ASRock

WRX90 WS EVO

User Manual

Contact Information

If you need to contact ASRock or want to know more about ASRock, you're welcome to visit ASRock's website at http://www.asrock.com; or you may contact your dealer for further information. For technical questions, please submit a support request form at https://event.asrock.com/tsd.asp

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Chapter 1 Introduction

Thank you for purchasing ASRock WRX90 WS EVO motherboard, a reliable motherboard produced under ASRock's consistently stringent quality control. It delivers excellent performance with robust design conforming to ASRock's commitment to quality and endurance.

Because the motherboard specifications and the BIOS software might be updated, the content of this documentation will be subject to change without notice. In case any modifications of this documentation occur, the updated version will be available on ASRock's website without further notice. If you require technical support related to this motherboard, please visit our website for specific information about the model you are using. You may find the latest VGA cards and CPU support list on ASRock's website as well. ASRock website http://www.asrock.com.

1.1 Package Contents

- ASRock WRX90 WS EVO Motherboard (EEB Form Factor)
- ASRock WRX90 WS EVO User Manual
- 4 x Serial ATA (SATA) Data Cables (Optional)
- 1 x I/O Panel Shield
- 2 x Thermistor Cables (Optional)
- 1 x Multi PSU Adaptor Cable (Optional)
- 2 x Screws for M.2 Sockets (Optional)
- 2 x Standoffs for M.2 Sockets (Optional)

1.2 Specifications

Platform	• EEB Form Factor • 14 Layer PCB • 2oz Copper PCB
CPU	• Supports AMD Ryzen™ Threadripper™ PRO Processors • Supports AMD Socket sTR5 • Supports ASRock Hyper BCLK Engine
Chipset	• AMD WRX90
Memory	• Eight Channel DDR5 Memory Technology • 8 x DDR5 DIMM Slots* • Supports DDR5 ECC, buffered memory (RDIMM/ RDIMM-3DS) up to 7600+(OC)** • Max. capacity of system memory: 2TB * S3 (Sleep) mode is supported only when 1 / 2 / 4 DIMMs memory modules are installed. ** Please refer to Memory Support List on ASRock's website for more information. (http://www.asrock.com/)
Expansion Slot	CPU: • 7 x PCIe 5.0 x16 Slots (PCIE1/PCIE2/PCIE3/PCIE4/PCIE5/PCIE7 at x16; PCIE6 at x8)* * Supports NVMe SSD as boot disks • 15μ Gold Contact in VGA PCIe Slots
Graphics	• Aspeed® AST2600 BMC Controller • 1 x DisplayPort 1.1a with max. resolution up to 1920x1200 @ 60Hz* * DisplayPort 1.1a does not support audio function.
Audio	• 7.1 CH HD Audio with Content Protection (Realtek ALC1220 Audio Codec) • Impedance Sensing on Rear Out port • Individual PCB Layers for R/L Audio Channel • Nahimic Audio

LAN	**2 x 10 Gigabit LAN 100/1000/2500/5000/10000 Mb/s (Intel® X710-AT2)** • Support PXE **1 x Dedicated IPMI (Realtek RTL8211F)**
USB	CPU: • 2 x USB4 Type-C (Rear) • 4 x USB 3.2 Gen2 Type-A (Rear) Chipset: • 1 x USB 3.2 Gen2x2 Type-C (Front) • 4 x USB 3.2 Gen1 Type-A (2 Rear, 2 Front) • 4 x USB 2.0 (Front) * All USB ports support ESD Protection
Rear Panel I/O	• 1 x DisplayPort 1.1a • 1 x Optical SPDIF Out Port • 2 x USB4 Type-C Ports (40 Gb/s)* • 4 x USB 3.2 Gen2 Type-A Ports (10 Gb/s) • 2 x USB 3.2 Gen1 Type-A Ports • 2 x RJ-45 LAN Ports • 1 x RJ45 Dedicated IPMI LAN Port • 1 x Line Out Jack (Gold Audio Jack) • 1 x Microphone Input Jack (Gold Audio Jack) * USB_TC1 supports USB PD 3.0 up to 9V@3A (27W) / 5V@3A (15W) charging; USB_TC2 supports USB PD 3.0 up to 5V@3A (15W) charging.
Storage	CPU: • 1 x Blazing M.2 Socket (M2_1, Key M), supports type 2260/2280/22110 PCIe Gen5x4 (128 Gb/s) mode* • 2 x MCIO Connectors (PCIe Gen5x4 or 4 x SATA3 6.0 Gb/s) • 1 x SlimSAS SFF-8654 Connector (SLIM1) (PCIe Gen4x4 or 4 x SATA3 6.0 Gb/s) Chipset: • 1 x Hyper M.2 Socket (M2_2, Key M), supports type 2260/2280 PCIe Gen4x4 (64 Gb/s) mode* • 1 x SlimSAS SFF-8654 Connector (SLIM2) (PCIe Gen4x4) • 4 x SATA3 6.0 Gb/s Connectors * Supports NVMe SSD as boot disks

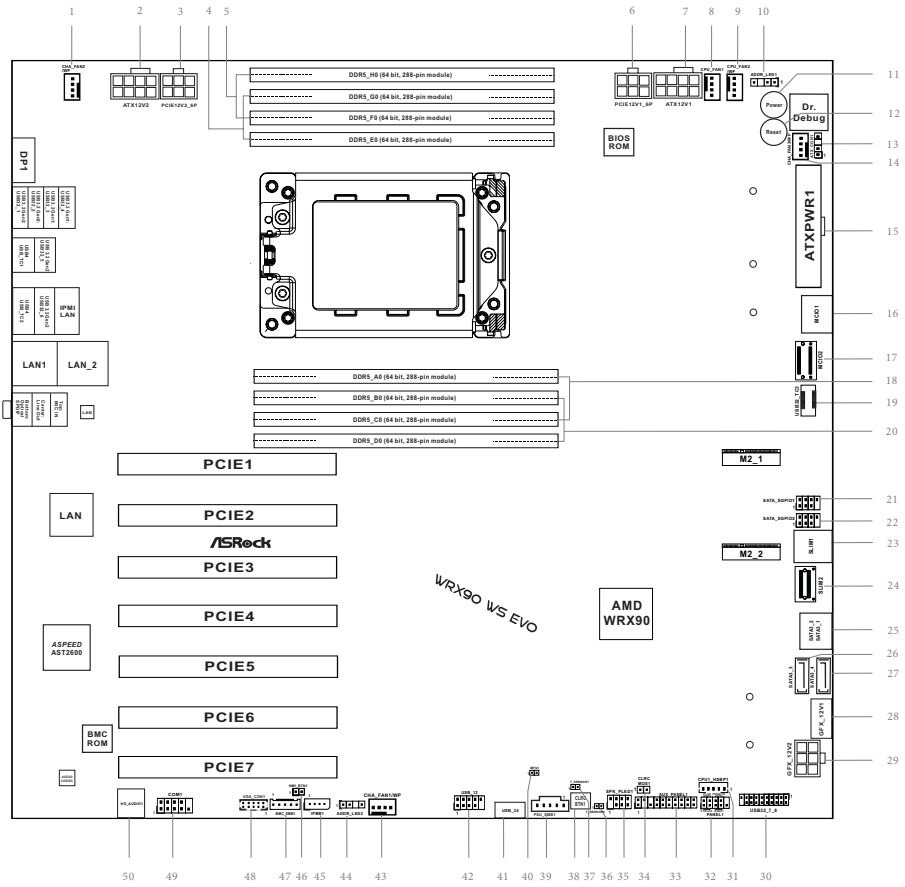
RAID	• Supports RAID 0, RAID 1 and RAID 10 for SATA storage devices • Supports RAID 0, RAID 1 and RAID 10 for M.2 NVMe storage devices* * Requires additional M.2 NVMe expansion cards to support RAID 10
Connector	• 2 x Thermistor Cable Headers • 1 x Front VGA Header • 1 x COM Port Header • 1 x Power LED and Speaker Header • 1 x Intelligent Platform Management Bus Header • 1 x PSU SMBus Header • 1 x BMC SMBus Header • 1 x Auxiliary Panel Header • 2 x Addressable LED Headers* • 1 x CPU Fan Connector (4-pin)** • 1 x CPU/Water Pump Fan Connector (4-pin) (Smart Fan Speed Control)*** • 3 x Chassis/Water Pump Fan Connectors (4-pin) (Smart Fan Speed Control)**** • 1 x 24 pin ATX Power Connector (Hi-Density Power Connector) • 1 x 3 pin ATX Power Connector***** • 2 x 8 pin ATX 12V Power Connectors (Hi-Density Power Connector) (for Motherboard)****** • 2 x 6 pin PCIe 12V Power Connectors (Hi-Density Power Connector) (for Motherboard)****** • 2 x 6 pin Graphics 12V Power Connectors (Hi-Density Power Connector) (for PCIe card)******* • 1 x Right Angle Front Panel Audio Connector • 2 x USB 2.0 Headers (Support 4 USB 2.0 ports) • 1 x USB 3.2 Gen1 Header (Supports 2 USB 3.2 Gen1 ports) • 1 x Front Panel Type C USB 3.2 Gen2x2 Header (20 Gb/s) • 2 x SGPIO Headers • 1 x CPU HP-SMBus Connector • 1 x Non Maskable Interrupt Button Header • 1 x Dr. Debug with LED

	• 1 x Power Button with LED • 1 x Reset Button with LED • 1 x Clear CMOS Button * Support in total up to 5V/3A, 15W LED Strip ** CPU_FAN1 supports the fan power up to 1A (12W). *** CPU_FAN2/WP supports the fan power up to 2A (24W). **** CHA_FAN1~3/WP support the fan power up to 2A (24W). ***** Plug the Multi PSU Adaptor Cable that comes with the package to ATX_CON1 if you use a secondary PSU. ****** It is required to connect both ATX12V1 and ATX12V2; otherwise, the system may not boot up properly. ****** It is required to connect all 8 pin and 6 pin 12V Power Connectors when overclocking. ******* It is required to connect 6 pin PCIE 12V power cables to either GFX_12V1 or GFX_12V2; otherwise, the system may not boot up properly.
BIOS Feature	• AMI UEFI Legal BIOS with GUI support
OS	• Microsoft® Windows® 11 64-bit
Certifications	• FCC, CE • ErP/EuP ready (ErP/EuP ready power supply is required) • CEC Tier II ready

** For detailed product information, please visit our website: http://www.asrock.com*

Please realize that there is a certain risk involved with overclocking, including adjusting the setting in the BIOS, applying Untied Overclocking Technology, or using third-party overclocking tools. Overclocking may affect your system's stability, or even cause damage to the components and devices of your system. It should be done at your own risk and expense. We are not responsible for possible damage caused by overclocking.

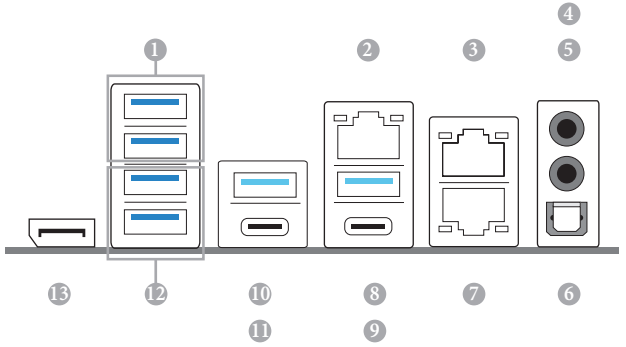
1.3 Motherboard Layout



No.	Description
1	Chassis/Water Pump Fan Connector (CHA_FAN2/WP)
2	8 pin ATX 12V Power Connector (ATX12V2)
3	6 pin PCIe 12V Power Connector (PCIE12V2_6P)
4	2 x 288-pin DDR5 DIMM Slots (DDR5_G0, DDR5_E0)
5	2 x 288-pin DDR5 DIMM Slots (DDR5_H0, DDR5_F0)
6	6 pin PCIe 12V Power Connector (PCIE12V1_6P)
7	8 pin ATX 12V Power Connector (ATX12V1)
8	CPU Fan Connector (CPU_FAN1)
9	CPU/Water Pump Fan Connector (CPU_FAN2/WP)
10	Addressable LED Header (ADDR_LED1)
11	Power Button (PWRBTN1)
12	Reset Button (RSTBTN1)
13	3 pin ATX Power Connector Connector (ATX_CON1)
14	Chassis/Water Pump Fan Connector (CHA_FAN3/WP)
15	ATX Power Connector (ATXPWR1)
16	Mini Cool Edge IO Connector (MCIO1)
17	Mini Cool Edge IO Connector (MCIO2)
18	2 x 288-pin DDR5 DIMM Slots (DDR5_A0, DDR5_C0)
19	Front Panel Type C USB 3.2 Gen2x2 Header (USB32_TC3)
20	2 x 288-pin DDR5 DIMM Slots (DDR5_B0, DDR5_D0)
21	SATA SGPIO Connector (SATA_SGPIO1)
22	SATA SGPIO Connector (SATA_SGPIO2)
23	SlimSAS Connector (SLIM1)
24	SlimSAS Connector (SLIM2)
25	SATA3 Connectors (SATA3_2)(Upper), (SATA3_1)(Lower)
26	SATA3 Connector (SATA3_3)
27	SATA3 Connector (SATA3_4)
28	6 pin Graphics 12V Power Connector (GFX_12V1)
29	6 pin Graphics 12V Power Connector (GFX_12V2)
30	USB 3.2 Gen1 Header (USB32_7_8)
31	Backplane PCI Express Hot-Plug Connector (CPU1_HSBP1)
32	System Panel Header (PANEL1)
33	Auxiliary Panel Header (AUX_PANEL1)

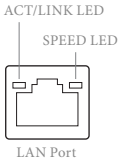
No.	Description
34	Clear CMOS Jumper (CLRCMOS1)
35	Power LED and Speaker Header (SPK_PLED1)
36	Thermistor Cable Header (T_SENSOR2)
37	Thermistor Cable Header (T_SENSOR1)
38	Clear CMOS Button (CLRCBTN1)
39	PSU SMBus Header (PSU_SMB1)
40	Manufacturing Mode Jumper (MFG1)
41	USB 2.0 Header (USB_34)
42	USB 2.0 Header (USB_12)
43	Chassis/Water Pump Fan Connector (CHA_FAN1/WP)
44	Addressable LED Header (ADDR_LED2)
45	Intelligent Platform Management Bus Header (IPMB1)
46	Non Maskable Interrupt Button (NMI_BTN1)
47	BMC SMBus Header (BMC_SMB1)
48	VGA Header (VGA_CON1)
49	COM Port Header (COM1)
50	Front Panel Audio Header (HD_AUDIO1)

