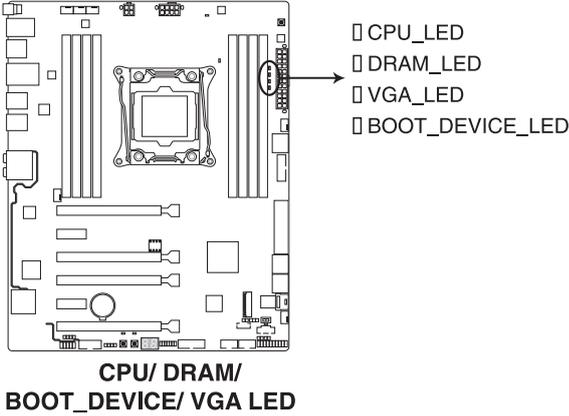
The CPU Over Voltage jumper allows you to set a higher CPU voltage for a flexible overclocking system, depending on the type of the installed CPU. To gain more CPU voltage setting, insert the jumper to pins 2-3. To go back to its default CPU voltage setting, insert the jumper to pins 1-2.



1.1.8 Onboard LEDs

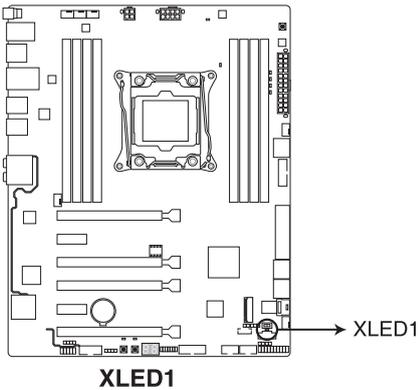
1. POST State LEDs

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.



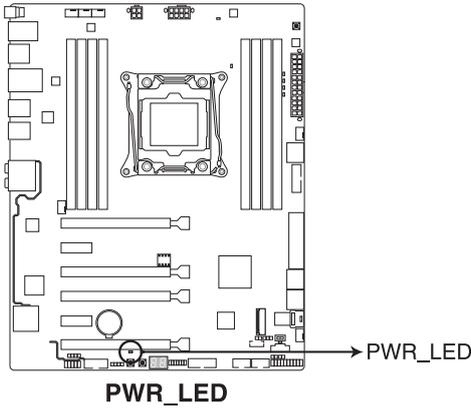
2. EZ XMP LED (XLED1)

This LED lights up when you enable the EZ XMP switch.



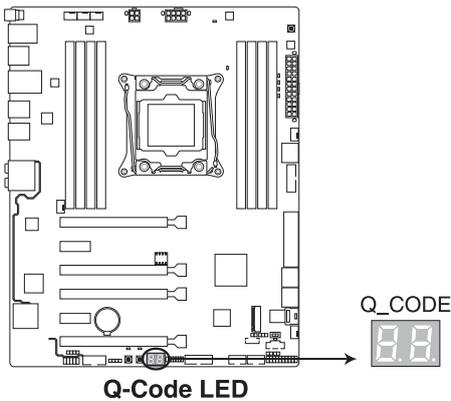
3. Standby Power LED (PWR_LED)

The motherboard comes with a standby power LED that 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 any motherboard components. The illustration below shows the location of the onboard LED.



4. 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
01	Power on. Reset type detection (soft/hard).
02	AP initialization before microcode loading
03	System Agent initialization before microcode loading
04	PCH initialization before microcode loading
06	Microcode loading
07	AP initialization after microcode loading
08	System Agent initialization after microcode loading
09	PCH initialization after microcode loading
0B	Cache initialization
0C – 0D	Reserved for future AMI SEC error codes
0E	Microcode not found
0F	Microcode not loaded
10	PEI Core is started
11 – 14	Pre-memory CPU initialization is started
15 – 18	Pre-memory System Agent initialization is started
19 – 1C	Pre-memory PCH initialization is started
2B – 2F	Memory initialization
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32 – 36	CPU post-memory initialization
37 – 3A	Post-Memory System Agent initialization is started
3B – 3E	Post-Memory PCH initialization is started
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
54	Unspecified memory initialization error
55	Memory not installed
56	Invalid CPU type or Speed
57	CPU mismatch
58	CPU self test failed or possible CPU cache error
59	CPU micro-code is not found or micro-code update is failed

(continued on the next page)

Q-Code table

Code	Description
5A	Internal CPU error
5B	Reset PPI is not available
5C – 5F	Reserved for future AMI 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 AMI progress codes
E8	S3 Resume Failed
E9	S3 Resume PPI not Found
EA	S3 Resume Boot Script Error
EB	S3 OS Wake Error
EC – EF	Reserved for future AMI error codes
F0	Recovery condition triggered by firmware (Auto recovery)
F1	Recovery condition triggered by user (Forced recovery)
F2	Recovery process started
F3	Recovery firmware image is found
F4	Recovery firmware image is loaded
F5 – F7	Reserved for future AMI progress codes
F8	Recovery PPI is not available
F9	Recovery capsule is not found
FA	Invalid recovery capsule
FB – FF	Reserved for future AMI error codes
60	DXE Core is started
61	NVRAM initialization
62	Installation of the PCH Runtime Services
63 – 67	CPU DXE initialization is started
68	PCI host bridge initialization
69	System Agent DXE initialization is started
6A	System Agent DXE SMM initialization is started
6B – 6F	System Agent DXE initialization (System Agent module specific)

(continued on the next page)

Q-Code table

Code	Description
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

(continued on the next page)

