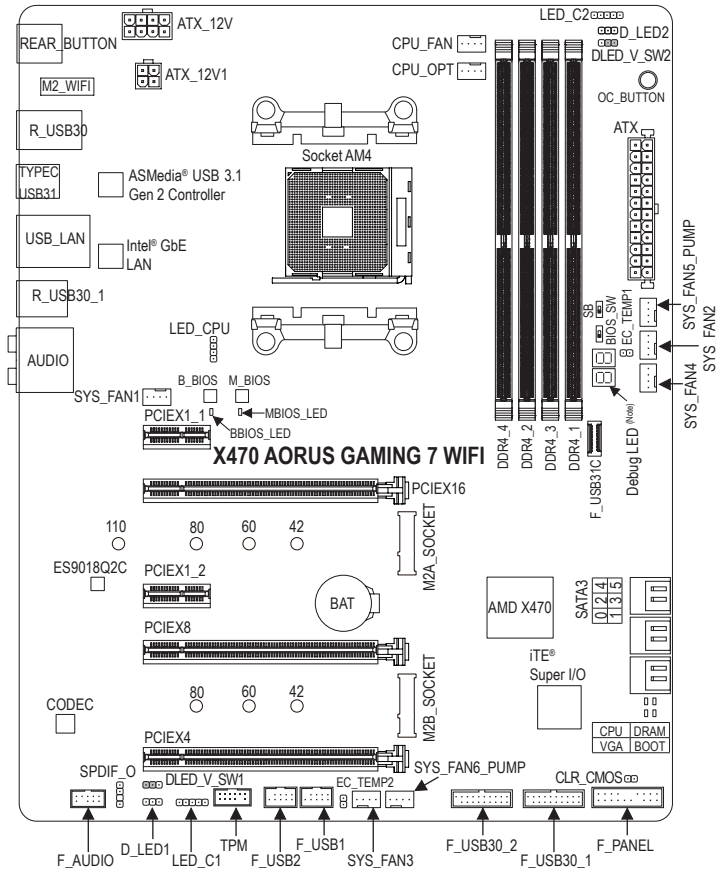


X470 AORUS GAMING 7 WIFI Motherboard Layout



Box Contents

- | | |
|--|--|
| <input checked="" type="checkbox"/> X470 AORUS GAMING 7 WIFI motherboard | <input checked="" type="checkbox"/> M.2 screw(s)/M.2 standoff(s) |
| <input checked="" type="checkbox"/> Motherboard driver disk | <input checked="" type="checkbox"/> One Wi-Fi antenna |
| <input checked="" type="checkbox"/> Wireless module driver disk | <input checked="" type="checkbox"/> One GC-SLI2PL bridge connector |
| <input checked="" type="checkbox"/> User's Manual | <input checked="" type="checkbox"/> One digital LED strip adapter cable |
| <input checked="" type="checkbox"/> Quick Installation Guide | <input checked="" type="checkbox"/> One RGB (RGBW) LED strip extension cable |
| <input checked="" type="checkbox"/> Four SATA cables | <input checked="" type="checkbox"/> One G Connector |
| <input checked="" type="checkbox"/> Two Velcro Cable Ties | <input checked="" type="checkbox"/> Two thermistor cables |

* The box contents above are for reference only and the actual items shall depend on the product package you obtain. The box contents are subject to change without notice.

(Note) For debug code information, please refer to Chapter 3.











Chapter 1 Hardware Installation





1-1 Installation Precautions








The motherboard contains numerous delicate electronic circuits and components which can become damaged as a result of electrostatic discharge (ESD). Prior to installation, carefully read the user's manual and follow these procedures:

- Prior to installation, make sure the chassis is suitable for the motherboard.
- Prior to installation, do not remove or break motherboard S/N (Serial Number) sticker or warranty sticker provided by your dealer. These stickers are required for warranty validation.
- Always remove the AC power by unplugging the power cord from the power outlet before installing or removing the motherboard or other hardware components.
- When connecting hardware components to the internal connectors on the motherboard, make sure they are connected tightly and securely.
- When handling the motherboard, avoid touching any metal leads or connectors.
- It is best to wear an electrostatic discharge (ESD) wrist strap when handling electronic components such as a motherboard, CPU or memory. If you do not have an ESD wrist strap, keep your hands dry and first touch a metal object to eliminate static electricity.
- Prior to installing the motherboard, please have it on top of an antistatic pad or within an electrostatic shielding container.
- Before connecting or unplugging the power supply cable from the motherboard, make sure the power supply has been turned off.
- Before turning on the power, make sure the power supply voltage has been set according to the local voltage standard.
- Before using the product, please verify that all cables and power connectors of your hardware components are connected.
- To prevent damage to the motherboard, do not allow screws to come in contact with the motherboard circuit or its components.
- Make sure there are no leftover screws or metal components placed on the motherboard or within the computer casing.
- Do not place the computer system on an uneven surface.
- Do not place the computer system in a high-temperature or wet environment.
- Turning on the computer power during the installation process can lead to damage to system components as well as physical harm to the user.
- If you are uncertain about any installation steps or have a problem related to the use of the product, please consult a certified computer technician.
- If you use an adapter, extension power cable, or power strip, ensure to consult with its installation and/or grounding instructions.

1-2 Product Specifications

 CPU	<ul style="list-style-type: none"> AM4 Socket: <ul style="list-style-type: none"> AMD Ryzen™ processor (Go to GIGABYTE's website for the latest CPU support list.)
 Chipset	<ul style="list-style-type: none"> AMD X470
 Memory	<ul style="list-style-type: none"> 4 x DDR4 DIMM sockets supporting up to 64 GB of system memory Dual channel memory architecture Support for DDR4 2933/2667/2400/2133 MHz memory modules Support for ECC Un-buffered DIMM 1Rx8/2Rx8 memory modules Support for non-ECC Un-buffered DIMM 1Rx8/2Rx8/1Rx16 memory modules Support for Extreme Memory Profile (XMP) memory modules (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
 Audio	<ul style="list-style-type: none"> Realtek® ALC1220 codec ES9018Q2C chip High Definition Audio 2/4/5.1/7.1-channel Support for S/PDIF Out
 LAN	<ul style="list-style-type: none"> Intel® GbE LAN chip (10/100/1000 Mbit)
 Wireless Communication Module	<ul style="list-style-type: none"> Wi-Fi 802.11a/b/g/n/ac, supporting 2.4/5 GHz Dual-Band BLUETOOTH 5 Support for 11ac 160MHz wireless standard and up to 1.73 Gbps data rate <ul style="list-style-type: none"> * Actual data rate may vary depending on environment and equipment.
 Expansion Slots	<ul style="list-style-type: none"> 1 x PCI Express x16 slot, running at x16 (PCIEX16) <ul style="list-style-type: none"> * For optimum performance, if only one PCI Express graphics card is to be installed, be sure to install it in the PCIEX16 slot. 1 x PCI Express x16 slot, running at x8 (PCIEX8) <ul style="list-style-type: none"> * The PCIEX8 slot shares bandwidth with the PCIEX16 slot. When the PCIEX8 slot is populated, the PCIEX16 slot operates at up to x8 mode. (The PCIEX16 and PCIEX8 slots conform to PCI Express 3.0 standard.) 1 x PCI Express x16 slot, running at x4 (PCIEX4) <ul style="list-style-type: none"> * The PCIEX4 slot becomes unavailable when a device is installed in the M2B_SOCKET connector. 2 x PCI Express x1 slots (The PCIEX4 and PCI Express x1 slots conform to PCI Express 2.0 standard.)
 Multi-Graphics Technology	<ul style="list-style-type: none"> Support for NVIDIA® Quad-GPU SLI™ and 2-Way NVIDIA® SLI™ technologies Support for AMD Quad-GPU CrossFire™ and 2-Way AMD CrossFire™ technologies
 Storage Interface	<ul style="list-style-type: none"> 1 x M.2 connector (Socket 3, M key, type 2242/2260/2280/22110 SATA and PCIe 3.0 x4/x2 SSD support) (M2A_SOCKET) 1 x M.2 connector (Socket 3, M key, type 2242/2260/2280 PCIe 2.0 x4/x2 SSD support) (M2B_SOCKET) 6 x SATA 6Gb/s connectors Support for RAID 0, RAID 1, and RAID 10
 USB	<ul style="list-style-type: none"> ASMedia® USB 3.1 Gen 2 Controller: <ul style="list-style-type: none"> 1 x USB Type-C™ port on the back panel, with USB 3.1 Gen 2 support 1 x USB 3.1 Gen 2 Type-A port (red) on the back panel

