ASRock®

Z690

AQUA

User Manual

FC

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(1) this device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

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

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Licensee's specific rights may vary from country to country.

CE Warning

This device complies with directive 2014/53/EU issued by the Commision of the European Community.

This equipment complies with EU radiation exposure limits set forth for an uncontrolled environment.
This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Operations in the 5.15-5.35GHz band are restricted to indoor usage only.

AT	BE	BG	CH	CY	CZ	DE
DK	EE	EL	ES	FI	FR	HR
HU	IE	IS	IT	LI	LT	LU
LV	MT	NL	NO	PL	PT	RO
SE	SI	SK	TR	UK		

 C E

Radio transmit power per transceiver type

Function	Frequency	Maximum Output Power (EIRP)
WiFi	2400-2483.5 MHz	18.5 + / -1.5 dbm
	5150-5250 MHz	21.5 + / -1.5 dbm
	5250-5350 MHz	18.5 + / -1.5 dbm (no TPC)
		21.5 + / -1.5 dbm (TPC)
	5470-5725 MHz	25.5 + / -1.5 dbm (no TPC)
		28.5 + / -1.5 dbm (TPC)
Bluetooth	2400-2483.5 MHz	8.5 + / -1.5 dbm

ASRock Incorporation

Contains Wi-Fi 6E module with Bluetooth

Intel® Wi-Fi 6E AX210
Model: AX210NGW

FCC ID : PD9AX210NG

IC : 1000M-AX210NG

R 003-200209
T D200188003

CCAH20Y10130T8

R-NZ

 C E
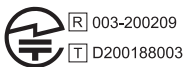
5.15~5.35GHz indoor use only
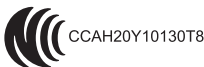
ASRock Incorporation
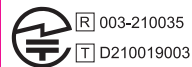
Contains Wi-Fi 6E module with Bluetooth

Intel® Wi-Fi 6E AX211
Model: AX211NGW

FCC ID : PD9AX211NG

IC : 1000M-AX211NG

R 003-210035
T D210019003

R-NZ

 C E

5.15~5.35GHz indoor use only

Contents

Chapter 1 Introduction

Thank you for purchasing ASRock Z690 AQUA 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.

In this documentation, Chapter 1 and 2 contains the introduction of the motherboard and step-by-step installation guides. Chapter 3 contains the operation guide of the software and utilities. Chapter 4 contains the configuration guide of the BIOS setup.

> *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 Z690 AQUA Motherboard (EATX Form Factor)
- ASRock Z690 AQUA Quick Installation Guide
- ASRock Z690 AQUA Support CD
- 4 x Serial ATA (SATA) Data Cables (Optional)
- 1 x Digital Leak Detector (Optional)
- 1 x ASRock WiFi 2.4/5/6 GHz Antenna (Optional)
- 1 x Thermal Compound (Optional)
- 9 x Spare Thermal Pads (Optional)
- 4 x Spare Screws for MOS (Optional)
- 4 x Spare Screws for CPU Sockets (Optional)
- 3 x Screws for M.2 Sockets (Optional)

1.2 Specifications

Platform	• EATX Form Factor • 12 Layer PCB • 2oz Copper PCB
CPU	• Supports 12th Gen Intel® Core™ Processors (LGA1700) • Digi Power design • 20 Power Phase design • Supports Intel® Hybrid Technology • Supports Intel® Turbo Boost Max 3.0 Technology • Supports ASRock Hyper BCLK Engine V
Chipset	• Intel® Z690
Memory	• Dual Channel DDR5 Memory Technology • 4 x DDR5 DIMM Slots • Supports DDR5 non-ECC, un-buffered memory up to 6400+(OC)* * Supports DDR5 4400 (1DPC) / 3600 (2DPC) natively. * Please refer to Memory Support List on ASRock's website for more information. (http://www.asrock.com/) • Max. capacity of system memory: 128GB • Supports Intel® Extreme Memory Profile (XMP) 3.0 • 15μ Gold Contact in DIMM Slots
Expansion Slot	• 3 x PCIe x16 Slots (PCIE1/PCIE3/PCIE4: single at Gen5x16 (PCIE1); dual at Gen5x8 (PCIE1) / Gen5x8 (PCIE3); triple at Gen5x8 (PCIE1) / Gen5x8 (PCIE3) / Gen4x4 (PCIE4))* * Supports NVMe SSD as boot disks • 1 x PCIe Gen3x1 Slot • Supports AMD CrossFire™ • 1 x Vertical M.2 Socket (Key E), supports type 2230 WiFi/BT PCIe WiFi module • 15μ Gold Contact in VGA PCIe Slots (PCIE1 and PCIE3)

Graphics	• Intel® UHD Graphics Built-in Visuals and the VGA outputs can be supported only with processors which are GPU integrated.
	• Intel® Xe Graphics Architecture (Gen 12)
	• Supports Intel® Thunderbolt™ 4 with max. resolution up to 8K (7680x4320) @ 60Hz

* The display specification of thunderbolt port varies by the specification of DisplayPort input from the graphics card.

* If you use a Thunderbolt™ Type-C monitor, make sure that you install the DisplayPort Cables into both DPIN_1 and DPIN_2 on the motherboard's rear I/O panel.

- Supports HDMI 2.1 TMDS Compatible with max. resolution up to 4K x 2K (4096x2160) @ 60Hz
- Supports HDCP 2.3 with HDMI 2.1 TMDS Compatible and Intel® Thunderbolt™ 4 Ports

Audio	• 7.1 CH HD Audio with Content Protection (Realtek ALC1220 Audio Codec)
	• Premium Blu-ray Audio support
	• Supports Surge Protection
	• WIMA Audio Capacitors (For Front Outputs)
	• ESS SABRE9218 DAC for Front Panel Audio (130dB SNR)
	• Pure Power-In
	• Direct Drive Technology
	• PCB Isolate Shielding
	• Impedance Sensing on Rear Out port
	• Individual PCB Layers for R/L Audio Channel
	• Gold Audio Jacks
	• 15μ Gold Audio Connector
	• Nahimic Audio

LAN	1 x 10 Gigabit LAN 100/1000/2500/5000/10000 Mb/s (Marvell (Aquantia) AQC113CS):
	• Supports Wake-On-LAN
	• Supports PXE

1 x 2.5 Gigabit LAN 10/100/1000/2500 Mb/s (Killer® E3100G)

- Supports Killer LAN Software
- Supports Killer DoubleShot™ Pro
- Supports Wake-On-LAN
- Supports Lightning/ESD Protection
- Supports Energy Efficient Ethernet 802.3az
- Supports PXE

Wireless LAN	- 802.11ax Wi-Fi 6E Module - Supports IEEE 802.11a/b/g/n/ax - Supports Dual-Band 2x2 160MHz with extended 6GHz band* support * Wi-Fi 6E (6GHz band) will be supported by Microsoft® Windows® 11. The availability will depend on the different regulation status of each country and region. It will be activated (for supported countries) through Windows Update and software updates once available. * A 6GHz compatible router is required for 6E functionality. - 2 antennas to support 2 (Transmit) x 2 (Receive) diversity technology - Supports Bluetooth + High speed class II - Supports MU-MIMO - Supports Killer LAN Software - Supports Killer DoubleShot™ Pro
Rear Panel I/O	- 2 x Antenna Ports - 1 x HDMI Port - 2 x DisplayPort 1.4 Input - 1 x Optical SPDIF Out Port - 2 x USB 3.2 Gen2 Type-A Ports (10 Gb/s) (ReDriver) (Supports ESD Protection) - 2 x USB4 Thunderbolt™ 4 Type-C Port (40 Gb/s for USB4 protocol; 40Gb/s for Thunderbolt protocol) (Supports ESD Protection) * Supports USB PD 3.0 up to 9V@3A (27W) / 5V@3A (15W) charging

English

4

- 4 x USB 3.2 Gen1 Type-A Ports (Supports ESD Protection)

* USB3_2, USB3_3 and USB3_4 are from ASMedia ASM1074; USB3_1 is from ASMedia ASM3042.

* USB3_1 and USB3_2 are the Lightning Gaming Ports.

* Ultra USB Power is supported on USB3_3 and USB3_4 ports.

* ACPI wake-up function is not supported on USB3_3 and USB3_4 ports.

- 2 x RJ-45 LAN Ports with LED (ACT/LINK LED and SPEED LED)
- 1 x Clear CMOS Button
- 1 x BIOS Flashback Button
- HD Audio Jacks: Rear Speaker / Central / Bass / Line in / Front Speaker / Microphone (Gold Audio Jacks with LED)

Storage	- 4 x SATA3 6.0 Gb/s Connectors*

* If M2_2 is occupied by a SATA-type M.2 device, SATA3_0 will be disabled.

- 4 x SATA3 6.0 Gb/s Connectors by ASMedia ASM1061
- 1 x Hyper M.2 Socket (M2_1, Key M), supports type 2260/2280 PCIe Gen4x4 (64 Gb/s) mode**
- 1 x Hyper M.2 Socket (M2_2, Key M), supports type 2260/2280 SATA3 6.0 Gb/s & PCIe Gen4x4 (64 Gb/s) mode**
- 1 x Hyper M.2 Socket (M2_3, Key M), supports type 2242/2260/2280/22110 SATA3 6.0 Gb/s & PCIe Gen4x4 (64 Gb/s) mode**

** Supports Intel® Optane™ Technology (M2_2 and M2_3 only)

**Supports Intel® Volume Management Device (VMD)

** Supports NVMe SSD as boot disks

** Supports ASRock U.2 Kit

RAID	- Supports RAID 0, RAID 1, RAID 5 and RAID 10 for SATA storage devices - Supports RAID 0, RAID 1 and RAID 5 for M.2 NVMe storage devices

Connector
- 1 x SPI TPM Header
- 1 x Power LED and Speaker Header
- 1 x RGB LED Header

* Supports in total up to 12V/3A, 36W LED Strip
- 3 x Addressable LED Headers

* Support in total up to 5V/3A, 15W LED Strip
- 1 x CPU Fan Connector (4-pin)

* The CPU Fan Connector supports the CPU fan of maximum 1A (12W) fan power.
- 1 x CPU/Water Pump Fan Connector (4-pin) (Smart Fan Speed Control)

* CPU_FAN2/WP_3A supports the water cooler fan of maximum 3A (36W) fan power.
- 6 x Chassis/Water Pump Fan Connectors (4-pin) (Smart Fan Speed Control)

* The Chassis/Water Pump Fan supports the water cooler fan of maximum 2A (24W) fan power.
* CPU_FAN2/WP_3A, CHA_FAN1~6/WP can auto detect if 3-pin or 4-pin fan is in use.
- 1 x 24 pin ATX Power Connector (Hi-Density Power Connector)
- 2 x 8 pin 12V Power Connectors (Hi-Density Power Connector)
- 1 x Front Panel Audio Connector (15μ Gold Audio Connector)
- 2 x USB 2.0 Headers (Support 4 USB 2.0 ports) (Supports ESD Protection)
- 2 x USB 3.2 Gen1 Headers (Support 4 USB 3.2 Gen1 ports) (ASMedia ASM1074 hub) (Supports ESD Protection)
- 2 x Front Panel Type C USB 3.2 Gen2x2 Headers (20 Gb/s) (Support ESD Protection)
- 1 x Dr. Debug with LED
- 1 x Power Button with LED
- 1 x Reset Button with LED
- 1 x Retry Button
- 1 x Safe Boot Button

BIOS Feature	• AMI UEFI Legal BIOS with multilingual GUI support • ACPI 6.0 Compliant wake up events • SMBIOS 2.7 Support • CPU Core/Cache, CPU GT, VCCIN_AUX, VDD2, DRAM(VDD, VDDQ, VPP), +1.8V PROC, +1.05V PROC, +0.82V PCH, +1.05V PCH, CPU Core PLL, GT PLL, Ring PLL, System Agent PLL, Memory Controller PLL, Atom Core PLL Voltage Multi-adjustment
Hardware Monitor	• Fan Tachometer: CPU, CPU/Water Pump, Chassis/Water Pump Fans • Quiet Fan (Auto adjust chassis fan speed by CPU temperature): CPU, CPU/Water Pump, Chassis/Water Pump Fans • Fan Multi-Speed Control: CPU, CPU/Water Pump, Chassis/Water Pump Fans • Voltage monitoring: +12V, +5V, +3.3V, CPU Vcore, VCCIN_AUX, +VDD2, +1.8V PROC, +1.05V PROC • 1 x Status OLED
OS	• Microsoft® Windows® 10 64-bit / 11 64-bit
Certifica-tions	• 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
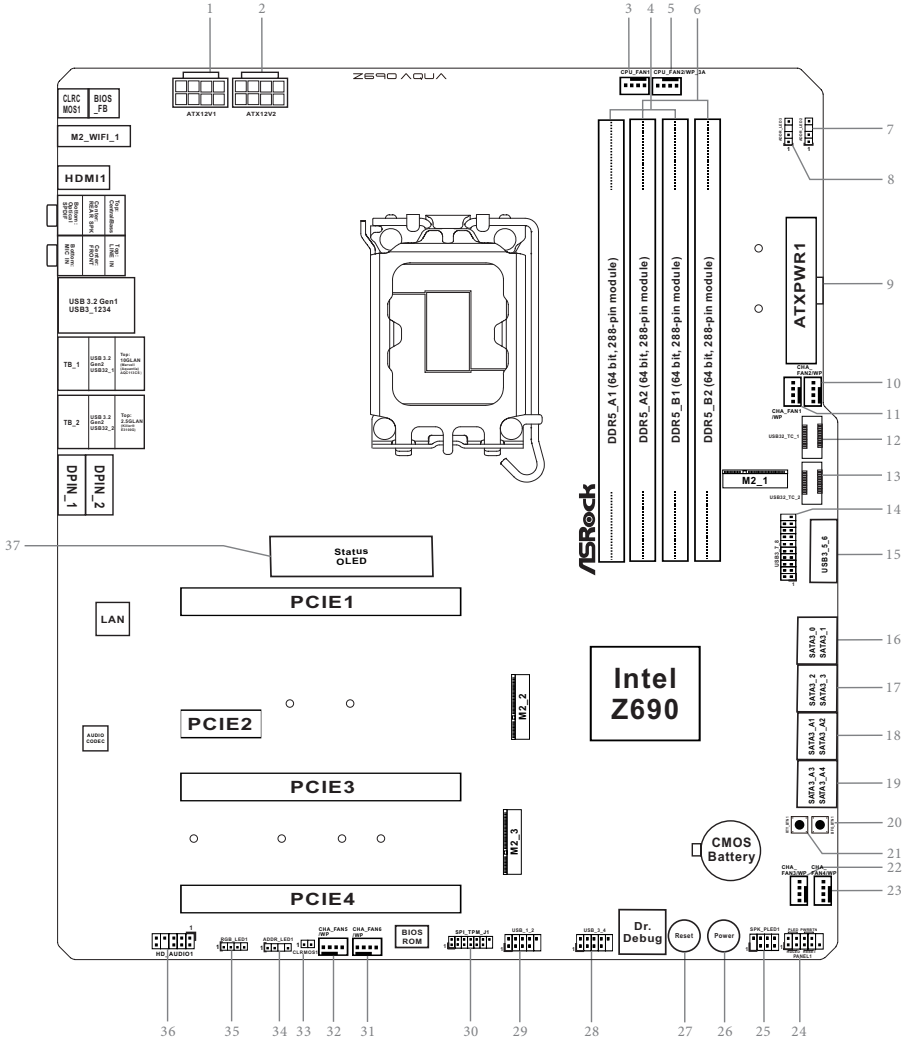
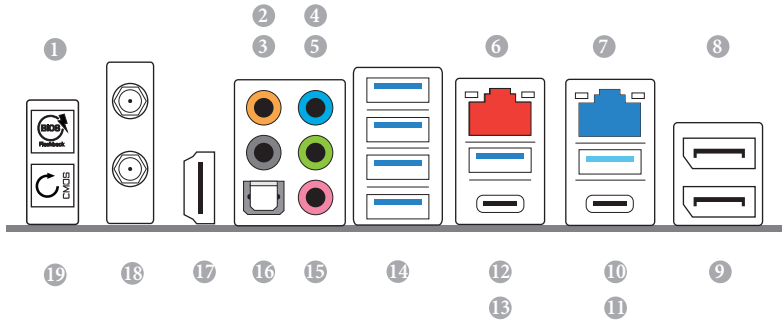| No.	Description
1	8 pin 12V Power Connector (ATX12V1)
2	8 pin 12V Power Connector (ATX12V2)
3	CPU Fan Connector (CPU_FAN1)
4	2 x 288-pin DDR5 DIMM Slots (DDR5_A1, DDR5_B1)
5	CPU/Water Pump Fan Connector (CPU_FAN2/WP_3A)
6	2 x 288-pin DDR5 DIMM Slots (DDR5_A2, DDR5_B2)
7	Addressable LED Header (ADDR_LED2)
8	Addressable LED Header (ADDR_LED3)
9	ATX Power Connector (ATXPWR1)
10	Chassis/Water Pump Fan Connector (CHA_FAN2/WP)
11	Chassis/Water Pump Fan Connector (CHA_FAN1/WP)
12	Front Panel Type C USB 3.2 Gen2x2 Header (USB32_TC_1)
13	Front Panel Type C USB 3.2 Gen2x2 Header (USB32_TC_2)
14	USB 3.2 Gen1 Header (USB3_7_8)
15	USB 3.2 Gen1 Header (USB3_5_6)
16	SATA3 Connectors (SATA3_0)(Upper), (SATA3_1)(Lower)
17	SATA3 Connectors (SATA3_2)(Upper), (SATA3_3)(Lower)
18	SATA3 Connectors (SATA3_A1)(Upper), (SATA3_A2)(Lower)
19	SATA3 Connectors (SATA3_A3)(Upper), (SATA3_A4)(Lower)
20	Safe Boot Button (BFG_BTN1)
21	Retry Button (RTY_BTN1)
22	Chassis/Water Pump Fan Connector (CHA_FAN3/WP)
23	Chassis/Water Pump Fan Connector (CHA_FAN4/WP)
24	System Panel Header (PANEL1)
25	Power LED and Speaker Header (SPK_PLED1)
26	Power Button (PWRBTN1)
27	Reset Button (RSTBTN1)
28	USB 2.0 Header (USB_3_4)
29	USB 2.0 Header (USB_1_2)
30	SPI TPM Header (SPI_TPM_J1)
31	Chassis/Water Pump Fan Connector (CHA_FAN6/WP)
32	Chassis/Water Pump Fan Connector (CHA_FAN5/WP)
33	Clear CMOS Jumper (CLRMOS1)
34	Addressable LED Header (ADDR_LED1)
35	RGB LED Header (RGB_LED1)

No.	Description
36	Front Panel Audio Header (HD_AUDIO1)
37	Status OLED

1.4 I/O Panel

No.	Description	No.	Description
1	BIOS Flashback Button	11	USB4 Thunderbolt™ 4 Type-C Port
2	Central / Bass (Orange)		(TB_2)
3	Rear Speaker (Black)	12	USB 3.2 Gen2 Type-A Port
4	Line In (Light Blue)		(USB32_1)
5	Front Speaker (Lime)*	13	USB4 Thunderbolt™ 4 Type-C Port
6	10G LAN RJ-45 Port		(TB_1)
	(Marvell (Aquantia) AQC113CS)**	14	USB 3.2 Gen1 Ports
7	2.5G LAN RJ-45 Port		(USB3_1234)****
	(Killer® E3100G)***	15	Microphone (Pink)
8	DisplayPort 1.4 Input (DPIN_2)	16	Optical SPDIF Out Port
9	DisplayPort 1.4 Input (DPIN_1)	17	HDMI Port
10	USB 3.2 Gen2 Type-A Port	18	Antenna Ports
	(USB32_2)	19	Clear CMOS Button

If you use a 2-channel speaker, please connect the speaker's plug into "Front Speaker Jack". See the table below for connection details in accordance with the type of speaker you use.

Audio Output Channels	Front Speaker (No. 5)	Rear Speaker (No. 3)	Central / Bass (No. 2)	Line In (No. 4)
2	V	--	--	--
4	V	V	--	--
6	V	V	V	--
8	V	V	V	V

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

ACT/LINK LED
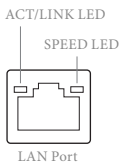
SPEED LED

LAN Port

Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Orange	100Mbps/1Gbps/2.5Gbps /5Gbps connection
Blinking	Data Activity		
On	Link	Green	10Gbps connection

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

ACT/LINK LED

SPEED LED

LAN Port
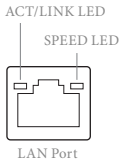
Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	10Mbps connection
Blinking	Data Activity	Orange	100Mbps/1Gbps connection
On	Link	Green	2.5Gbps connection

**** Ultra USB Power is supported on USB3_3 and USB3_4 ports. ACPI wake-up function is not supported on USB3_3 and USB3_4 ports. USB3_1 and USB3_2 are the Lightning Gaming Ports.

1.5 802.11ax Wi-Fi 6E Module and ASRock WiFi 2.4/5/6 GHz Antenna

802.11ax Wi-Fi 6E + BT Module

This motherboard comes with an exclusive 802.11 a/b/g/n/ax Wi-Fi 6E + BT module (pre-installed on the rear I/O panel) that offers support for 802.11 a/b/g/n/ax Wi-Fi 6E connectivity standards and Bluetooth. Wi-Fi 6E + BT module is an easy-to-use wireless local area network (WLAN) adapter to support Wi-Fi 6E + BT. Bluetooth standard features Smart Ready technology that adds a whole new class of functionality into the mobile devices. BT also includes Low Energy Technology and ensures extraordinary low power consumption for PCs.

* The transmission speed may vary according to the environment.
* Wi-Fi 6E (6GHz band) will be supported by Microsoft® Windows® 11. The availability will depend on the different regulation status of each country and region. It will be activated (for supported countries) through Windows Update and software updates once available.
* A 6GHz compatible router is required for 6E functionality.