Q-Code table

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

ACPI/ASL Checkpoints

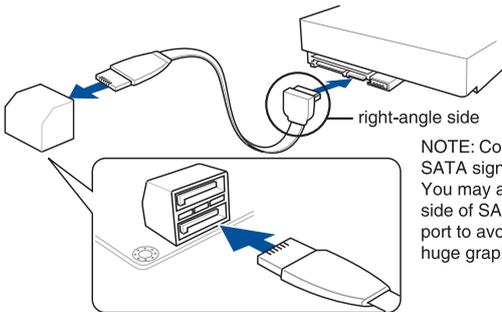
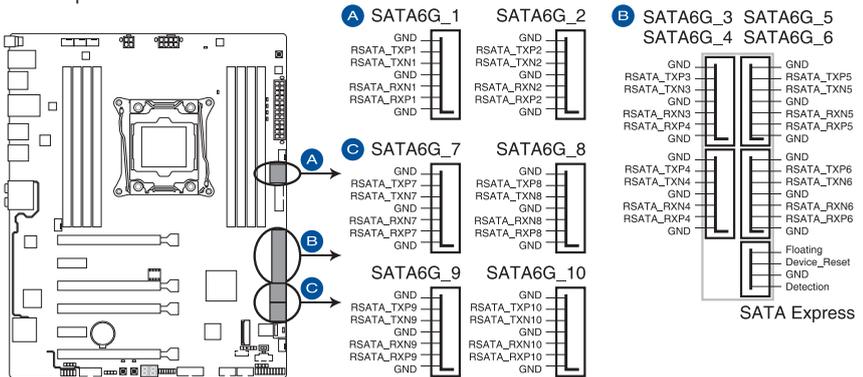
Code	Description
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

1.1.9 Internal connectors

1. Intel® X99 Serial ATA 6 Gb/s connectors (7-pin SATA6G_12, SATA6G_34, SATA6G_56/SATAEXPRESS, SATA6G_78, SATA6G_910)

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® X99 chipset.



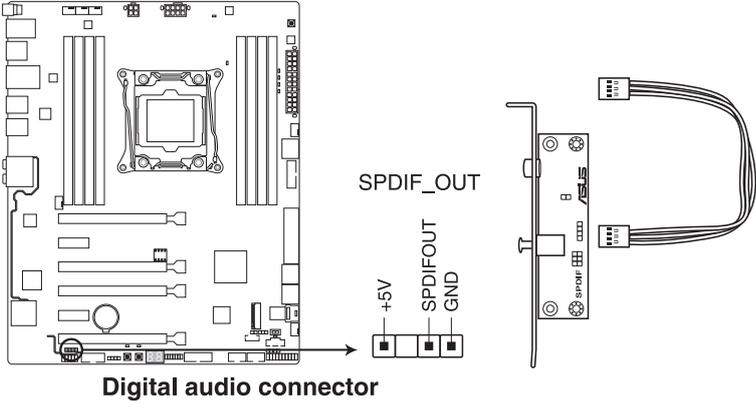
- These connectors are set to **[AHCI Mode]** by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to **[RAID Mode]**. Refer to section 3.6.3 PCH Storage Configuration for details.
- Before creating a RAID set, refer to the manual bundled in the motherboard support DVD.



- The SATAEXPRESS_1 connector can support one SATA Express device or two SATA devices.
- Due to chipset behavior, the SATA6G_78 and SATA6G_910 ports (black) do not support Intel® Rapid Storage Technology and RAID configuration.

2. Digital audio connector (4-1 pin SPDIF_OUT)

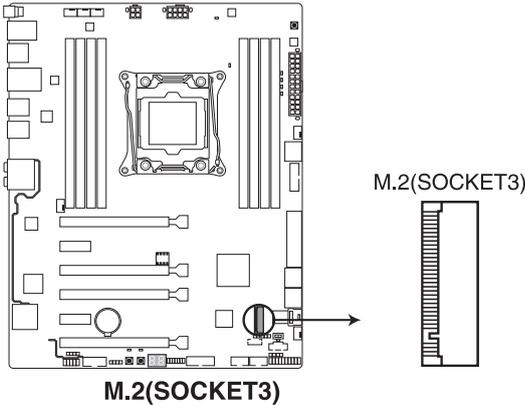
This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port. Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.



The S/PDIF module is purchased separately.

3. M.2 socket 3

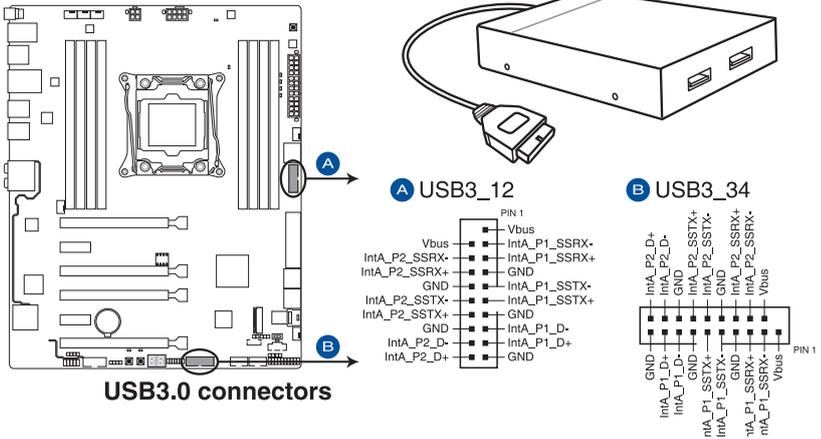
This socket allows you to install an M.2 (NGFF) SSD module.



This socket supports M Key and type 2242/2260/2280/22110 storage devices.

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

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

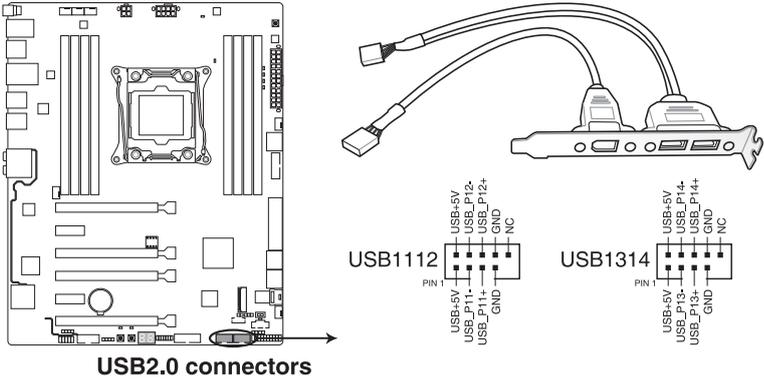


The USB 3.0 module is purchased separately.

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

5. USB 2.0 connectors (10-1 pin USB1112; USB1314)

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 Mb/s connection speed.



DO NOT connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!



You can connect the front panel USB cable to the Q-Connector (USB) first, and then install the Q-Connector (USB) to the USB connector onboard if your chassis supports front panel USB ports.