1.4 I/O Panel



No.	Description	No.	Description
1	USB 3.2 Gen1 Type-A Ports (USB32_34)	8	USB 3.2 Gen2 Type-A Port (USB32_6)
2	LAN RJ-45 Port (IPMI_LAN)*	9	USB4 Type-C Port (USB_TC2)
3	10G LAN RJ-45 Port (LAN_2)**	10	USB 3.2 Gen2 Type-A Port (USB32_5)
4	Microphone Input Jack***	11	USB4 Type-C Port (USB_TC1)****
5	Line Out Jack***	12	USB 3.2 Gen2 Type-A Ports (USB32_12)
6	Optical SPDIF Out Port	13	DisplayPort 1.1a
7	10G LAN RJ-45 Port (LAN1)**		

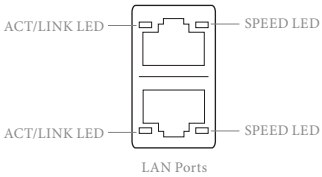
** There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.*



Dedicated IPMI LAN Port LED Indications

Activity / Link LED		Speed LED	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	10M bps connection or no link
Blinking Yellow	Data Activity	Yellow	100M bps connection
On	Link	Green	1G bps connection

***There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.*



10G LAN Port (LAN1, LAN_2) LED Indications

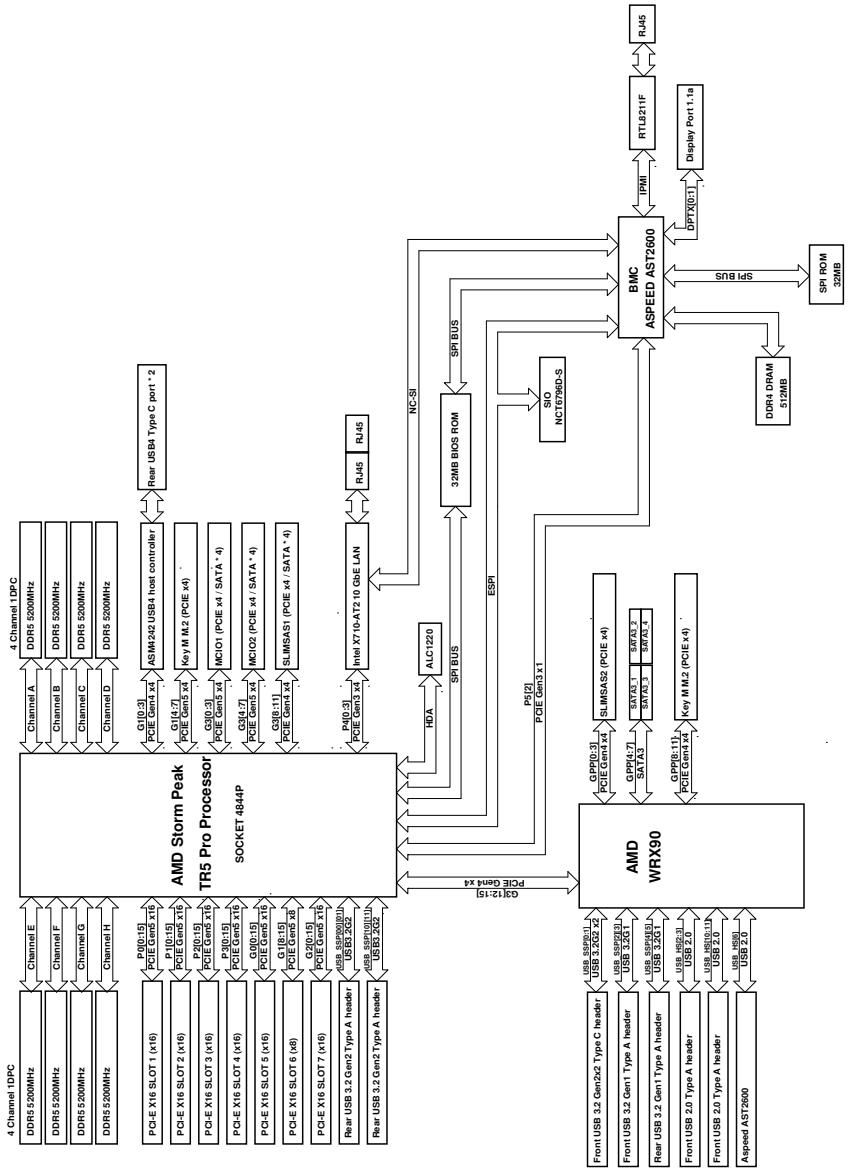
Activity / Link LED		Speed LED	
Status	**Description**	**Status**	**Description**
Off	No Link	Off	100Mbps connection or no link
Blinking Green	Data Activity	Yellow	5Gbps/2.5Gbps/1Gbps connection
On	Link	Green	10Gbps connection

*** ***Function of the Audio Ports in 2, 4, 5.1 or 7.1-channel Configuration***:

Channel	Port	Function
2ch	Line Out Jack (Rear Panel)	Front speaker out
4ch	Pink-Mic (Front Panel)	Rear speaker out
5.1ch	Microphone Input Jack (Rear Panel)	Central/Subwoofer speaker out
7.1ch	Lime-Headphone (Front Panel)	Side Speaker out

***** USB_TC1 supports USB PD 3.0 up to 9V@3A (27W) / 5V@3A (15W) charging; USB_TC2 supports USB PD 3.0 up to 5V@3A (15W) charging.*

1.5 Block Diagram



Chapter 2 Installation

This is an EEB form factor motherboard. Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.

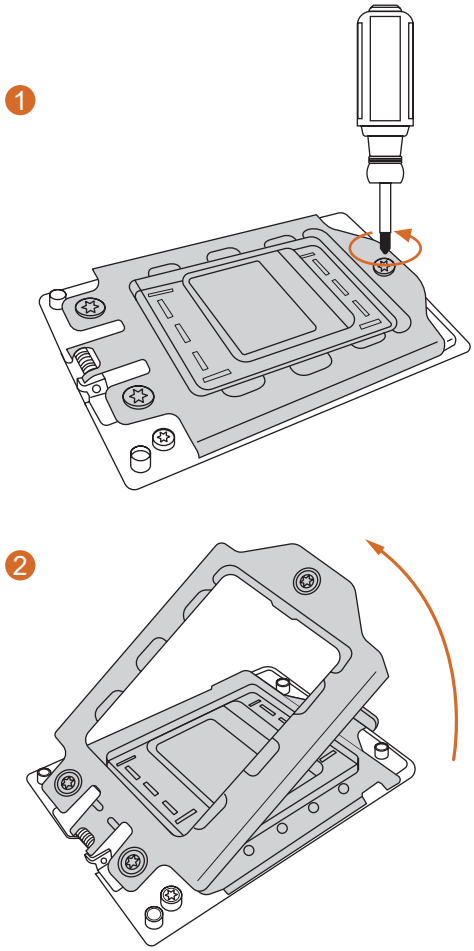
Pre-installation Precautions

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

- Make sure to unplug the power cord before installing or removing the motherboard components. Failure to do so may cause physical injuries and damages to motherboard components.
- In order to avoid damage from static electricity to the motherboard's components, NEVER place your motherboard directly on a carpet. Also remember to use a grounded wrist strap or touch a safety grounded object before you handle the components.
- Hold components by the edges and do not touch the ICs.
- Whenever you uninstall any components, place them on a grounded anti-static pad or in the bag that comes with the components.
- When placing screws to secure the motherboard to the chassis, please do not over-tighten the screws! Doing so may damage the motherboard.

2.1 Installing the CPU

Unplug all power cables before installing the CPU.



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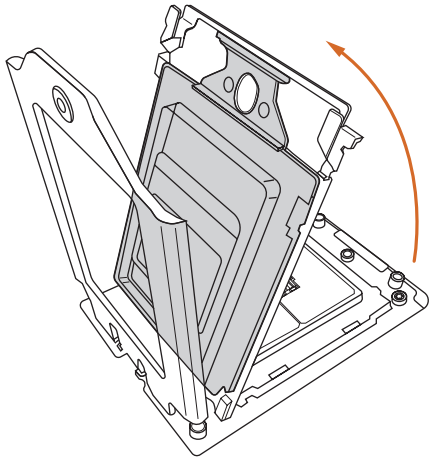

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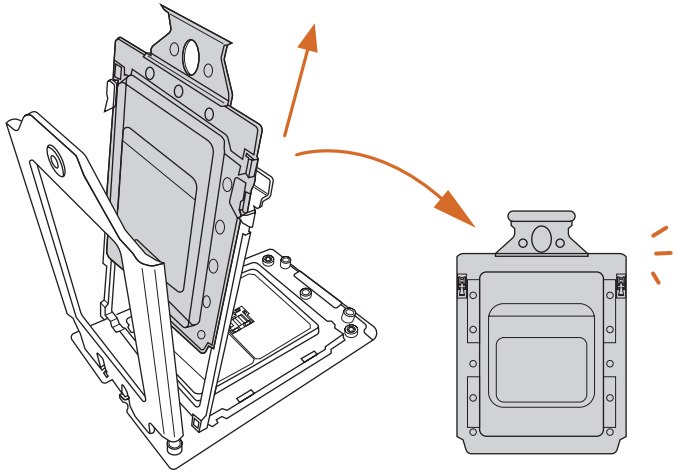

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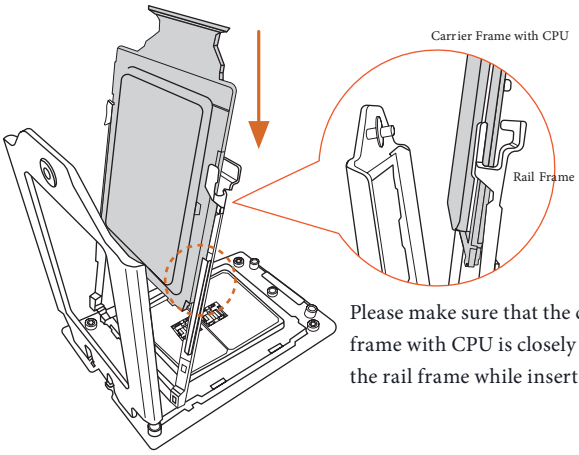
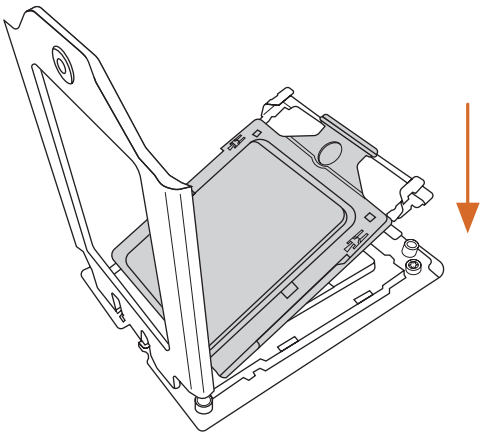


Please make sure that the carrier frame with CPU is closely attached to the rail frame while inserting it.

⚠

Install the orange carrier frame with CPU. Don't separate them.

6



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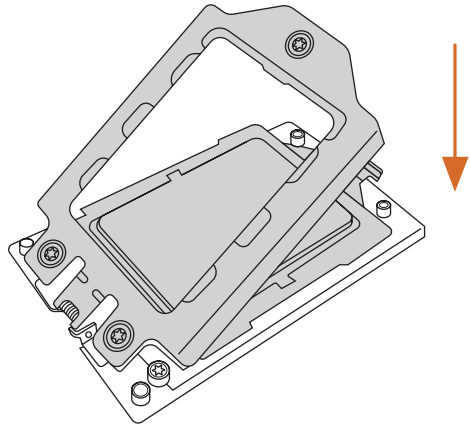

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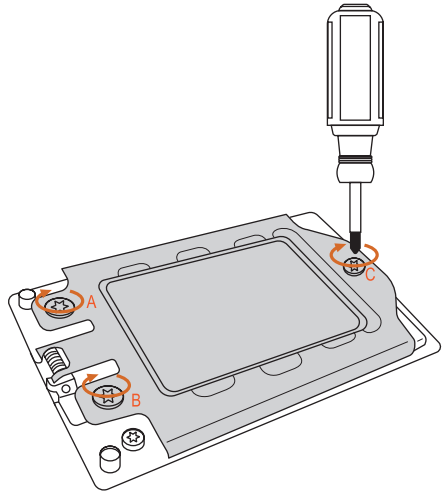
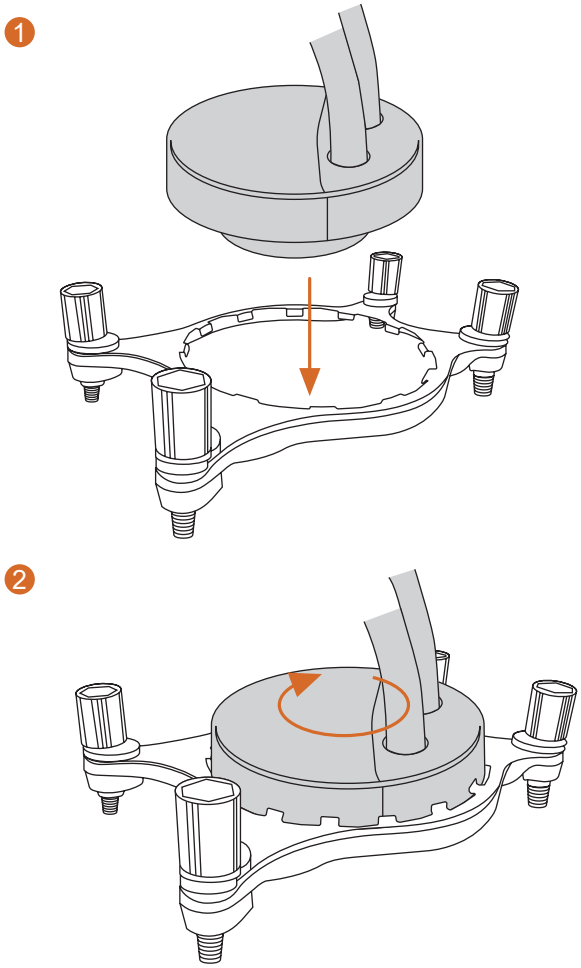


2.2 Installing the CPU Liquid Cooler

After you install the CPU into this motherboard, it is necessary to install a larger heatsink and cooling fan to dissipate heat. You also need to spray thermal grease between the CPU and the heatsink to improve heat dissipation. Make sure that the CPU and the heatsink are securely fastened and in good contact with each other.