ASRock WiFi 2.4/5/6 GHz Antenna

Chapter 2 Installation

This is an EATX 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.

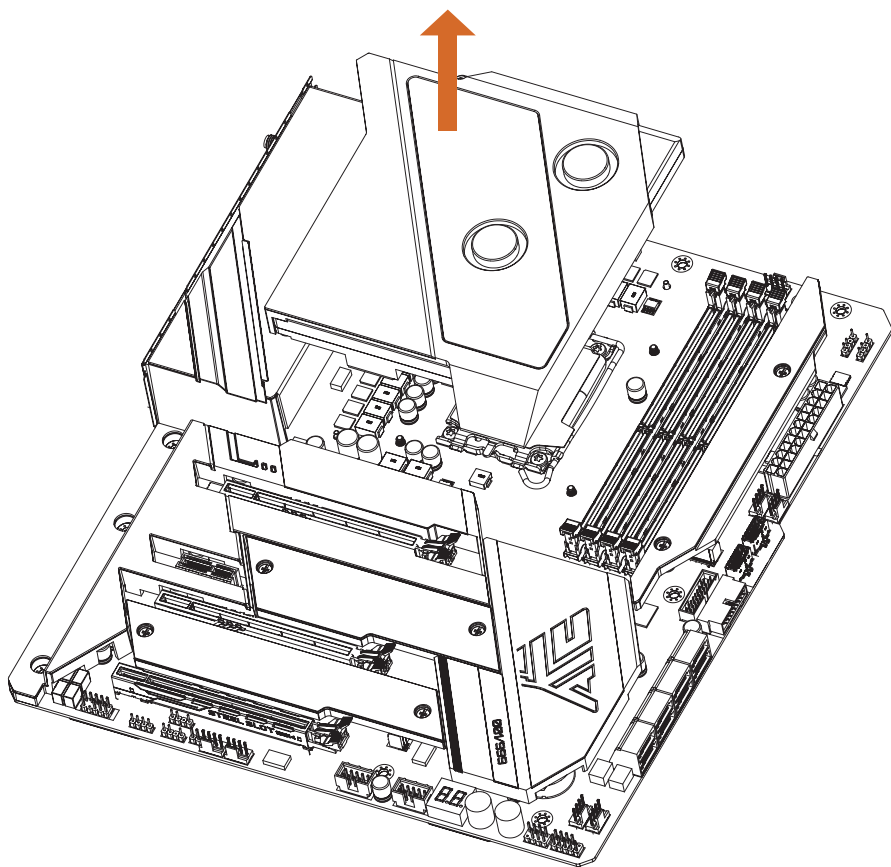English

2.1 Removing the Water-cooling Module

❶ Removing the CPU Backplate
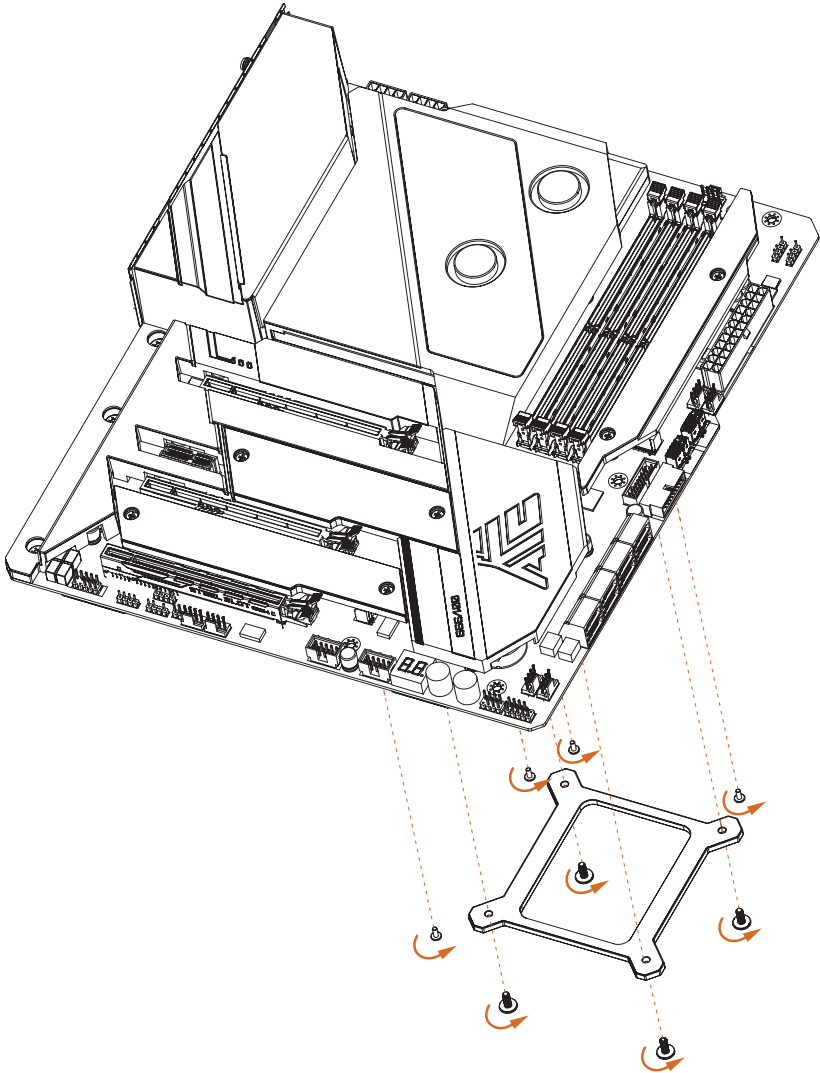
Please unscrew the eight screws from the bottom side of the motherboard to release the backplate and the water-cooling module. Please make sure to remove them in the order shown below.
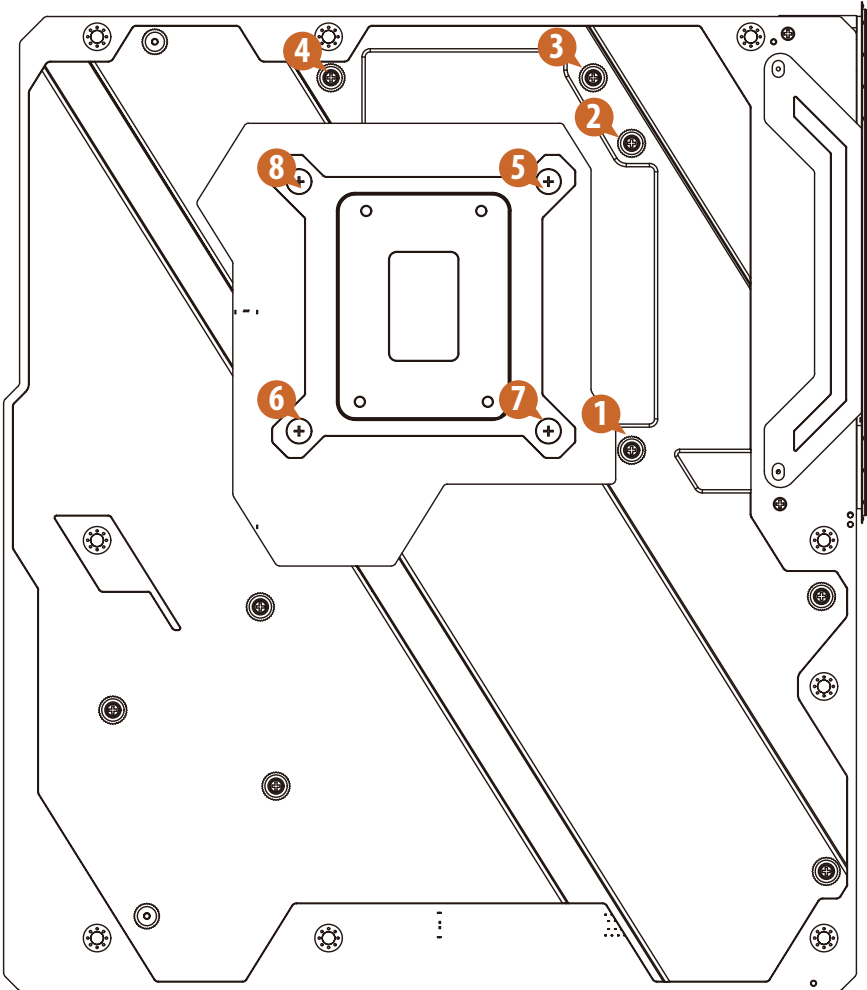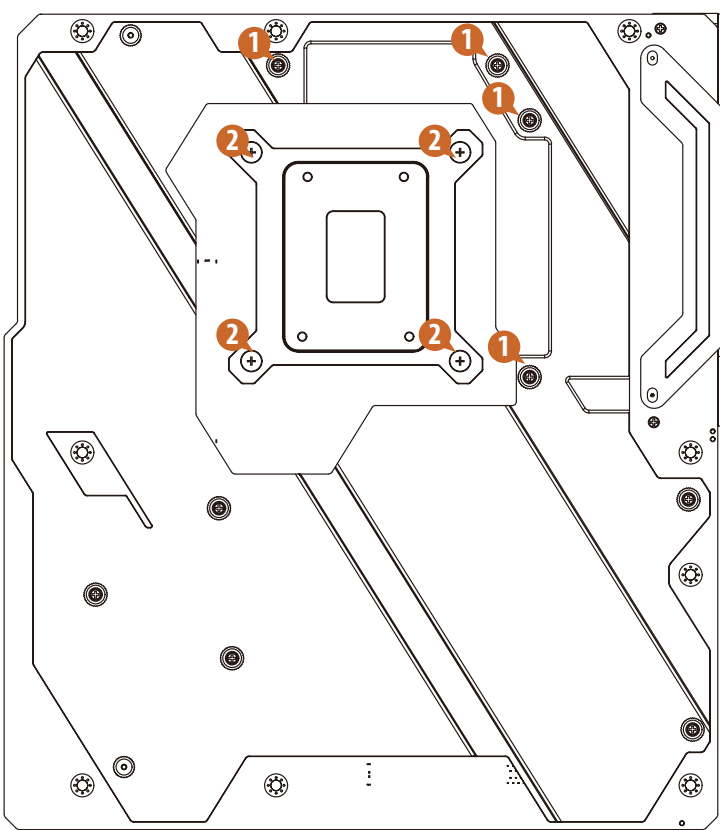
2 Removing the Water-cooling Module

Screw Assembly Schematic

Bottom View

Screw Specifications				
No.	Screw Spec.	Screw Type	Screw Qty	Screw Locking Position
1	M2*5L	Flat head Screw	4	For locking MOS
2	M3*8L	Flat head Screw	4	For locking CPU backplate

Removing the Protective Films

Please make sure to peel the protective films from the heatsinks before assembly. The positions are indicated as below.

A. Water-cooling Module

B. M.2 Heatsink

MOS

CPU

M2_1

C. M.2 Heatsink

M2_2

D. M.2 Heatsink

M2_3
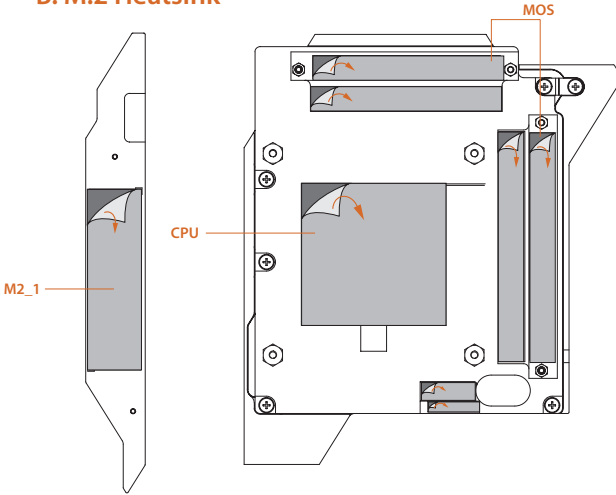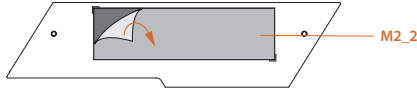
*Please remove the protective films on the bottom sides of the M.2 heatsinks before you install a M.2 SSD module.

Top View

A

B

C

D
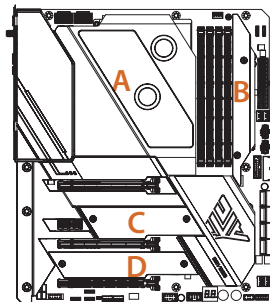
Cooling Water Inlet/Outlet Hole
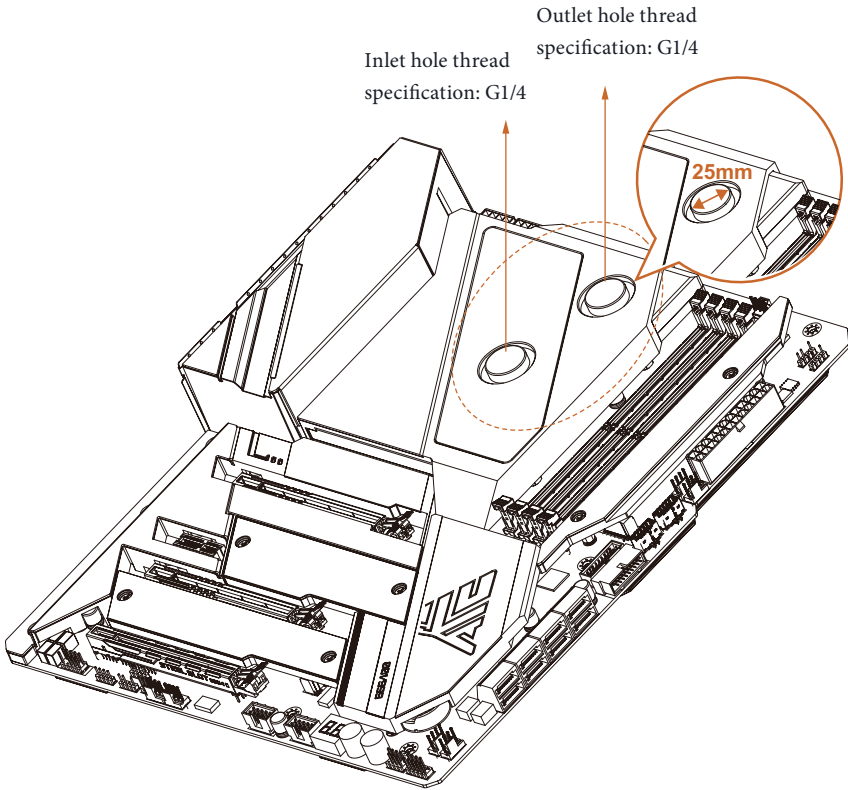
Outlet hole thread
specification: G1/4

Inlet hole thread
specification: G1/4

25mm
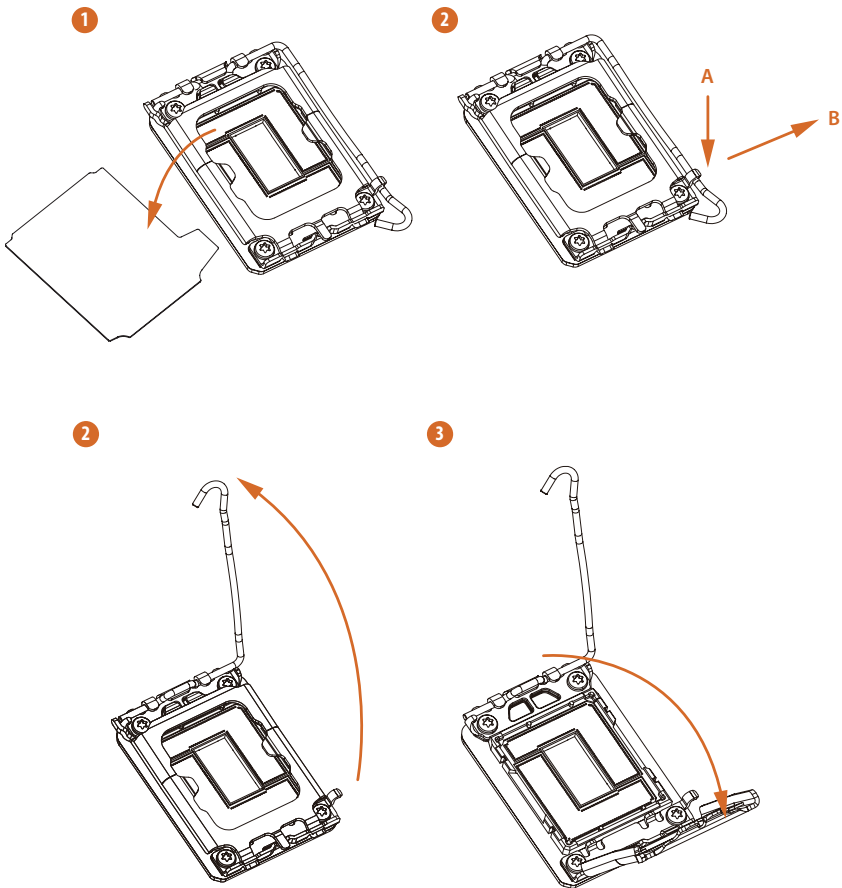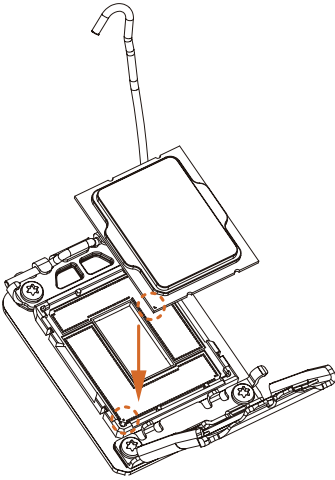
2.2 Installing the CPU
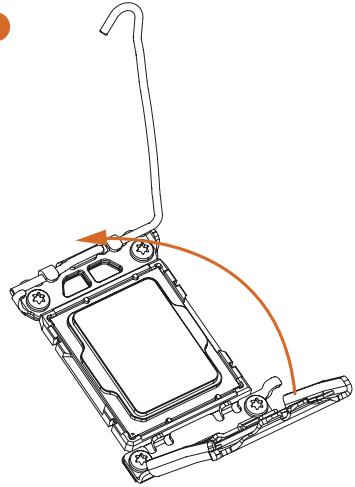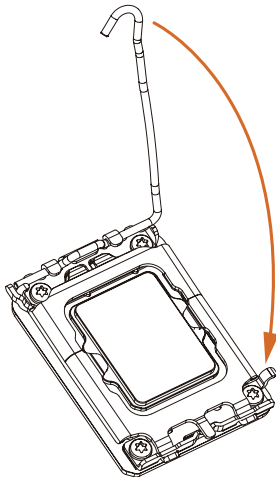
Please save and replace the cover if the processor is removed. The cover must be placed if you wish to return the motherboard for after service.