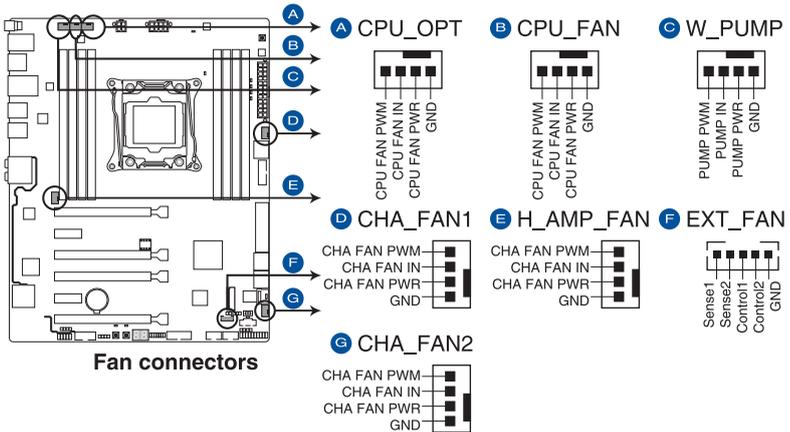
The USB 2.0 module is purchased separately.

6. CPU, CPU optional, extension, and chassis fan connectors (4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin W_PUMP; 4-pin H_AMP_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.
- The CPU_FAN, CHA_FAN, and EXT_FAN connectors support the FAN Xpert 3 feature on X99 platform.
- W_PUMP function support depends on water cooling device. When using a water cooling device, connect the device's fan connector(s) to the motherboard's CPU_FAN connector, and the water pump connector to the W_PUMP connector.
- The EXT_FAN connector supports 3 of 10 thermal sensor sources.
- All fan connectors detect the type of fan installed and automatically switches the control modes. To configure the fan's control mode, go to **Advanced Mode > Monitor > CPU Q-Fan Control** item in BIOS.
- For better Q-Fan functions, we recommend using 4-pin PWM fans when you connect powerful fans (1A or above) onto the H_AMP_FAN connector.
- The chassis fan connectors support DC and PWM modes. To set these fans to DC or PWM, go to **Advanced Mode > Monitor > Chassis Fan 1/2 Q-Fan Control** items in BIOS.



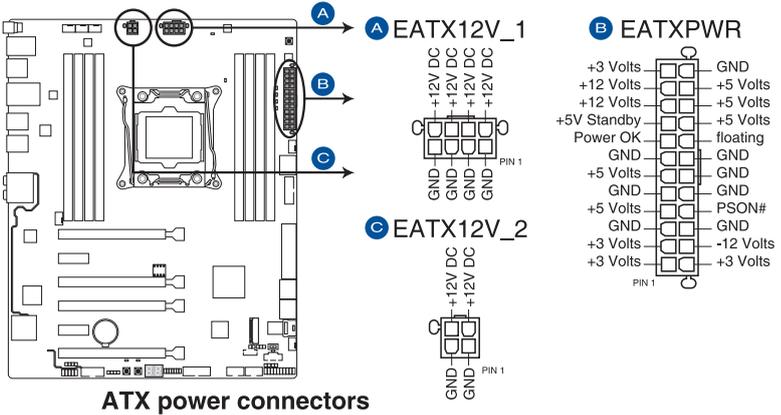
The FAN EXTENSION CARD is purchased separately.

7. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V_1; 4-pin EZTX12V_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.



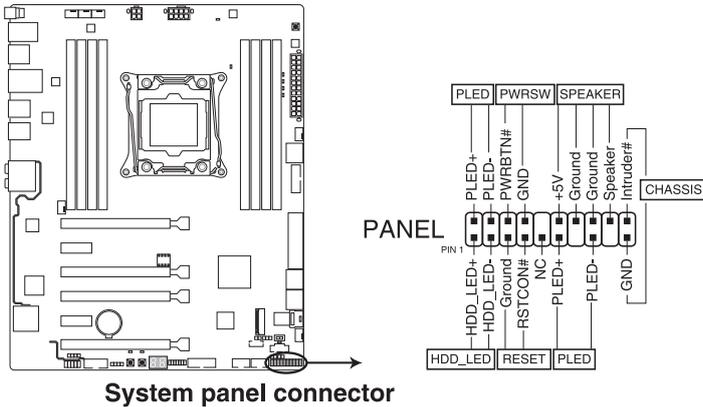
DO NOT forget to connect BOTH of the 4-pin and 8-pin EATX12 V power plug.



- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V 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.

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

This connector supports several chassis-mounted functions.



- **System power LED (4-pin PLED)**

This 2-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)**

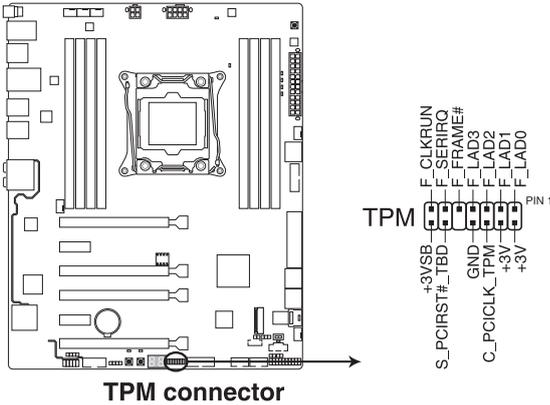
This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

- **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.

9. TPM connector (14-1 pin TPM)

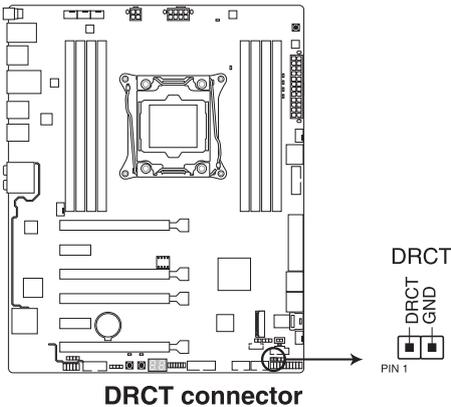
This connector supports a Trusted Platform Module (TPM) system, which securely stores keys, digital certificates, passwords and data. A TPM system also helps enhance network security, protect digital identities, and ensures platform integrity.



The TPM module is purchased separately.