Please turn off the power or remove the power cord before changing a CPU or heatsink.



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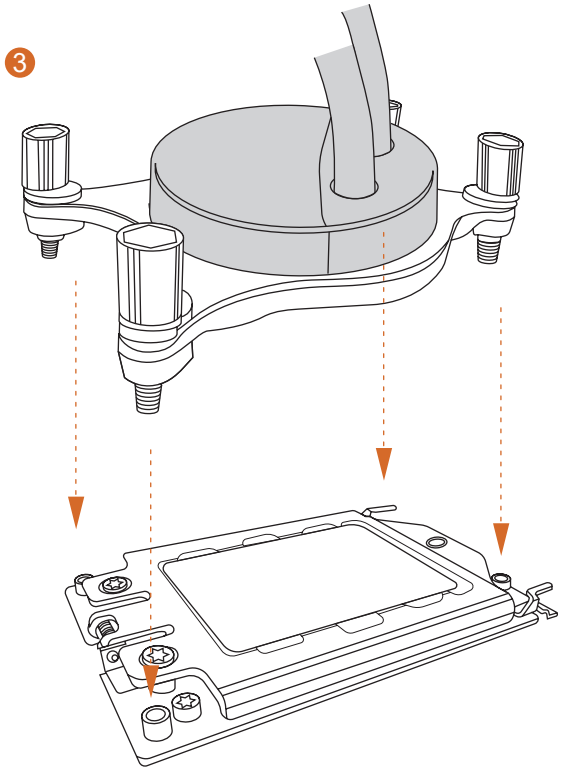

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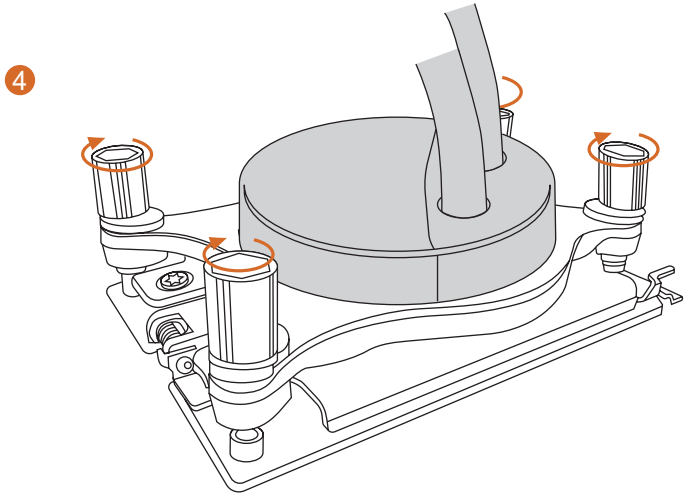


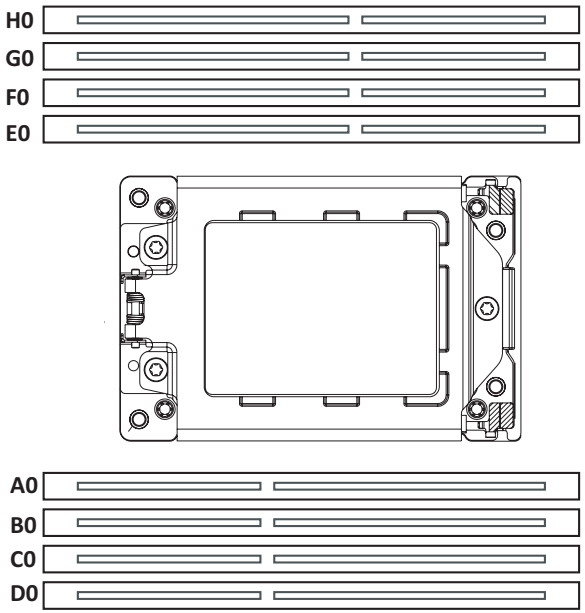
2.3 Installation of Memory Modules (DIMM)

This motherboard provides eight 288-pin DDR5 (Double Data Rate 5) DIMM slots, and supports Eight Channel Memory Technology.

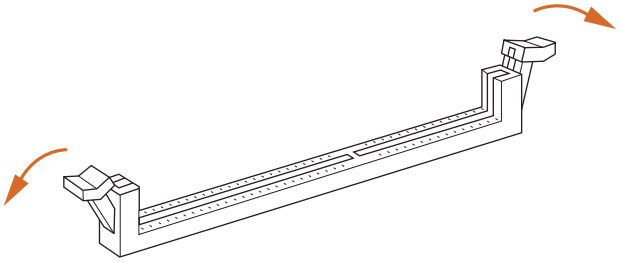
1. *It is not allowed to install a DDR, DDR2 , DDR3 or DDR4 memory module into a DDR5 slot; otherwise, this motherboard and DIMM may be damaged.*
2. *For eight channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR5 DIMM pairs.*
3. *The DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the DIMM if you force the DIMM into the slot at incorrect orientation.*

Recommended Memory Configuration

	A0	B0	C0	D0	E0	F0	G0	H0
1 DIMM	V							
2 DIMMS	V				V			
4 DIMMS	V		V		V		V	
8 DIMMS	V	V	V	V	V	V	V	V



1



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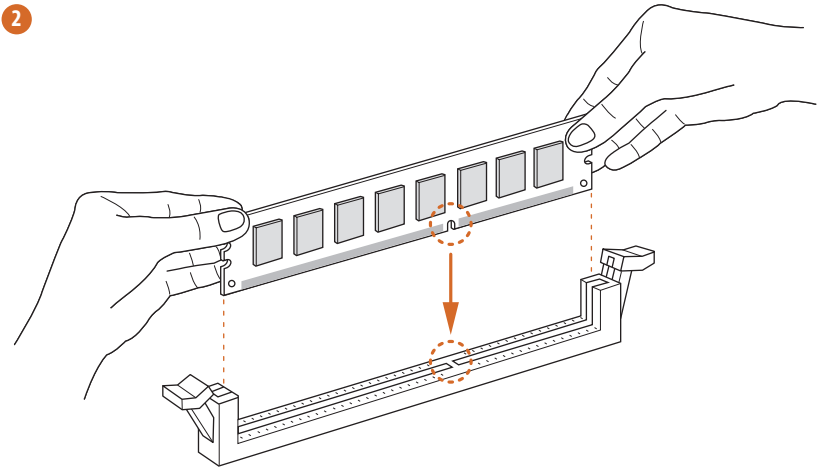

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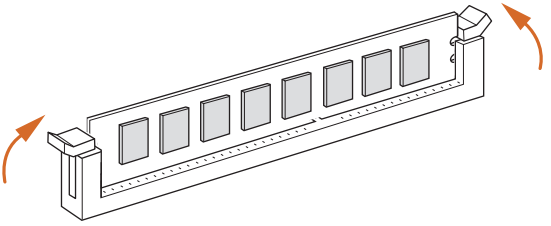
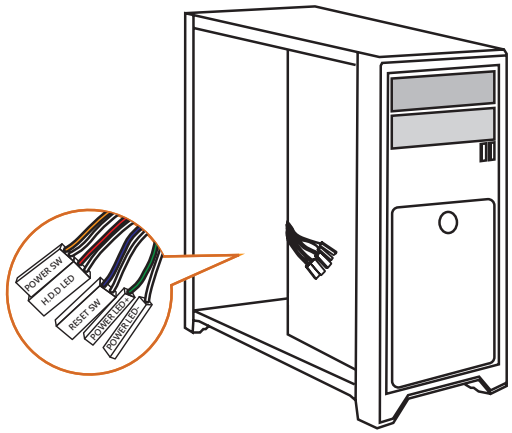


2.4 Connecting the Front Panel Header

1



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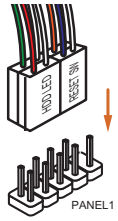
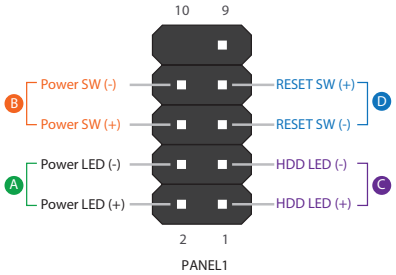
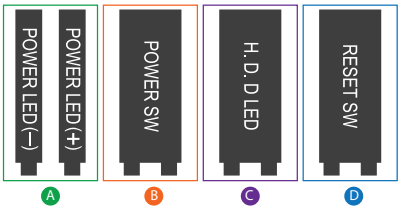


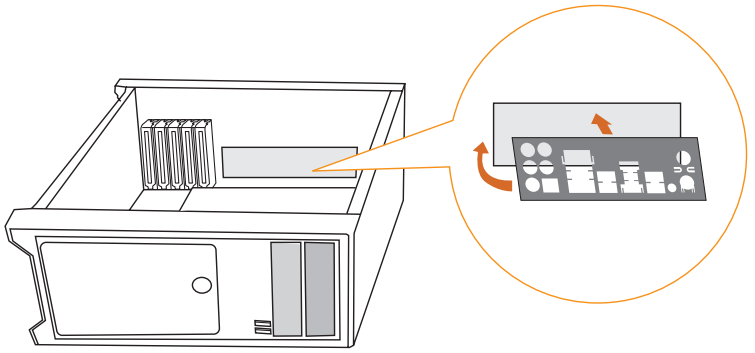
System Panel Header



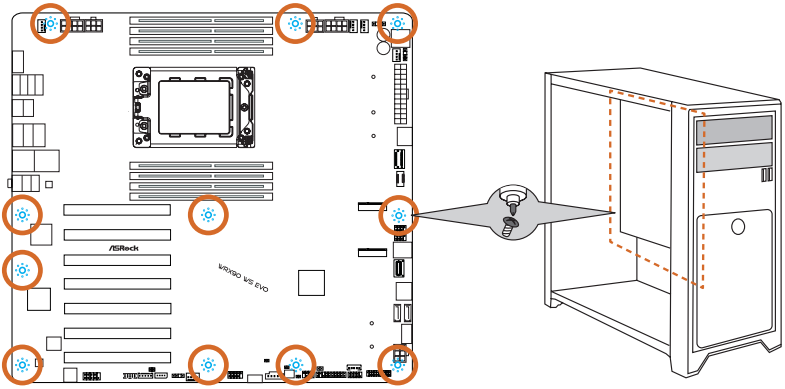
Front Panel Wires



2.5 Installing the I/O Panel Shield

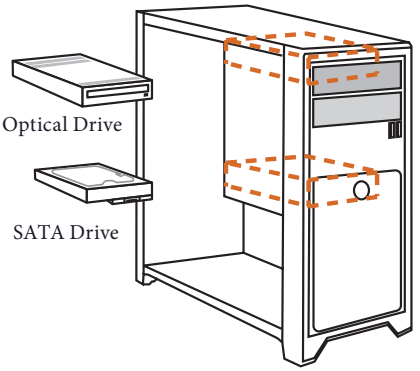


2.6 Installing the Motherboard

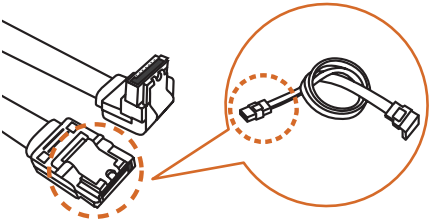


2.7 Installing SATA Drives

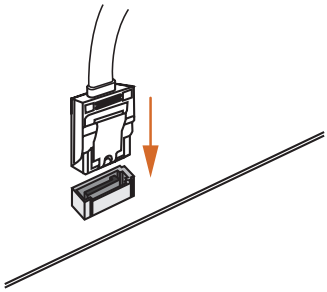
1



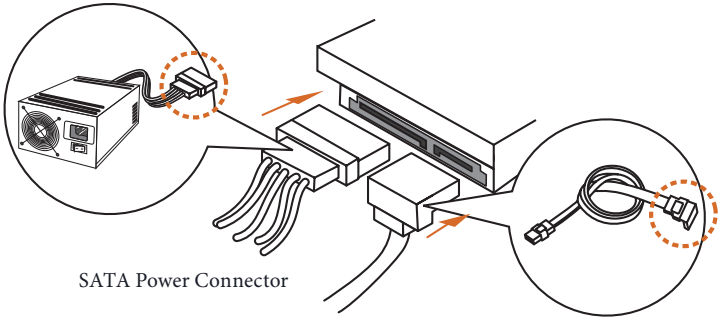
2



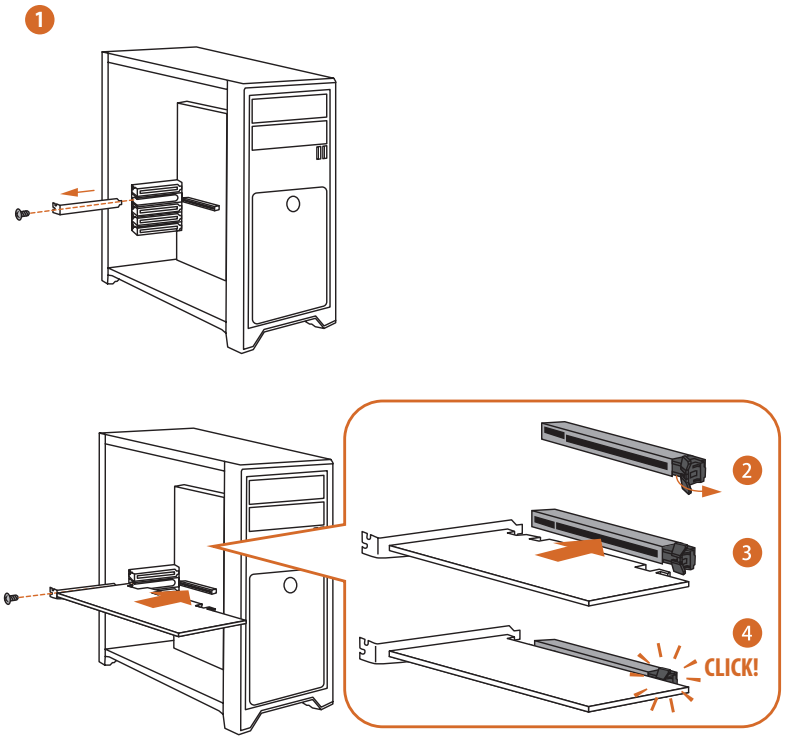
3



4



2.8 Installing a Graphics Card



Expansion Slots (PCIe Slots)

There are 7 PCI Express slots on the motherboard.