2.3 Installing the Water-cooling Module

❶ Installing the Water-cooling Module
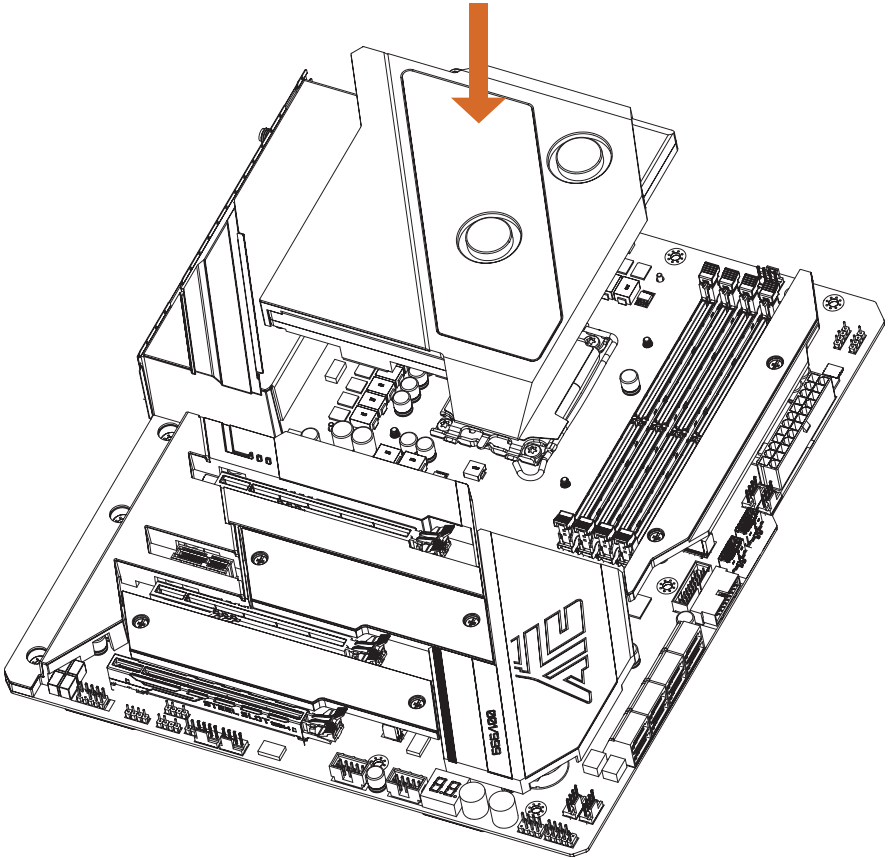
2 Installing the CPU Backplate
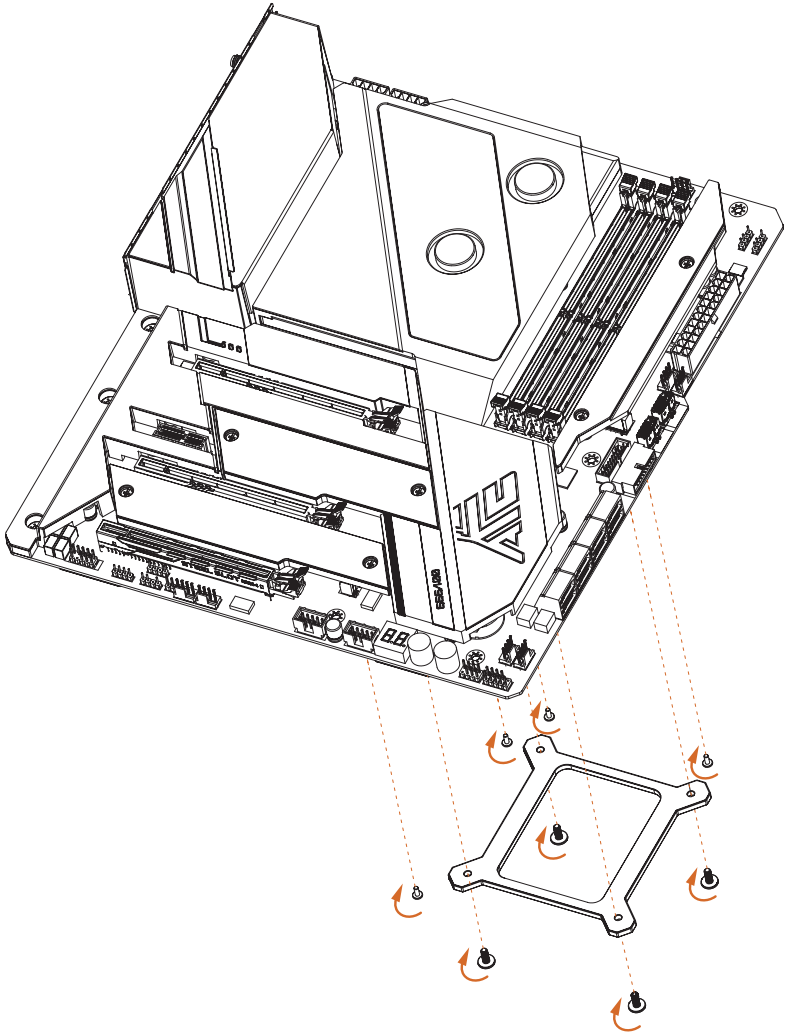
When you install the backplate back to the bottom side of the motherboard, please make sure to install screws in the order shown below.
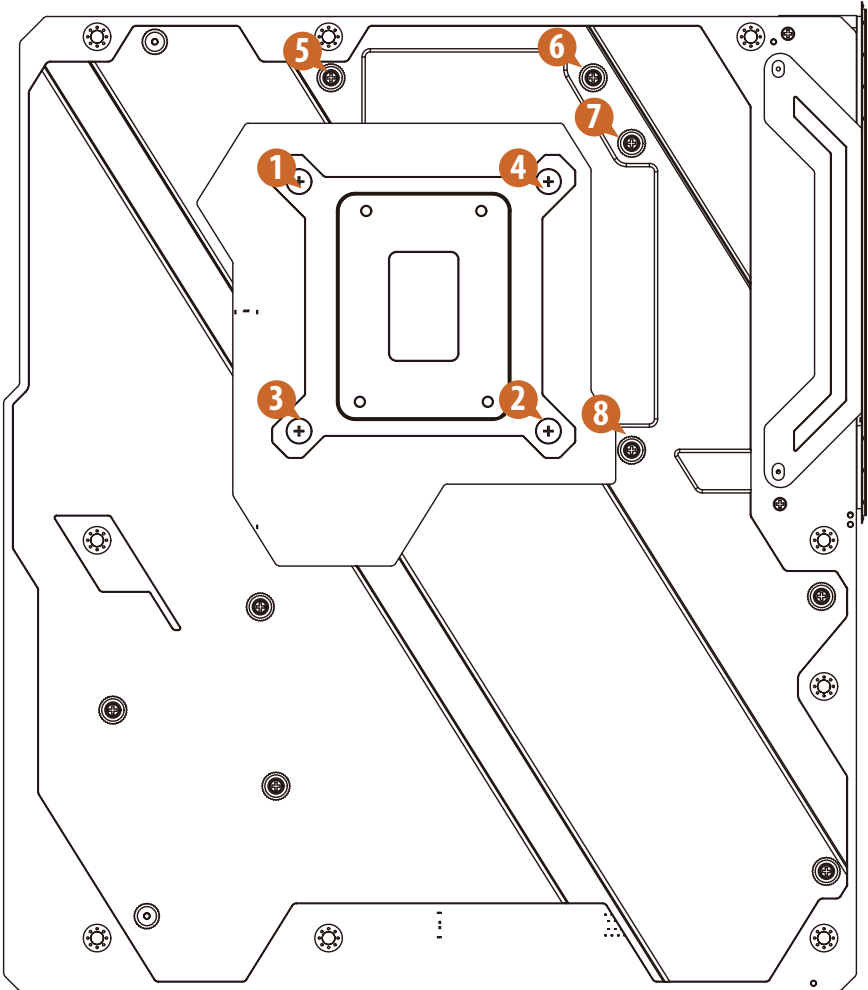
2.4 Installing Memory Modules (DIMM)

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

1. *For dual channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR5 DIMM pairs.*
2. *It is unable to activate Dual Channel Memory Technology with only one or three memory module installed.*
3. *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.*

Dual Channel Memory Configuration

Priority	DDR5_A1	DDR5_A2	DDR5_B1	DDR5_B2
1		Populated		Populated
2	Populated	Populated	Populated	Populated

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.
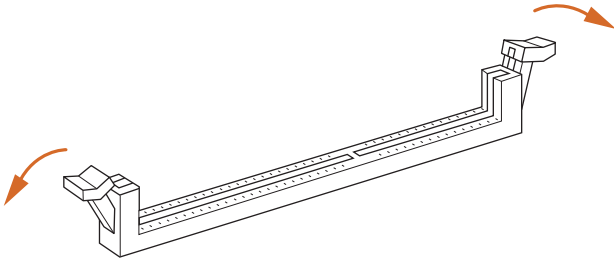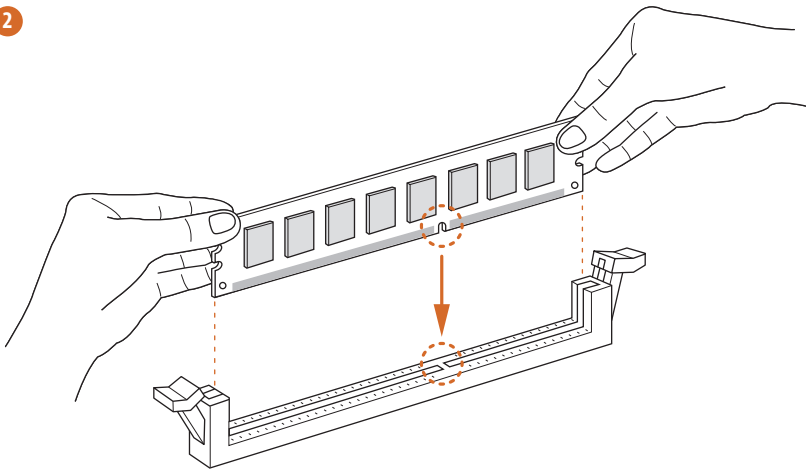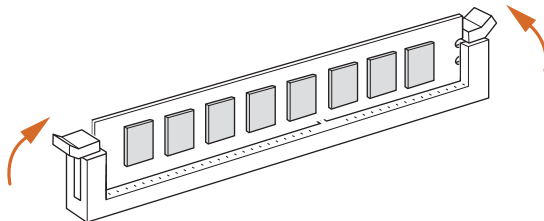
2.5 Installing the Motherboard

❶

❷
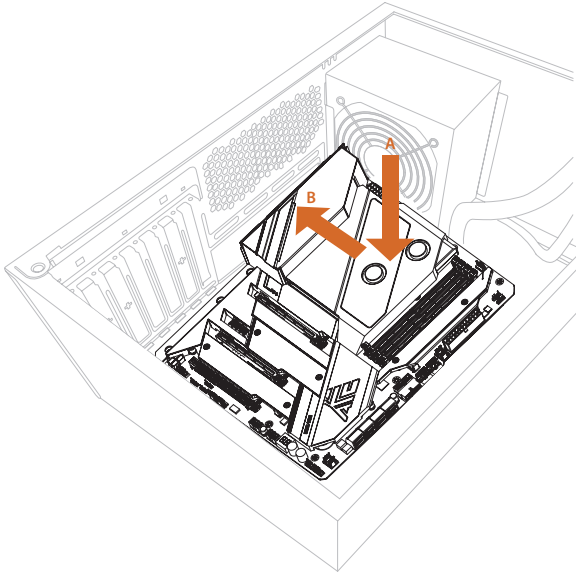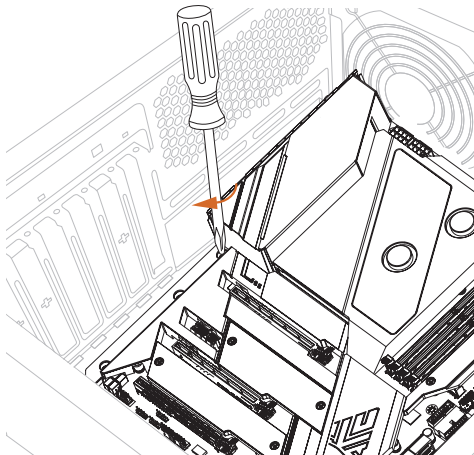
2.6 Expansion Slots (PCIe Slots)

There are 4 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 3.0 x1 slot) is used for PCIe x1 lane width cards.

PCIE3 (PCIe 5.0 x16 slot) is used for PCIe x8 lane width graphics cards.

PCIE4 (PCIe 4.0 x16 slot) is used for PCIe x4 lane width graphics cards.

PCIe Slot Configurations

	PCIE1	PCIE3
Single Graphics Card	Gen5x16	N/A
Two Graphics Cards in CrossFire™ Mode	Gen5x8	Gen5x8

🔍 *For a better thermal environment, please connect a chassis fan to the motherboard's chassis fan connector (CHA_FAN1~6/WP) when using multiple graphics cards.*

2.7 Connecting Graphics Card to DisplayPort Input

> ⚠️ *If you use a Thunderbolt™ Type-C monitor, make sure that you install the DisplayPort Cables into both DPIN_1 and DPIN_2 on the motherboard's rear I/O panel.*

Installation Procedure

Step 1: Connecting a Graphics Card to DPIN1

Connect one end of the DisplayPort Cable to the **DisplayPort IN Port (A)** on the graphics card. Then connect the other end of the cable to the **DisplayPort Port (B)** on the motherboard's rear I/O panel.
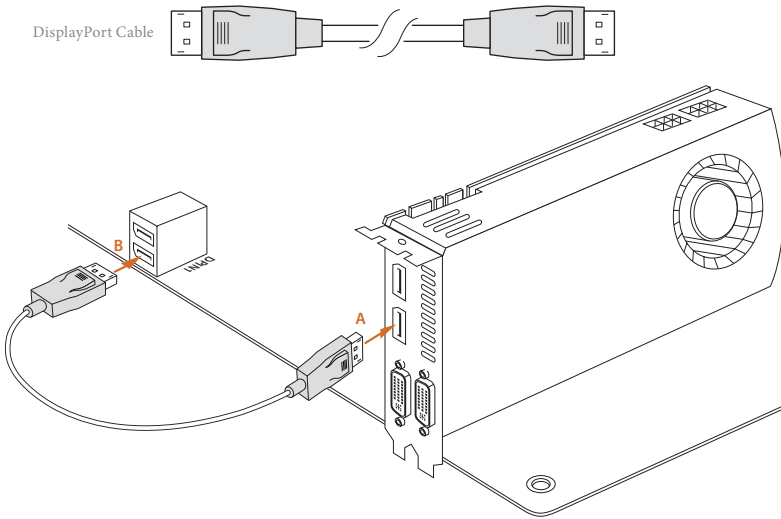
DisplayPort Cable

For USB Type C Monitor Connection:

Input	Output
DPIN_1	TB_1

TB_1   DPIN_1
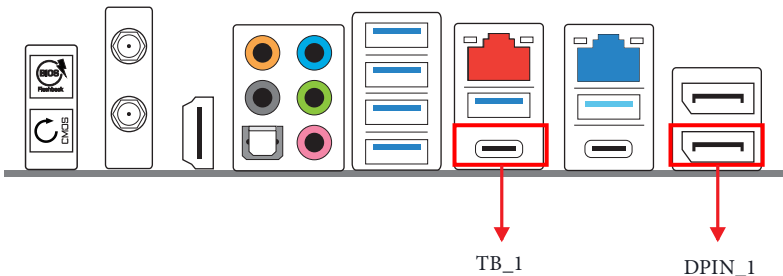
Step 2: Connecting a Graphics Card to DPIN2

Connect one end of the DisplayPort Cable to the **DisplayPort IN Port (A)** on the graphics card. Then connect the other end of the cable to the **DisplayPort Port (B)** on the motherboard's rear I/O panel.

DisplayPort Cable
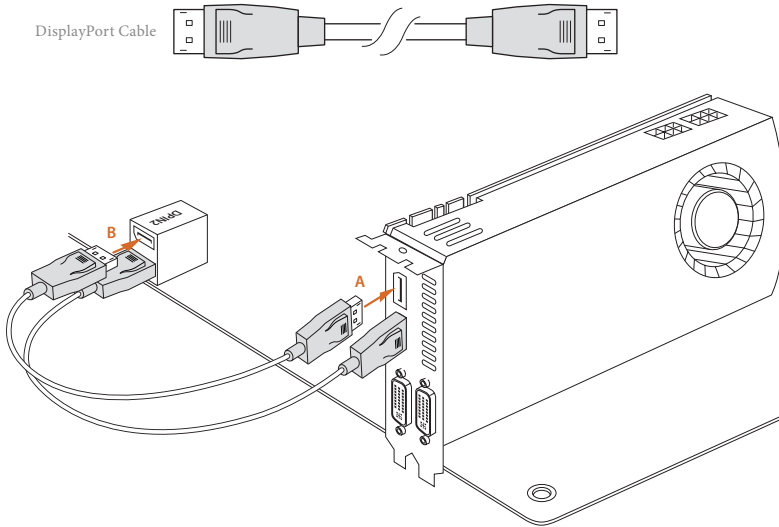
For USB Type C Monitor Connection:

Input	Output
DPIN_2	TB_2

TB_2   DPIN_2
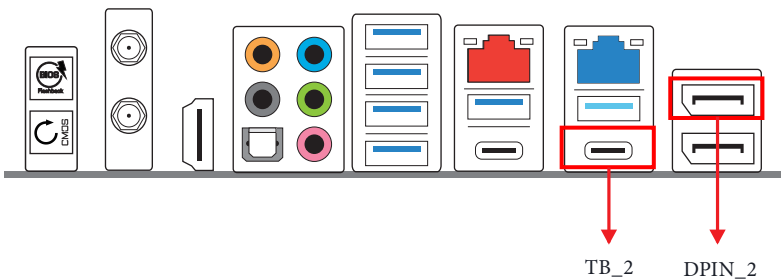
2.8 Jumpers Setup

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".
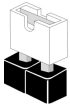
Short   Open

| Clear CMOS Jumper (CLRMOS1) (see p.8, No. 33) | 2-pin Jumper | Short: Clear CMOS Open: Default |

CLRMOS1 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 CLRMOS1 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.

2.9 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.8, No. 24)

PLED+
PLED-
PWRBTN#
GND

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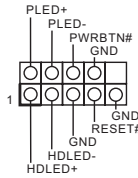
Connect the power button, reset button and system status indicator on the chassis to this header according to the pin assignments below. Note the positive and negative pins before connecting the cables.

🔍 **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.

Power LED and Speaker
Header
(7-pin SPK_PLED1)
(see p.8, No. 25)

SPEAKER
DUMMY
DUMMY
+5V

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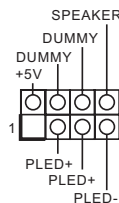
Please connect the chassis power LED and the chassis speaker to this header.

Serial ATA3 Connectors
Right Angle:
(SATA3_0:
see p.8, No. 16)(Upper)
(SATA3_1:
see p.8, No. 16)(Lower)
(SATA3_2
see p.8, No. 17)(Upper)
(SATA3_3:
see p.8, No. 17)(Lower)
(SATA3_A1:
see p.8, No. 18)(Upper)
(SATA3_A2:
see p.8, No. 18)(Upper)
(SATA3_A3:
see p.8, No. 19)(Upper)
(SATA3_A4:
see p.8, No. 19)(Upper)

SATA3_0   SATA3_1
SATA3_2   SATA3_3
SATA3_A1 SATA3_A2
SATA3_A3 SATA3_A4
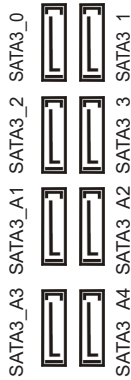
These eight SATA3
connectors support SATA
data cables for internal
storage devices with up to
6.0 Gb/s data transfer rate.
*To minimize the boot
time, use Intel® Z690
SATA ports (SATA3_0~3)
for your bootable devices.
* If M2_2 is occupied by
a SATA-type M.2 device,
SATA3_0 will be disabled.

USB 2.0 Headers
(9-pin USB_1_2)
(see p.8, No. 29)
(9-pin USB_3_4)
(see p.8, No. 28)

USB_PWR
P-
P+
GND
DUMMY
GND
P+
P-
USB_PWR
1
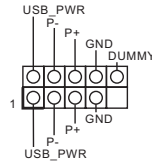
There are two headers
on this motherboard.
Each USB 2.0 header can
support two ports.

USB 3.2 Gen1 Headers
Right Angle:
(19-pin USB3_5_6)
(see p.8, No. 15)

1
Dummy   IntA_PA_D+
IntA_PB_D+   IntA_PA_D-
IntA_PB_D-   GND
GND   IntA_PA_SSTX+
IntA_PB_SSTX+ IntA_PA_SSTX-
IntA_PB_SSTX- GND
GND   IntA_PA_SSRX+
IntA_PB_SSRX+ IntA_PA_SSRX-
IntA_PB_SSRX- Vbus
Vbus
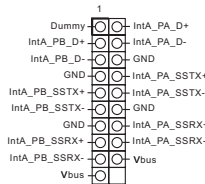
There are two headers on
this motherboard. Each
USB 3.2 Gen1 header can
support two ports.

Vertical:
(19-pin USB3_7_8)
(see p.8, No. 14)

Vbus
Vbus   IntA_PB_SSRX-
IntA_PA_SSRX- IntA_PB_SSRX+
IntA_PA_SSRX+ GND
GND   IntA_PB_SSTX-
IntA_PA_SSTX- IntA_PB_SSTX+
IntA_PA_SSTX+ GND
GND   IntA_PB_D-
IntA_PA_D-   IntA_PB_D+
IntA_PA_D+   Dummy
1

36
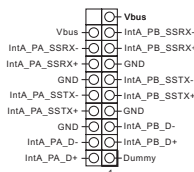
Front Panel Type C USB
3.2 Gen2x2 Headers
(20-pin F_USB32_TC_1)
(see p.8, No. 12)
(20-pin F_USB32_TC_2)
(see p.8, No. 13)

USB Type-C Cable
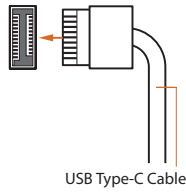
There are two Front
Panel Type C USB 3.2
Gen2x2 Headers on this
motherboard. This header
is used for connecting a
USB 3.2 Gen2x2 module
for additional USB 3.2
Gen2x2 ports.

Front Panel Audio Header
(9-pin HD_AUDIO1)
(see p.8, No. 36)

MIC2_L
MIC2_R
OUT2_R
J_SENSE
OUT2_L

OUT_RET
MIC_RET
PRESENCE#
GND
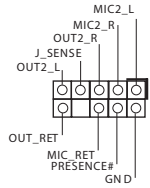
This header is for
connecting audio devices
to the front audio panel.

> *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.8, No. 11)
(4-pin CHA_FAN2/WP)
(see p.8, No. 10)
(4-pin CHA_FAN3/WP)
(see p.8, No. 22)
(4-pin CHA_FAN4/WP)
(see p.8, No. 23)

FAN_SPEED_CONTROL   4
CHA_FAN_SPEED   3
FAN_VOLTAGE   2
GND   1
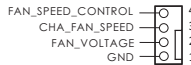
This motherboard
provides six 4-Pin water
cooling chassis fan
connectors. If you plan to
connect a 3-Pin chassis
water cooler fan, please
connect it to Pin 1-3.

(4-pin CHA_FAN5/WP)
(see p.8, No. 32)
(4-pin CHA_FAN6/WP)
(see p.8, No. 31)

```
GND
  FAN_VOLTAGE
    CHA_FAN_SPEED
      FAN_SPEED_CONTROL
```
1 2 3 4
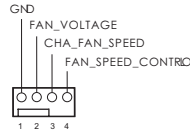
CPU Fan Connector
(4-pin CPU_FAN1)
(see p.8, No. 3)

4 3 2 1

```
        GND
     +12V
   CPU_FAN_SPEED
FAN_SPEED_CONTROL
```
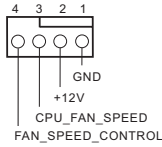
This motherboard
provides a 4-Pin CPU fan
(Quiet Fan) connector.
If you plan to connect a
3-Pin CPU fan, please
connect it to Pin 1-3.

CPU/Water Pump Fan
Connector
(4-pin CPU_FAN2/
WP_3A)
(see p.8, No. 5)

4 3 2 1

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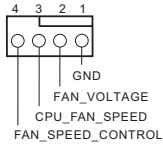
This motherboard
provides a 4-Pin water
cooling CPU fan
connector. If you plan
to connect a 3-Pin CPU
water cooler fan, please
connect it to Pin 1-3.

ATX Power Connector
(24-pin ATXPWR1)
(see p.8, No. 9)

12   24

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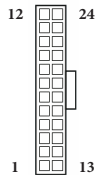
This motherboard pro-
vides a 24-pin ATX power
connector. To use a 20-pin
ATX power supply, please
plug it along Pin 1 and Pin
13.