	USB	<ul style="list-style-type: none"> ◆ Chipset: <ul style="list-style-type: none"> - 1 x USB Type-C™ port with USB 3.1 Gen 2 support, available through the internal USB header - 6 x USB 3.1 Gen 1 ports (2 ports on the back panel, 4 ports available through the internal USB headers) - 6 x USB 2.0/1.1 ports (2 ports on the back panel, 4 ports available through the internal USB headers) ◆ CPU: <ul style="list-style-type: none"> - 4 x USB 3.1 Gen 1 ports on the back panel
	Internal Connectors	<ul style="list-style-type: none"> ◆ 1 x 24-pin ATX main power connector ◆ 1 x 8-pin ATX 12V power connector ◆ 1 x 4-pin ATX 12V power connector ◆ 1 x CPU fan header ◆ 1 x water cooling CPU fan header ◆ 4 x system fan headers ◆ 2 x system fan/water cooling pump headers ◆ 1 x CPU cooler LED strip/RGB LED strip header ◆ 2 x digital LED strip headers ◆ 2 x digital LED strip power select jumpers ◆ 2 x RGB (RGBW) LED strip headers ◆ 2 x M.2 Socket 3 connectors ◆ 6 x SATA 6Gb/s connectors ◆ 1 x front panel header ◆ 1 x front panel audio header ◆ 1 x S/PDIF Out header ◆ 1 x USB Type-C™ port, with USB 3.1 Gen 2 support ◆ 2 x USB 3.1 Gen 1 headers ◆ 2 x USB 2.0/1.1 headers ◆ 1 x Trusted Platform Module (TPM) header (2x6 pin, for the GC-TPM2.0_0 module only) ◆ 1 x Clear CMOS jumper ◆ 1 x OC button ◆ 1 x BIOS switch ◆ 1 x DualBIOS™ switch ◆ 2 x temperature sensor headers
	Back Panel Connectors	<ul style="list-style-type: none"> ◆ 1 x power/reset button ◆ 1 x Clear CMOS button ◆ 2 x MMCX antenna connectors (2T2R) ◆ 6 x USB 3.1 Gen 1 ports ◆ 1 x USB Type-C™ port, with USB 3.1 Gen 2 support ◆ 1 x USB 3.1 Gen 2 Type-A port (red) ◆ 2 x USB 2.0/1.1 ports ◆ 1 x RJ-45 port ◆ 1 x optical S/PDIF Out connector ◆ 5 x audio jacks
	Hardware Monitor	<ul style="list-style-type: none"> ◆ Voltage detection ◆ Temperature detection ◆ Fan speed detection ◆ Water cooling flow rate detection

 Hardware Monitor	<ul style="list-style-type: none"> ◆ Overheating warning ◆ Fan fail warning ◆ Fan speed control <ul style="list-style-type: none"> * Whether the fan (pump) speed control function is supported will depend on the cooler (pump) you install.
 BIOS	<ul style="list-style-type: none"> ◆ 2 x 128 Mbit flash ◆ Use of licensed AMI UEFI BIOS ◆ Support for DualBIOS™ ◆ PnP 1.0a, DMI 2.7, WfM 2.0, SM BIOS 2.7, ACPI 5.0
 I/O Controller	<ul style="list-style-type: none"> ◆ iTE® I/O Controller Chip
 Unique Features	<ul style="list-style-type: none"> ◆ Support for APP Center <ul style="list-style-type: none"> * Available applications in APP Center may vary by motherboard model. Supported functions of each application may also vary depending on motherboard specifications. - 3D OSD - @BIOS - AutoGreen - Cloud Station - EasyTune - Fast Boot - Game Boost - ON/OFF Charge - RGB Fusion - Smart Backup - Smart Keyboard - Smart TimeLock - Smart HUD - System Information Viewer - USB Blocker - USB DAC-UP 2 - V-Tuner ◆ Support for Q-Flash ◆ Support for Xpress Install
 Bundled Software	<ul style="list-style-type: none"> ◆ Norton® Internet Security (OEM version) ◆ cFosSpeed ◆ XSplit Gamecaster + Broadcaster (12 months license)
 Operating System	<ul style="list-style-type: none"> ◆ Support for Windows 10 64-bit
 Form Factor	<ul style="list-style-type: none"> ◆ ATX Form Factor; 30.5cm x 24.4cm

* GIGABYTE reserves the right to make any changes to the product specifications and product-related information without prior notice.



Please visit GIGABYTE's website for support lists of CPU, memory modules, SSDs, and M.2 devices.



Please visit the **Support Utility List** page on GIGABYTE's website to download the latest version of apps.

1-3 Installing the CPU



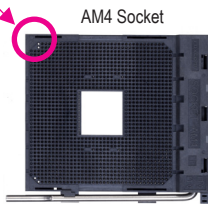
Read the following guidelines before you begin to install the CPU:

- Make sure that the motherboard supports the CPU.
(Go to GIGABYTE's website for the latest CPU support list.)
- Always turn off the computer and unplug the power cord from the power outlet before installing the CPU to prevent hardware damage.
- Locate the pin one of the CPU. The CPU cannot be inserted if oriented incorrectly.
- Apply an even and thin layer of thermal grease on the surface of the CPU.
- Do not turn on the computer if the CPU cooler is not installed, otherwise overheating and damage of the CPU may occur.
- Set the CPU host frequency in accordance with the CPU specifications. It is not recommended that the system bus frequency be set beyond hardware specifications since it does not meet the standard requirements for the peripherals. If you wish to set the frequency beyond the standard specifications, please do so according to your hardware specifications including the CPU, graphics card, memory, hard drive, etc.