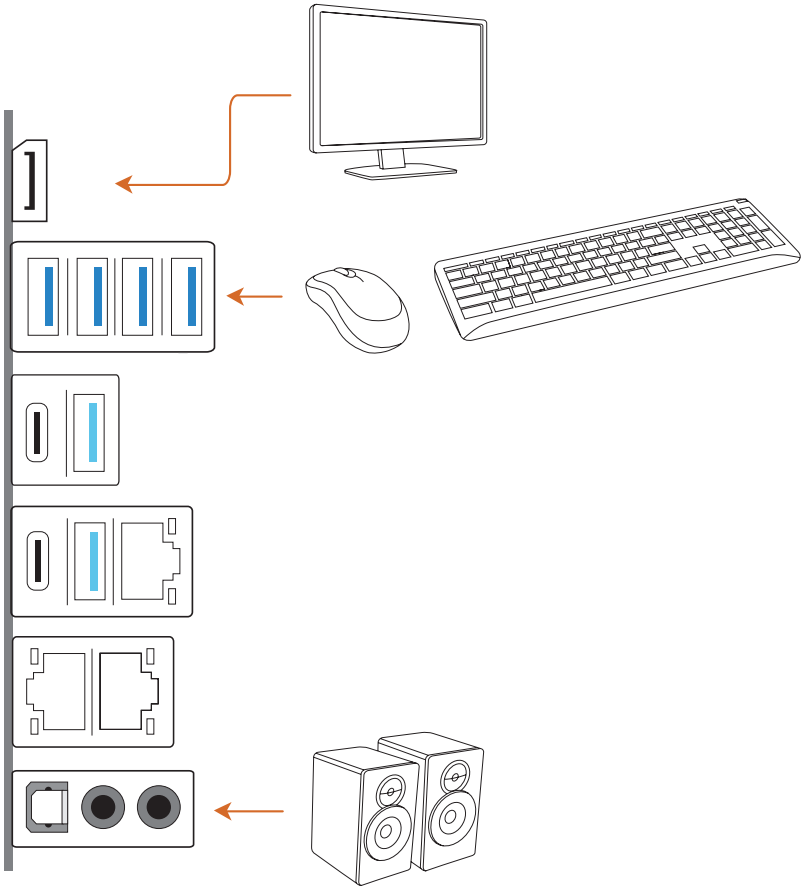
Before installing an expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before you start the installation.

PCIe slots:

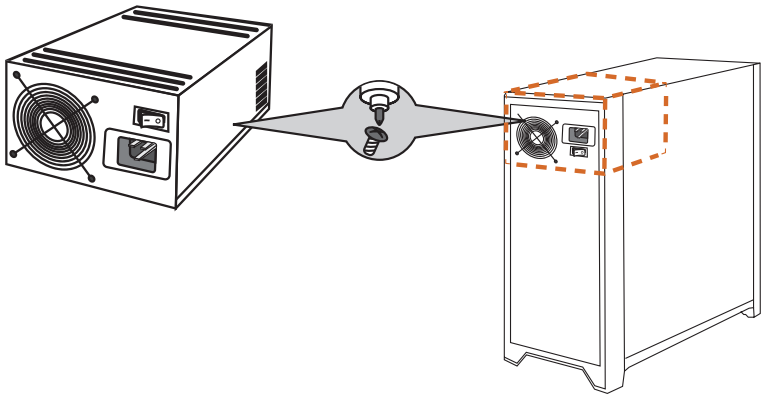
PCIE1 (PCIe 5.0 x16 slot) is used for PCIe x16 lane width graphics cards.
PCIE2 (PCIe 5.0 x16 slot) is used for PCIe x16 lane width graphics cards.
PCIE3 (PCIe 5.0 x16 slot) is used for PCIe x16 lane width graphics cards.
PCIE4 (PCIe 5.0 x16 slot) is used for PCIe x16 lane width graphics cards.
PCIE5 (PCIe 5.0 x16 slot) is used for PCIe x16 lane width graphics cards.
PCIE6 (PCIe 5.0 x16 slot) is used for PCIe x8 lane width graphics cards.
PCIE7 (PCIe 5.0 x16 slot) is used for PCIe x16 lane width graphics cards.

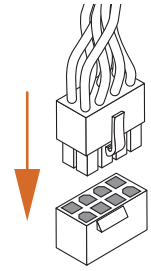
For a better thermal environment, please connect a chassis fan to the motherboard's chassis fan connector (CHA_FAN1~3/WP) when using multiple graphics cards.

2.9 Connecting Peripheral Devices

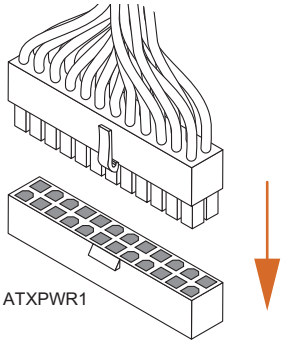


2.10 Connecting the Power Connectors

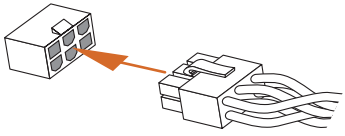




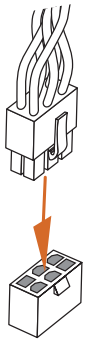
ATX12V1 & ATX12V2



ATXPWR1

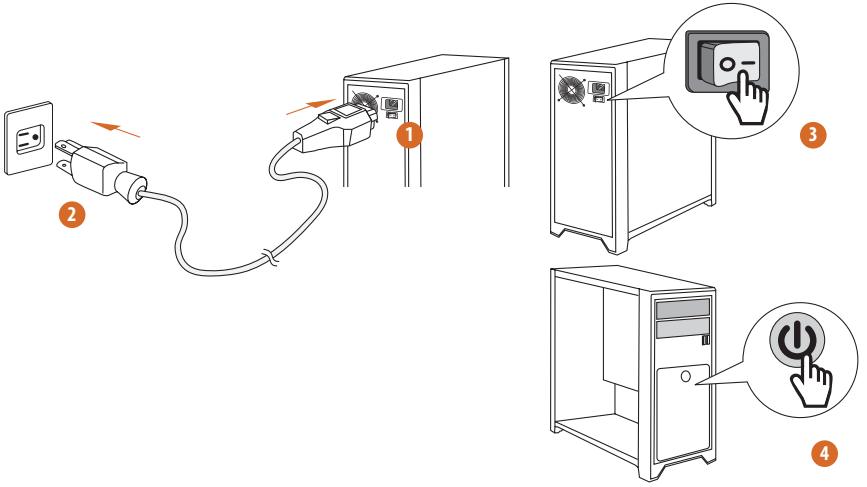


GFX_12V1



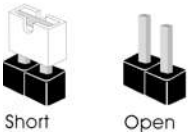
GFX_12V2

2.11 Power On



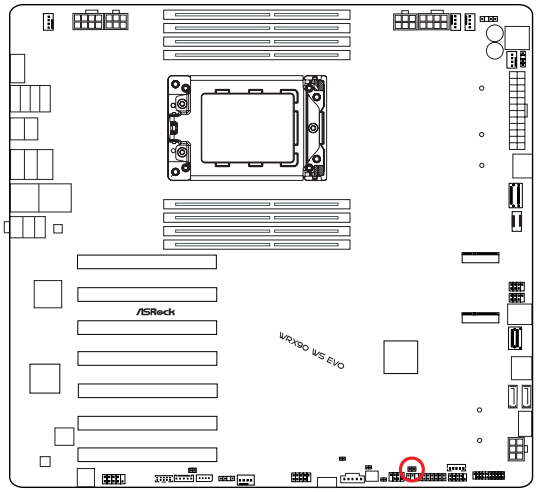
2.12 Jumpers Setup

The illustration shows how jumpers are setup. When the jumper cap is placed on the pins, the jumper is “Short”. If no jumper cap is placed on the pins, the jumper is “Open”.



Clear CMOS Jumper
(CLRCMOS1) (see p.6, No. 34)

CLRCMOS1 allows you to clear the data in CMOS. The data in CMOS includes system setup information such as system password, date, time, and system setup parameters. To clear and reset the system parameters to default setup, please turn off the computer and unplug the power cord, then use a jumper cap to short the pins on CLRCMOS1 for 3 seconds. Please remember to remove the jumper cap after clearing the CMOS. If you need to clear the CMOS when you just finish updating the BIOS, you must boot up the system first, and then shut it down before you do the clear-CMOS action.



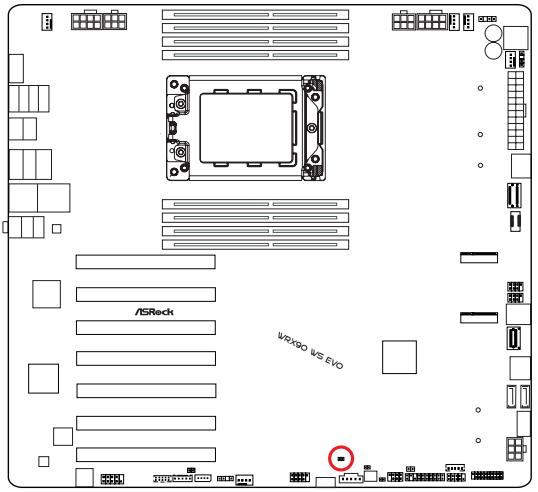
CLRCMOS1

2-pin Jumper

Short: Clear CMOS
Open: Default

Manufacturing Mode Jumper
(MFG1) (see p.6, No. 40)

Short two pins to boot Manufactory mode.



MFG1

2-pin Jumper

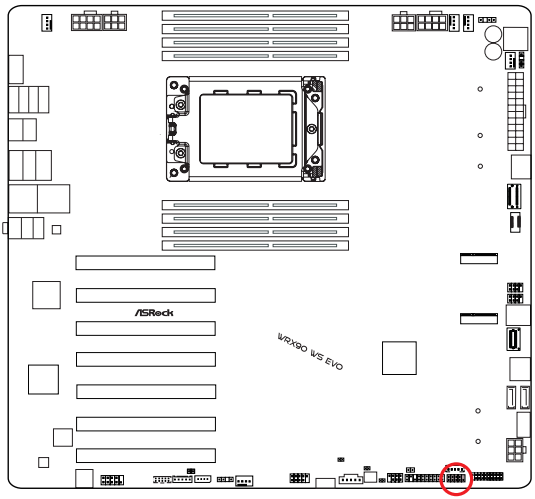
Short: Boot Manufactory mode
Open: Default

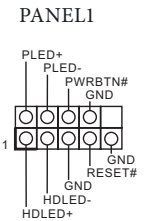
2.13 Onboard Headers and Connectors

Onboard headers and connectors are NOT jumpers. Do NOT place jumper caps over these headers and connectors. Placing jumper caps over the headers and connectors will cause permanent damage to the motherboard.

System Panel Header
(9-pin PANEL1) (see p.6, No. 32)

Connect the power button, reset button and system status indicator on the chassis to this header according to the pin assignments below. Note the positive and negative pins before connecting the cables.





PWRBTN (Power Button):
Connect to the power button on the chassis front panel. You may configure the way to turn off your system using the power button.

RESET (Reset Button):
Connect to the reset button on the chassis front panel. Press the reset button to restart the computer if the computer freezes and fails to perform a normal restart.

PLED (System Power LED):
Connect to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED keeps blinking when the system is in S1/S3 sleep state. The LED is off when the system is in S4 sleep state or powered off (S5).

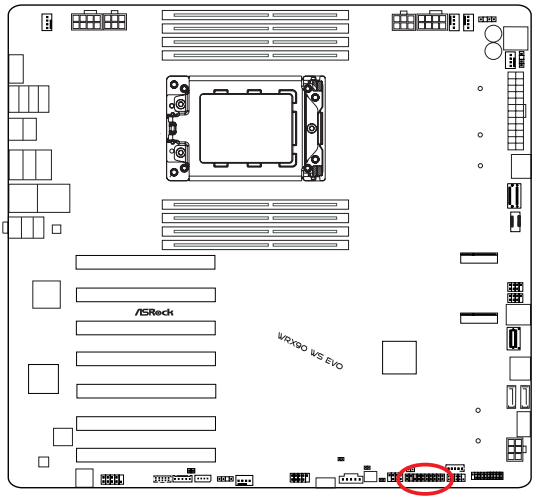
HDLED (Hard Drive Activity LED):
Connect to the hard drive activity LED on the chassis front panel. The LED is on when the hard drive is reading or writing data.

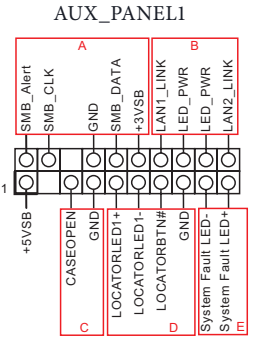
The front panel design may differ by chassis. A front panel module mainly consists of power button, reset button, power LED, hard drive activity LED, speaker and etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.

Auxiliary Panel Header

(18-pin AUX_PANEL1) (see p.6, No. 33)

This header supports multiple functions on the front panel, including the front panel SMB, internet status indicator and chassis intrusion pin.





A. Front panel SMBus connecting pin (6-1 pin FPSMB)
This header allows you to connect SMBus (System Management Bus) equipment. It can be used for communication between peripheral equipment in the system, which has slower transmission rates, and power management equipment.

B. Internet status indicator (2-pin LAN1_LED, LAN2_LED)
These two 2-pin headers allow you to use the Gigabit internet indicator cable to connect to the LAN status indicator. When this indicator flickers, it means that the internet is properly connected.

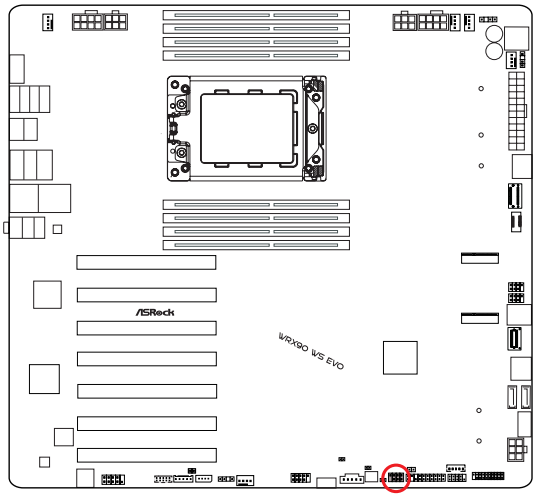
C. Chassis intrusion pin (2-pin CHASSIS)
This header is provided for host computer chassis with chassis intrusion detection designs. In addition, it must also work with external detection equipment, such as a chassis intrusion detection sensor or a microswitch. When this function is activated, if any chassis component movement occurs, the sensor will immediately detect it and send a signal to this header, and the system will then record this chassis intrusion event. The default setting is set to the CASEOPEN and GND pin; this function is off.