ATX 12V Power
Connectors
(8-pin ATX12V1)
(see p.8, No. 1)
(8-pin ATX12V2)
(see p.8, No. 2)

8   5

4   1
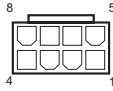
This motherboard provides two 8-pin ATX 12V power connectors. To use a 4-pin ATX power supply, please plug it along Pin 1 and Pin 5.
*Connecting an ATX 12V 8-pin cable to ATX12V2 is optional.
Warning: Please make sure that the power cable connected is for the CPU and not the graphics card. Do not plug the PCIe power cable to this connector.

SPI TPM Header
(13-pin SPI_TPM_J1)
(see p.8, No. 30)

SPI_DQ3
SPI_PWR
Dummy
CLK
SPI_MOSI
RST#
TPM_PIRQ

1

SPI_TPM_CS#
GND
RSMRST#
SPI_MISO
SPI_CS0
SPI_DQ2
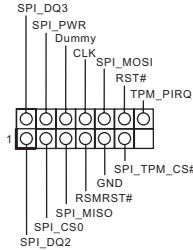
This connector supports SPI Trusted Platform Module (TPM) system, which can securely store keys, digital certificates, pass-words, and data. A TPM system also helps enhance network security, protects digital identities, and ensures platform integrity.

RGB LED Header
(4-pin RGB_LED1)
(see p.8, No. 35)

1
+12V G   R   B

This RGB header is used to connect RGB LED extension cable which allow users to choose from various LED lighting effects.
Caution: Never install the RGB LED cable in the wrong orientation; otherwise, the cable may be damaged.
*Please refer to page 78 for further instructions on this header.

English

Addressable LED Headers
(3-pin ADDR_LED1)
(see p.8, No. 34)

1 ⬜⬜ ⬜
     GND
  DO_ADDR
VOUT

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.

(3-pin ADDR_LED2)
(see p.8, No. 7)
(3-pin ADDR_LED3)
(see p.8, No. 8)

⬜ GND
⬜ DO_ADDR
⬜ VOUT
1

*Please refer to page 79 for further instructions on this header.

2.10 Smart Switches

The motherboard has six smart switches: Power Button, Reset Button, Clear CMOS Buttons, Retry Button, Safe Boot Button and BIOS Flashback Button, allowing users to quickly turn on/off the system, reset the system, clear the CMOS values, force the system shutdown, safely boot the system or flash the BIOS.

Power Button
(PWRBTN1)
(see p.8, No. 26)

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

Reset Button
(RSTBTN1)
(see p.8, No. 27)

Reset Button allows users to quickly reset the system.

Clear CMOS Button
(CLRCMOS1)
(see p.11, No. 19)

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

☆ *This function is workable only when you power off your computer and unplug the power supply, or press and hold this button for two seconds under S5 mode.*

Retry Button
(RTY_BTN1)
(see p.8 No. 21)

Reset Button allows users to restart system immediately when the system needs to be forced shutdown.

Safe Boot Button
(BFG_BTN1)
(see p.8 No. 20)

If press this button, the next boot of the system will use BIOS default setting.

BIOS Flashback Button
(BIOS_FB)
(see p.11, No. 1)

BIOS Flashback Switch allows users to flash the BIOS.

ASRock BIOS Flashback feature allows you to update BIOS without powering on the system, even without CPU.

> ⚠ *Before using the BIOS Flashback function, please suspend BitLocker and any encryption or security relying on the TPM. Make sure that you have already stored and backup-ed the recovery key. If the recovery key is missing while encryption is active, the data will stay encrypted and the system will not boot into the operating system. It is recommended to disable fTPM before updating the BIOS. Otherwise an unpredictable failure may occur.*

To use the USB BIOS Flashback function, Please follow the steps below.

1. Download the latest BIOS file from ASRock's website : http://www.asrock.com.
2. Copy the BIOS file to your USB flash drive. Please make sure the file system of
   your USB flash drive must be FAT32.
3. Extract BIOS file from the zip file.
4. Rename the file to "**creative.rom**" and save it to the root directory of X: USB flash drive.
5. Plug the 24 pin power connector to the motherboard. Then turn on the power supply's AC switch.
   *There is no need to power on the system.
6. Then plug your USB drive to the USB BIOS Flashback port.
7. Press the BIOS Flashback Switch for about three seconds. Then the LED starts to blink.
8. Wait until the LED stops blinking, indicating that BIOS flashing has been completed.
   *If the LED light turns solid green, this means that the BIOS Flashback is not
   operating properly. Please make sure that you plug the USB drive to the USB BIOS Flashback
   port.
   **If the LED does not light up at all then please disconnect power from the system and remove/
   disconnect the CMOS battery from the motherboard for several minutes. Reconnect power
   and battery and try again.
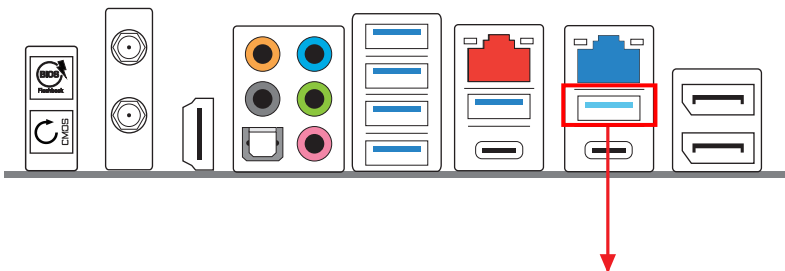
USB BIOS Flashback port

2.11 Status OLED

Status OLED shows various information of the system on a new OLED screen. It displays information of the power on self test, fan speed, temperatures, frequencies and voltages on the motherboard. With the Status OLED, you can also check that if your CPU or DRAM is properly installed

2.12 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

English

2.13 CrossFire™ Operation Guide

This motherboard supports CrossFire™ that allows you to install up to two identical PCI Express x16 graphics cards.

> ☆
> 1. You should only use identical CrossFire™-ready graphics cards that are AMD certified.
> 2. Make sure that your graphics card driver supports AMD CrossFire™ technology. Download the drivers from the AMD's website: www.amd.com
> 3. Make sure that your power supply unit (PSU) can provide at least the minimum power your system requires. It is recommended to use a AMD certified PSU. Please refer to the AMD's website for details.
> 4. If you pair a 12-pipe CrossFire™ Edition card with a 16-pipe card, both cards will operate as 12-pipe cards while in CrossFire™ mode.
> 5. Different CrossFire™ cards may require different methods to enable CrossFire™. Please refer to AMD graphics card manuals for detailed installation guide.

2.13.1 Installing Two CrossFire™-Ready Graphics Cards
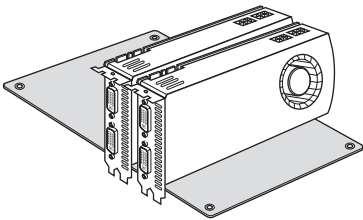
Step 1

Insert one graphics card into PCIE1 slot and the other graphics card to PCIE3 slot. Make sure that the cards are properly seated on the slots.

CrossFire Bridge

Step 2

Connect two graphics cards by installing a CrossFire Bridge on the CrossFire Bridge Interconnects on the top of the graphics cards. (The CrossFire Bridge is provided with the graphics card you purchase, not bundled with this motherboard. Please refer to your graphics card vendor for details.)
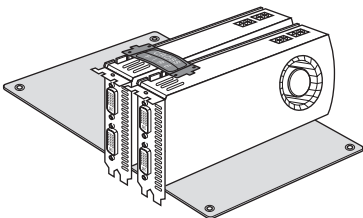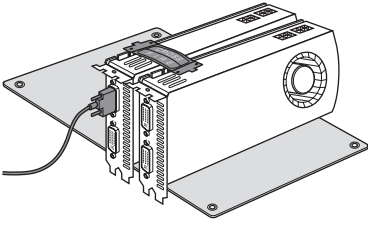
Step 3

Connect a VGA/DVI/DP/HDMI cable from the monitor to the corresponding port on the graphics card installed to the PCIE1 slot.

2.13.2 Driver Installation and Setup

Step 1

Power on your computer and boot into OS.

Step 2

Remove the AMD drivers if you have any VGA drivers installed in your system.

> *The Catalyst Uninstaller is an optional download. We recommend using this utility to uninstall any previously installed Catalyst drivers prior to installation. Please check AMD's website for AMD driver updates.*

Step 3

Install the required drivers and CATALYST Control Center then restart your computer. Please check AMD's website for details.

AMD Catalyst Control Center

Step 4

Double-click the **AMD Catalyst Control Center** icon in the Windows* system tray.
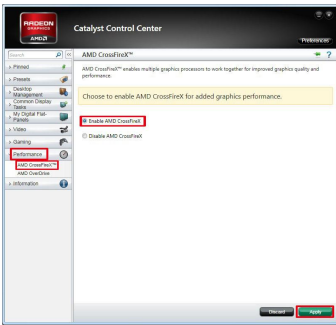
Step 5

In the left pane, click **Performance** and then **AMD CrossFire**^{TM}. Then select **Enable AMD CrossFire** and click **Apply**. Select the GPU number according to your graphics card and click **Apply**.

2.14 M.2_SSD (NGFF) Module Installation Guide (M2_1)

The M.2, also known as the Next Generation Form Factor (NGFF), is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The Hyper M.2 Socket (M2_1, Key M) supports type 2260/2280 PCIe Gen4x4 (64 Gb/s) mode.

Installing the M.2_SSD (NGFF) Module

Step 1

Prepare a M.2_SSD (NGFF) module and the screw.

Step 2

Depending on the PCB type and length of your M.2_SSD (NGFF) module, 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 (NGFF) SSD module, 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 module.

Step 4

Prepare the M.2 standoff that comes with the package. Then hand tighten the standoff into the desired nut location on the motherboard. Align and gently insert the M.2 (NGFF) SSD module into the M.2 slot. Please be aware that the M.2 (NGFF) SSD module only fits in one orientation.

Step 5

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

Step 6

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 module and M.2 heatsink.

M.2_SSD (NGFF) Module Support List (M2_1)

Vendor	Interface	P/N
ADATA	PCIe3 x4	ASX7000NP-128GT-C
ADATA	PCIe3 x4	ASX8000NP-256GM-C
ADATA	PCIe3 x4	ASX7000NP-256GT-C
ADATA	PCIe3 x4	ASX8000NP-512GM-C
ADATA	PCIe3 x4	ASX7000NP-512GT-C
Apacer	PCIe3 x4	AP240GZ280
Corsair	PCIe3 x4	CSSD-F240GBMP500
Intel	PCIe3 x4	SSDPEKKF256G7
Intel	PCIe3 x4	SSDPEKKF512G7
Kingston	PCIe3 x4	SKC1000/480G
Kingston	PCIe2 x4	SH2280S3/480G
OCZ	PCIe3 x4	RVD400 -M2280-512G (NVME)
PATRIOT	PCIe3 x4	PH240GPM280SSDR NVME
Plextor	PCIe3 x4	PX-128M8PeG
Plextor	PCIe3 x4	PX-1TM8PeG
Plextor	PCIe3 x4	PX-256M8PeG
Plextor	PCIe3 x4	PX-512M8PeG
Plextor	PCIe	PX-G256M6e
Plextor	PCIe	PX-G512M6e
Samsung	PCIe3 x4	SM961 MZVPW128HEGM (NVM)
Samsung	PCIe3 x4	PM961 MZVLW128HEGR (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250) (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250BW) (NVME)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe3 x4	SM951 (MZHPV256HDGL)
Samsung	PCIe3 x4	SM951 (MZHPV512HDGL)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe x4	XP941-512G (MZHPU512HCGL)
SanDisk	PCIe	SD6PP4M-128G
SanDisk	PCIe	SD6PP4M-256G
TEAM	PCIe3 x4	TM8FP2240G0C101
TEAM	PCIe3 x4	TM8FP2480GC110
WD	PCIe3 x4	WDS256G1X0C-00ENX0 (NVME)
WD	PCIe3 x4	WDS512G1X0C-00ENX0 (NVME)

For the latest updates of M.2_SSD (NFGG) module support list, please visit our website for details: http://www.asrock.com

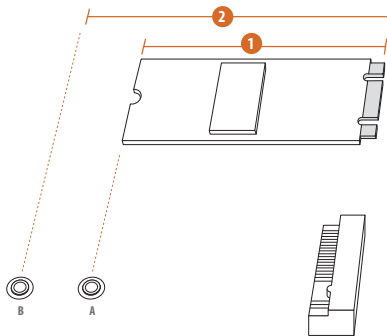## 2.15 M.2_SSD (NGFF) Module Installation Guide (M2_2)

The M.2, also known as the Next Generation Form Factor (NGFF), 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 SATA3 6.0 Gb/s & PCIe Gen4x4 (64 Gb/s) mode.

* If M2_2 is occupied by a SATA-type M.2 device, SATA3_0 will be disabled.

Installing the M.2_SSD (NGFF) Module
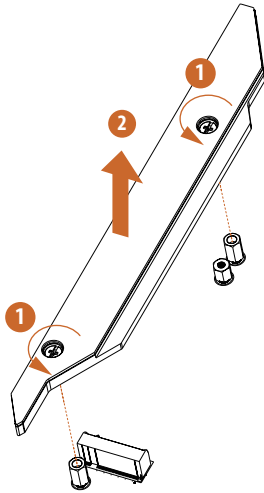
Step 1

Prepare a M.2_SSD (NGFF) module and the screw.

Step 2

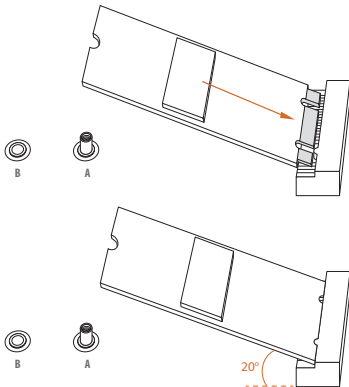Depending on the PCB type and length of your M.2_SSD (NGFF) module, find the corresponding nut location to be used.

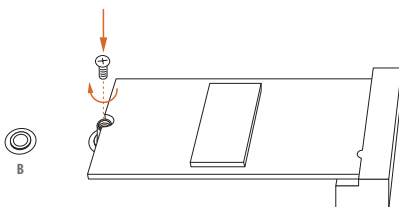| No.	1	2
Nut Location	A	B
PCB Length	6cm	8cm
Module Type	Type2260	Type 2280

Step 3

Before installing a M.2 (NGFF) SSD module, 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 module.

Step 4

Prepare the M.2 standoff that comes with the package. Then hand tighten the standoff into the desired nut location on the motherboard. Align and gently insert the M.2 (NGFF) SSD module into the M.2 slot. Please be aware that the M.2 (NGFF) SSD module only fits in one orientation.

Step 5

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

Step 6

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 module and M.2 heatsink.

M.2_SSD (NGFF) Module Support List (M2_2)

Vendor	Interface	P/N
ADATA	SATA3	AXNS330E-32GM-B
ADATA	SATA3	AXNS381E-128GM-B
ADATA	SATA3	AXNS381E-256GM-B
ADATA	SATA3	ASU800NS38-256GT-C
ADATA	SATA3	ASU800NS38-512GT-C
ADATA	PCIe3 x4	ASX7000NP-128GT-C
ADATA	PCIe3 x4	ASX8000NP-256GM-C
ADATA	PCIe3 x4	ASX7000NP-256GT-C
ADATA	PCIe3 x4	ASX8000NP-512GM-C
ADATA	PCIe3 x4	ASX7000NP-512GT-C
Apacer	PCIe3 x4	AP240GZ280
Corsair	PCIe3 x4	CSSD-F240GBMP500
Crucial	SATA3	CT120M500SSD4
Crucial	SATA3	CT240M500SSD4
Intel	SATA3	Intel SSDSCKGW080A401/80G
Intel	PCIe3 x4	SSDPEKKF256G7
Intel	PCIe3 x4	SSDPEKKF512G7
Kingston	SATA3	SM2280S3
Kingston	PCIe3 x4	SKC1000/480G
Kingston	PCIe2 x4	SH2280S3/480G
OCZ	PCIe3 x4	RVD400 -M2280-512G (NVME)
PATRIOT	PCIe3 x4	PH240GPM280SSDR NVME
Plextor	PCIe3 x4	PX-128M8PeG
Plextor	PCIe3 x4	PX-1TM8PeG
Plextor	PCIe3 x4	PX-256M8PeG
Plextor	PCIe3 x4	PX-512M8PeG
Plextor	PCIe	PX-G256M6e
Plextor	PCIe	PX-G512M6e
Samsung	PCIe3 x4	SM961 MZVPW128HEGM (NVM)
Samsung	PCIe3 x4	PM961 MZVLW128HEGR (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250) (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250BW) (NVME)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe3 x4	SM951 (MZHPV256HDGL)
Samsung	PCIe3 x4	SM951 (MZHPV512HDGL)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe x4	XP941-512G (MZHPU512HCGL)
SanDisk	PCIe	SD6PP4M-128G
SanDisk	PCIe	SD6PP4M-256G
Team	SATA3	TM4PS4128GMC105
Team	SATA3	TM4PS4256GMC105
Team	SATA3	TM8PS4128GMC105

Team	SATA3	TM8PS4256GMC105
TEAM	PCIe3 x4	TM8FP2240G0C101
TEAM	PCIe3 x4	TM8FP2480GC110
Transcend	SATA3	TS256GMTS400
Transcend	SATA3	TS512GMTS600
Transcend	SATA3	TS512GMTS800
V-Color	SATA3	VLM100-120G-2280B-RD
V-Color	SATA3	VLM100-240G-2280RGB
V-Color	SATA3	VSM100-240G-2280
V-Color	SATA3	VLM100-240G-2280B-RD
WD	SATA3	WDS100T1B0B-00AS40
WD	SATA3	WDS240G1G0B-00RC30
WD	PCIe3 x4	WDS256G1X0C-00ENX0 (NVME)
WD	PCIe3 x4	WDS512G1X0C-00ENX0 (NVME)

For the latest updates of M.2_SSD (NFGG) module support list, please visit our website for details: http://www.asrock.com

English

2.16 M.2_SSD (NGFF) Module Installation Guide (M2_3)

The M.2, also known as the Next Generation Form Factor (NGFF), is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The Hyper M.2 Socket (M2_3, Key M), supports type 2242/2260/2280/22110 SATA3 6.0 Gb/s & PCIe Gen4x4 (64 Gb/s) mode.
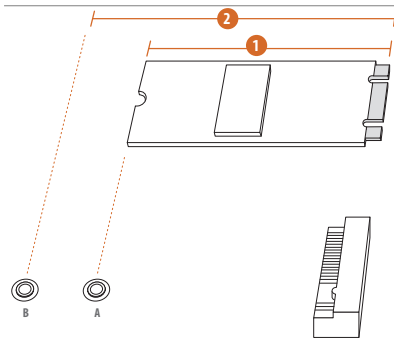
Installing the M.2_SSD (NGFF) Module

Step 1
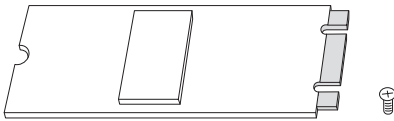
This motherboard supports M.2_SSD (NGFF) module type 2260 and 2280 only. Prepare a proper PCB lenth of module, the screw and the standoff.

Step 2
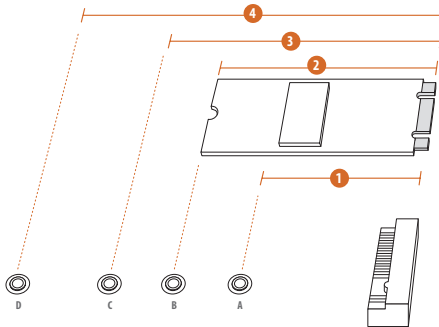
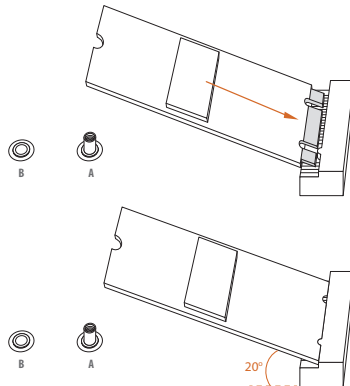Depending on the PCB type and length of your M.2_SSD (NGFF) module, find the corresponding nut location to be used.

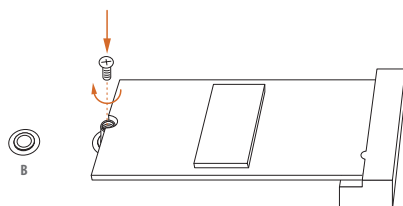| No.	1	2	3	4
Nut Location	A	B	C	D
PCB Length	4.2cm	6cm	8cm	11cm
Module Type	Type 2242	Type2260	Type 2280	Type 22110

Step 3

Before installing a M.2 (NGFF) SSD module, 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 module.
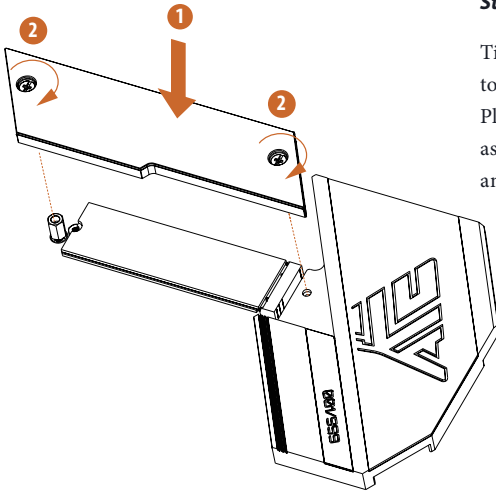
Step 4

Prepare the M.2 standoff that comes with the package. Then hand tighten the standoff into the desired nut location on the motherboard. Align and gently insert the M.2 (NGFF) SSD module into the M.2 slot. Please be aware that the M.2 (NGFF) SSD module only fits in one orientation.