10. DirectKey connector (2-pin DRCT)

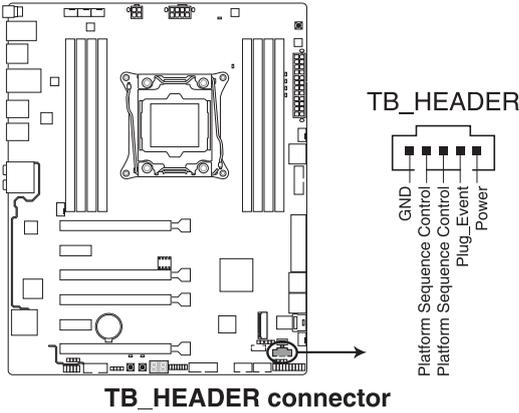
This connector is for the chassis-mounted button that supports the DirectKey function. Connect the button cable that supports DirectKey, from the chassis to this connector on the motherboard.



Ensure that your chassis comes with the extra button cable that supports the DirectKey feature. Refer to the technical documentation that came with the chassis for details.

11. Thunderbolt header (5-pin TB_HEADER)

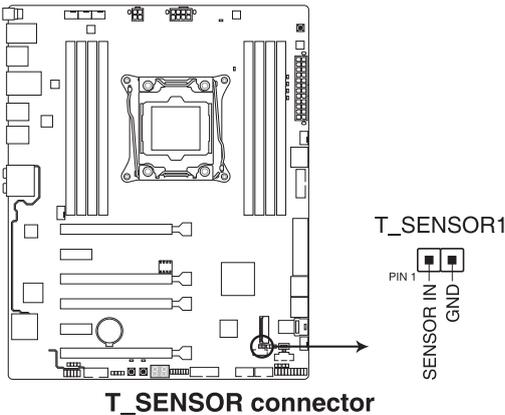
This connector is for the add-on Thunderbolt I/O card that supports Intel's Thunderbolt Technology, allowing you to connect up to six Thunderbolt-enabled devices and a DisplayPort-enabled display in a daisy-chain configuration.



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

12. T_Sensor connector (2-pin T_SENSOR1)

This connector is for the thermistor cable that allows you to monitor the temperature of your motherboard's critical components and connected devices.

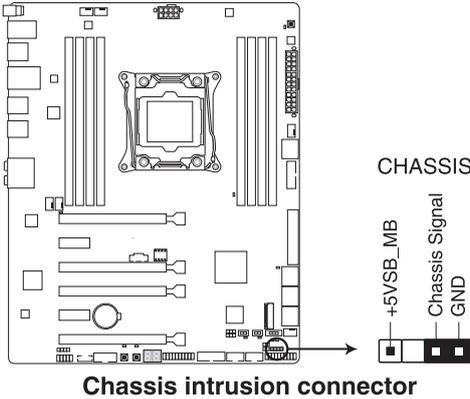


The thermistor cable is purchased separately.

13. Chassis intrusion connector (4-1 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 intrusion sensor is removed or replaced. The signal is then generated as a chassis intrusion event.

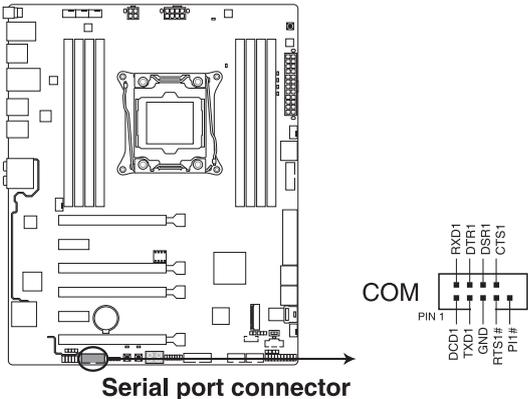
By default, the pin labeled “Chassis Signal” and “Ground” are shorted with a jumper cap. Remove the jumper caps and enable the related options in BIOS if you intend to use the chassis intrusion detection feature.



A message appears when you connect the sensor or switch at the first time or when you reconnect the sensor or switch to this connector. Reset the system to exit the message.

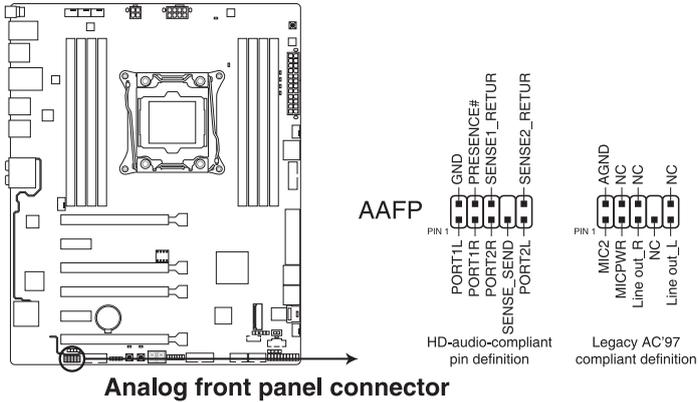
14. Serial port connector (10-1 pin COM)

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



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

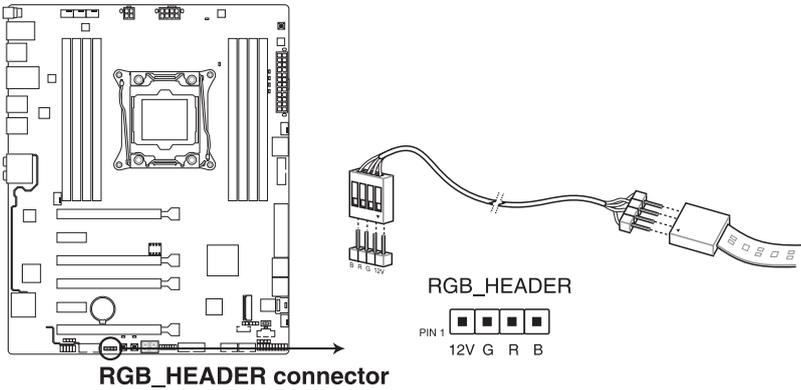
This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC'97 audio standard. Connect one end of the front panel audio I/O module cable to this connector.



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

16. Aura Strip Headers (4-pin RGB_HEADER)

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 meters.