Installing the CPU

Locate the pin one (denoted by a small triangle) of the CPU socket and the CPU.

A Small Triangle Marking
Denotes Pin One of the
Socket



A Small Triangle Marking
Denotes CPU Pin One



1-4 Installing the Memory



Read the following guidelines before you begin to install the memory:

- Make sure that the motherboard supports the memory. It is recommended that memory of the same capacity, brand, speed, and chips be used.
(Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
- Always turn off the computer and unplug the power cord from the power outlet before installing the memory to prevent hardware damage.
- Memory modules have a foolproof design. A memory module can be installed in only one direction. If you are unable to insert the memory, switch the direction.

Dual Channel Memory Configuration

This motherboard provides four memory sockets and supports Dual Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity of the memory. Enabling Dual Channel memory mode will double the original memory bandwidth.

The four memory sockets are divided into two channels and each channel has two memory sockets as following:

▶▶ Channel A: DDR4_2, DDR4_4

▶▶ Channel B: DDR4_1, DDR4_3

▶▶ Dual Channel Memory Configurations Table:

	DDR4_4	DDR4_2	DDR4_3	DDR4_1
Two Modules	--	DS/SS	--	DS/SS
	DS/SS	--	DS/SS	--
Four Modules	DS/SS	DS/SS	DS/SS	DS/SS

(SS=Single-Sided, DS=Double-Sided, "--=No Memory)

Due to CPU limitations, read the following guidelines before installing the memory in Dual Channel mode.

1. Dual Channel mode cannot be enabled if only one memory module is installed.
2. When enabling Dual Channel mode with two or four memory modules, it is recommended that memory of the same capacity, brand, speed, and chips be used. For optimum performance, when enabling Dual Channel mode with two memory modules, we recommend that you install them in the DDR4_1 and DDR4_2 sockets.

1-5 Installing an Expansion Card



Read the following guidelines before you begin to install an expansion card:

- Make sure the motherboard supports the expansion card. Carefully read the manual that came with your expansion card.
- Always turn off the computer and unplug the power cord from the power outlet before installing an expansion card to prevent hardware damage.

1-6 Setting up AMD CrossFire™/NVIDIA® SLI™ Configuration

A. System Requirements

- Windows 10 64-bit operating system
- A CrossFire/SLI-supported motherboard with two or more PCI Express x16 slots and correct driver
- CrossFire/SLI-ready graphics cards of identical brand and chip and correct driver
- CrossFire^(Note)/SLI bridge connectors
- A power supply with sufficient power is recommended (Refer to the manual of your graphics cards for the power requirement)

B. Connecting the Graphics Cards

Step 1:

Observe the steps in "1-5 Installing an Expansion Card" and install CrossFire/SLI graphics cards on the PCI Express x16 slots. (To set up a 2-Way configuration, we recommend installing the graphics cards on the PCIEX16 and PCIEX8 slots.)

Step 2:

Insert the CrossFire^(Note)/SLI bridge connectors in the CrossFire/SLI gold edge connectors on top of the cards.

Step 3:

Plug the display cable into the graphics card on the PCIEX16 slot.

C. Configuring the Graphics Card Driver

C-1. To Enable CrossFire Function

After installing the graphics card driver in the operating system, go to the **AMD RADEON SETTINGS** screen. Browse to **GamingGlobal Settings** and ensure **AMD CrossFire** is set to **On**.

C-2. To Enable SLI Function

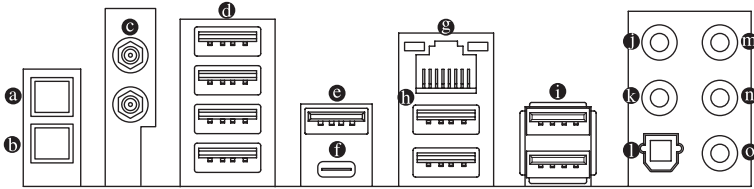
After installing the graphics card driver in the operating system, go to the **NVIDIA Control Panel**. Browse to the **Configure SLI, Surround, Physx** screen and ensure **Maximize 3D performance** is enabled.

(Note) The bridge connector(s) may be needed or not depending on your graphics cards.



Procedure and driver screen for enabling CrossFire/SLI technology may differ by graphics cards and driver version. Refer to the manual that came with your graphics cards for more information about enabling CrossFire/SLI technology.

1-7 Back Panel Connectors



a Power/Reset Button

The power/reset button allows users to quickly turn on/off or reset the computer in an open-case environment when they want to change hardware components or conduct hardware testing. This button is a power button by default. To change the button's default to Reset function, refer to Chapter 2, "BIOS Setup," "Power," for more information.

b Clear CMOS Button

Use this button to clear the CMOS values (e.g. BIOS configuration) and reset the CMOS values to factory defaults when needed.



- Always turn off your computer and unplug the power cord from the power outlet before using the clear CMOS button.
- Do not use the clear CMOS button when the system is on, or the system may shutdown and data loss or damage may occur.
- After system restart, go to BIOS Setup to load factory defaults (select Load Optimized Defaults) or manually configure the BIOS settings (refer to Chapter 2, "BIOS Setup," for BIOS configurations).

c MMCX Antenna Connectors (2T2R)

Use this connector to connect an antenna.



Tighten the antenna cables to the antenna connectors and then move the antenna to a place where the signal is good.

d USB 3.1 Gen 1 Port

The USB 3.1 Gen 1 port supports the USB 3.1 Gen 1 specification and is compatible to the USB 2.0 specification. Use this port for USB devices.

e USB 3.1 Gen 2 Type-A Port (Red)

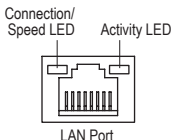
The USB 3.1 Gen 2 Type-A port supports the USB 3.1 Gen 2 specification and is compatible to the USB 3.1 Gen 1 and USB 2.0 specification. Use this port for USB devices.

f USB Type-C™ Port

The reversible USB port supports the USB 3.1 Gen 2 specification and is compatible to the USB 3.1 Gen 1 and USB 2.0 specification. Use this port for USB devices.

g RJ-45 LAN Port

The Gigabit Ethernet LAN port provides Internet connection at up to 1 Gbps data rate. The following describes the states of the LAN port LEDs.



Connection/Speed LED:	
State	Description
Orange	1 Gbps data rate
Green	100 Mbps data rate
Off	10 Mbps data rate

Activity LED:	
State	Description
Blinking	Data transmission or receiving is occurring
On	No data transmission or receiving is occurring

⑩ **USB 2.0/1.1 Port**

The USB port supports the USB 2.0/1.1 specification. Use this port for USB devices.