20°

Step 5

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

English

Step 6

Tighten the screw with a screwdriver to secure the module and M.2 heatsink into place. Please do not overtighten the screw as this might damage the module and M.2 heatsink.
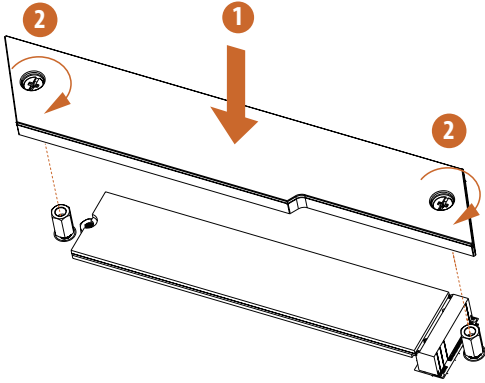
M.2_SSD (NGFF) Module Support List (M2_3)

Vendor	Interface	P/N
ADATA	SATA3	AXNS330E-32GM-B
ADATA	SATA3	AXNS381E-128GM-B
ADATA	SATA3	AXNS381E-256GM-B
ADATA	SATA3	ASU800NS38-256GT-C
ADATA	SATA3	ASU800NS38-512GT-C
ADATA	PCIe3 x4	ASX7000NP-128GT-C
ADATA	PCIe3 x4	ASX8000NP-256GM-C
ADATA	PCIe3 x4	ASX7000NP-256GT-C
ADATA	PCIe3 x4	ASX8000NP-512GM-C
ADATA	PCIe3 x4	ASX7000NP-512GT-C
Apacer	PCIe3 x4	AP240GZ280
Corsair	PCIe3 x4	CSSD-F240GBMP500
Crucial	SATA3	CT120M500SSD4
Crucial	SATA3	CT240M500SSD4
Intel	SATA3	Intel SSDSCKGW080A401/80G
Intel	PCIe3 x4	SSDPEKKF256G7
Intel	PCIe3 x4	SSDPEKKF512G7
Kingston	SATA3	SM2280S3
Kingston	PCIe3 x4	SKC1000/480G
Kingston	PCIe2 x4	SH2280S3/480G
OCZ	PCIe3 x4	RVD400 -M2280-512G (NVME)
PATRIOT	PCIe3 x4	PH240GPM280SSDR NVME
Plextor	PCIe3 x4	PX-128M8PeG
Plextor	PCIe3 x4	PX-1TM8PeG
Plextor	PCIe3 x4	PX-256M8PeG
Plextor	PCIe3 x4	PX-512M8PeG
Plextor	PCIe	PX-G256M6e
Plextor	PCIe	PX-G512M6e
Samsung	PCIe3 x4	SM961 MZVPW128HEGM (NVM)
Samsung	PCIe3 x4	PM961 MZVLW128HEGR (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250) (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250BW) (NVME)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe3 x4	SM951 (MZHPV256HDGL)
Samsung	PCIe3 x4	SM951 (MZHPV512HDGL)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe x4	XP941-512G (MZHPU512HCGL)
SanDisk	PCIe	SD6PP4M-128G
SanDisk	PCIe	SD6PP4M-256G
Team	SATA3	TM4PS4128GMC105
Team	SATA3	TM4PS4256GMC105
Team	SATA3	TM8PS4128GMC105
Team	SATA3	TM8PS4256GMC105

TEAM	PCIe3 x4	TM8FP2240G0C101
TEAM	PCIe3 x4	TM8FP2480GC110
Transcend	SATA3	TS256GMTS400
Transcend	SATA3	TS512GMTS600
Transcend	SATA3	TS512GMTS800
V-Color	SATA3	VLM100-120G-2280B-RD
V-Color	SATA3	VLM100-240G-2280RGB
V-Color	SATA3	VSM100-240G-2280
V-Color	SATA3	VLM100-240G-2280B-RD
WD	SATA3	WDS100T1B0B-00AS40
WD	SATA3	WDS240G1G0B-00RC30
WD	PCIe3 x4	WDS256G1X0C-00ENX0 (NVME)
WD	PCIe3 x4	WDS512G1X0C-00ENX0 (NVME)

For the latest updates of M.2_SSD (NFGG) module support list, please visit our website for details: http://www.asrock.com

Chapter 3 Software and Utilities Operation

3.1 Installing Drivers

The Support CD that comes with the motherboard contains necessary drivers and useful utilities that enhance the motherboard's features.

Running The Support CD

To begin using the support CD, insert the CD into your CD-ROM drive. The CD automatically displays the Main Menu if "AUTORUN" is enabled in your computer. If the Main Menu does not appear automatically, locate and double click on the file "ASRSETUP.EXE" in the Support CD to display the menu.

Drivers Menu

The drivers compatible to your system will be auto-detected and listed on the support CD driver page. Please click **Install All** or follow the order from top to bottom to install those required drivers. Therefore, the drivers you install can work properly.

Utilities Menu

The Utilities Menu shows the application software that the motherboard supports. Click on a specific item then follow the installation wizard to install it.

3.2 ASRock Motherboard Utility (A-Tuning)

ASRock Motherboard Utility (A-Tuning) is ASRock's multi purpose software suite with a new interface, more new features and improved utilities.

3.2.1 Installing ASRock Motherboard Utility (A-Tuning)

ASRock Motherboard Utility (A-Tuning) can be downloaded from ASRock Live Update & APP Shop. After the installation, you will find the icon "ASRock Motherboard Utility (A-Tuning)" on your desktop. Double-click the "ASRock Motherboard Utility (A-Tuning)" icon, ASRock Motherboard Utility (A-Tuning) main menu will pop up.

3.2.2 Using ASRock Motherboard Utility (A-Tuning)

There are five sections in ASRock Motherboard Utility (A-Tuning) main menu: Operation Mode, OC Tweaker, System Info, FAN-Tastic Tuning and Settings.

Operation Mode

Choose an operation mode for your computer.
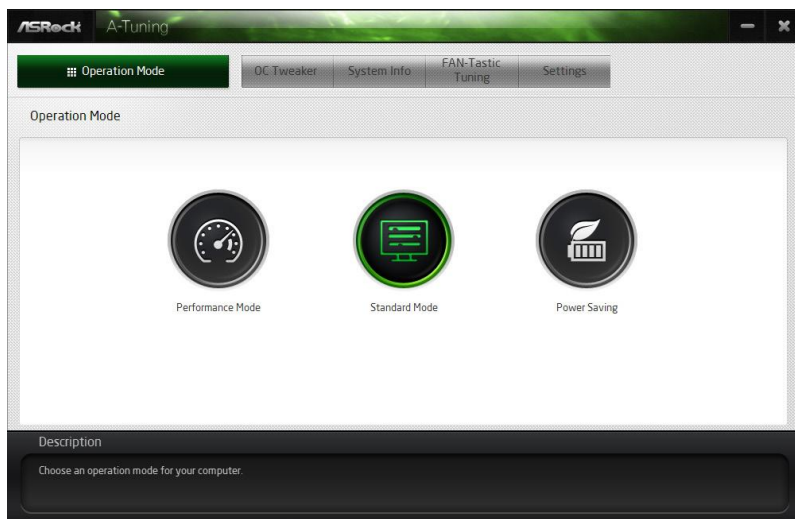
OC Tweaker

Configurations for overclocking the system.
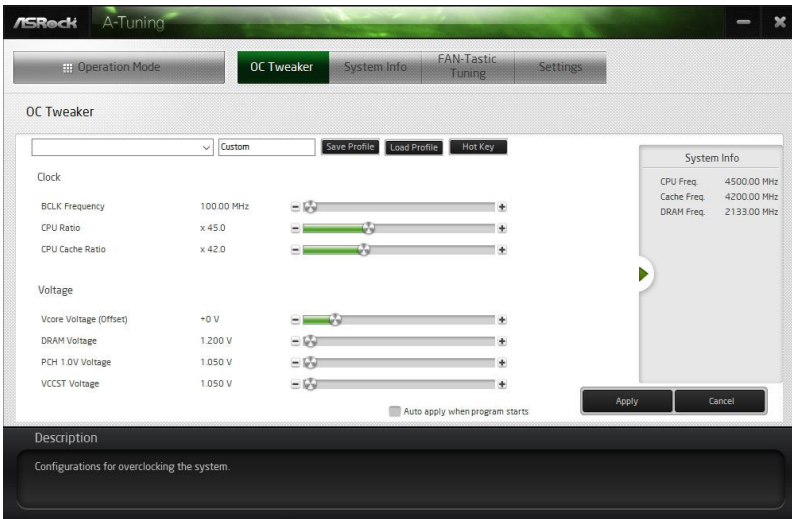
System Info
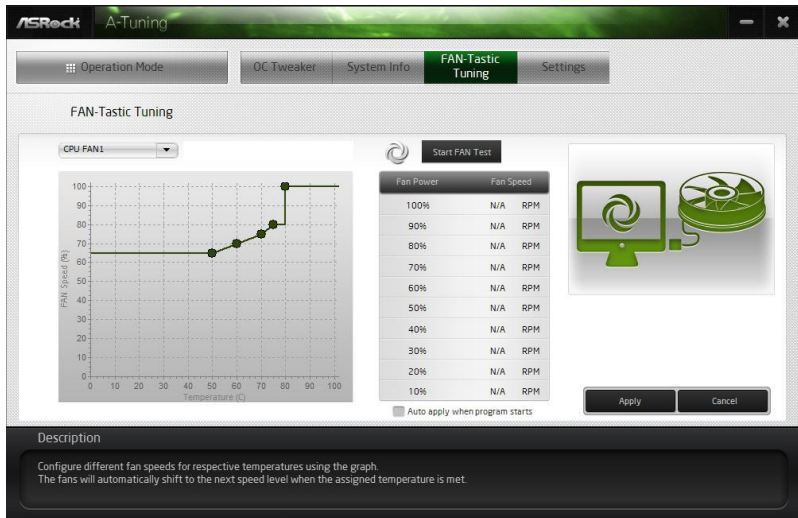
View information about the system.

*The System Browser tab may not appear for certain models.
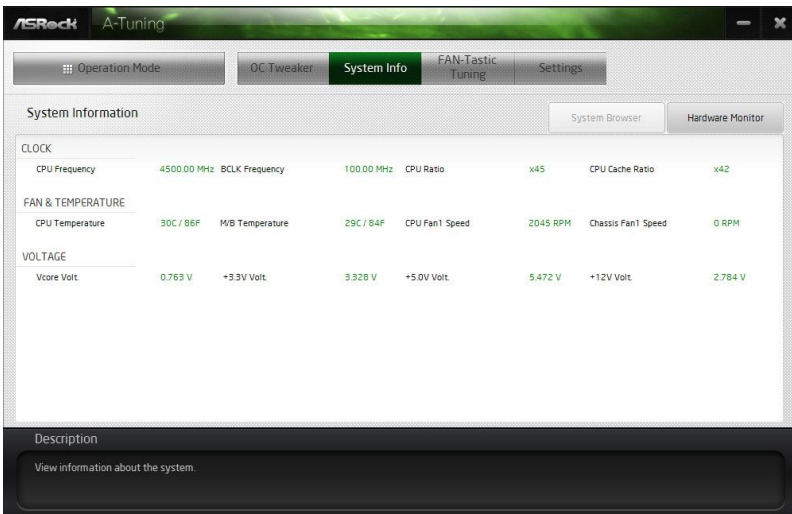
FAN-Tastic Tuning

Configure up to five different fan speeds using the graph. The fans will automatically shift to the next speed level when the assigned temperature is met.

Settings

Configure ASRock ASRock Motherboard Utility (A-Tuning). Click to select "Auto run at Windows Startup" if you want ASRock Motherboard Utility (A-Tuning) to be launched when you start up the Windows operating system.

3.3 ASRock Live Update & APP Shop

The ASRock Live Update & APP Shop is an online store for purchasing and downloading software applications for your ASRock computer. You can quickly and easily install various apps and support utilities. With ASRock Live Update & APP Shop, you can optimize your system and keep your motherboard up to date simply with a few clicks.

Double-click ![icon] on your desktop to access ASRock Live Update & APP Shop utility.

You need to be connected to the Internet to download apps from the ASRock Live Update & APP Shop.

3.3.1 UI Overview

Category Panel

Hot News

Information Panel

Category Panel: The category panel contains several category tabs or buttons that when selected the information panel below displays the relative information.

Information Panel: The information panel in the center displays data about the currently selected category and allows users to perform job-related tasks.

Hot News: The hot news section displays the various latest news. Click on the image to visit the website of the selected news and know more.

English

3.3.2 Apps

When the "Apps" tab is selected, you will see all the available apps on screen for you to download.

Installing an App

Step 1

Find the app you want to install.

The most recommended app appears on the left side of the screen. The other various apps are shown on the right. Please scroll up and down to see more apps listed.

You can check the price of the app and whether you have already intalled it or not.

- The red icon displays the price or "Free" if the app is free of charge.

- The green "Installed" icon means the app is installed on your computer.

Step 2

Click on the app icon to see more details about the selected app.

Step 3

If you want to install the app, click on the red icon [Free] to start downloading.

Step 4

When installation completes, you can find the green "Installed" icon appears on the upper right corner.
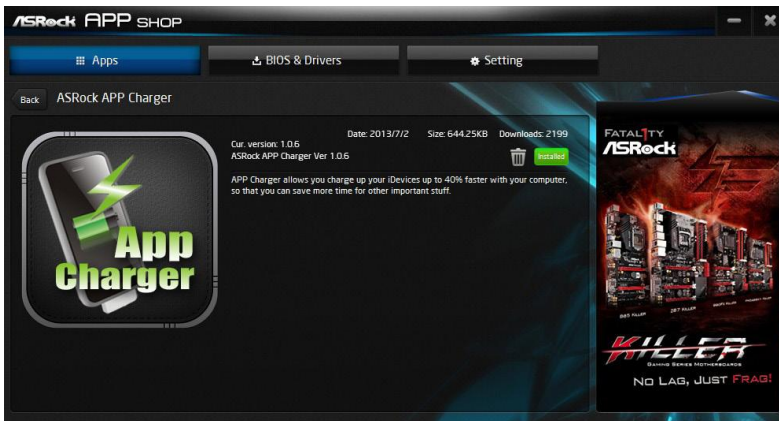
To uninstall it, simply click on the trash can icon 🗑.
*The trash icon may not appear for certain apps.

Upgrading an App

You can only upgrade the apps you have already installed. When there is an available new version for your app, you will find the mark of "New Version" [New Version] appears below the installed app icon.

Step 1

Click on the app icon to see more details.

Step 2

Click on the yellow icon [New Version] to start upgrading.

3.3.3 BIOS & Drivers

Installing BIOS or Drivers

When the "BIOS & Drivers" tab is selected, you will see a list of recommended or critical updates for the BIOS or drivers. Please update them all soon.
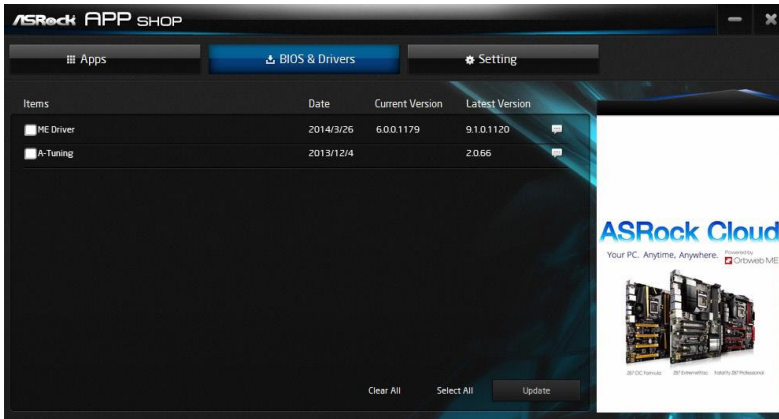
Step 1

Please check the item information before update. Click on 💬 to see more details.

Step 2

Click to select one or more items you want to update.

Step 3

Click Update to start the update process.

3.3.4 Setting

In the "Setting" page, you can change the language, select the server location, and determine if you want to automatically run the ASRock Live Update & APP Shop on Windows startup.
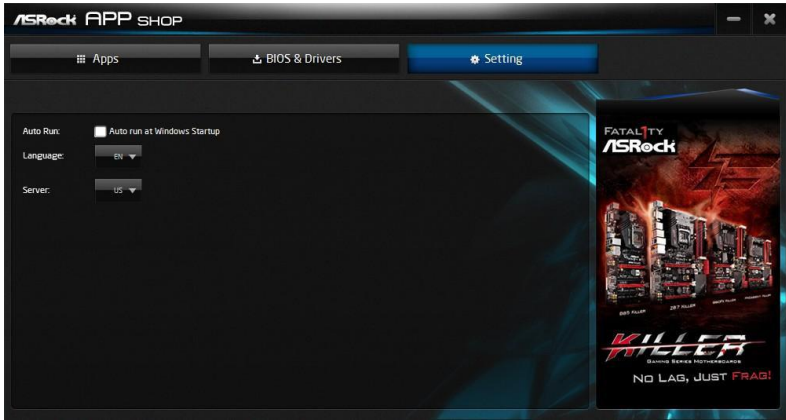
3.4 Nahimic Audio

Nahimic audio software provides an incredible high definition sound technology which boosts the audio and voice performance of your system. Nahimic Audio interface is composed of four tabs: Audio, Microphone, Sound Tracker and Settings.
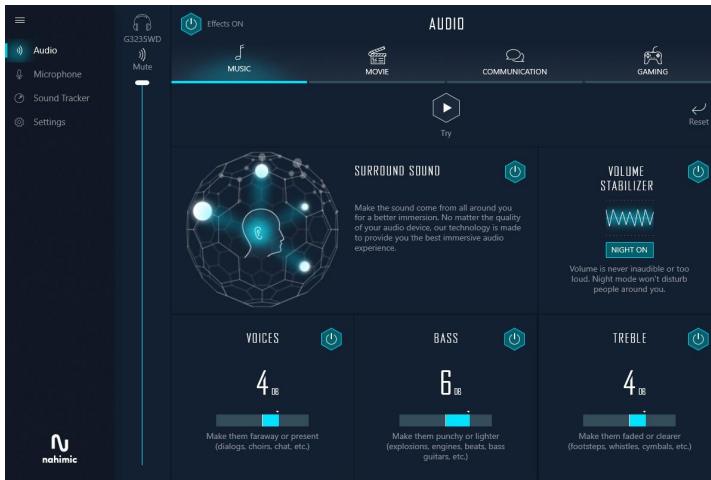
There are four functions in Nahimic audio :

No.	Function	Description
1	Audio	From this tab, you can mute the current audio device, choose between four factory audio profiles, turn all audio effects on/off, restores the current profile to its default settings and access Surround Sound and various features.
2	Microphone	From this tab, you can mute the current mic device, choose between two factory mic profiles, turn/off all microphone effects, restore the current profile to its default settings, and access Static Noise Suppression and various features.
3	Sound Tracker	The Sound Tracker provides a visual indication localizing the sources of the sounds while in a game. These are represented by dynamic segments pointing the direction of the sounds: the more opaque they are, the stronger the sounds are.
4	Settings	From this tab, you can access all settings and information of the software.

3.5 ASRock Polychrome SYNC

ASRock Polychrome SYNC is a lighting control utility specifically designed for unique individuals with sophisticated tastes to build their own stylish colorful lighting system. Simply by connecting the LED strip, you can customize various lighting schemes and patterns, including Static, Breathing, Strobe, Cycling, Music, Wave and more.

Connecting the LED Strip

Connect your RGB LED strip to the **RGB LED Header (RGB_LED1)** on the motherboard.
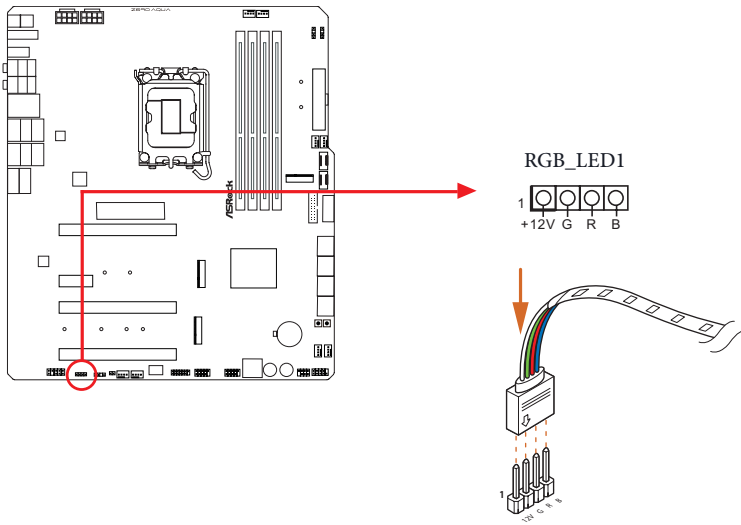
RGB_LED1

+12V G R B

⚠
1. *Never install the RGB LED cable in the wrong orientation; otherwise, the cable may be damaged.*
2. *Before installing or removing your RGB 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 RGB LED strips do not come with the package.*
2. *The RGB LED header supports standard 5050 RGB LED strip (12V/G/R/B), with a maximum power rating of 3A (12V) and length within 2 meters.*

Connecting the Addressable RGB LED Strip

Connect your Addressable RGB LED strips to the **Addressable LED Headers (ADDR_LED1 / ADDR_LED2 / ADDR_LED3)** on the motherboard.
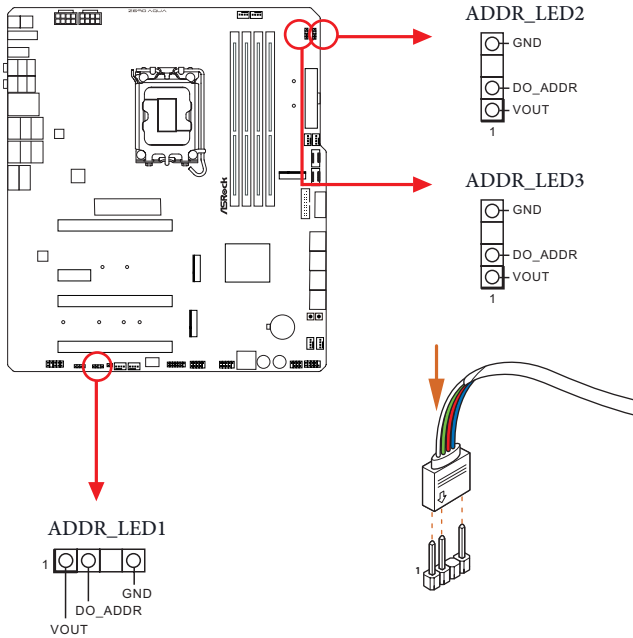
ADDR_LED2

GND

DO_ADDR
VOUT
1

ADDR_LED3

GND

DO_ADDR
VOUT
1

ADDR_LED1

1

GND
DO_ADDR
VOUT

1

> ⚠
> 1. *Never install the RGB LED cable in the wrong orientation; otherwise, the cable may be damaged.*
> 2. *Before installing or removing your RGB 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 RGB LED strips do not come with the package.*
> 2. *The RGB LED header supports WS2812B addressable RGB LED strip (5V/Data/ GND), with a maximum power rating of 3A (5V) and length within 2 meters.*

ASRock Polychrome SYNC Utility

Now you can adjust the RGB LED color through the ASRock Polychrome SYNC Utility. Download this utility from the ASRock Live Update & APP Shop and start coloring your PC style your way!