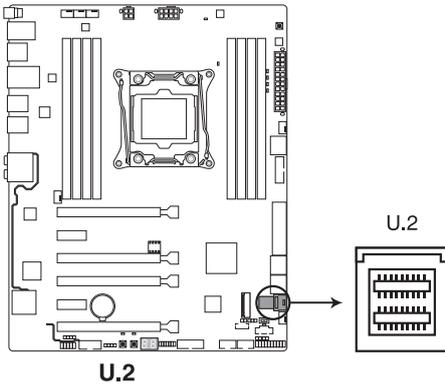
Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.



- 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. Make sure your LED stripe pins are in the exact order (12V/G/R/B), for more details, please contact your product vendor.

17. U.2 connector (U.2)

This motherboard comes with a U.2 connector which supports PCIe 3.0 x4 NVM Express storage.



NVM Express devices currently do not support BIOS S.M.A.R.T. information.

Basic Installation

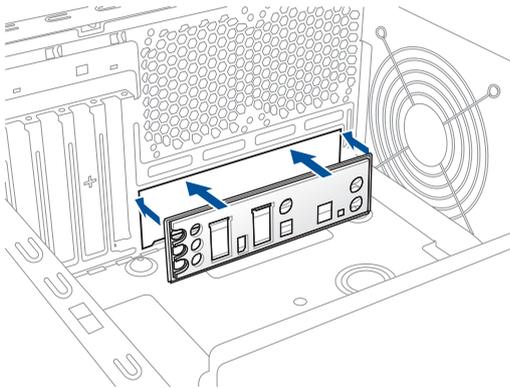
2.1 Building your PC system

2.1.1 Motherboard installation

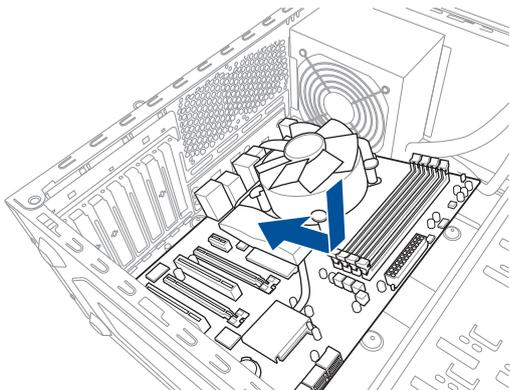


The diagrams in this section are for reference only. The motherboard layout may vary with models, but the installation steps are the same for all models.

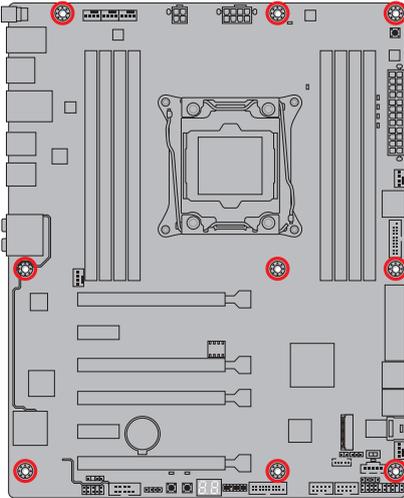
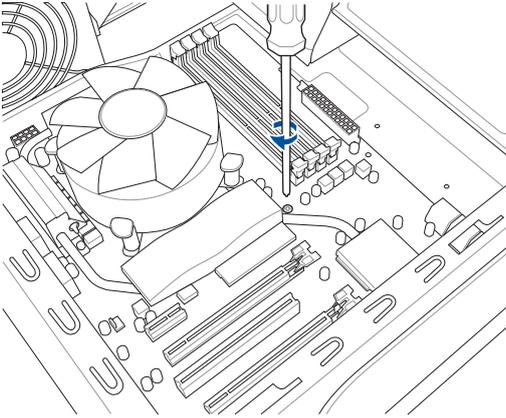
1. Install the Q-Shield to the chassis rear I/O panel.



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 (9) screws into the holes indicated by circles to secure the motherboard to the chassis.



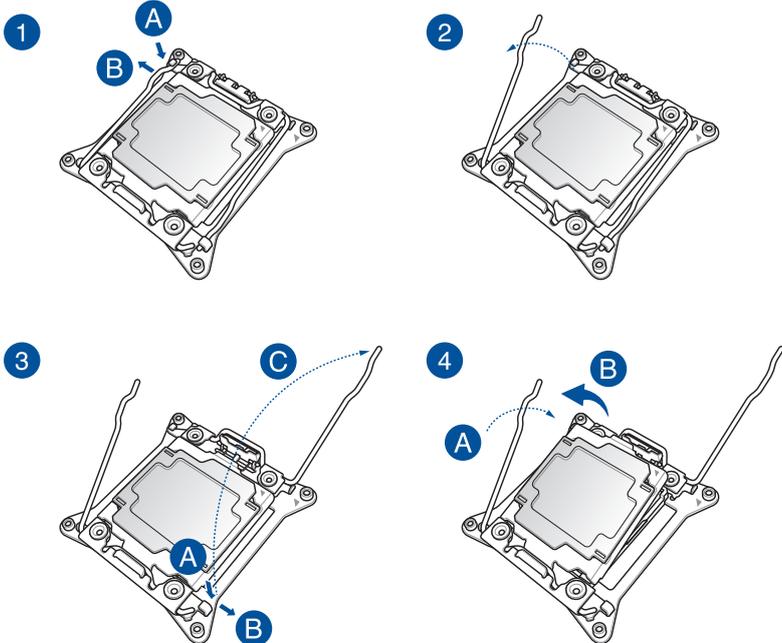
DO NOT overtighten the screws! Doing so can damage the motherboard.