⑪ **USB 3.1 Gen 1 Port**

The USB 3.1 Gen 1 port supports the USB 3.1 Gen 1 specification and is compatible to the USB 2.0 specification. You can connect a USB DAC to this port or use this port for USB devices.

⑫ **Center/Subwoofer Speaker Out (Orange)**

Use this audio jack to connect center/subwoofer speakers.

⑬ **Rear Speaker Out (Black)**

Use this audio jack to connect rear speakers.

⑭ **Optical S/PDIF Out Connector**

This connector provides digital audio out to an external audio system that supports digital optical audio. Before using this feature, ensure that your audio system provides an optical digital audio in connector.

⑮ **Line In/Side Speaker Out (Blue)**

The line in jack. Use this audio jack for line in devices such as an optical drive, walkman, etc.

⑯ **Line Out/Front Speaker Out (Green)**

The line out jack.

⑰ **Mic In/Side Speaker Out (Pink)**

The Mic in jack.

Audio Jack Configurations:

Jack	Headphone/ 2-channel	4-channel	6-channel	8-channel
⑫ Center/Subwoofer Speaker Out			✓	✓
⑬ Rear Speaker Out		✓	✓	✓
⑮ Line In/Side Speaker Out				✓
⑯ Line Out/Front Speaker Out	✓	✓	✓	✓
⑰ Mic In/Side Speaker Out				✓



If you want to install a Side Speaker, you need to retask either the Line in or Mic in jack to be Side Speaker out through the audio driver.

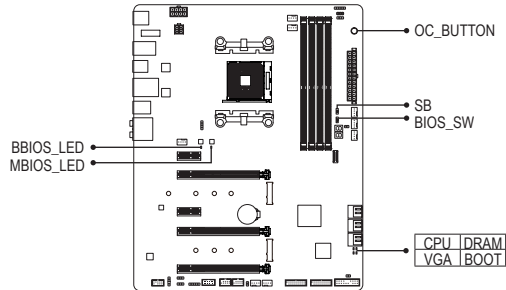


- When removing the cable connected to a back panel connector, first remove the cable from your device and then remove it from the motherboard.
- When removing the cable, pull it straight out from the connector. Do not rock it side to side to prevent an electrical short inside the cable connector.



Please visit GIGABYTE's website for details on configuring the audio software.

1-8 Onboard LEDs, Buttons, and Switches



CPU/DRAM/VGA/BOOT (Status LEDs)

The status LEDs show whether the CPU, memory, graphics card, and operating system are working properly after system power-on. If the CPU/DRAM/VGA LED is on, that means the corresponding device is not working normally; if the BOOT LED is on, that means you haven't entered the operating system yet.

OC Button (OC_BUTTON)

The OC button helps enthusiasts and overclockers not only get the most performance from their hardware, but also the absolute most enjoyable OC experience. Press this button to load the most optimized GIGABYTE overclocking configuration for your hardware.

BIOS Switches (BIOS_SW, SB) and BIOS LED Indicators

The BIOS switch (BIOS_SW) allows users to easily select a different BIOS for boot up or overclocking, helping to reduce BIOS failure during overclocking. The SB switch allows enabling or disabling of the DualBIOS™ function. The LED indicator (MBIOS_LED/BBIOS_LED) shows which BIOS is active.

BIOS_SW



1: Main BIOS (Boot from the main BIOS)



2: Backup BIOS (Boot from the backup BIOS)

SB



1: Dual BIOS



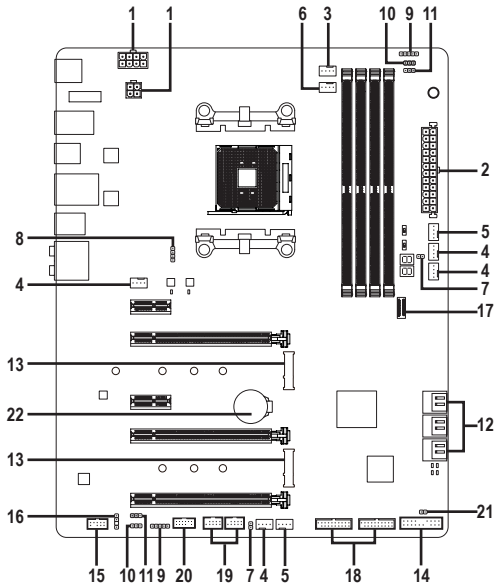
2: Single BIOS

BIOS LED Indicators:

MBIOS_LED (The main BIOS is active)

BBIOS_LED (The backup BIOS is active)

1-9 Internal Connectors



1) ATX_12V/ATX_12V1	12) SATA3 0/1/2/3/4/5
2) ATX	13) M2A_SOCKET/M2B_SOCKET
3) CPU_FAN	14) F_PANEL
4) SYS_FAN1/2/3/4	15) F_AUDIO
5) SYS_FAN5/6_PUMP	16) SPDIF_O
6) CPU_OPT	17) F_USB31C
7) EC_TEMP1/EC_TEMP2	18) F_USB30_1/F_USB30_2
8) LED_CPU	19) F_USB1/F_USB2
9) LED_C1/LED_C2	20) TPM
10) D_LED1/D_LED2	21) CLR_CMOS
11) DLED_V_SW1/DLED_V_SW2	22) BAT



Read the following guidelines before connecting external devices:

- First make sure your devices are compliant with the connectors you wish to connect.
- Before installing the devices, be sure to turn off the devices and your computer. Unplug the power cord from the power outlet to prevent damage to the devices.
- After installing the device and before turning on the computer, make sure the device cable has been securely attached to the connector on the motherboard.

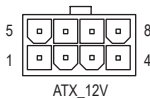
1/2) ATX_12V/ATX_12V1/ATX (2x4, 2x2, 12V Power Connectors and 2x12 Main Power Connector)

With the use of the power connector, the power supply can supply enough stable power to all the components on the motherboard. Before connecting the power connector, first make sure the power supply is turned off and all devices are properly installed. The power connector possesses a foolproof design. Connect the power supply cable to the power connector in the correct orientation.

The 12V power connector mainly supplies power to the CPU. If the 12V power connector is not connected, the computer will not start.

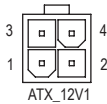


To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power supply is used that does not provide the required power, the result can lead to an unstable or unbootable system.