Drag the tab to customize your preference.

Toggle on/off the RGB LED switch

Select a RGB LED light effect from the drop-down menu.

Sync RGB LED effects for all LED regions of the motherboard
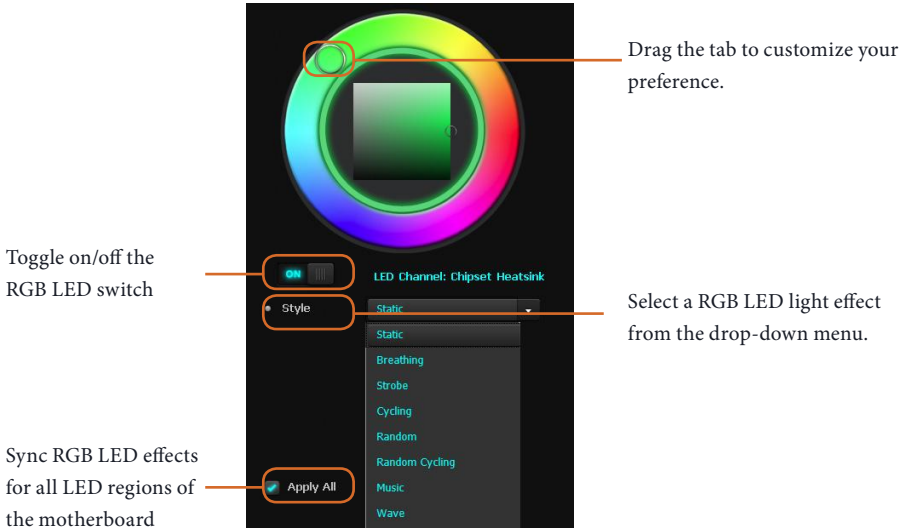
Chapter 4 UEFI SETUP UTILITY

4.1 Introduction

This section explains how to use the UEFI SETUP UTILITY to configure your system. You may run the UEFI SETUP UTILITY by pressing <F2> or <Del> right after you power on the computer, otherwise, the Power-On-Self-Test (POST) will continue with its test routines. If you wish to enter the UEFI SETUP UTILITY after POST, restart the system by pressing <Ctl> + <Alt> + <Delete>, or by pressing the reset button on the system chassis. You may also restart by turning the system off and then back on.

Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions are for reference purpose only, and they may not exactly match what you see on your screen.

4.2 EZ Mode

The EZ Mode screen appears when you enter the BIOS setup program by default. EZ mode is a dashboard which contains multiple readings of the system's current status. You can check the most crucial information of your system, such as CPU speed, DRAM frequency, SATA information, fan speed, etc.

Press <F6> or click the "Advanced Mode" button at the upper right corner of the screen to switch to "Advanced Mode" for more options.
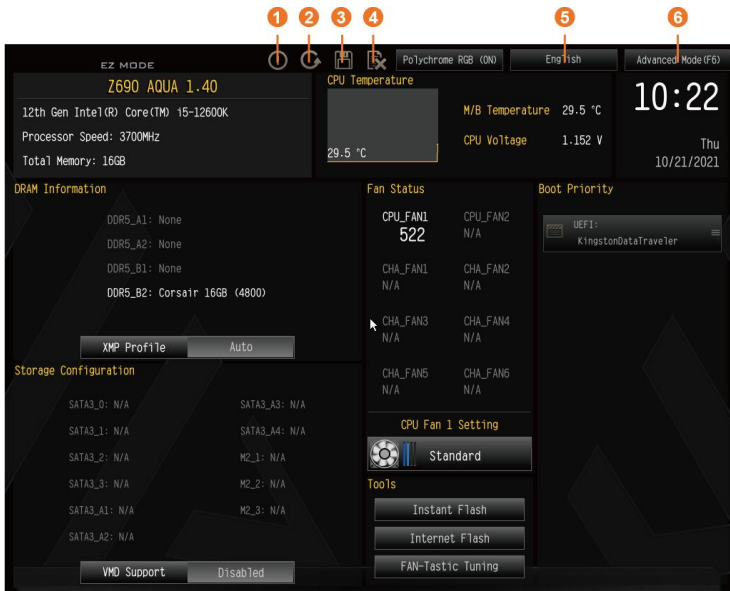
No.	Function
1	Help
2	Load UEFI Defaults
3	Save Changes and Exit
4	Discard Changes
5	Change Language
6	Switch to Advanced Mode

4.3 Advanced Mode

The Advanced Mode provides more options to configure the BIOS settings. Refer to the following sections for the detailed configurations.

To access the EZ Mode, press <F6> or click the "EZ Mode" button at the upper right corner of the screen.

4.3.1 UEFI Menu Bar

The top of the screen has a menu bar with the following selections:

Main	For setting system time/date information
OC Tweaker	For overclocking configurations
Advanced	For advanced system configurations
Tool	Useful tools
H/W Monitor	Displays current hardware status
Security	For security settings
Boot	For configuring boot settings and boot priority
Exit	Exit the current screen or the UEFI Setup Utility

4.3.2 Navigation Keys

Use <←> key or <→> key to choose among the selections on the menu bar, and use < ↑ > key or < ↓ > key to move the cursor up or down to select items, then press <Enter> to get into the sub screen. You can also use the mouse to click your required item.

Please check the following table for the descriptions of each navigation key.

Navigation Key(s)	Description
+ / -	To change option for the selected items
<Tab>	Switch to next function
<PGUP>	Go to the previous page
<PGDN>	Go to the next page
<HOME>	Go to the top of the screen
<END>	Go to the bottom of the screen
<F1>	To display the General Help Screen
<F5>	Add / Remove Favorite
<F7>	Discard changes and exit the SETUP UTILITY
<F9>	Load optimal default values for all the settings
<F10>	Save changes and exit the SETUP UTILITY
<F12>	Print screen
<ESC>	Jump to the Exit Screen or exit the current screen

4.4 Main Screen

When you enter the UEFI SETUP UTILITY, the Main screen will appear and display the system overview.

> *The availability and location of BIOS settings can be different for different models and BIOS versions.*
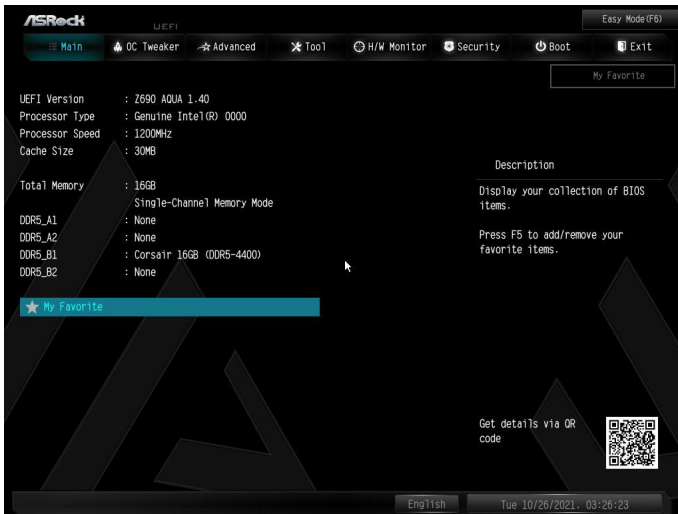
My Favorite

Display your collection of BIOS items. Press F5 to add/remove your favorite items.

4.5 OC Tweaker Screen

In the OC Tweaker screen, you can set up overclocking features.
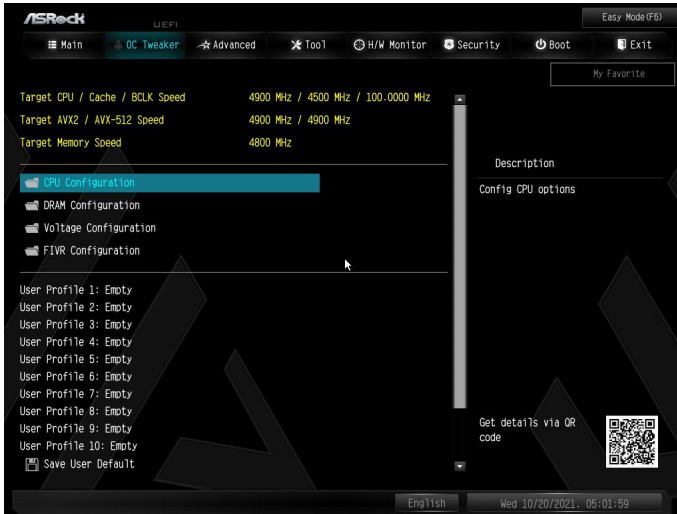
> *Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions are for reference purpose only, and they may not exactly match what you see on your screen.*

CPU Configuration

CPU Turbo Ratio Information

This item allows users to browse the CPU Turbo Ratio information.

CPU Configuration

CPU P-Core Ratio

The CPU speed is determined by the CPU P-Core Ratio multiplied with the BCLK. Increasing the CPU P-Core Ratio will increase the internal CPU clock speed without affecting the clock speed of other components.

AVX2 Ratio Offset

AVX2 Ratio Offset specifies a negative offset from the CPU Ratio for AVX workloads. AVX is a more stressful workload that lower the AVX ratio to ensure maximum possible ratio for SSE workloads.

Core Ratio Extension Mode

Enable or disable core ratio above 85 Extension mode.

[Enabled] Max overclocking ratio limit as specified by OCMB 0x1 command is 120

[Disabled] Max overclocking ratio limit as specified by OCMB 0x1 command is 85

CPU E-Core Ratio

The E-Core speed is determined by the E-Core Ratio multiplied with the BCLK. Increasing the E-Core Ratio will increase the internal E-Core clock speed without affecting the clock speed of other components.

CPU Cache Ratio

The CPU Internal Bus Speed Ratio. The maximum should be the same as the CPU Ratio.

BCLK Frequency

The CPU speed is determined by the CPU Ratio multiplied with the BCLK. Increasing the BCLK will increase the internal CPU clock speed but also affect the clock speed of other components.

BCLK Advanced Setting

Use this item to configure BCLK Advanced Setting.

BCLK Aware Adaptive Voltage

BCLK Aware Adaptive Voltage enable/disable. When enabled, pcode will be aware of the BCLK frequency when calculating the CPU V/F curves. This is ideal for BCLK OC to avoid high voltage overrides.

Boot Performance Mode

Select the performance state that the BIOS will set before OS handoff.

Ring to Core Ratio Offset

Disable Ring to Core Ratio Offset so the ring and core can run at the same frequency.

SA PLL Frequency Override

Configure Sa PLL Frequency.

BCLK TSC HW Fixup

BCLK TSC HW Fixup disable during TSC copy from PMA to APIC

English

FLL Overclocking Mode

Nominal is good for normal core ratio overclocking. Elevated and Extremely Elevated are good for high BCLK OC.

Intel SpeedStep Technology

Intel SpeedStep technology allows processors to switch between multiple frequencies and voltage points for better power saving and heat dissipation.

Intel Turbo Boost Technology

Intel Turbo Boost Technology enables the processor to run above its base operating frequency when the operating system requests the highest performance state.

Intel Speed Shift Technology

Enable/Disable Intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-sates.

Intel Turbo Boost Max Technology 3.0

Intel Turbo Boost Technology enables the processor to run above its base operating frequency when the operating system requests the highest performance state.

Intel Thermal Velocity Boost Ratio Clipping

This service controls core frequency reduction caused by high package temperatures for processors that implement the Intel Thermal Velocity Boost (TVB) feature. It is required to be disabled for supporting overclocking at frequencies higher than the default max turbo frequency.

Intel Thermal Velocity Boost Voltage Optimizations

This service controls thermal based voltage optimizations for processors that implment the Intel Thermal Velocity Boost (TVB) feature.

CPU Tj Max

Set CPU Tj Max to adjust TCC Target Temperature. Default setting is 105°C.

Intel Dynamic Tuning Technology

Enable/Disable Intel Dynamic Platform Thermal Framework.

Dual Tau Boost

Enable Dual Tau Boost feature. This is only applicable for CMLS 35W/65W/125W skus. This item is only supported with processors with Config TDP support.

Long Duration Power Limit

Configure Package Power Limit 1 in watts. When the limit is exceeded, the CPU ratio will be lowered after a period of time. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

Long Duration Maintained

Configure the period of time until the CPU ratio is lowered when the Long Duration Power Limit is exceeded.

Short Duration Power Limit

Configure Package Power Limit 2 in watts. When the limit is exceeded, the CPU ratio will be lowered immediately. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

CPU Core Unlimited Current Limit

To unlock voltage regulator current limit completely, you can set this option to Enabled.

CPU Core Current Limit

Configure the current limit of the CPU core. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

GT Unlimited Current Limit

To unlock voltage regulator current limit completely, you can set this option to Enabled.

GT Current Limit

Configure the current limit of the GT slice. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

DRAM Configuration

Memory Information

Allows users to browse the serial presence detect (SPD) and Intel extreme memory profile (XMP) for DDR5 modules.

DRAM Timing Configuration

Load XMP Setting

English

89

Load XMP settings to overclock the memory and perform beyond standard specifications.

DRAM Reference Clock

Select Auto for optimized settings.

DRAM Frequency

If [Auto] is selected, the motherboard will detect the memory module(s) inserted and assign the appropriate frequency automatically.

DRAM Gear Mode

High gear is good for high frequency.

BCLK Frequency

Configure the BCLK Frequency.

Primary Timing

CAS# Latency (tCL)

The time between sending a column address to the memory and the beginning of the data in response.

RAS# to CAS# Delay and Row Precharge (tRCDtRP)

RAS# to CAS# Delay : The number of clock cycles required between the opening of a row of memory and accessing columns within it.
Row Precharge: The number of clock cycles required between the issuing of the precharge command and opening the next row.

RAS# Active Time (tRAS)

The number of clock cycles required between a bank active command and issuing the precharge command.

Command Rate (CR)

The delay between when a memory chip is selected and when the first active command can be issued.

Secondary Timing

Write Recovery Time (tWR)

The amount of delay that must elapse after the completion of a valid write operation, before an active bank can be precharged.

Write to Read Delay (tWTR_L)

The number of clocks between the last valid write operation and the next read command to the same internal bank.

Write to Read Delay (tWTR_S)

The number of clocks between the last valid write operation and the next read command to the same internal bank.

Refresh Cycle Time 2 (tRFC2)

The number of clocks from a Refresh command until the first Activate command to the same rank.

Refresh Cycle Time per Bank (tRFCpb)

The number of clocks from a Refresh command (per bank) until the first Activate command to the same rank.

RAS to RAS Delay (tRRD_L)

The number of clocks between two rows activated in different banks of the same rank.

RAS to RAS Delay (tRRD_S)

The number of clocks between two rows activated in different banks of the same rank.

Read to Precharge (tRTP)

The number of clocks that are inserted between a read command to a row precharge command to the same rank.

Four Activate Window (tFAW)

The time window in which four activates are allowed the same rank.

CAS Write Latency (tCWL)

Configure CAS Write Latency.

Third Timing

tREFI

Configure refresh cycles at an average periodic interval.

tCKE

Configure the period of time the DDR5 initiates a minimum of one refresh command internally once it enters Self-Refresh mode.

Turn Around Timing

Turn Around Timing Optimization

Auto is enabled in general case.

TAT Training Value

tRDRD_sg

Configure between module read to read delay.

tRDRD_dg

Configure between module read to read delay.

tRDRD_dr

Configure between module read to read delay.

tRDRD_dd

Configure between module read to read delay.

tRDWR_sg

Configure between module read to write delay.

tRDWR_dg

Configure between module read to write delay.

tRDWR_dr

Configure between module read to write delay.

tRDWR_dd

Configure between module read to write delay.

tWRRD_sg

Configure between module write to read delay.

tWRRD_dg

Configure between module write to read delay.

tWRRD_dr

Configure between module write to read delay.

tWRRD_dd

Configure between module write to read delay.

tWRWR_sg

Configure between module write to write delay.

tWRWR_dg

Configure between module write to write delay.

tWRWR_dr

Configure between module write to write delay.

tWRWR_dd

Configure between module write to write delay.

TAT Runtime Value

tRDRD_sg

Configure between module read to read delay.

tRDRD_dg

Configure between module read to read delay.

tRDRD_dr

Configure between module read to read delay.

tRDRD_dd

Configure between module read to read delay.

tRDWR_sg

Configure between module read to write delay.

tRDWR_dg

Configure between module read to write delay.

tRDWR_dr

Configure between module read to write delay.

tRDWR_dd

Configure between module read to write delay.

tWRRD_sg

Configure between module write to read delay.

tWRRD_dg

Configure between module write to read delay.

tWRRD_dr

Configure between module write to read delay.

tWRRD_dd

Configure between module write to read delay.

tWRWR_sg

Configure between module write to write delay.

tWRWR_dg

Configure between module write to write delay.

tWRWR_dr

Configure between module write to write delay.

tWRWR_dd

Configure between module write to write delay.

Round Trip Timing

Round Trip Timing Optimization

Auto is enabled in general case.

Round Trip Level

Configure round trip level.

Initial RTL IO Delay Offset

Configure round trip latency IO delay initial offset.

Initial RTL FIF0 Delay Offset

Configure round trip latency FIF0 delay initial offset.

Initial RTL (MC0 C0 A1/A2)

Configure round trip latency initial value.

Initial RTL (MC0 C1 A1/A2)

Configure round trip latency initial value.

Initial RTL (MC1 C0 B1/B2)

Configure round trip latency initial value.

Initial RTL (MC1 C1 B1/B2)

Configure round trip latency initial value.

RTL (MC0 C0 A1/A2)

Configure round trip latency value.

RTL (MC0 C1 A1/A2)

Configure round trip latency value.

RTL (MC1 C0 B1/B2)

Configure round trip latency value.

RTL (MC1 C1 B1/B2)

Configure round trip latency value.

ODT Setting

Dimm ODT Training

ODT values will be optimized by Dimm On-Die Termination Training.

ODT WR (A1)

Configure the memory on die termination resistors' WR for channel A1.

ODT WR (A2)

Configure the memory on die termination resistors' WR for channel A2.

ODT WR (B1)

Configure the memory on die termination resistors' WR for channel B1.

ODT WR (B2)

Configure the memory on die termination resistors' WR for channel B2.

ODT NOM Rd (A1)

Configure the memory on die termination resistors' NOM Rd for channel A1.

ODT NOM Rd (A2)

Configure the memory on die termination resistors' NOM Rd for channel A2.

ODT NOM Rd (B1)

Configure the memory on die termination resistors' NOM Rd for channel B1.

ODT NOM Rd (B2)

Configure the memory on die termination resistors' NOM Rd for channel B2.

ODT NOM Wr (A1)

Configure the memory on die termination resistors' NOM Wr for channel A1.

ODT NOM Wr (A2)

Configure the memory on die termination resistors' NOM Wr for channel A2.

ODT NOM Wr (B1)

Configure the memory on die termination resistors' NOM Wr for channel B1.

ODT NOM Wr (B2)

Configure the memory on die termination resistors' NOM Wr for channel B2.

ODT PARK (A1)

Configure the memory on die termination resistors' PARK for channel A1.

ODT PARK (A2)

Configure the memory on die termination resistors' PARK for channel A2.

ODT PARK (B1)

Configure the memory on die termination resistors' PARK for channel B1.

ODT PARK (B2)

Configure the memory on die termination resistors' PARK for channel B2.

ODT PARK DQS (A1)

Configure the memory on die termination resistors' PARK DQS for channel A1.

ODT PARK DQS (A2)

Configure the memory on die termination resistors' PARK DQS for channel A2.

ODT PARK DQS (B1)

Configure the memory on die termination resistors' PARK DQS for channel B1.

ODT PARK DQS (B2)

Configure the memory on die termination resistors' PARK DQS for channel B2.

ODT CA (A1 Group A)

Configure the memory on die termination resistors' CA for channel A1 Group A.

ODT CA (A2 Group A)

Configure the memory on die termination resistors' CA for channel A2 Group A.

ODT CA (B1 Group A)

Configure the memory on die termination resistors' CA for channel B1 Group A.

ODT CA (B2 Group A)

Configure the memory on die termination resistors' CA for channel B2 Group A.

ODT CA (A1 Group B)

Configure the memory on die termination resistors' CA for channel A1 Group B.

ODT CA (A2 Group B)

Configure the memory on die termination resistors' CA for channel A2 Group B.

ODT CA (B1 Group B)

Configure the memory on die termination resistors' CA for channel B1 Group B.

ODT CA (B2 Group B)

Configure the memory on die termination resistors' CA for channel B2 Group B.