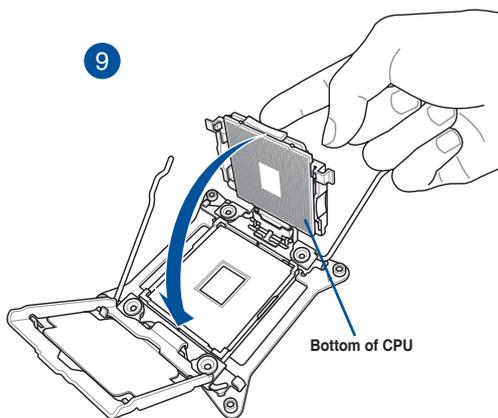
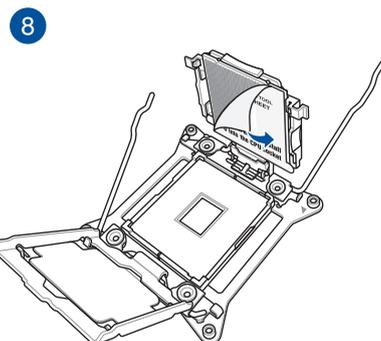
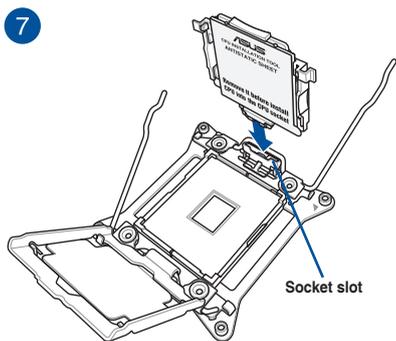
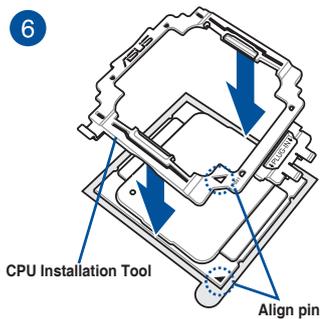
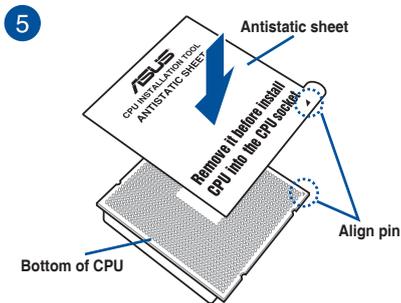
2.1.2 CPU installation



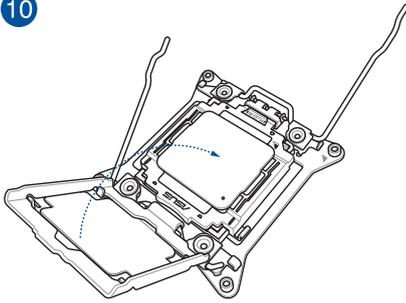
- Please note the order in opening/ closing the double latch. Follow the instructions printed on the metal sealing hatch or the illustrations shown below in this manual. The plastic cap will pop up automatically once the CPU is in place and the hatch properly sealed down.
- The illustrations are for reference only.
- The CPU Installation Tool is only compatible on motherboards with an Intel® LGA2011-3 socket.
- Ensure that the CPU is firmly clicked into place before installing it into the CPU socket or socket slot.
- 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.
- will not cover damages resulting from incorrect CPU installation/removal, incorrect CPU orientation/placement, or other damages resulting from negligence by the user.

Installing CPU

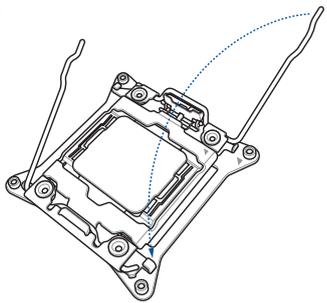




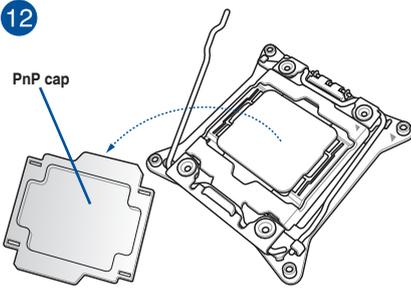
10



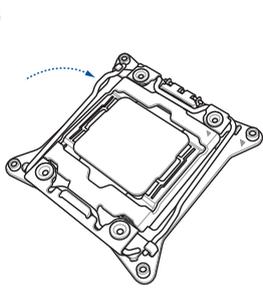
11



12

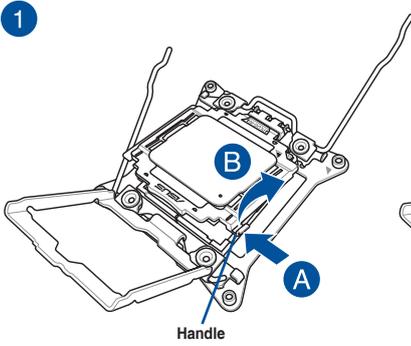


13

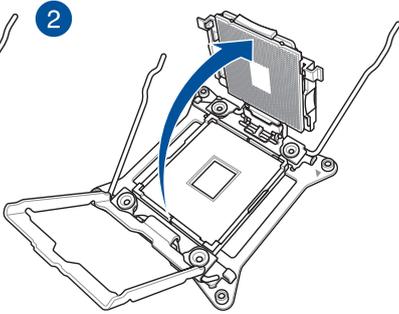


Removing CPU

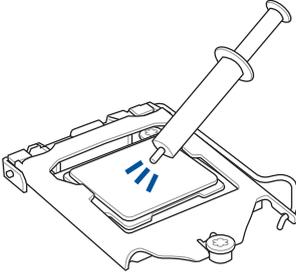
1



2

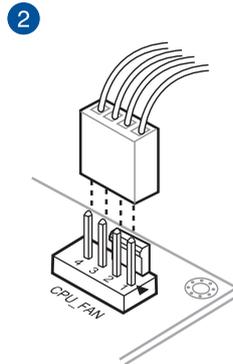
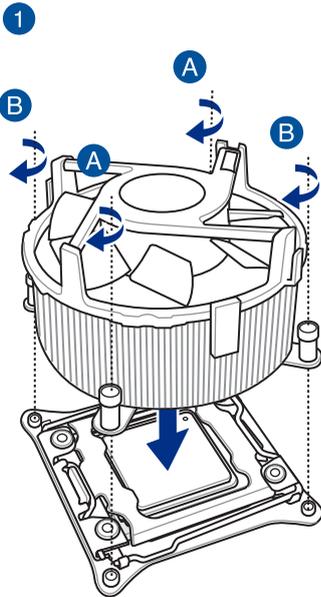