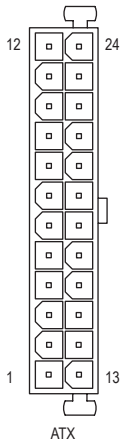
ATX_12V:

Pin No.	Definition	Pin No.	Definition
1	GND (Only for 2x4-pin 12V)	5	+12V (Only for 2x4-pin 12V)
2	GND (Only for 2x4-pin 12V)	6	+12V (Only for 2x4-pin 12V)
3	GND	7	+12V
4	GND	8	+12V



ATX_12V1:

Pin No.	Definition
1	GND
2	GND
3	+12V
4	+12V

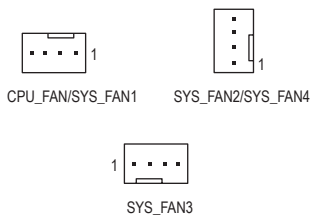


ATX:

Pin No.	Definition	Pin No.	Definition
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON (soft On/Off)
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	Power Good	20	NC
9	5VSB (stand by +5V)	21	+5V
10	+12V	22	+5V
11	+12V (Only for 2x12-pin ATX)	23	+5V (Only for 2x12-pin ATX)
12	3.3V (Only for 2x12-pin ATX)	24	GND (Only for 2x12-pin ATX)

3/4) CPU_FAN/SYS_FAN1/2/3/4 (Fan Headers)

All fan headers on this motherboard are 4-pin. Most fan headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The speed control function requires the use of a fan with fan speed control design. For optimum heat dissipation, it is recommended that a system fan be installed inside the chassis.



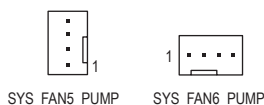
Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control



- Be sure to connect fan cables to the fan headers to prevent your CPU and system from overheating. Overheating may result in damage to the CPU or the system may hang.
- These fan headers are not configuration jumper blocks. Do not place a jumper cap on the headers.

5) SYS_FAN5_PUMP/SYS_FAN6_PUMP (System Fan/Water Cooling Pump Headers)

The fan/pump headers are 4-pin and possess a foolproof insertion design. Most fan headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The speed control function requires the use of a fan with fan speed control design. For optimum heat dissipation, it is recommended that a system fan be installed inside the chassis. The header also provides speed control for a water cooling pump, refer to Chapter 2, "BIOS Setup," "M.I.T.," for more information.



Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control

6) CPU_OPT (Water Cooling CPU Fan Header)

The fan header is 4-pin and possesses a foolproof insertion design. Most fan headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The speed control function requires the use of a fan with fan speed control design.



Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control

7) EC_TEMP1/EC_TEMP2 (Temperature Sensor Headers)

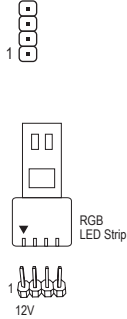
Connect the thermistor cables to the headers for temperature detection.



Pin No.	Definition
1	SENSOR IN
2	GND

8) LED_CPU (CPU Cooler LED Strip/RGB LED Strip Header)

The header can be used to connect a CPU cooler LED strip or a standard 5050 RGB LED strip (12V/G/R/B), with maximum power rating of 2A (12V) and maximum length of 2m.

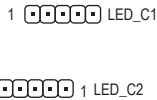


Pin No.	Definition
1	12V
2	G
3	R
4	B

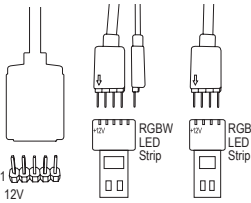
Connect the CPU cooler LED strip/RGB LED strip to the header. The power pin (marked with a triangle on the plug) of the LED strip must be connected to Pin 1 (12V) of the LED strip header. Incorrect connection may lead to the damage of the LED strip.

9) LED_C1/LED_C2 (RGB (RGBW) LED Strip Headers)

The headers can be used to connect a standard 5050 RGB (RGBW) LED strip (12V/G/R/B/W), with maximum power rating of 2A (12V) and maximum length of 2m.



Pin No.	Definition
1	12V
2	G
3	R
4	B
5	W



Connect one end of the RGB (RGBW) LED strip extension cable to the header and the other end to your RGB (RGBW) LED strip. The black wire (marked with a triangle on the plug) of the extension cable must be connected to Pin 1 (12V) of this header. The 12V pin (marked with an arrow) on the other end of the extension cable must be lined up with the 12V of the LED strip. Be careful with the connection orientation of the LED strip; incorrect connection may lead to the damage of the LED strip. If you are connecting a RGBW LED strip (5-pin), combine the two plugs of the extension cable together first. If you are connecting a RGB LED strip (4-pin), use only the 4-pin plug of the extension cable.



For how to turn on/off the lights of the LED strip, refer to the instructions on in Chapter 2, "BIOS Setup," "Peripherals."



Before installing the devices, be sure to turn off the devices and your computer. Unplug the power cord from the power outlet to prevent damage to the devices.

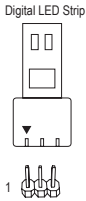
10) D_LED1/D_LED2 (Digital LED Strip Headers)

The headers can be used to connect a standard 5050 digital LED strip, with maximum power rating of 2A (12V or 5V) and maximum length of 5m or maximum number of 300 LEDs. There are 12V and 5V digital LED strips. Be sure to verify the voltage requirements of your digital LED strip and set the DLED_V_SW1 and DLED_V_SW2 jumpers accordingly.



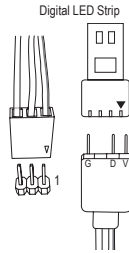
Pin No.	Definition
1	V
2	D
3	G

Connecting a 3-pin digital LED strip:



The power pin (marked with a triangle on the plug) of the LED strip must be connected to Pin 1 of the digital LED strip header. Incorrect connection may lead to the damage of the LED strip.

Connecting a 4-pin digital LED strip (using the included digital LED strip adapter cable):



Connect one end of the included digital LED strip adapter cable to this header and the other end to your digital LED strip. The triangle marking on the plug of the adapter cable must be connected to Pin 1 of the header. The "V" pin of the other end of the adapter cable must be connected to the power pin (marked with a triangle) of the LED strip. Incorrect connection may lead to the damage of the LED strip.



For how to turn on/off the lights of the LED strip, refer to the instructions on in Chapter 2, "BIOS Setup," "Peripherals."



Before installing the devices, be sure to turn off the devices and your computer. Unplug the power cord from the power outlet to prevent damage to the devices.

11) DLED_V_SW1/DLED_V_SW2 (Digital LED Strip Power Select Jumpers)

The jumpers allow you to select the supply voltage of the D_LED1 and D_LED2 headers. Be sure to verify the voltage requirements of your digital LED strip and set the correct voltage with this jumper before connection. Incorrect connection may lead to the damage of the LED strip.

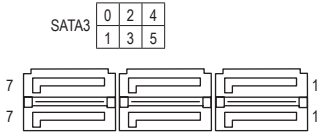


DLED_V_SW1

DLED_V_SW2

12) SATA3 0/1/2/3 (SATA 6Gb/s Connectors)

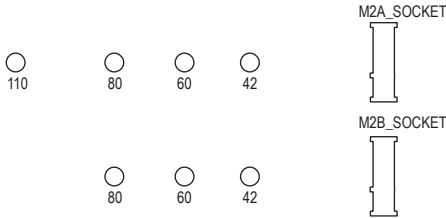
The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA device. The SATA connectors support RAID 0, RAID 1, and RAID 10. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.



Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND

13) M2A_SOCKET/M2B_SOCKET (M.2 Socket 3 Connectors)

The M.2 connectors support M.2 SATA SSDs or M.2 PCIe SSDs ^(NOTE) and support SATA RAID configuration. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array. (NVMe PCIe RAID support requires driver and BIOS updates. Visit the AMD or GIGABYTE official website for future update information.)



Follow the steps below to correctly install an M.2 SSD in the M.2 connector.

Step 1:

Get a screw and a standoff from the included M.2 screw kit. Locate the M.2 connector where you will install the M.2 SSD, use a screwdriver to unfasten the screw on the heatsink and then remove the heatsink.

Step 2:

Locate the proper mounting hole for the M.2 SSD to be installed and then tighten the standoff first. Insert the M.2 SSD into the M.2 connector at an angle.

Step 3:

Press the M.2 SSD down and then secure it with the screw. Replace the heatsink and secure it to the original hole.

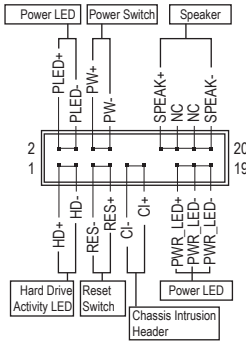


Select the proper hole for the M.2 SSD to be installed and refasten the screw and nut.

(Note) The M2B_SOCKET connector supports only PCIe SSDs.

14) F_PANEL (Front Panel Header)

Connect the power switch, reset switch, speaker, chassis intrusion switch/sensor 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.



- **PLED/PWR_LED (Power LED, Yellow/Purple):**

System Status	LED
S0	On
S3/S4/S5	Off

Connects to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED is off when the system is in S3/S4 sleep state or powered off (S5).

- **PW (Power Switch, Red):**

Connects to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch (refer to Chapter 2, "BIOS Setup," "Power," for more information).

- **SPEAK (Speaker, Orange):**

Connects to the speaker on the chassis front panel. The system reports system startup status by issuing a beep code. One single short beep will be heard if no problem is detected at system startup.

- **HD (Hard Drive Activity LED, Blue):**

Connects to the hard drive activity LED on the chassis front panel. The LED is on when the hard drive is reading or writing data.

- **RES (Reset Switch, Green):**

Connects to the reset switch on the chassis front panel. Press the reset switch to restart the computer if the computer freezes and fails to perform a normal restart.

- **CI (Chassis Intrusion Header, Gray):**

Connects to the chassis intrusion switch/sensor on the chassis that can detect if the chassis cover has been removed. This function requires a chassis with a chassis intrusion switch/sensor.

- **NC (Orange):** No Connection.



The front panel design may differ by chassis. A front panel module mainly consists of power switch, reset switch, 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.

15) F_AUDIO (Front Panel Audio Header)

The front panel audio header supports High Definition audio (HD). You may connect your chassis front panel audio module to this header. Make sure the wire assignments of the module connector match the pin assignments of the motherboard header. Incorrect connection between the module connector and the motherboard header will make the device unable to work or even damage it.



Pin No.	Definition	Pin No.	Definition
1	MIC2_L	6	Sense
2	GND	7	GND
3	MIC2_R	8	No Pin
4	NC	9	LINE2_L
5	LINE2_R	10	Sense



Some chassis provide a front panel audio module that has separated connectors on each wire instead of a single plug. For information about connecting the front panel audio module that has different wire assignments, please contact the chassis manufacturer.

16) SPDIF_O (S/PDIF Out Header)

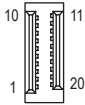
This header supports digital S/PDIF Out and connects a S/PDIF digital audio cable (provided by expansion cards) for digital audio output from your motherboard to certain expansion cards like graphics cards and sound cards. For example, some graphics cards may require you to use a S/PDIF digital audio cable for digital audio output from your motherboard to your graphics card if you wish to connect an HDMI display to the graphics card and have digital audio output from the HDMI display at the same time. For information about connecting the S/PDIF digital audio cable, carefully read the manual for your expansion card.



Pin No.	Definition
1	5VDUAL
2	No Pin
3	SPDIFO
4	GND

17) F_USB31C (USB Type-C™ Header with USB 3.1 Gen 2 Support)

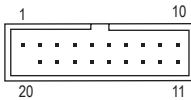
The header conforms to USB 3.1 Gen 2 specification and can provide one USB port.



Pin No.	Definition	Pin No.	Definition	Pin No.	Definition
1	VBUS	8	CC1	15	RX2+
2	TX1+	9	SBU1	16	RX2-
3	TX1-	10	SBU2	17	GND
4	GND	11	VBUS	18	D-
5	RX1+	12	TX2+	19	D+
6	RX1-	13	TX2-	20	CC2
7	VBUS	14	GND		

18) F_USB30_1/F_USB30_2 (USB 3.1 Gen 1 Headers)

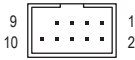
The headers conform to USB 3.1 Gen 1 and USB 2.0 specification and each header can provide two USB ports. For purchasing the optional 3.5" front panel that provides two USB 3.1 Gen 1 ports, please contact the local dealer.



Pin No.	Definition	Pin No.	Definition	Pin No.	Definition
1	VBUS	8	D1-	15	SSTX2-
2	SSRX1-	9	D1+	16	GND
3	SSRX1+	10	NC	17	SSRX2+
4	GND	11	D2+	18	SSRX2-
5	SSTX1-	12	D2-	19	VBUS
6	SSTX1+	13	GND	20	No Pin
7	GND	14	SSTX2+		

19) F_USB1/F_USB2 (USB 2.0/1.1 Headers)

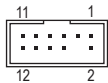
The headers conform to USB 2.0/1.1 specification. Each USB header can provide two USB ports via an optional USB bracket. For purchasing the optional USB bracket, please contact the local dealer.



Pin No.	Definition	Pin No.	Definition
1	Power (5V)	6	USB DY+
2	Power (5V)	7	GND
3	USB DX-	8	GND
4	USB DY-	9	No Pin
5	USB DX+	10	NC

20) TPM (Trusted Platform Module Header)

You may connect a TPM (Trusted Platform Module) to this header.



Pin No.	Definition	Pin No.	Definition
1	LAD0	7	LAD3
2	VCC3	8	GND
3	LAD1	9	LFRAME
4	No Pin	10	NC
5	LAD2	11	SERIRQ
6	LCLK	12	LRESET

21) CLR_CMOS (Clear CMOS Jumper)

Use this jumper to clear the BIOS configuration and reset the CMOS values to factory defaults. To clear the CMOS values, use a metal object like a screwdriver to touch the two pins for a few seconds.



Open: Normal



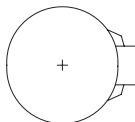
Short: Clear CMOS Values



- Always turn off your computer and unplug the power cord from the power outlet before clearing the CMOS values.
- After system restart, go to BIOS Setup to load factory defaults (select Load Optimized Defaults) or manually configure the BIOS settings (refer to Chapter 2, "BIOS Setup," for BIOS configurations).