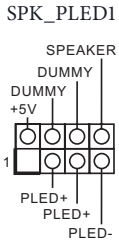
D. Locator LED (4-pin LOCATOR)
This header is for the locator switch and LED on the front panel.

E. System Fault LED (2-pin LOCATOR)
This header is for the Fault LED on the system.

Power LED and Speaker Header
(7-pin SPK_PLED1) (see p.6, No. 35)

Please connect the chassis power LED and the chassis speaker to this header.





Serial ATA3 Connectors

Right Angle:

(SATA3_1) (see p.6, No. 25)(Lower)

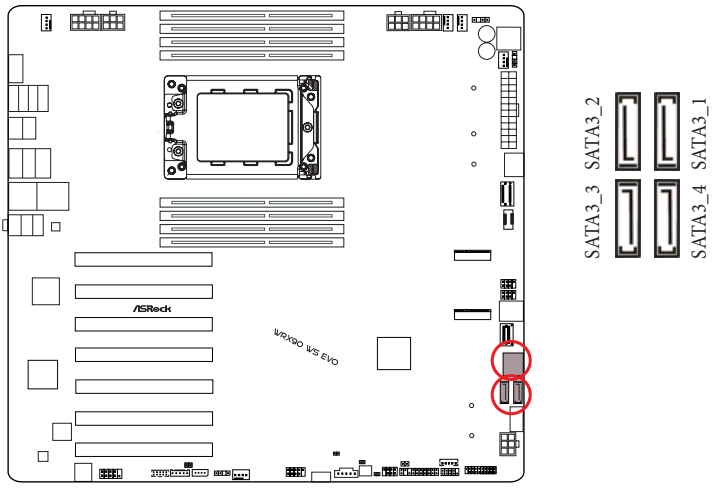
(SATA3_2) (see p.6, No. 25)(Upper)

Vertical:

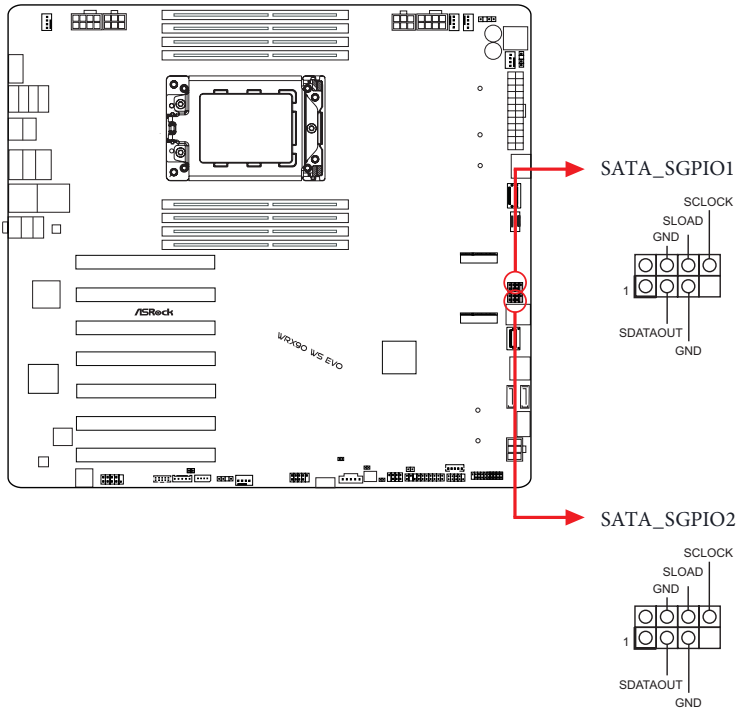
(SATA3_3) (see p.6, No. 26)

(SATA3_4) (see p.6, No. 27)

These four SATA3 connectors support SATA data cables for internal storage devices with up to 6.0 Gb/s data transfer rate.



Serial General Purpose
Input/Output Headers
(7-pin SATA_SGPIO1) (see p.6, No. 21)
(7-pin SATA_SGPIO2) (see p.6, No. 22)
The headers support Serial Link interface for onboard SATA connections.



SlimSAS Connectors

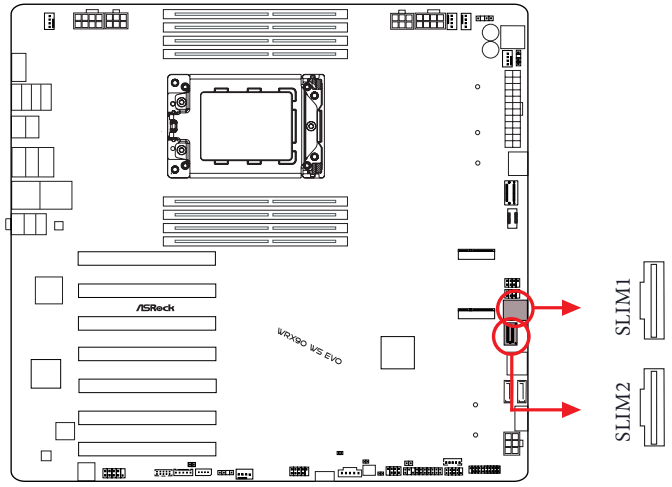
Right Angle:

(SLIM1) (see p.6, No. 23)

Vertical:

(SLIM2) (see p.6, No. 24)

These connectors are used for the NVME PCIE or SATA devices. SLIM1 supports PCIe Gen4x4 or 4 x SATA3 6.0 Gb/s. SLIM2 supports PCIe Gen4x4.



MCIO Connectors

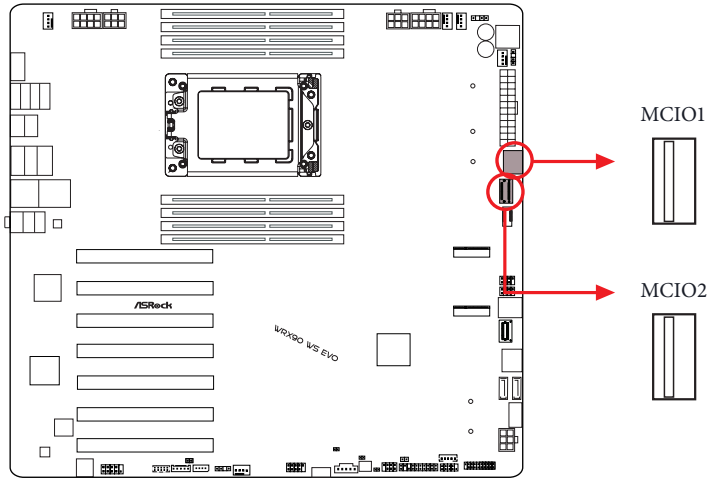
Right Angle:

(MCIO1) (see p.6, No. 16)

Vertical:

(MCIO2) (see p.6, No. 17)

These connectors are used for the NVME PCIE or SATA devices.



Pin	Defeinition	Pin	Defeinition
A1	GND	B1	GND
A2	G1_RXP3	B2	G1_TXP3
A3	G1_RXN3	B3	G1_TXN3
A4	GND	B4	GND
A5	G1_RXP2	B5	G1_TXP2
A6	G1_RXN2	B6	G1_TXN2
A7	GND	B7	GND
A8	BP_TYPE	B8	SCL
A9	WAKE#	B9	SDA
A10	GND	B10	GND
A11	CLKP	B11	BUF_RST0_L
A12	CLKN	B12	R_PRSNT_N
A13	GND	B13	GND
A14	G1_RXP1	B14	G1_TXP1
A15	G1_RXN1	B15	G1_TXN1
A16	GND	B16	GND
A17	G1_RXP0	B17	G1_TXP0
A18	G1_RXN0	B18	G1_TXN0
A19	GND	B19	GND

USB 2.0 Headers

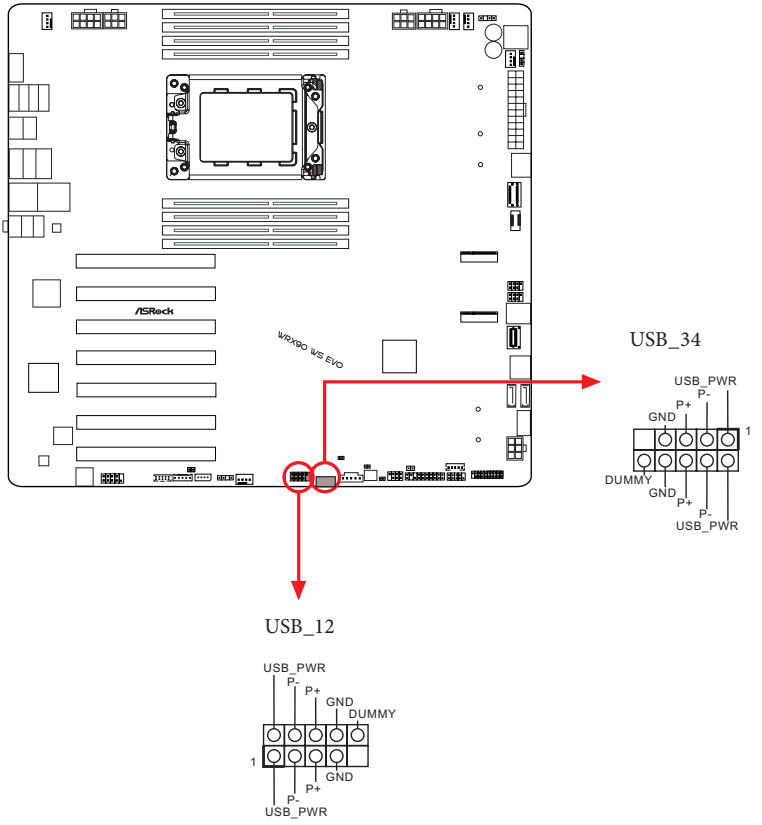
Vertical:

(9-pin USB_12) (see p.6, No. 42)

Right Angle:

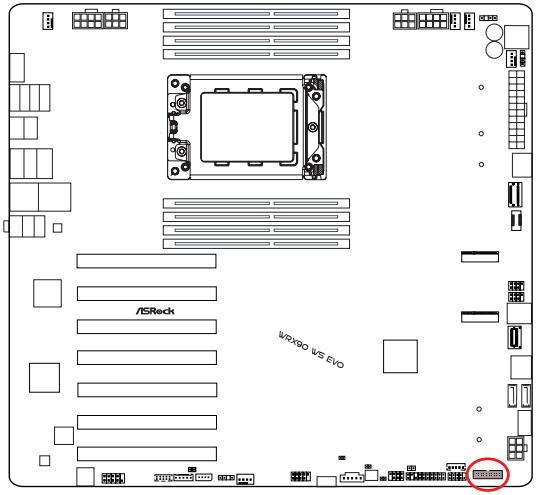
(9-pin USB_34) (see p.6, No. 41)

There are two headers on this motherboard. Each USB 2.0 header can support two ports.

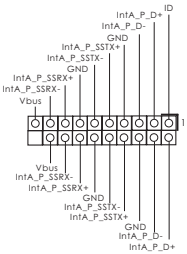


USB 3.2 Gen1 Header
(19-pin USB32_7_8) (see p.6, No. 30)

There is a header on this motherboard. This USB 3.2 Gen1 header can support two ports.



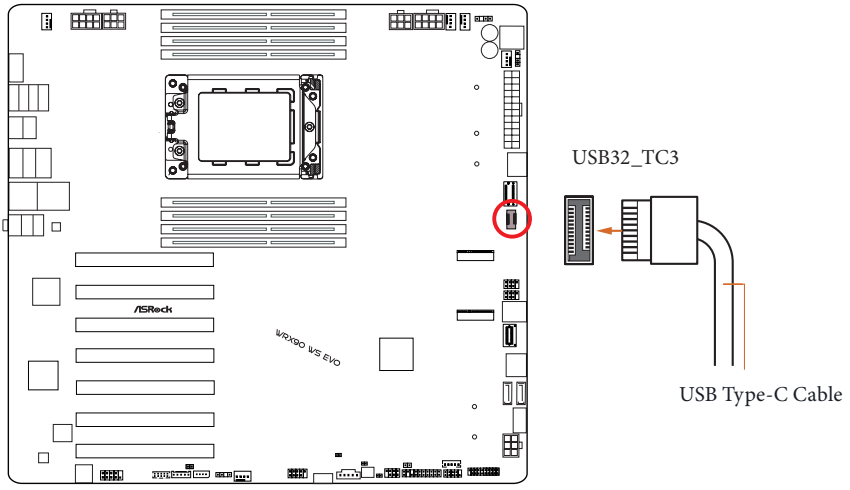
USB32_7_8



Front Panel Type C USB 3.2 Gen2x2 Header

(20-pin USB32_TC3) (see p.6, No. 19)

There is one Front Panel Type C USB 3.2 Gen2x2 Header on this motherboard. This header is used for connecting a USB 3.2 Gen2x2 module for additional USB 3.2 Gen2x2 ports.

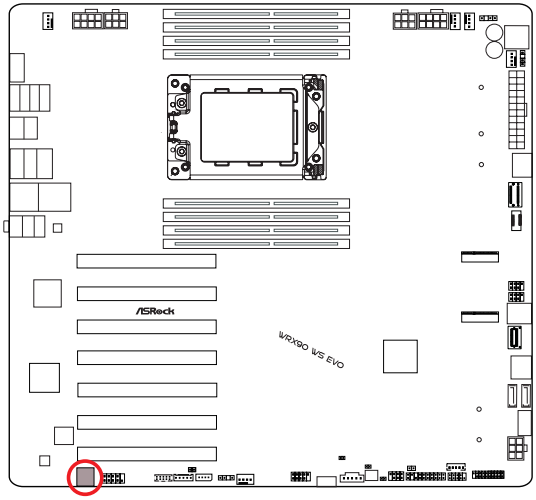


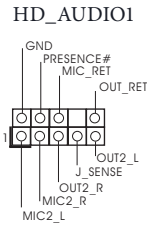
Front Panel Audio Header

Right Angle:

(9-pin HD_AUDIO1) (see p.6, No. 50)

This header is for connecting audio device to the front audio panel.