2.1.3 CPU heatsink and fan assembly installation

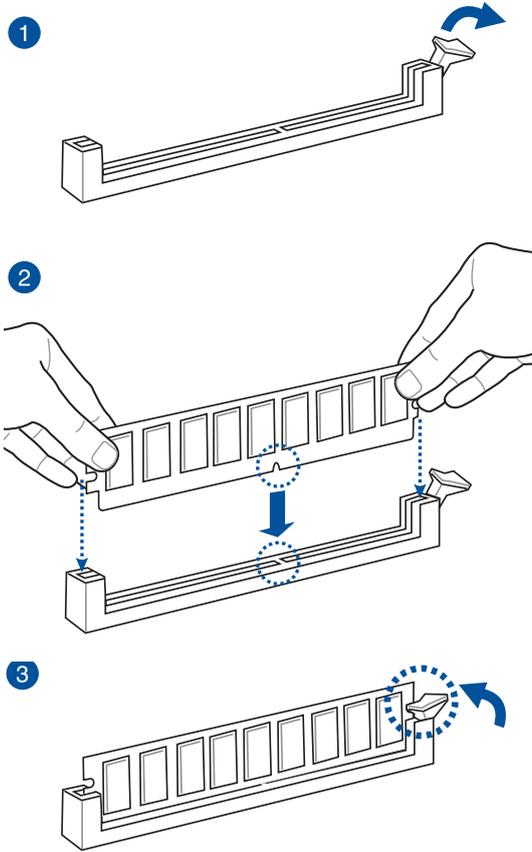


Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan, if necessary.

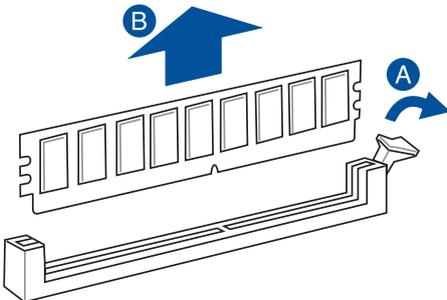
To install the CPU heatsink and fan assembly