22) BAT (Battery)

The battery provides power to keep the values (such as BIOS configurations, date, and time information) in the CMOS when the computer is turned off. Replace the battery when the battery voltage drops to a low level, or the CMOS values may not be accurate or may be lost.



You may clear the CMOS values by removing the battery:

1. Turn off your computer and unplug the power cord.
2. Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making them short for 5 seconds.)
3. Replace the battery.
4. Plug in the power cord and restart your computer.



- Always turn off your computer and unplug the power cord before replacing the battery.
- Replace the battery with an equivalent one. Damage to your devices may occur if the battery is replaced with an incorrect model.
- Contact the place of purchase or local dealer if you are not able to replace the battery by yourself or uncertain about the battery model.
- When installing the battery, note the orientation of the positive side (+) and the negative side (-) of the battery (the positive side should face up).
- Used batteries must be handled in accordance with local environmental regulations.

Chapter 2 BIOS Setup

BIOS (Basic Input and Output System) records hardware parameters of the system in the CMOS on the motherboard. Its major functions include conducting the Power-On Self-Test (POST) during system startup, saving system parameters and loading operating system, etc. BIOS includes a BIOS Setup program that allows the user to modify basic system configuration settings or to activate certain system features.

When the power is turned off, the battery on the motherboard supplies the necessary power to the CMOS to keep the configuration values in the CMOS.

To access the BIOS Setup program, press the <Delete> key during the POST when the power is turned on.

To upgrade the BIOS, use either the GIGABYTE Q-Flash or @BIOS utility.

- Q-Flash allows the user to quickly and easily upgrade or back up BIOS without entering the operating system.
- @BIOS is a Windows-based utility that searches and downloads the latest version of BIOS from the Internet and updates the BIOS.



- Because BIOS flashing is potentially risky, if you do not encounter problems using the current version of BIOS, it is recommended that you not flash the BIOS. To flash the BIOS, do it with caution. Inadequate BIOS flashing may result in system malfunction.
- It is recommended that you not alter the default settings (unless you need to) to prevent system instability or other unexpected results. Inadequately altering the settings may result in system's failure to boot. If this occurs, try to clear the CMOS values and reset the board to default values. (Refer to the "Load Optimized Defaults" section in this chapter or introductions of the battery/clear CMOS button/jumper in Chapter 1 for how to clear the CMOS values.)

2-1 Startup Screen

The following startup Logo screen will appear when the computer boots.

(Sample BIOS Version: D4)

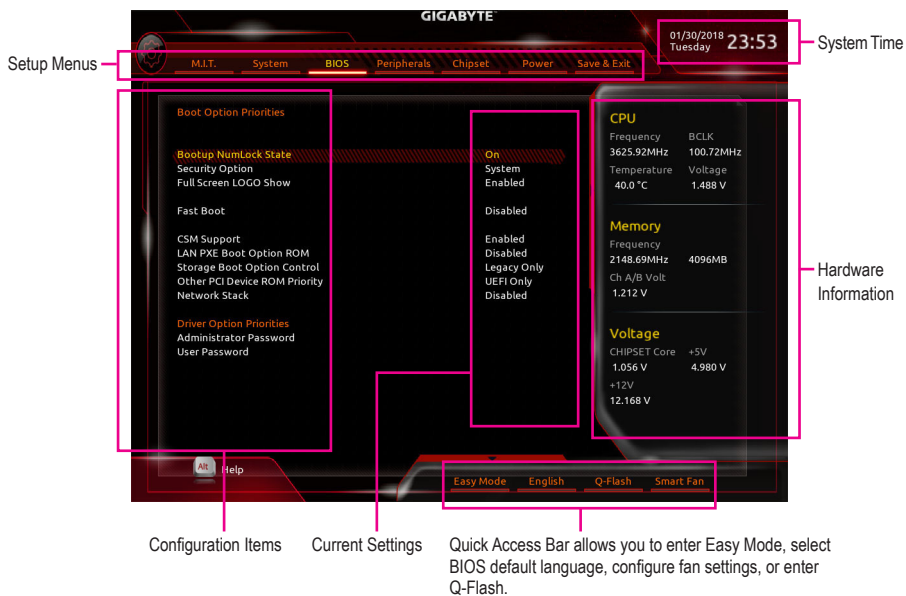


There are two different BIOS modes as follows and you can use the <F2> key to switch between the two modes. The Classic Setup mode provides detailed BIOS settings. You can press the arrow keys on your keyboard to move among the items and press <Enter> to accept or enter a sub-menu. Or you can use your mouse to select the item you want. Easy Mode allows users to quickly view their current system information or to make adjustments for optimum performance. In Easy Mode, you can use your mouse to move through configuration items.



- When the system is not stable as usual, select the **Load Optimized Defaults** item to set your system to its defaults.
- The BIOS Setup menus described in this chapter are for reference only and may differ by BIOS version.

2-2 The Main Menu



Classic Setup Function Keys

<←><→>	Move the selection bar to select a setup menu
<↑><↓>	Move the selection bar to select an configuration item on a menu
<Enter>	Execute command or enter a menu
<+>/<Page Up>	Increase the numeric value or make changes
<->/<Page Down>	Decrease the numeric value or make changes
<F1>	Show descriptions of the function keys
<F2>	Switch to Easy Mode
<F5>	Restore the previous BIOS settings for the current submenus
<F7>	Load the Optimized BIOS default settings for the current submenus
<F8>	Access the Q-Flash utility
<F9>	Display system information
<F10>	Save all the changes and exit the BIOS Setup program
<F12>	Capture the current screen as an image and save it to your USB drive
<Esc>	Main Menu: Exit the BIOS Setup program Submenus: Exit current submenu

2-3 M.I.T.



Whether the system will work stably with the overclock/overvoltage settings you made is dependent on your overall system configurations. Incorrectly doing overclock/overvoltage may result in damage to CPU, chipset, or memory and reduce the useful life of these components. This page is for advanced users only and we recommend you not to alter the default settings to prevent system instability or other unexpected results. (Inadequately altering the settings may result in system's failure to boot. If this occurs, clear the CMOS values and reset the board to default values.)

▶ **Advanced Frequency Settings**

☞ **EZ Overclock Tuner**

Provides you with several preset profiles to achieve the target frequency of the installed memory by changing the CPU host clock and memory multiplier. Please note that actual performance may vary depending on the memory installed. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **CPU Clock Control**

Allows you to manually set the CPU base clock in 0.01 MHz increments. (Default: Auto)

Important: It is highly recommended that the CPU frequency be set in accordance with the CPU specifications.

☞ **Host Clock Value**

Displays the current operating Host Clock frequency.

☞ **CPU Clock Ratio**

Allows you to alter the clock ratio for the installed CPU. The adjustable range is dependent on the CPU being installed.

☞ **CPU Frequency**

Displays the current operating CPU frequency.

▶ **Advanced CPU Core Settings**

☞ **CPU Clock Ratio, CPU Frequency**

The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.