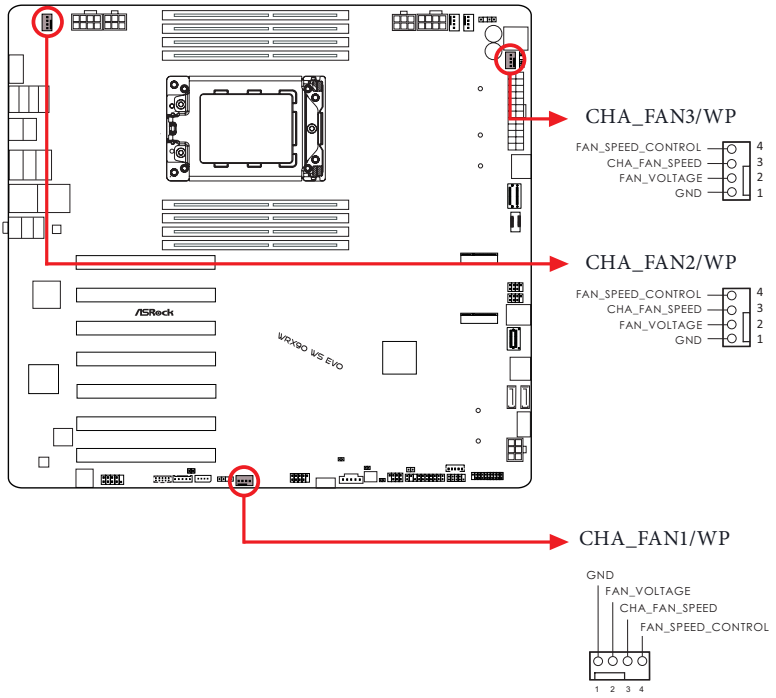




High Definition Audio supports Jack Sensing, but the panel wire on the chassis must support HDA to function correctly. Please follow the instructions in our manual and chassis manual to install your system.

Chassis/Water Pump Fan Connectors
(4-pin CHA_FAN1/WP) (see p.6, No. 43)
(4-pin CHA_FAN2/WP) (see p.6, No. 1)
(4-pin CHA_FAN3/WP) (see p.6, No. 14)

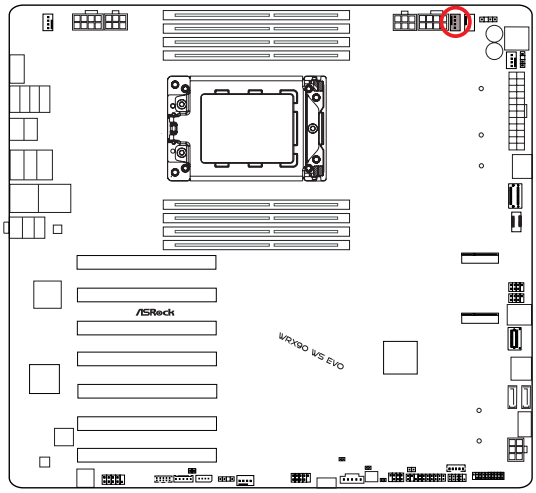
This motherboard provides three 4-Pin water cooling chassis fan connectors. If you plan to connect a 3-Pin chassis water cooler fan, please connect it to Pin 1-3.

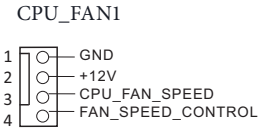


CPU Fan Connector

(4-pin CPU_FAN1) (see p.6, No. 8)

This motherboard provides a 4-Pin CPU fan (Quiet Fan) connector. If you plan to connect a 3-Pin CPU fan, please connect it to Pin 1-3.

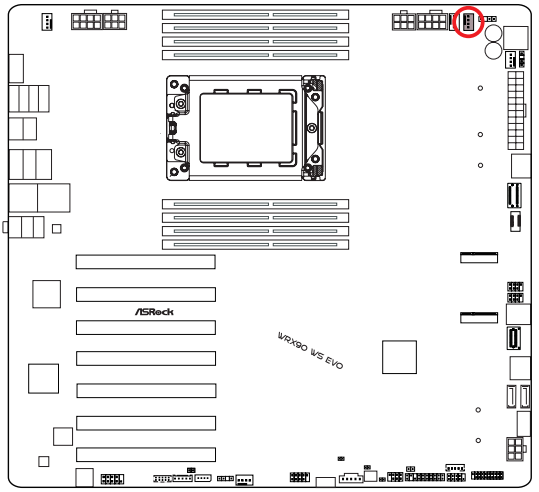




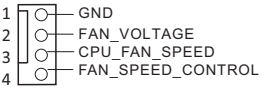
CPU/Water Pump Fan Connector
(4-pin CPU_FAN2/WP) (see p.6, No.9)

This motherboard provides a 4-Pin water cooling CPU fan connector. If you plan to connect a 3-Pin CPU water cooler fan, please connect it to Pin 1-3.

*The default of CPU_FAN2/WP BIOS setting is [Full Speed].

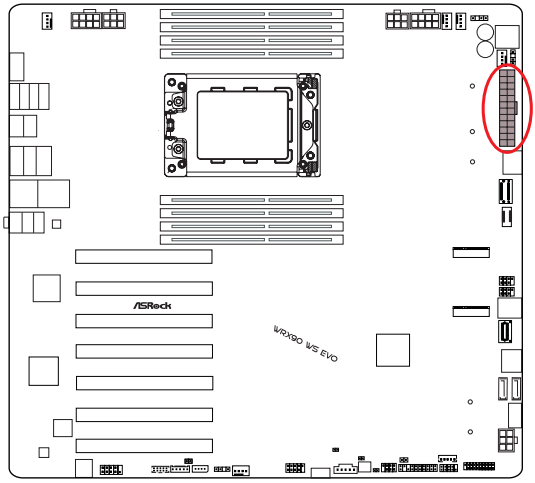


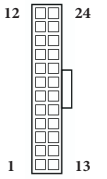
CPU_FAN2/WP



24 pin ATX Power Connector
(24-pin ATXPWR1) (see p.6, No. 15)

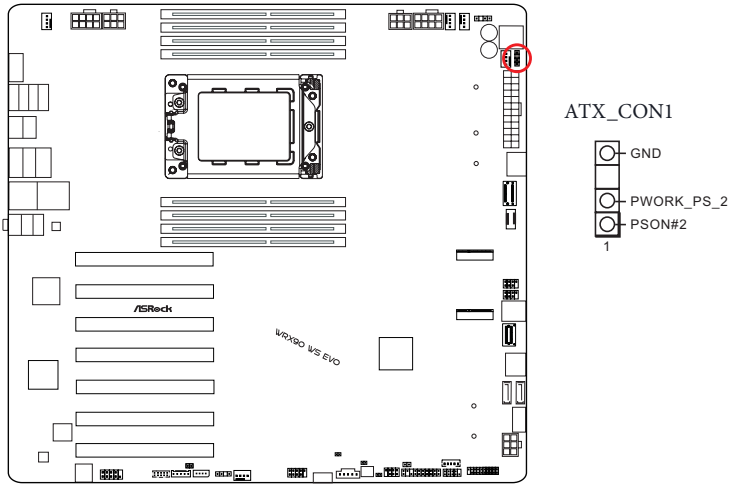
This motherboard provides a 24-pin ATX power connector. To use a 20-pin ATX power supply, please plug it along Pin 1 and Pin 13.



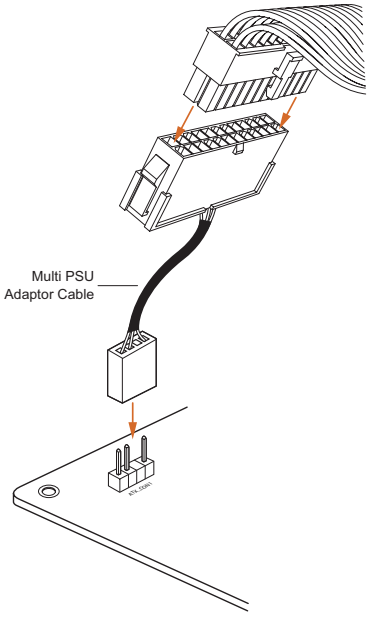


3 pin ATX Power Connector
(3-pin ATX_CON1) (see p.6, No. 13)

This motherboard provides a 3-pin ATX power connector. Plug the Multi PSU Adaptor Cable that comes with the package to this connector if you use a secondary PSU.



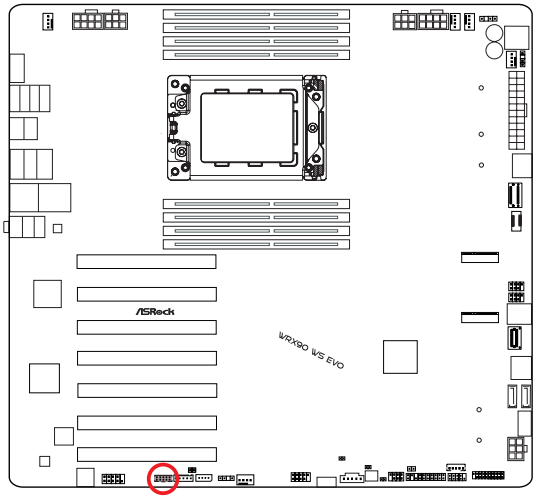
The following diagram illustrates how to connect the bundled Multi PSU Adaptor Cable.

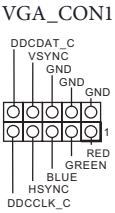


Front VGA Header

(10-pin VGA_CON1) (see p.6, No. 48)

Please connect either end of VGA_2X5 cable to VGA header.





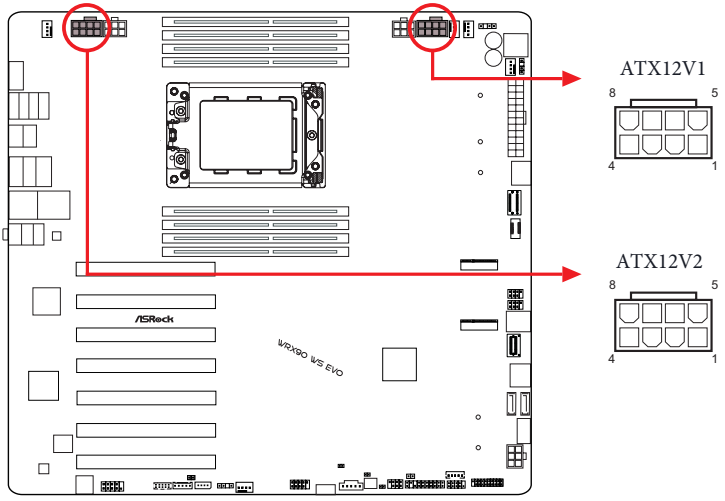
8 pin ATX 12V Power Connectors
(8-pin ATX12V1) (see p.6, No. 7)
(8-pin ATX12V2) (see p.6, No. 2)

This motherboard provides two 8-pin ATX 12V power connectors. To use a 4-pin ATX power supply, please plug it along Pin 1 and Pin 5.

* It is required to connect both ATX12V1 and ATX12V2; otherwise, the system may not boot up properly.

*It is required to connect all 8 pin and 6 pin 12V Power Connectors when over-clocking.

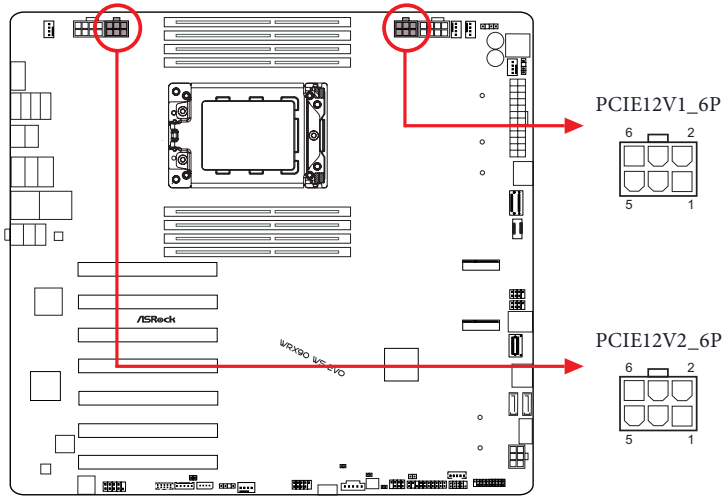
***Warning: Please make sure that the power cable connected is for the CPU and not the graphics card. Do not plug the PCIe 6-pin power cable to ATX12V1 or ATX12V2.**



6-pin PCIe 12V Power Connectors
(6-pin PCIE12V1_6P) (see p.6, No. 6)
(6-pin PCIE12V2_6P) (see p.6, No. 3)

This motherboard provides two 6-pin PCIe 12V power connectors. Connect PCIe power cables to PCIE12V1_6P and PCIE12V2_6P.

*It is required to connect all 8 pin and 6 pin 12V Power Connectors when over-clocking.



6 pin Graphics 12V Power Connectors

Right Angle:

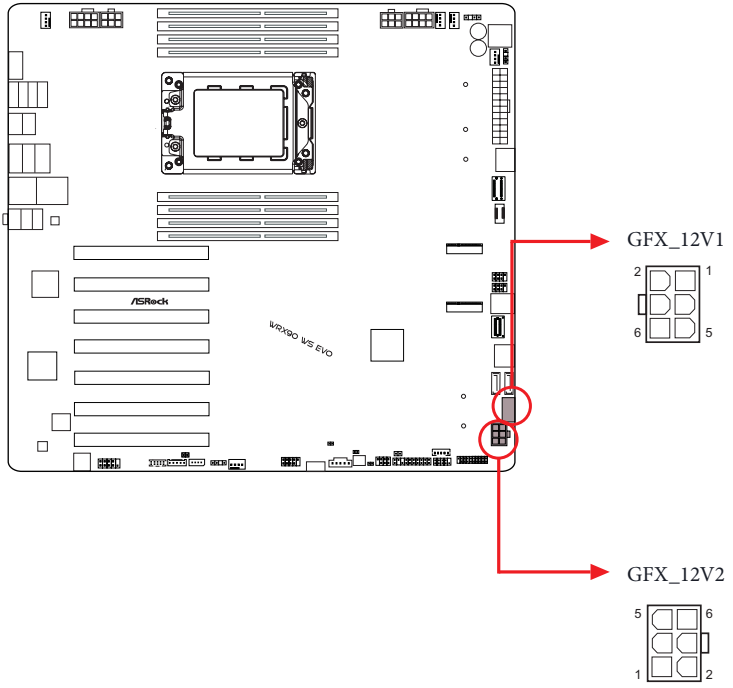
(6-pin GFX_12V1) (see p.6, No. 28)

Vertical:

(6-pin GFX_12V2) (see p.6, No. 29)

This motherboard provides two 6 pin Graphics 12V Power Connectors.