2.1.4 DIMM installation

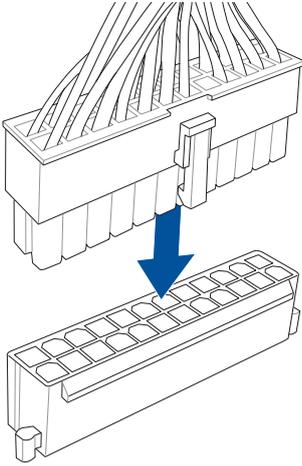


To remove a DIMM

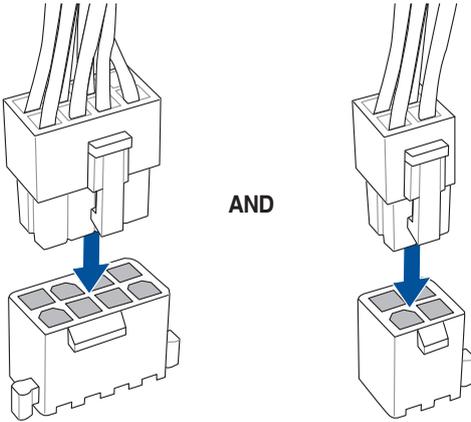


2.1.5 ATX Power connection

1

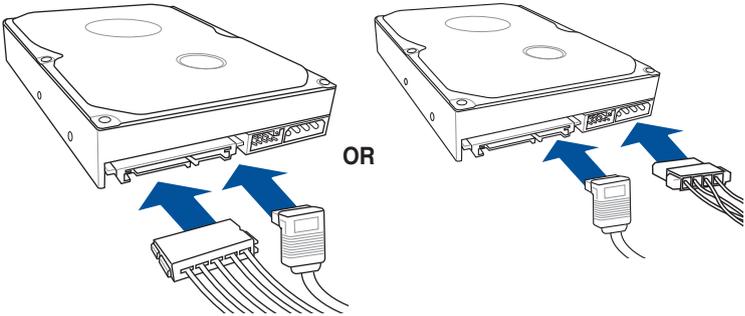


2

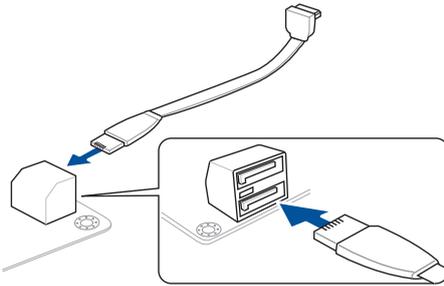


2.1.6 SATA device connection

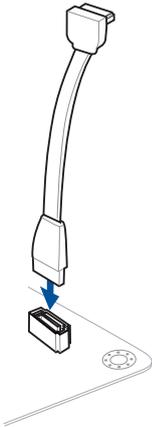
1



2

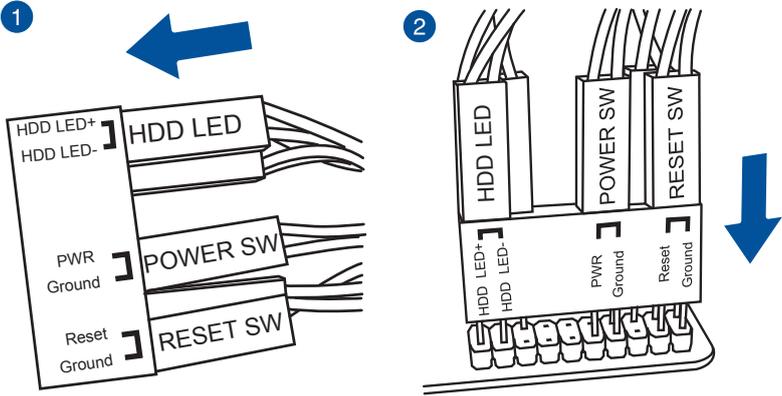


OR

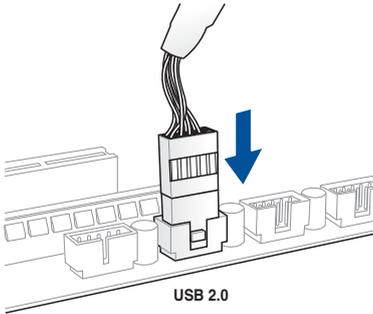


2.1.7 Front I/O Connector

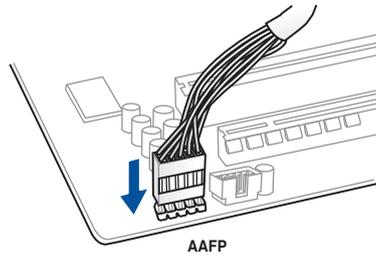
To install Q-Connector



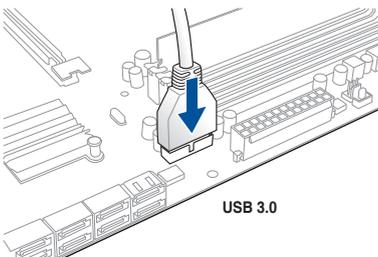
To install USB 2.0 connector



To install front panel audio connector

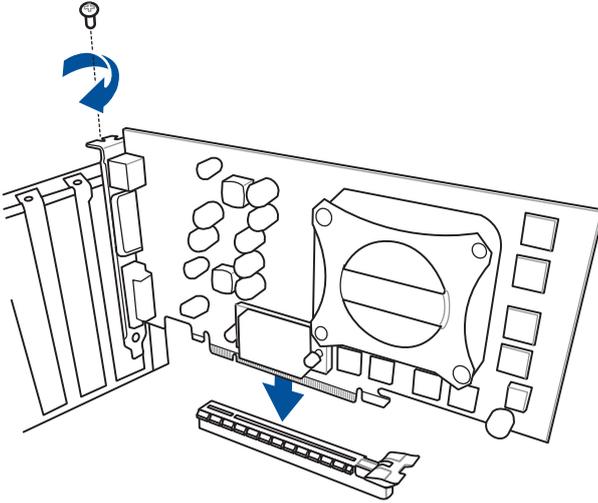


To install USB 3.0 connector

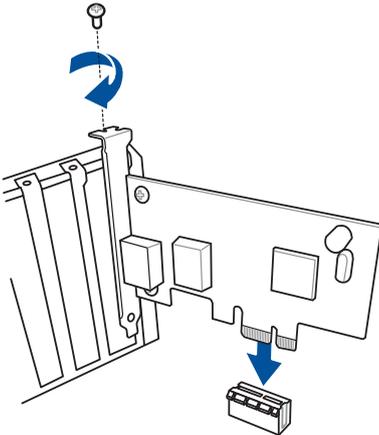


2.1.8 Expansion Card installation

To install PCIe x16 cards



To install PCIe x1 cards



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.

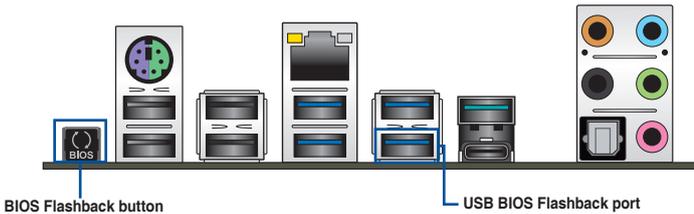
To use USB BIOS Flashback:

1. Place the bundled support DVD to the optical drive and install the USB BIOS Flashback Wizard. Follow the onscreen instructions to complete the installation.
2. Insert the 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.

3. Launch the USB BIOS Flashback Wizard to automatically download the latest BIOS version.
4. Shut down your computer.
5. Press the BIOS Flashback button for three seconds until the Flashback LED begins to blink, indicating that the BIOS Flashback function is enabled, then release.



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



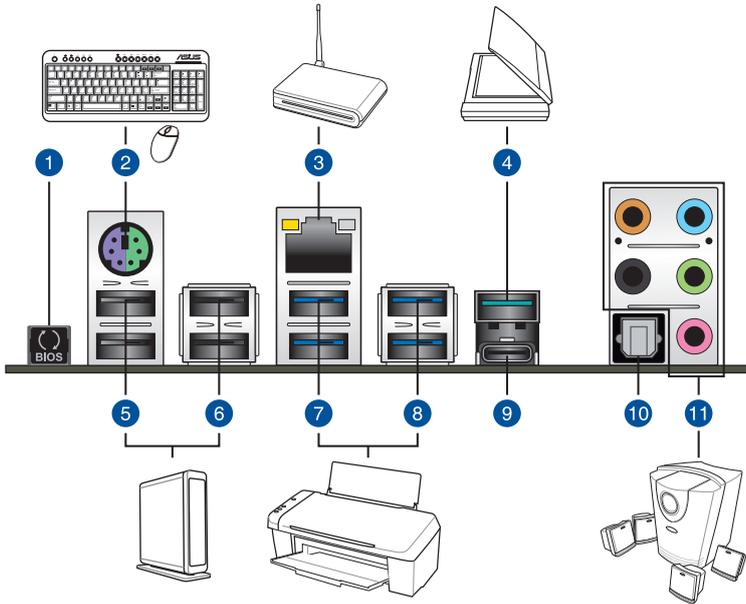
For more BIOS update utilities in BIOS setup, refer to the section **3.11 Updating BIOS** in Chapter 3.



- 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	7. USB 3.0 ports E34 (Supports USB 3.0 Boost)
2. PS/2 keyboard/mouse port	8. USB 3.0 ports E2_5 (Bottom port supports USB BIOS Flashback)
3. Intel® LAN port	9. USB 3.1 port EC1 (supports USB 3.1 Boost)
4. USB 3.1 port EA2	10. Optical S/PDIF Out port
5. USB 2.0 ports 78	11. Audio I/O ports**
6. USB 2.0 ports 910	

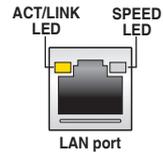
* and **: Refer to the tables on the next page for LAN port LEDs and audio port definitions.



- The plugged USB 3.0 device may run on xHCI mode or EHCI mode, depending on the operating system's setting.
- USB 3.0 devices can only be used as data storage only.
- We strongly recommend that you connect USB 3.0 devices to USB 3.0 ports for faster and better performance for your USB 3.0 devices.
- Due to the design of the Intel® X99 series chipset, all USB devices connected to the USB 2.0 and USB 3.0 ports are controlled by the xHCI controller. Some legacy USB devices must update their firmware for better compatibility.

* 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 LAN port's LEDs may continue to blink even when disabled.

** Audio 2.1, 4.1, 5.1 or 7.1-channel configuration

Port	Headset 2.1-channel	4.1-channel	5.1-channel	7.1-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