ODT CS (A1 Group A)

Configure the memory on die termination resistors' CS for channel A1 Group A.

ODT CS (A2 Group A)

Configure the memory on die termination resistors' CS for channel A2 Group A.

ODT CS (B1 Group A)

Configure the memory on die termination resistors' CS for channel B1 Group A.

ODT CS (B2 Group A)

Configure the memory on die termination resistors' CS for channel B2 Group A.

ODT CS (A1 Group B)

Configure the memory on die termination resistors' CS for channel A1 Group B.

ODT CS (A2 Group B)

Configure the memory on die termination resistors' CS for channel A2 Group B.

English

ODT CS (B1 Group B)

Configure the memory on die termination resistors' CS for channel B1 Group B.

ODT CS (B2 Group B)

Configure the memory on die termination resistors' CS for channel B2 Group B.

ODT CK (A1 Group A)

Configure the memory on die termination resistors' CK for channel A1 Group A.

ODT CK (A2 Group A)

Configure the memory on die termination resistors' CK for channel A2 Group A.

ODT CK (B1 Group A)

Configure the memory on die termination resistors' CK for channel B1 Group A.

ODT CK (B2 Group A)

Configure the memory on die termination resistors' CK for channel B2 Group A.

ODT CK (A1 Group B)

Configure the memory on die termination resistors' CK for channel A1 Group B.

ODT CK (A2 Group B)

Configure the memory on die termination resistors' CK for channel A2 Group B.

ODT CK (B1 Group B)

Configure the memory on die termination resistors' CK for channel B1 Group B.

ODT CK (B2 Group B)

Configure the memory on die termination resistors' CK for channel B2 Group B.

Advanced Setting

ASRock Timing Optimization

Configure the fast path through the MRC.

ASRock DRAM Frequency Optimization

Enable/Disable ASRock DRAM Frequency Optimization. When enabled, the DRAM Frequency will run ASRock optimized procedure.

MRC Training Respond Time

Try Slowest MRC Training.

Realtime Memory Timing

Configure the realtime memory timings.

[Enabled] The system will allow performing realtime memory timing changes after MRC_DONE.

Reset for MRC Failed

Reset system after MRC training is failed.

MRC Training on Warm Boot

When enabled, memory training will be executed when warm boot.

MRC Fast Boot

Enable Memory Fast Boot to skip DRAM memory training for booting faster.

Voltage Configuration

Voltage Mode

[OC]: Larger range voltage for overclocking.

[STABLE]: Smaller range voltage for stable system.

CPU Core/Cache Voltage

Input voltage for the processor by the external voltage regulator.

Core/Cache V/F Curve

Configure CPU Core/Cache Voltage/Frequency Curve.

CPU CORE/Cache Load-Line Calibration

CPU Core/Cache Load-Line Calibration helps prevent CPU Core/Cache voltage droop when the system is under heavy loading.

CPU GT Voltage

Configure the voltage for the integrated GPU.

CPU GT Load-Line Calibration

GT Load-Line Calibration helps prevent integrated GPU voltage droop when the system is under heavy load.

VCCIN AUX Voltage

Configure the voltage for the VCCIN AUX.

English

VCCIN AUX Load-Line Calibration

VCCIN AUX Load-Line Calibration helps prevent VCCIN AUX voltage droop when the system is under heavy loading.

VDD_CPU Voltage

Configure the VDD_CPU voltage.

VDD_IMC Voltage

Configure the VDD_IMC voltage.

+0.82V PCH Voltage

Configure the voltage for the +0.82V PCH.

+1.05 PCH Voltage

Configure the voltage for the +1.05 PCH.

+1.8V PROC Voltage

Configure the voltage for the +1.8V PROC.

+1.05V PROC Voltage

Configure the voltage for the +1.05V PROC.

DDR5 PMIC Configuration

VDD Voltage

Configure the voltage for the VDD.

VDDQ Voltage

Configure the voltage for the VDDQ .

VPP Voltage

Configure the voltage for the VPP.

PLL Voltage Configuration

P-Core PLL Voltage Offset

Use this feature to set the PLL Voltage Offset value from 0-15 with each unit at 17.5mV. This is used to increase the range of the domain frequency in extreme overclocking conditions. Enter 0 to use the manufacturer default value.

E-Core Core PLL Voltage Offset

Use this feature to set the PLL Voltage Offset value from 0-15 with each unit at 17.5mV. This is used to increase the range of the domain frequency in extreme overclocking conditions. Enter 0 to use the manufacturer default value.

Ring PLL Voltage Offset

Use this feature to set the PLL Voltage Offset value from 0-15 with each unit at 17.5mV. This is used to increase the range of the domain frequency in extreme overclocking conditions. Enter 0 to use the manufacturer default value.

System Agent PLL Voltage Offset

Use this feature to set the PLL Voltage Offset value from 0-15 with each unit at 17.5mV. This is used to increase the range of the domain frequency in extreme overclocking conditions. Enter 0 to use the manufacturer default value.

Memory Controller PLL Voltage Offset

Use this feature to set the PLL Voltage Offset value from 0-15 with each unit at 17.5mV. This is used to increase the range of the domain frequency in extreme overclocking conditions. Enter 0 to use the manufacturer default value.

GT PLL Voltage Offset

Use this feature to set the PLL Voltage Offset value from 0-15 with each unit at 17.5mV. This is used to increase the range of the domain frequency in extreme overclocking conditions. Enter 0 to use the manufacturer default value.

AVX Configuration

AVX2 Voltage Guardband Scale Factor

AVX2 Voltage Guardband Scale Factor controls the voltage guardband applied to AVX2 workloads. A value > 1.00 will increase the voltage guardband, and < 1.00 will decrease the voltage guardband.

FIVR Configuration

Core Voltage Mode

Selects between Adaptive and Override Voltage modes. In Override Mode, the voltage selected will be applied over all operating frequencies. In Adaptive mode, the voltage is interpolated only in turbo mode.

Core Extra Turbo Voltage

Specifies the extra turbo voltage applied while the IA Core is operating in turbo mode.

English

VF Offset Mode

Selects between Legacy and Selection modes. Need Reset System after enabling OverClocking Feature to initialize the default value. In Legacy Mode, setting a global offset for the entire VF curve. In Selection modes, setting a selected VF point.

VF Configuration Scope

Allows all cores VF curve or per-core VF curve configuration.

Core Voltage Offset

Specifies the offset voltage applied to the IA Core domain. This voltage is specified in millivolts.

Offset Prefix

Sets the offset value as positive or negative.

E-Core L2 Voltage Mode

Selects between adaptive and Override Voltage modes. In Override Mode the voltage selected will be applied over all operating frequencies. In Adaptive Mode the voltage is interpolated only in turbo mode. Uses Mailbox 0SR 0x150, cmd 0x10, 0x11.

E-Core L2 Extra Turbo Voltage

Specifies the extra turbo voltage applied while Atom L2 is operating in turbo mode. Uses Mailbox MSR 0x150, cmd 0x10, 0x11. Range 0-2000 mV.

E-Core L2 Voltage Offset

Specifies the Offset Voltage applied to the Atom L2 domain. This voltage is specified in millivolts. Uses Mailbox MSR 0x150, cmd 0x11. Range -500 to 500 mV.

Offset Prefix

Sets the offset value as positive or negative.

Ring Voltage Mode

Selects between adaptive and Override Voltage modes. In Override Mode the voltage selected will be applied over all operating frequencies. In Adaptive Mode the voltage is interpolated only in turbo mode. Uses Mailbox 0SR 0x150, cmd 0x10, 0x11.

Ring Extra Turbo Voltage

Specifies the extra turbo voltage applied while ring is operating in turbo mode. Uses Mailbox MSR 0x150, cmd 0x10, 0x11. Range 0-2000 mV.

VF Offset Mode

Selects between Legacy and Selection modes. Need Reset System after enabling OverClocking Feature to initialize the default value. In Legacy Mode, setting a global offset for the entire VF curve. In Selection modes, setting a selected VF point.

Ring Voltage Offset

Specifies the Offset Voltage applied to the Ring domain. This voltage is specified in millivolts. Uses Mailbox MSR 0x150, cmd 0x11. Range -500 to 500 mV.

Offset Prefix

Sets the offset value as positive or negative.

GT Voltage Mode

Selects between adaptive and Override Voltage modes. In Override Mode the voltage selected will be applied over all operating frequencies. In Adaptive Mode the voltage is interpolated only in turbo mode. Uses Mailbox 0SR 0x150, cmd 0x10, 0x11.

GT Extra Turbo Voltage

Specifies the extra turbo voltage applied while GT is operating in turbo mode. Uses Mailbox MSR 0x150, cmd 0x10, 0x11. Range 0-2000 mV.

GT Voltage Offset

Specifies the Offset Voltage applied to the GT domain. This voltage is specified in millivolts. Uses Mailbox MSR 0x150, cmd 0x11. Range -500 to 500 mV.

Offset Prefix

Sets the offset value as positive or negative.

Uncore Voltage Mode

Selects between adaptive and Override Voltage modes. In Override Mode the voltage selected will be applied over all operating frequencies. In Adaptive Mode the voltage is interpolated only in turbo mode. Uses Mailbox 0SR 0x150, cmd 0x10, 0x11.

Uncore Extra Turbo Voltage

Specifies the extra turbo voltage applied while SA Uncore is operating in turbo mode. Uses Mailbox MSR 0x150, cmd 0x10, 0x11. Range 0-2000 mV.

English

Uncore Voltage Offset

Specifies the Offset Voltage applied to the Uncore domain. This voltage is specified in millivolts. Uses Mailbox MSR 0x150, cmd 0x11. Range -500 to 500 mV.

Offset Prefix

Sets the offset value as positive or negative.

Save User Default

Type a profile name and press enter to save your settings as user default.

Load User Default

Load previously saved user defaults.

Save User UEFI Setup Profile to Disk

It helps you to save current UEFI settings as an user profile to disk.

Load User UEFI Setup Profile from Disk

You can load previous saved profile from the disk.

4.6 Advanced Screen

In this section, you may set the configurations for the following items: CPU Configuration, Chipset Configuration, Storage Configuration, Intel(R) Thunderbolt, ACPI Configuration, USB Configuration and Trusted Computing.
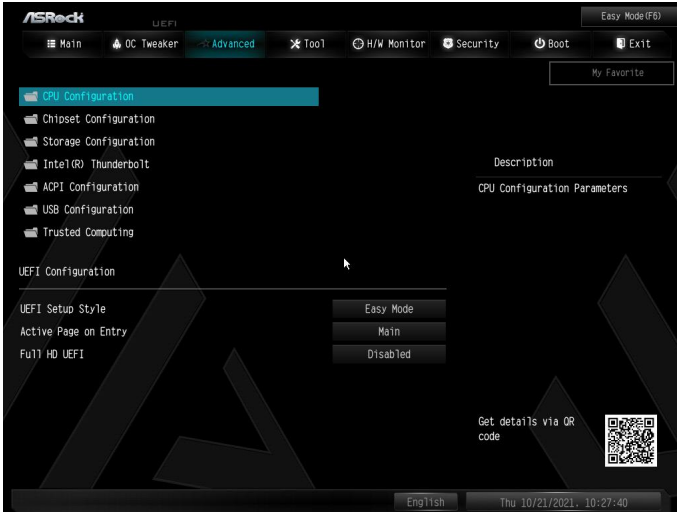
🔍 *Setting wrong values in this section may cause the system to malfunction.*

UEFI Configuration

UEFI Setup Style

Select the default mode when entering the UEFI setup utility.

Active Page on Entry

Select the default page when entering the UEFI setup utility.

Full HD UEFI

When [Auto] is selected, the resolution will be set to 1920 x 1080 if the monitor supports Full HD resolution. If the monitor does not support Full HD resolution, then the resolution will be set to 1024 x 768. When [Disable] is selected, the resolution will be set to 1024 x 768 directly.

4.6.1 CPU Configuration

Processor E-Core Information

This item displays the E-Core Information.

Processor P-Core Information

This item displays the P-Core Information.

Intel Hyper Threading Technology

Intel Hyper Threading Technology allows multiple threads to run on each core, so that the overall performance on threaded software is improved.

Pre-Core Hyper Threading

The Pre-Core Hyper Threading feature allows you to disable Hyper Threading on specific cores.

Active Processor P-Cores

Select the number of cores to enable in each processor package.

Active Processor E-Cores

Select the number of E-Cores to enable in each processor package.

CPU C States Support

Enable CPU C States Support for power saving. It is recommended to keep C6 and C7 enabled for better power saving.

Enhanced Halt State (C1E)

Enable Enhanced Halt State (C1E) for lower power consumption.

CPU C6 State Support

Enable C6 deep sleep state for lower power consumption.

CPU C7 State Support

Enable C7 deep sleep state for lower power consumption.

Package C State Support

Enable CPU, PCIe, Memory, Graphics C State Support for power saving.

CFG Lock

This item allows you to disable or enable the CFG Lock.

C6DRAM

Enable/Disable moving of DRAM contents to PRM memory when CPU is in C6 state.

CPU Thermal Throttling

Enable CPU internal thermal control mechanisms to keep the CPU from overheating.

Intel AVX/AVX2

Enable/Disable the Intel AVX and AVX2 Instructions. This is applicable for Big Core only.

Intel Virtualization Technology

Intel Virtualization Technology allows a platform to run multiple operating systems and applications in independent partitions, so that one computer system can function as multiple virtual systems.

Hardware Prefetcher

Automatically prefetch data and code for the processor. Enable for better performance.

Adjacent Cache Line Prefetch

Automatically prefetch the subsequent cache line while retrieving the currently requested cache line. Enable for better performance.

Legacy Game Compatibility Mode

When enabled, pressing the scroll lock key will toggle the Efficient cores between being parked when Scroll Lock LED is on and un-parked when LED is off.

4.6.2 Chipset Configuration
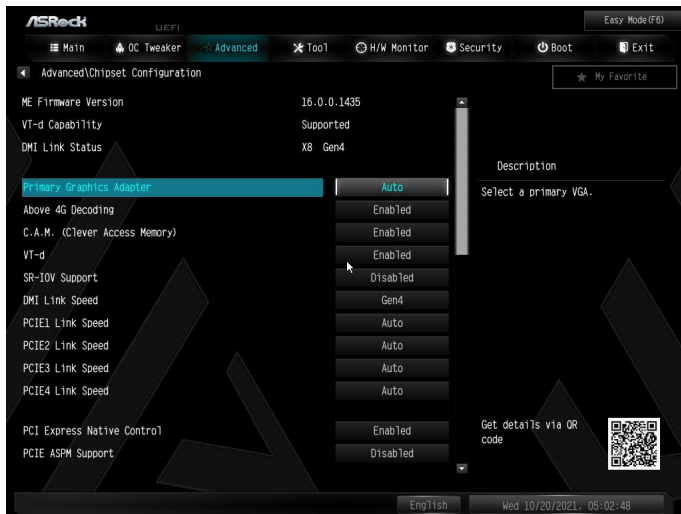
Primary Graphics Adapter

Select a primary VGA.

Above 4G Decoding

Enable or disable 64bit capable Devices to be decoded in Above 4G Address Space (only if the system supports 64 bit PCI decoding).

C.A.M (Clever Access Memory)

If system has Resizable BAR capable PCIe Devices, use this option to enable or disable Resizable BAR support (only of the system supports 64-bit PCI decoding).

VT-d

Intel® Virtualization Technology for Directed I/O helps your virtual machine monitor better utilize hardware by improving application compatibility and reliability, and providing additional levels of manageability, security, isolation, and I/O performance.

DMA Control Guarantee

Enable or disable DMA Control Guarantee.

SR-IOV Support

If system has SR-IOV capable PCIe Devices, this option Enables or Disables Single Root IO Virtualization Support.

DMI Link Speed

Configure DMI Slot Link Speed. Auto mode is optimizing for overclocking.

PCIE1 Link Speed

Select the link speed for PCIE1.

PCIE2 Link Speed

Select the link speed for PCIE2.

PCIE3 Link Speed

Select the link speed for PCIE3.

PCIE4 Link Speed

Select the link speed for PCIE4.

PCI Express Native Control

Select Enable for enhanced PCI Express power saving in OS.

PCIE ASPM Support

This option enables/disables the ASPM support for all CPU downstream devices.

PCH PCIE ASPM Support

This option enables/disables the ASPM support for all PCH PCIE devices.

DMI ASPM Support

This option enables/disables the control of ASPM on CPU side of the DMI Link.

PCH DMI ASPM Support

This option enables/disables the ASPM support for all PCH DMI devices.

Share Memory

Configure the size of memory that is allocated to the integrated graphics processor when the system boots up.

IGPU Multi-Monitor

Select disable to disable the integrated graphics when an external graphics card is installed. Select enable to keep the integrated graphics enabled at all times.

Killer E3100G

Enable or disable the onboard network interface controller (Killer E3100G).

AQ 10G LAN

Enable or disable the onboard network interface controller (Marvell (Aquantia) AQC113CS).

Onboard HD Audio

Enable/disable onboard HD audio. Set to Auto to enable onboard HD audio and automatically disable it when a sound card is installed.

Front Panel

Enable/disable front panel HD audio.

Onboard HDMI HD Audio

Enable audio for the onboard digital outputs.

Onboard WAN Device

Use this item to enable or disable the onboard WAN device.

Deep Sleep

Configure deep sleep mode for power saving when the computer is shut down.

Restore on AC/Power Loss

Select the power state after a power failure. If [Power Off] is selected, the power will remain off when the power recovers. If [Power On] is selected, the system will start to boot up when the power recovers.

Turn On Onboard LED in S5

Turn on Onboard LED in the ACPI S5 state.

Restore Onboard LED Default

Restore Onboard LED default value.

RGB LED

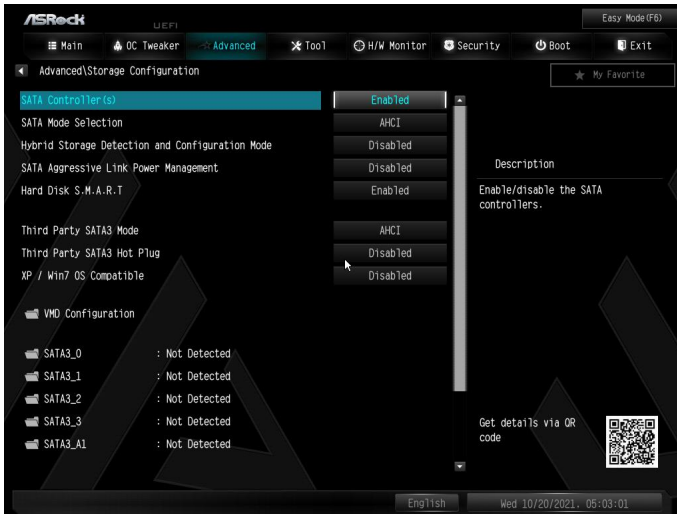This option enables/disables the RGB LED.

Onboard Button LED

Enable/disable the onboard button LED.

Onboard Debug Port LED

Enable/disable the onboard Dr. Debug LED.

4.6.3 Storage Configuration

SATA Controller(s)

Enable/disable the SATA controllers.

SATA Mode Selection

AHCI: Supports new features that improve performance.

Hybrid Storage Detection and Configuration Mode

This item allows you select Hybrid Storage Detection and Configuration Mode.

SATA Aggressive Link Power Management

SATA Aggressive Link Power Management allows SATA devices to enter a low power state during periods of inactivity to save power. It is only supported by AHCI mode.

Hard Disk S.M.A.R.T.

S.M.A.R.T stands for Self-Monitoring, Analysis, and Reporting Technology. It is a monitoring system for computer hard disk drives to detect and report on various indicators of reliability.

Third Party SATA 3 Controller

Enable or disable the third party SATA3 controller.

Third Party SATA3 Hot Plug

Enable or disable the third party SATA3 controller.

XP / Win7 OS Compatible

Enable Windows XP / 7 support on SATA3 A1, A2, A3 and A4. Please install an external graphics card which supports leagacy mode. Please disable this option if you don't use Windows XP / 7.

VMD Configuration

This item allows you to enable or disable the Intel VMD support function.

4.6.4 Intel(R) Thunderbolt
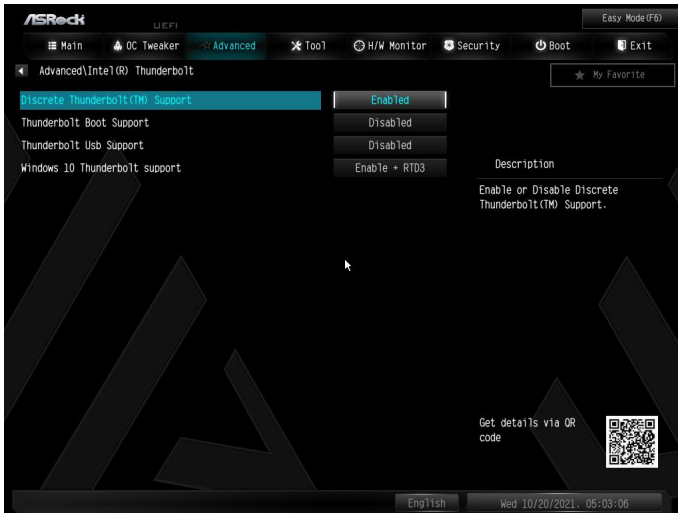
Discrete Thunderbolt(TM) Support

Enable or disable the Discrete Thunderbolt(TM) Support.