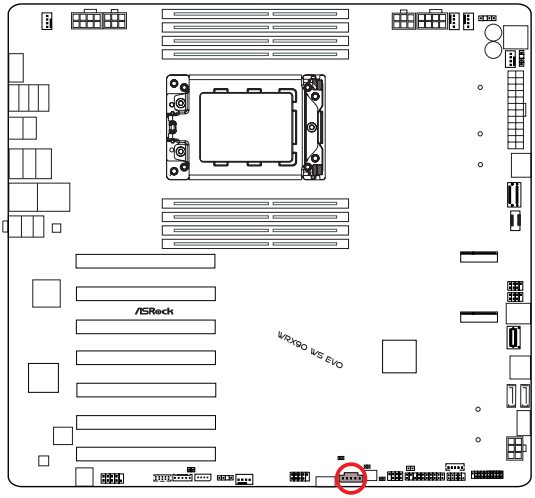
* It is required to connect 6 pin PCIE 12V power cables to either GFX_12V1 or GFX_12V2; otherwise, the system may not boot up properly.



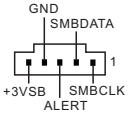
PSU SMBus Header

(5-pin PSU_SMB1) (see p.6, No. 39)

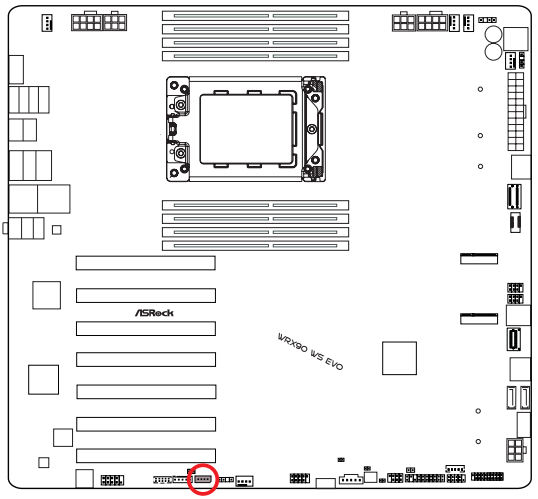
PSU SMBus monitors the status of the power supply, fan and system temperature.

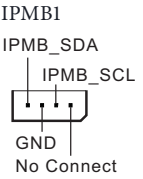


PSU_SMB1

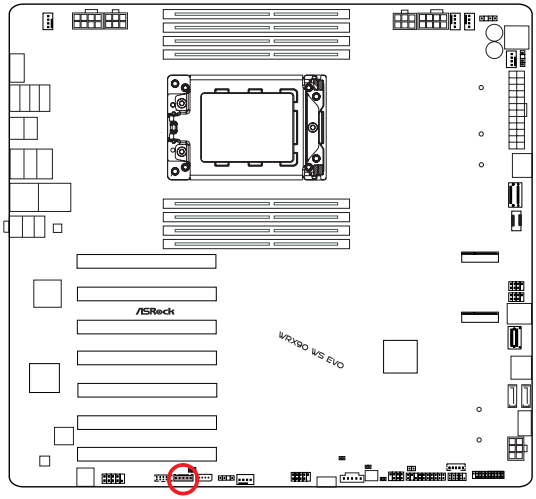


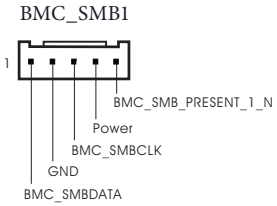
Intelligent Platform Management Bus Header
(4-pin IPMB1) (see p.6, No. 45)
This 4-pin connector is used to provide a cabled base-board or front panel connection for value added features and 3rd-party add-in cards, such as Emergency Management cards, that provide management features using the IPMB.



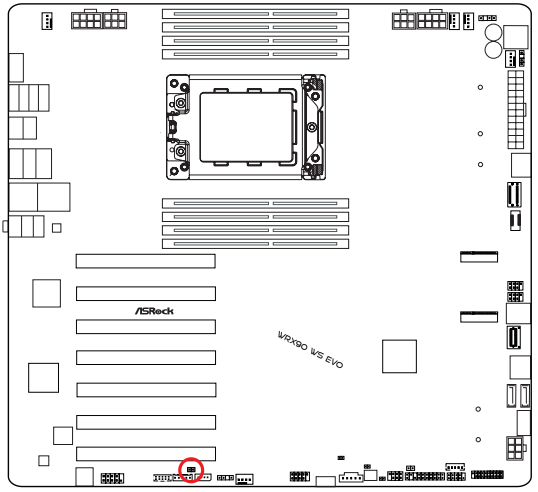


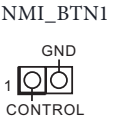
Baseboard Management Controller SMBus Header
(5-pin BMC_SMB1) (see p.6, No. 47)
The header is used for the SMBUS devices.





Non Maskable Interrupt Button Header
(NMI_BTN1) (see p.6, No. 46)
Please connect a NMI device to this header.

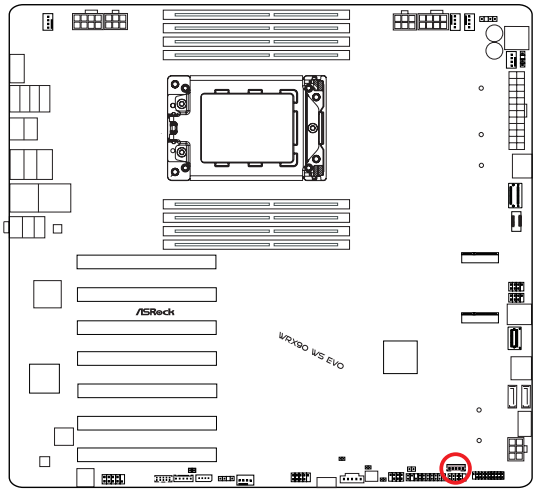


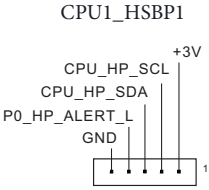


CPU HP-SMBus Connector

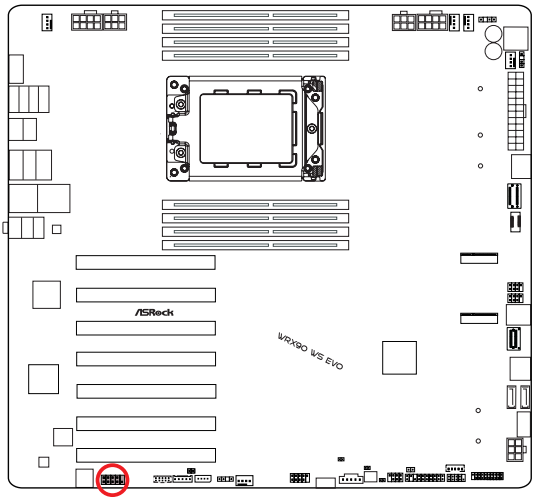
(5-pin CPU1_HSBP1) (see p.6, No. 31)

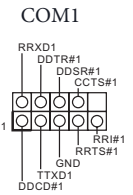
This header is used for the hot plug feature of HDDs on the backplane.



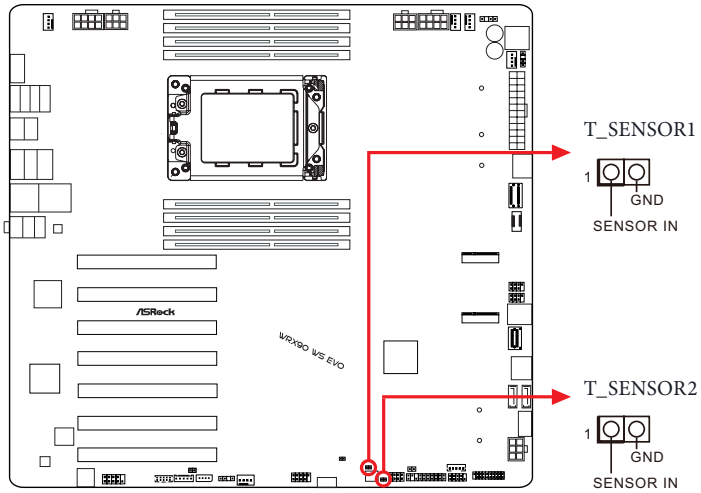


Serial Port Header
(9-pin COM1) (see p.6, No. 49)
This COM header supports serial port module.

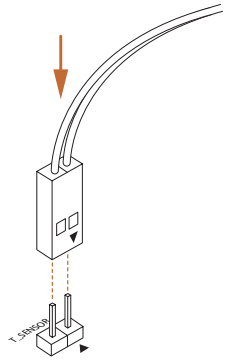




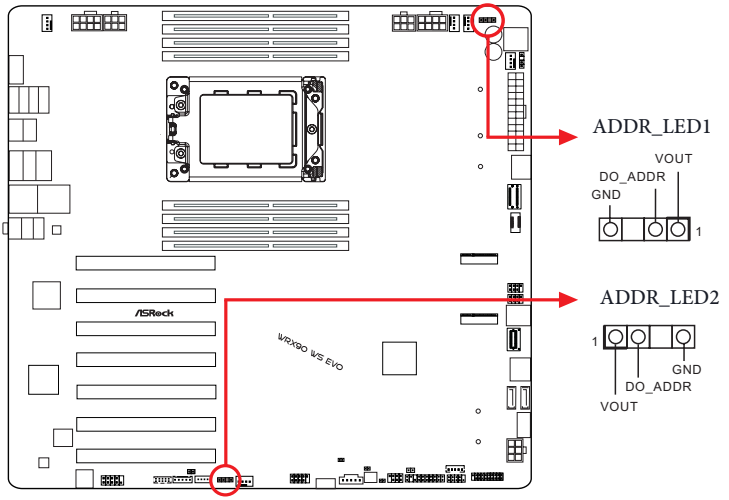
Thermistor Cable Headers
(2-pin T_SENSOR1) (see p.6, No. 37)
(2-pin T_SENSOR2) (see p.6, No. 36)
The Thermistor Cable Headers are used to connect thermistor cables to monitor the temperature of the critical components. Plug the thermistor cables that come with the package to these headers, and then attach the sensor ends to the components to detect their temperature.



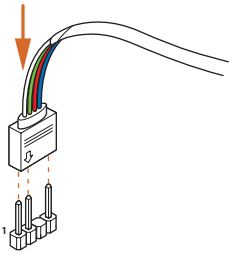
Connect your Thermistor Cables to the **Thermistor Cable Headers (T_SENSOR1 / T_SENSOR2)** on the motherboard.



Addressable LED Headers
(3-pin ADDR_LED1) (see p.6, No. 10)
(3-pin ADDR_LED2) (see p.6, No. 44)
These headers are used to connect Addressable LED extension cables which allow users to choose from various LED lighting effects.
Caution: Never install the Addressable LED cable in the wrong orientation; otherwise, the cable may be damaged.



Connect your Addressable RGB LED strips to the **Addressable LED Headers (ADDR_LED1 / ADDR_LED2)** on the motherboard.



1. *Never install the Addressable LED cable in the wrong orientation; otherwise, the cable may be damaged.*
2. *Before installing or removing your Addressable LED cable, please power off your system and unplug the power cord from the power supply. Failure to do so may cause damages to motherboard components.*

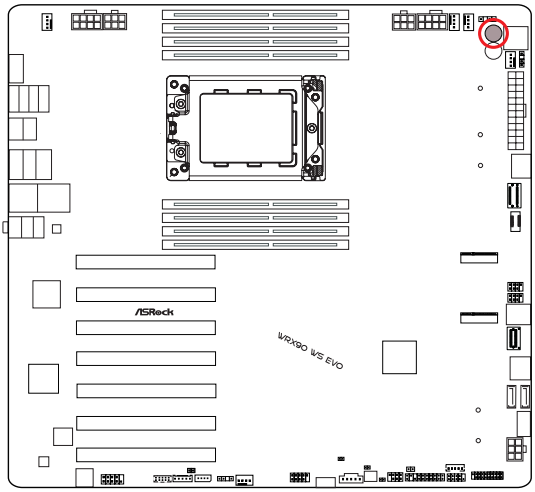
1. *Please note that the Addressable LED strips do not come with the package.*
2. *The Addressable LED header supports WS2812B addressable RGB LED strip (5V/ Data/GND), with a maximum power rating of 3A (5V) and length within 2 meters.*

2.14 Smart Buttons

The motherboard has three smart buttons: Power Button, Reset Button and Clear CMOS Button, allowing users to quickly turn on/off the system, reset the system or clear the CMOS values.

Power Button
(PWRBTN1) (see p.6, No. 11)

Power Button allows users to quickly turn on/off the system.

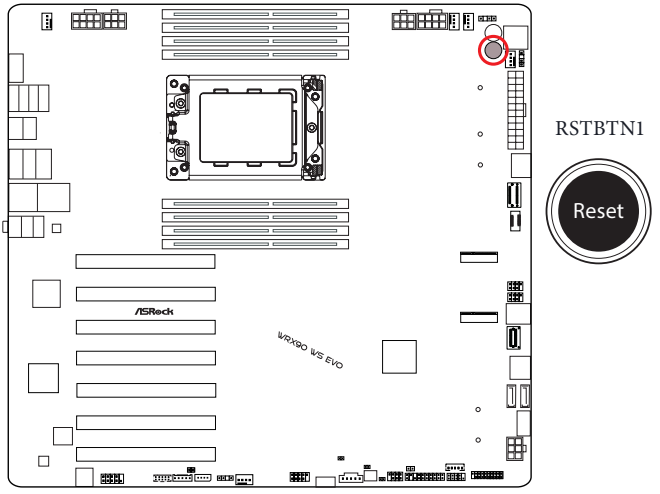


PWRBTN1

Reset Button

(RSTBTN1) (see p.6, No. 12)

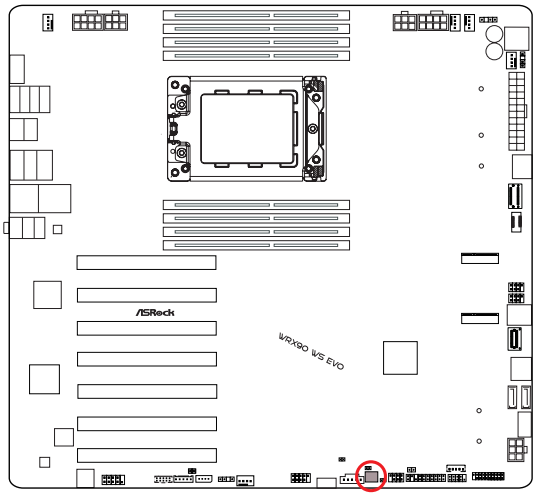
Reset Button allows users to quickly reset the system.