Thunderbolt Boot Support

Enabled to allow booting from Bootable devices which are present behind Thunderbolt.
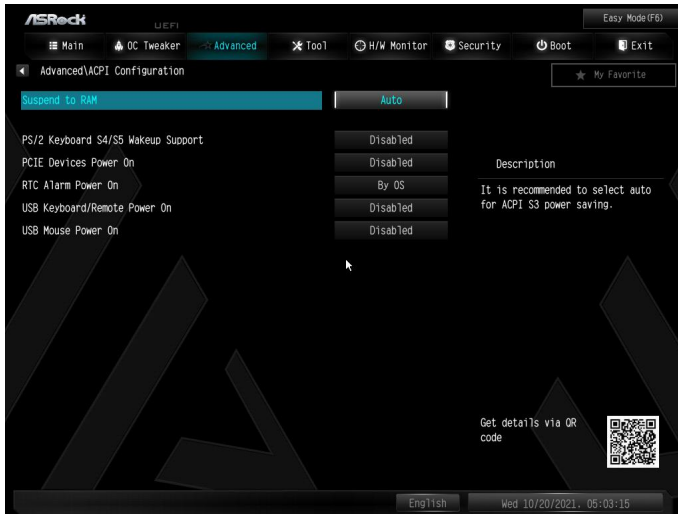
Thunderbolt Usb Support

Enabled to allow booting from Usb devices which are present behind Thunderbolt.

Windows 10 Thunderbolt support

Enable or disable the Windows 10 Thunderbolt support.

4.6.5 ACPI Configuration

Suspend to RAM

Select disable for ACPI suspend type S1. It is recommended to select auto for ACPI S3 power saving.

PCIE Devices Power On

Allow the system to be waked up by a PCIE device and enable wake on LAN.

RTC Alarm Power On

Allow the system to be waked up by the real time clock alarm. Set it to By OS to let it be handled by your operating system.
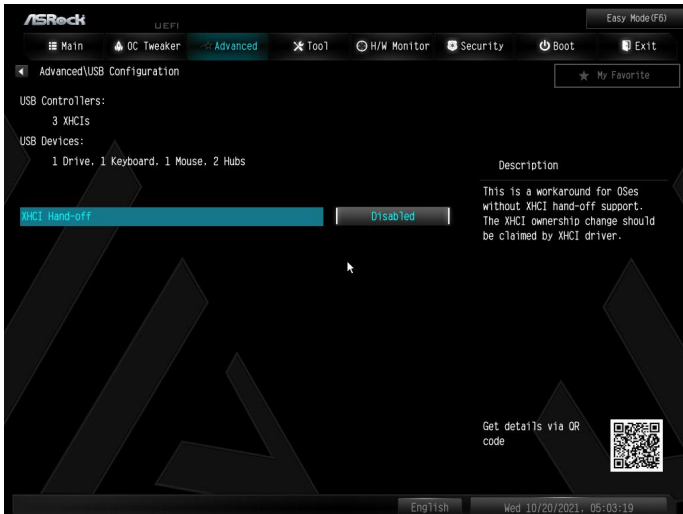
USB Keyboard/Remote Power On

Allow the system to be waked up by an USB keyboard or remote controller.

USB Mouse Power On

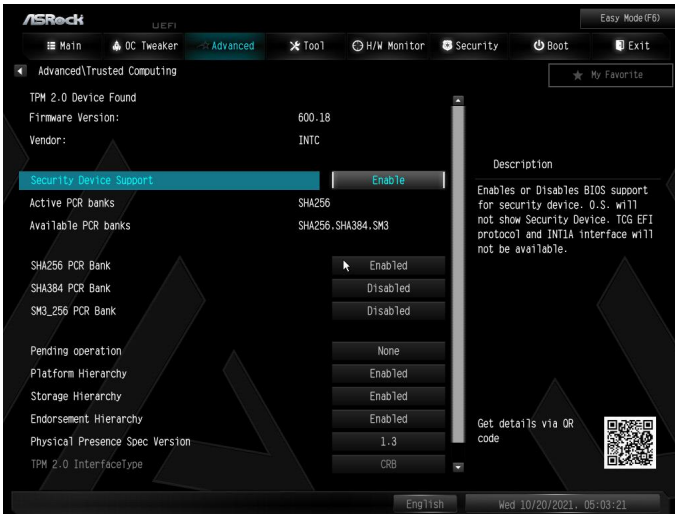Allow the system to be waked up by an USB mouse.

4.6.6 USB Configuration

XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

4.6.7 Trusted Computing

NOTE: Options vary depending on the version of your connected TPM module.

Security Device Support
Use this item to enable or disable BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

Active PCR banks
This item displays active PCR Banks.

Available PCR Banks

This item displays available PCR Banks.

SHA256 PCR Bank
Use this item to enable or disable SHA256 PCR Bank.

SHA384 PCR Bank
Use this item to enable or disable SHA384 PCR Bank.

SM3_256 PCR Bank
Use this item to enable or disable SM3_256 PCR Bank.

Pending Operation
Schedule an Operation for the Security Device.
NOTE: Your computer will reboot during restart in order to change State of the Device.

Platform Hierarchy

Use this item to enable or disable Platform Hierarchy.

Storage Hierarchy

Use this item to enable or disable Storage Hierarchy.

Endorsement Hierarchy

Use this item to enable or disable Endorsement Hierarchy.

Physical Presence Spec version

Select this item to tell OS to support PPI spec version 1.2 or 1.3. Please note that some HCK tests might not support version 1.3.

Device Select

Use this item to select the TPM device to be supported. TPM 1.2 will restrict support to TPM 1.2 devices. TPM 2.0 will restrict support to TPM 2.0 devices. Auto will support both with the default set to TPM 2.0 devices. If TPM 2.0 devices are not found, TPM 1.2 devices will be enumerated.

4.7 Tools
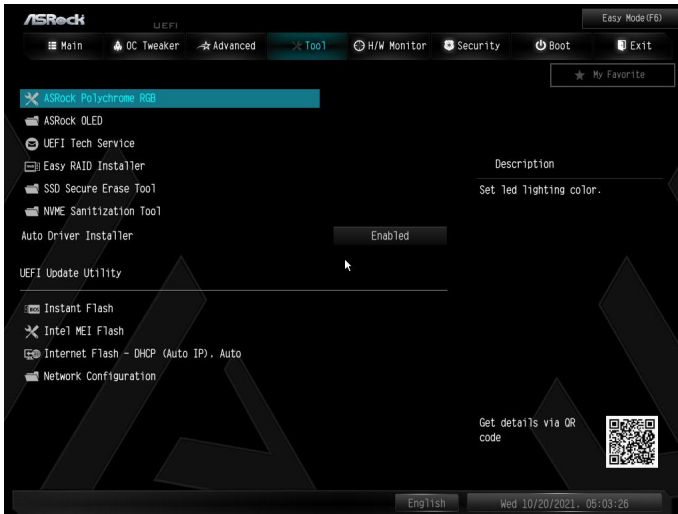
ASRock Polychrome RGB

Select LED lighting color.

ASRock OLED

ASRock Display

Turn on or off the OLED display.

ASRock Screen Saver

Select time for the ASRock Screen Saver.

Wake OLED

Use this to wake OLED up after Screen Saver.

UEFI Tech Service

Contact ASRock Tech Service if you are having trouble with your PC. Please setup network configuration before using UEFI Tech Service.

Easy RAID Installer

Easy RAID Installer helps you to copy the RAID driver from the support CD to your USB storage device. After copying the drivers please change the SATA mode to RAID, then you can start installing the operating system in RAID mode.

SSD Secure Erase Tool

All the SSD's listed that supports Secure Erase function.

NVME Sanitization Tool

After you Sanitize SSD, all user data will be permanently destroyed on the SSD and cannot be recovered.

Auto Driver Installer

If Auto Driver Installer is enabled, a notification will pop up to help users to install and update required drivers after booting into the system.

Instant Flash

Save UEFI files in your USB storage device and run Instant Flash to update your UEFI.

### Intel MEI Flash

Starts BIOS recovery flash.

Internet Flash - DHCP (Auto IP), Auto

ASRock Internet Flash downloads and updates the latest UEFI firmware version from our servers for you. Please setup network configuration before using Internet Flash.

*For BIOS backup and recovery purpose, it is recommended to plug in your USB pen drive before using this function.

Network Configuration

Use this to configure internet connection settings for Internet Flash.
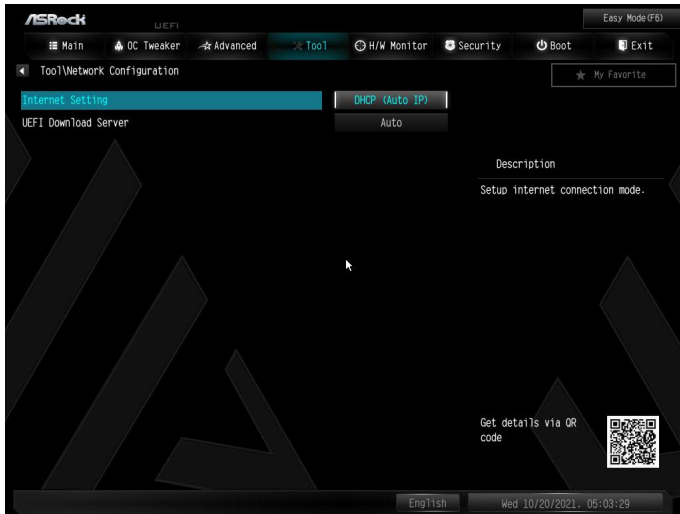
Internet Setting

Enable or disable sound effects in the setup utility.

UEFI Download Server

Select a server to download the UEFI firmware.

4.8 Hardware Health Event Monitoring Screen

This section allows you to monitor the status of the hardware on your system, including the parameters of the CPU temperature, motherboard temperature, fan speed and voltage.

Fan Tuning

Measure Fan Min Duty Cycle.

Fan-Tastic Tuning

Select a fan mode for CPU Fan, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

CPU Fan 1 Setting

Select a fan mode for CPU Fan 1, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

CPU_FAN2 / W_PUMP Switch

Switch CPU_FAN2 / W_PUMP header function.

CPU Fan 2 Control Mode

Select DC/PWM mode for CPU Fan 2.

CPU Fan 2 Setting

Select a fan mode for CPU Fan 2, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

CPU Fan 2 Temp Source

Select a fan temperature source for CPU Fan 2.

CPU_FAN3 / W_PUMP Switch

Switch CPU_FAN3 / W_PUMP header function.

CPU Fan 3 Control Mode

Select DC/PWM mode for CPU Fan 3.

CPU Fan 3 Setting

Select a fan mode for CPU Fan 3, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

CPU Fan 3 Temp Source

Select a fan temperature source for CPU Fan 3.

CHA_FAN1 / W_PUMP Switch

Select Chassis Fan 1 or Water Pump mode.

Chassis Fan 1 Control Mode

Select PWM mode or DC mode for Chassis Fan 1.

Chassis Fan 1 Setting

Select a fan mode for Chassis Fan 1, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 1 Temp Source

Select a fan temperature source for Chassis Fan 1.

CHA_FAN2 / W_PUMP Switch

Select Chassis Fan 2 or Water Pump mode.

Chassis Fan 2 Control Mode

Select PWM mode or DC mode for Chassis Fan 2.

Chassis Fan 2 Setting

Select a fan mode for Chassis Fan 2, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 2 Temp Source

Select a fan temperature source for Chassis Fan 2.

CHA_FAN3 / W_PUMP Switch

Select Chassis Fan 3 or Water Pump mode.

Chassis Fan 3 Control Mode

Select PWM mode or DC mode for Chassis Fan 3.

Chassis Fan 3 Setting

Select a fan mode for Chassis Fan 3, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 3 Temp Source

Select a fan temperature source for Chassis Fan 3.

CHA_FAN4 / W_PUMP Switch

Select Chassis Fan 4 or Water Pump mode.

Chassis Fan 4 Control Mode

Select PWM mode or DC mode for Chassis Fan 4.

Chassis Fan 4 Setting

Select a fan mode for Chassis Fan 4, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 4 Temp Source

Select a fan temperature source for Chassis Fan 4.

CHA_FAN5 / W_PUMP Switch

Select Chassis Fan 5 or Water Pump mode.

Chassis Fan 5 Control Mode

Select PWM mode or DC mode for Chassis Fan 5.

Chassis Fan 5 Setting

Select a fan mode for Chassis Fan 5, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 5 Temp Source

Select a fan temperature source for Chassis Fan 5.

CHA_FAN6 / W_PUMP Switch

Select Chassis Fan 6 or Water Pump mode.

Chassis Fan 6 Control Mode

Select PWM mode or DC mode for Chassis Fan 6.

Chassis Fan 6 Setting

Select a fan mode for Chassis Fan 6, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 6 Temp Source

Select a fan temperature source for Chassis Fan 6.

4.9 Security Screen

In this section you may set or change the supervisor/user password for the system. You may also clear the user password.
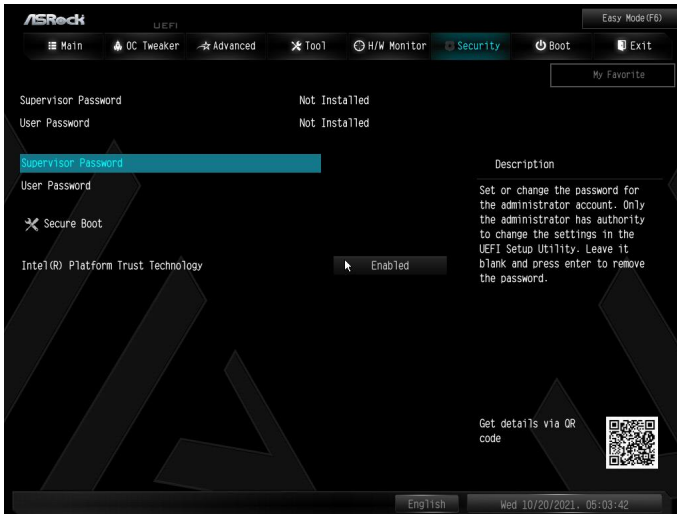
Supervisor Password

Set or change the password for the administrator account. Only the administrator has authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

User Password

Set or change the password for the user account. Users are unable to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.
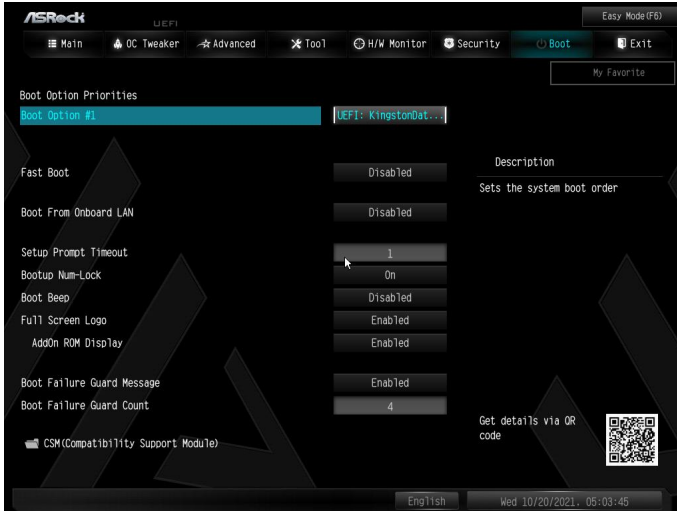
Secure Boot

Use this item to enable or disable support for Secure Boot.

Intel(R) Platform Trust Technology

Enable/disable Intel PTT in ME. Disable this option to use discrete TPM Module.

4.10 Boot Screen

This section displays the available devices on your system for you to configure the boot settings and the boot priority.

Fast Boot

Fast Boot minimizes your computer's boot time. In fast mode you may not boot from an USB storage device. The VBIOS must support UEFI GOP if you are using an external graphics card. Please notice that Ultra Fast mode will boot so fast that the only way to enter this UEFI Setup Utility is to Clear CMOS or run the Restart to UEFI utility in Windows.

Boot From Onboard LAN

Allow the system to be waked up by the onboard LAN.

Setup Prompt Timeout

Configure the number of seconds to wait for the setup hot key.

Bootup Num-Lock

Select whether Num Lock should be turned on or off when the system boots up.

Boot Beep

Select whether the Boot Beep should be turned on or off when the system boots up. Please note that a buzzer is needed.

Full Screen Logo

Enable to display the boot logo or disable to show normal POST messages.

AddOn ROM Display

Enable AddOn ROM Display to see the AddOn ROM messages or configure the AddOn ROM if you've enabled Full Screen Logo. Disable for faster boot speed.
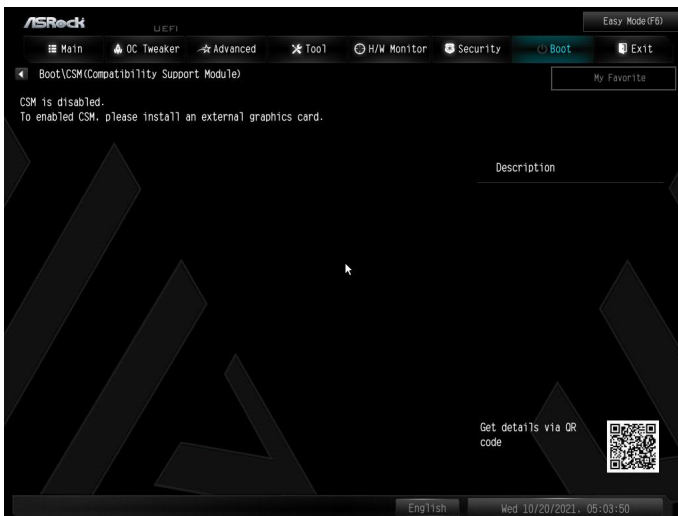
Boot Failure Guard Message

If the computer fails to boot for a number of times the system automatically restores the default settings.

Boot Failure Guard Count

Configure the number of attempts to boot until the system automatically restores the default settings.

CSM (Compatibility Support Module)

CSM

Enable to launch the Compatibility Support Module. Please do not disable unless you're running a WHCK test.

Launch PXE OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.
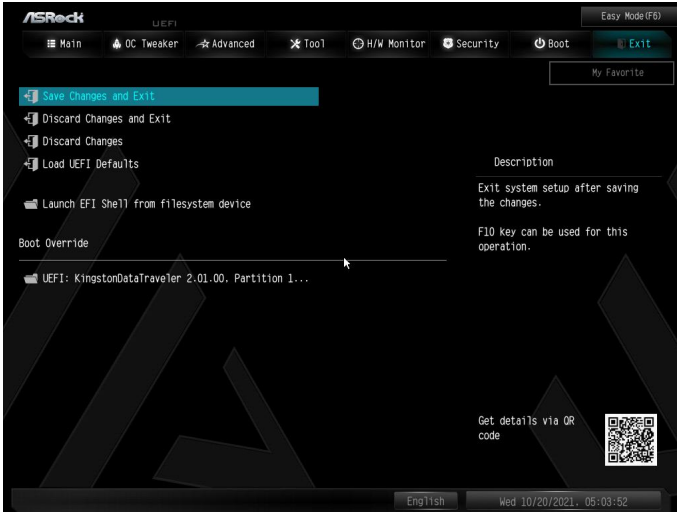
Launch Storage OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

Other PCI Device ROM Priority

For PCI devices other than Network. Mass storage or Video defines which OpROM to launch.

4.11 Exit Screen

Save Changes and Exit

When you select this option the following message, "Save configuration changes and exit setup?" will pop out. Select [OK] to save changes and exit the UEFI SETUP UTILITY.

Discard Changes and Exit

When you select this option the following message, "Discard changes and exit setup?" will pop out. Select [OK] to exit the UEFI SETUP UTILITY without saving any changes.

Discard Changes

When you select this option the following message, "Discard changes?" will pop out. Select [OK] to discard all changes.

Load UEFI Defaults

Load UEFI default values for all options. The F9 key can be used for this operation.

Launch EFI Shell from filesystem device

Copy shellx64.efi to the root directory to launch EFI Shell.

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 http://www.asrock.com/support/tsd.asp

ASRock Incorporation

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13848 Magnolia Ave, Chino, CA91710

U.S.A.

Phone: +1-909-590-8308

Fax: +1-909-590-1026

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2.1077(a)

Responsible Party Name: ASRock Incorporation

Address: 13848 Magnolia Ave, Chino, CA91710

Phone/Fax No: +1-909-590-8308/+1-909-590-1026

hereby declares that the product

Product Name : Motherboard

Model Number : Z690 AQUA

Conforms to the following specifications:

☒ FCC Part 15, Subpart B, Unintentional Radiators

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Representative Person's Name: __James__

Signature :

Date : __May 12, 2017__

EU Declaration of Conformity

/ISRock®

For the following equipment:

Motherboard

(Product Name)

Z690 AQUA / ASRock

(Model Designation / Trade Name)

ASRock Incorporation

(Manufacturer Name)

2F., No.37, Sec. 2, Jhongyang S. Rd., Beitou District, Taipei City 112, Taiwan (R.O.C.)

(Manufacturer Address)

Radio Equipment Directive - 2014/53/EU
- ■ EN 300 328 V2.2.2
- ■ EN 301 893 V2.1.1
- ☐ EN 300 330 V2.1.1

EMC Directive - 2014/30/EU

■ EN 301 489-1 V2.2.3	■ EN 55024:2010/A1:2015
■ EN 301 489-17 V3.2.4	☐ EN 55035:2017/A11:2020
☐ EN 301 489-3 V2.1.1	■ EN 61000-4-2:2009
■ EN 55032:2015/A11:2020	■ EN 61000-4-3:2006/A1:2008/A2:2010
■ EN 61000-3-2:2014	■ EN 61000-4-4:2012
■ EN 61000-3-3:2013	■ EN 61000-4-5:2014/A1:2017
	■ EN 61000-4-6:2014/AC:2015
	■ EN 61000-4-8:2010
	■ EN 61000-4-11:2004/A1:2017

Low Voltage Directive - 2014/35/EU

☐ EN 62368-1:2014	☐ EN 62311:2008
☐ EN 62368-1:2014/A11:2017	

RoHS Directive - 2011/65/EU

■ (EU) 2015/863	■ EN 50581:2012

CE marking

$C \in$ (EU conformity marking)

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(Company Name)

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(Company Address)

Person responsible for making this declaration:

Jason Chou

(Name, Surname)

A.V.P

(Position / Title)

December 17, 2021

(Date)

P/N: 15G062327000AK V1.0