Clear CMOS Button

(CLRCBTN1) (see p.6, No. 38)

Clear CMOS Button allows users to quickly clear the CMOS values.



CLRCBTN1

This function is workable only when you power off your computer and unplug the power supply.

2.15 Dr. Debug

Dr. Debug is used to provide code information, which makes troubleshooting even easier. Please see the diagrams below for reading the Dr. Debug codes.

Code	Description
0x10	PEI_CORE_STARTED
0x11	PEI_CAR_CPU_INIT
0x15	PEI_CAR_NB_INIT
0x19	PEI_CAR_SB_INIT
0x31	PEI_MEMORY_INSTALLED
0x32	PEI_CPU_INIT
0x33	PEI_CPU_CACHE_INIT
0x34	PEI_CPU_AP_INIT
0x35	PEI_CPU_BSP_SELECT
0x36	PEI_CPU_SMM_INIT
0x37	PEI_MEM_NB_INIT
0x3B	PEI_MEM_SB_INIT
0x4F	PEI_DXE_IPL_STARTED
0x60	DXE_CORE_STARTED
0x61	DXE_NVRAM_INIT
0x62	DXE_SBRUN_INIT

0x63	DXE_CPU_INIT
0x68	DXE_NB_HB_INIT
0x69	DXE_NB_INIT
0x6A	DXE_NB_SMM_INIT
0x70	DXE_SB_INIT
0x71	DXE_SB_SMM_INIT
0x72	DXE_SB_DEVICES_INIT
0x78	DXE_ACPI_INIT
0x79	DXE_CSM_INIT
0x90	DXE_BDS_STARTED
0x91	DXE_BDS_CONNECT_DRIVERS
0x92	DXE_PCI_BUS_BEGIN
0x93	DXE_PCI_BUS_HPC_INIT
0x94	DXE_PCI_BUS_ENUM
0x95	DXE_PCI_BUS_REQUEST_RESOURCES
0x96	DXE_PCI_BUS_ASSIGN_RESOURCES
0x97	DXE_CON_OUT_CONNECT
0x98	DXE_CON_IN_CONNECT

0x99	DXE_SIO_INIT
0x9A	DXE_USB_BEGIN
0x9B	DXE_USB_RESET
0x9C	DXE_USB_DETECT
0x9D	DXE_USB_ENABLE
0xA0	DXE_IDE_BEGIN
0xA1	DXE_IDE_RESET
0xA2	DXE_IDE_DETECT
0xA3	DXE_IDE_ENABLE
0xA4	DXE_SCSI_BEGIN
0xA5	DXE_SCSI_RESET
0xA6	DXE_SCSI_DETECT
0xA7	DXE_SCSI_ENABLE
0xA8	DXE_SETUP_VERIFYING_PASSWORD
0xA9	DXE_SETUP_START
0xAB	DXE_SETUP_INPUT_WAIT
0xAD	DXE_READY_TO_BOOT
0xAE	DXE_LEGACY_BOOT

0xAF	DXE_EXIT_BOOT_SERVICES
0xB0	RT_SET_VIRTUAL_ADDRESS_MAP_BEGIN
0xB1	RT_SET_VIRTUAL_ADDRESS_MAP_END
0xB2	DXE_LEGACY_OPROM_INIT
0xB3	DXE_RESET_SYSTEM
0xB4	DXE_USB_HOTPLUG
0xB5	DXE_PCI_BUS_HOTPLUG
0xB6	DXE_NVRAM_CLEANUP
0xB7	DXE_CONFIGURATION_RESET
0xF0	PEI_RECOVERY_AUTO
0xF1	PEI_RECOVERY_USER
0xF2	PEI_RECOVERY_STARTED
0xF3	PEI_RECOVERY_CAPSULE_FOUND
0xF4	PEI_RECOVERY_CAPSULE_LOADED
0xE0	PEI_S3_STARTED
0xE1	PEI_S3_BOOT_SCRIPT
0xE2	PEI_S3_VIDEO_REPOST

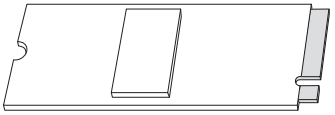
0xE3	PEI_S3_OS_WAKE
0x50	PEI_MEMORY_INVALID_TYPE
0x53	PEI_MEMORY_NOT_DETECTED
0x55	PEI_MEMORY_NOT_INSTALLED
0x57	PEI_CPU_MISMATCH
0x58	PEI_CPU_SELF_TEST_FAILED
0x59	PEI_CPU_NO_MICROCODE
0x5A	PEI_CPU_ERROR
0x5B	PEI_RESET_NOT_AVAILABLE
0xD0	DXE_CPU_ERROR
0xD1	DXE_NB_ERROR
0xD2	DXE_SB_ERROR
0xD3	DXE_ARCH_PROTOCOL_NOT_AVAILABLE
0xD4	DXE_PCI_BUS_OUT_OF_RESOURCES
0xD5	DXE_LEGACY_OPROM_NO_SPACE
0xD6	DXE_NO_CON_OUT
0xD7	DXE_NO_CON_IN

0xD8	DXE_INVALID_PASSWORD
0xD9	DXE_BOOT_OPTION_LOAD_ERROR
0xDA	DXE_BOOT_OPTION_FAILED
0xDB	DXE_FLASH_UPDATE_FAILED
0xDC	DXE_RESET_NOT_AVAILABLE
0xE8	PEI_MEMORY_S3_RESUME_FAILED
0xE9	PEI_S3_RESUME_PPI_NOT_FOUND
0xEA	PEI_S3_BOOT_SCRIPT_ERROR
0xEB	PEI_S3_OS_WAKE_ERROR

2.16 M.2 SSD Card Installation Guide (M2_1)

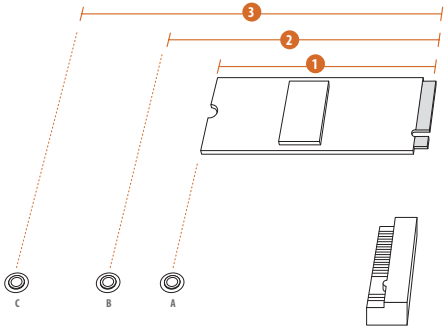
The M.2 is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The Blazing M.2 Socket (M2_1, Key M) supports type 2260/2280/22110 PCIe Gen5x4 (128 Gb/s) mode.

Installing the M.2 SSD Card



Step 1

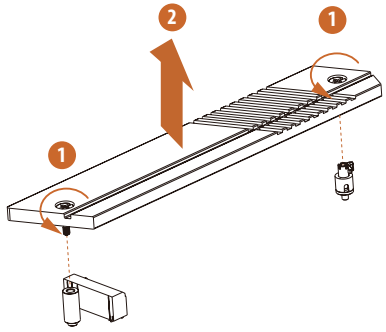
Prepare a M.2 SSD card.



Step 2

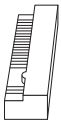
Depending on the PCB type and length of your M.2 SSD card, find the corresponding nut location to be used.

No.	1	2	3
Nut Location	A	B	C
PCB Length	6cm	8cm	11cm
Module Type	Type2260	Type 2280	Type 22110



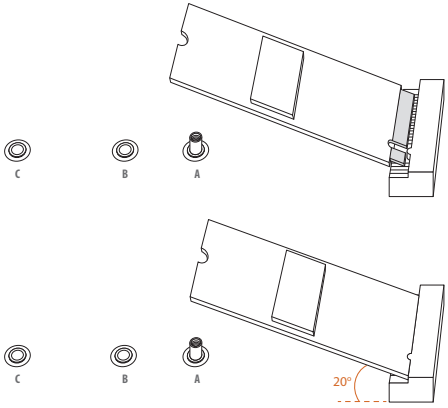
Step 3

Before installing a M.2 SSD card, please loosen the screws to remove the M.2 heatsink.
*Please remove the protective films on the bottom side of the M.2 heatsink before you install a M.2 SSD card.



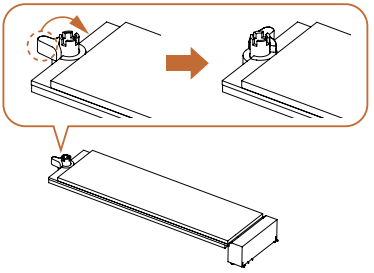
Step 4

Peel off the yellow protective film on the nut to be used. Remove the lock nut on the nut C with a screwdriver, and tighten it into the desired nut location on the motherboard.
Skip Step 4 if your M.2 SSD card is Type 22110.



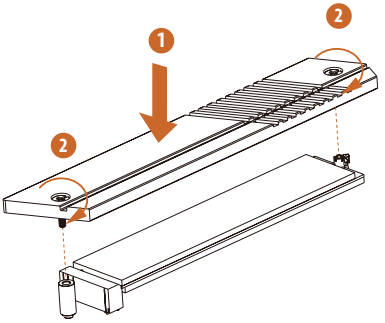
Step 5

Align and gently insert the M.2 SSD card into the M.2 slot. Please be aware that the M.2 SSD card only fits in one orientation.



Step 6

Ensure that the notch at the end of the M.2 SSD card aligns with the nut. Then secure the M.2 SSD card by turning the nut lock clockwise to its locked position.



Step 7

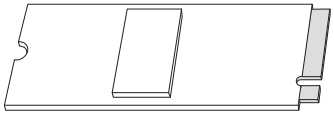
Tighten the screw with a screwdriver to secure the M.2 heatsink into place. Please do not overtighten the screw as this might damage the M.2 heatsink.

For the latest updates of M.2 SSD card support list, please visit our website for details: http://www.asrock.com

2.17 M.2 SSD Card Installation Guide (M2_2)

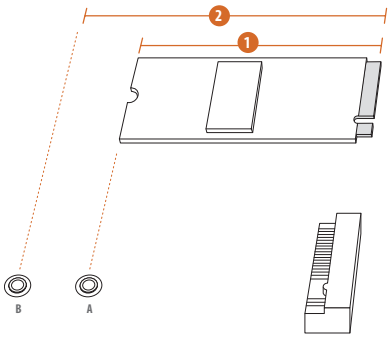
The M.2 is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The Hyper M.2 Socket (M2_2, Key M) supports type 2260/2280 PCIe Gen4x4 (64 Gb/s) mode.

Installing the M.2 SSD Card



Step 1

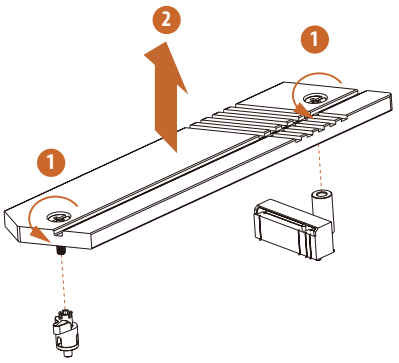
Prepare a M.2 SSD card.



Step 2

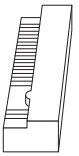
Depending on the PCB type and length of your M.2 SSD card, find the corresponding nut location to be used.

No.	1	2
Nut Location	A	B
PCB Length	6cm	8cm
Module Type	Type2260	Type 2280



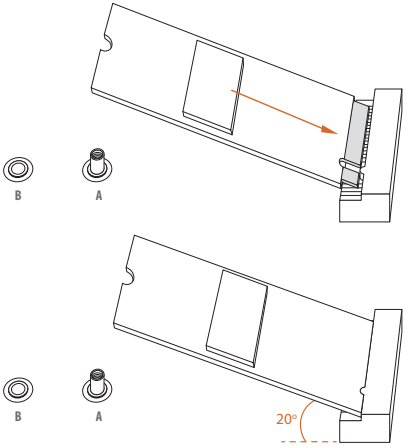
Step 3

Before installing a M.2 SSD card, please loosen the screws to remove the M.2 heatsink.
*Please remove the protective films on the bottom side of the M.2 heatsink before you install a M.2 SSD card.



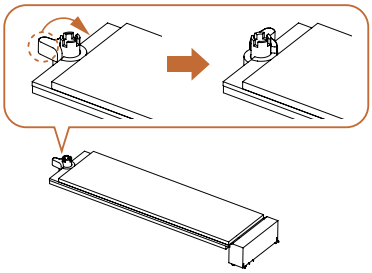
Step 4

Peel off the yellow protective film on the nut A. Remove the lock nut on the nut B with a screwdriver, and tighten it into the nut A.
Skip Step 4 if your M.2 SSD card is Type 2280.



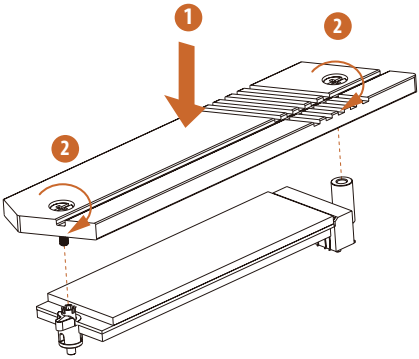
Step 5

Align and gently insert the M.2 SSD card into the M.2 slot. Please be aware that the M.2 SSD card only fits in one orientation.



Step 6

Ensure that the notch at the end of the M.2 SSD card aligns with the nut. Then secure the M.2 SSD card by turning the nut lock clockwise to its locked position.



Step 7

Tighten the screw with a screwdriver to secure the M.2 heatsink into place. Please do not overtighten the screw as this might damage the M.2 heatsink.

For the latest updates of M.2 SSD card support list, please visit our website for details: http://www.asrock.com

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HIGH-DEFINITION MULTIMEDIA INTERFACE

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THIS PRODUCT CONTAINS A BUTTOON BATTERY
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Please keep batteries out of sight or reach of children.

CALIFORNIA, USA ONLY

The Lithium battery adopted on this motherboard contains Perchlorate, a toxic substance controlled in Perchlorate Best Management Practices (BMP) regulations passed by the California Legislature. When you discard the Lithium battery in California, USA, please follow the related regulations in advance.

"Perchlorate Material-special handling may apply, see www.dtsc.ca.gov/hazardouswaste/perchlorate"

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