- ☞ **Core Performance Boost**
 Allows you to determine whether to enable the Core Performance Boost (CPB) technology, a CPU performance-boost technology. (Default: Auto)
- ☞ **AMD Cool&Quiet function**

 - ▶▶ Enabled Lets the AMD Cool'n'Quiet driver dynamically adjust the CPU clock and VID to reduce heat output from your computer and its power consumption. (Default)
 - ▶▶ Disabled Disables this function.
- ☞ **SVM Mode**
 Virtualization enhanced by Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With virtualization, one computer system can function as multiple virtual systems. (Default: Disabled)
- ☞ **Global C-state Control**
 Allows you to determine whether to let the CPU enter C states. When enabled, the CPU core frequency will be reduced during system halt state to decrease power consumption. (Default: Auto)
- ☞ **Power Supply Idle Control**
 Enables or disables Package C6 State.

 - ▶▶ Typical Current Idle Disables this function.
 - ▶▶ Low Current Idle Enables this function.
 - ▶▶ Auto Lets the BIOS automatically configure this setting. (Default)
- ☞ **Opcache Control**
 Enables or disables Opcache. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **Downcore Control**
 Allows you to select the number of CPU cores to enable (the number of CPU cores may vary by CPU). **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **SMT Mode**
 Allows you to enable or disable the CPU Simultaneous Multi-Threading technology. This feature only works for operating systems that support multi-processor mode. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **Extreme Memory Profile (X.M.P.)** ^(Note)
 Allows the BIOS to read the SPD data on XMP memory module(s) to enhance memory performance when enabled.

 - ▶▶ Disabled Disables this function. (Default)
 - ▶▶ Profile1 Uses Profile 1 settings.
 - ▶▶ Profile2 ^(Note) Uses Profile 2 settings.
- ☞ **System Memory Multiplier**
 Allows you to set the system memory multiplier. **Auto** sets memory multiplier according to memory SPD data. (Default: Auto)
- ☞ **Memory Frequency (MHz)**
 The first memory frequency value is the normal operating frequency of the memory being used; the second is the memory frequency that is automatically adjusted according to the **System Memory Multiplier** settings.
- ▶ **Advanced Memory Settings**

 - ☞ **Extreme Memory Profile (X.M.P.)** ^(Note), **System Memory Multiplier**, **Memory Frequency(MHz)**
 The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.

(Note) This item is present only when you install a CPU and a memory module that support this feature.

☞ **Memory Timing Mode**

Manual allows the memory timing settings below to be configurable. Options are: Auto (default), Manual.

☞ **Profile DDR Voltage**

When using a non-XMP memory module or **Extreme Memory Profile (X.M.P.)** is set to **Disabled**, the value is displayed according to your memory specification. When **Extreme Memory Profile (X.M.P.)** is set to **Profile1** or **Profile2**, the value is displayed according to the SPD data on the XMP memory.

▶ **Standard Timing Control, Advanced Timing Control, CAD Bus Setup Timing, CAD Bus Drive Strength, Data Bus Configuration**

These sections provide memory timing settings. The respective timing setting screens are configurable only when **Memory Timing Mode** is set to **Manual**. Note: Your system may become unstable or fail to boot after you make changes on the memory timings. If this occurs, please reset the board to default values by loading optimized defaults or clearing the CMOS values.

▶ **Advanced Voltage Settings**

This sub-menu allows you to set CPU, chipset and memory voltages.

▶ **PC Health Status**

☞ **Reset Case Open Status**

- ▶ Disabled Keeps or clears the record of previous chassis intrusion status. (Default)
- ▶ Enabled Clears the record of previous chassis intrusion status and the **Case Open** field will show "No" at next boot.

☞ **Case Open**

Displays the detection status of the chassis intrusion detection device attached to the motherboard CI header. If the system chassis cover is removed, this field will show "Yes", otherwise it will show "No". To clear the chassis intrusion status record, set **Reset Case Open Status** to **Enabled**, save the settings to the CMOS, and then restart your system.

☞ **CPU Vcore/CPU VDDP/CPU VDD18/DDRvt A/B/DRAM Channel A/B Voltage/DDRvpp A/B/+3.3V/+5V/CHIPSET Core 2.5V/+12V/VCORE SOC**

Displays the current system voltages.

▶ **Miscellaneous Settings**

☞ **PCIe Slot Configuration**

Allows you to set the operation mode of the PCI Express slots to Gen 1, Gen 2, or Gen 3. Actual operation mode is subject to the hardware specification of each slot. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **3DMark01 Enhancement**

Allows you to determine whether to enhance some legacy benchmark performance. (Default: Disabled)

▶ **Smart Fan 5 Settings**

☞ **Monitor**

Allows you to select a target to monitor and to make further adjustment. (Default: CPU FAN)

☞ **Fan Speed Control**

Allows you to determine whether to enable the fan speed control function and adjust the fan speed.

- ▶▶ **Normal** Allows the fan to run at different speeds according to the temperature. You can adjust the fan speed with System Information Viewer based on your system requirements. (Default)
- ▶▶ **Silent** Allows the fan to run at slow speeds.
- ▶▶ **Manual** Allows you to control the fan speed in the curve graph.
- ▶▶ **Full Speed** Allows the fan to run at full speeds.

☞ **Fan Control Use Temperature Input**

Allows you to select the reference temperature for fan speed control.

☞ **Temperature Interval**

Allows you to select the temperature interval for fan speed change.

☞ **Fan/Pump Control Mode**

- ▶▶ **Auto** Lets the BIOS automatically detect the type of fan/pump installed and sets the optimal control mode. (Default)
- ▶▶ **Voltage** Voltage mode is recommended for a 3-pin fan/pump.
- ▶▶ **PWM** PWM mode is recommended for a 4-pin fan/pump.

☞ **Fan/Pump Stop**

Enables or disables the fan/pump stop function. You can set the temperature limit using the temperature curve. The fan or pump stops operation when the temperature is lower than the limit. (Default: Disabled)

☞ **Temperature**

Displays the current temperature of the selected target area.

☞ **Fan Speed**

Displays current fan/pump speeds.

☞ **Flow Rate**

Displays the flow rate of your water cooling system.

☞ **Temperature Warning Control**

Sets the warning threshold for temperature. When temperature exceeds the threshold, BIOS will emit warning sound. Options are: Disabled (default), 60°C/140°F, 70°C/158°F, 80°C/176°F, 90°C/194°F.

☞ **Fan/Pump Fail Warning**

Allows the system to emit warning sound if the fan/pump is not connected or fails. Check the fan/pump condition or fan/pump connection when this occurs. (Default: Disabled)

2-4 System



This section provides information on your motherboard model and BIOS version. You can also select the default language used by the BIOS and manually set the system time.

System Language

Selects the default language used by the BIOS.

System Date

Sets the system date. The date format is week (read-only), month, date, and year. Use <Enter> to switch between the Month, Date, and Year fields and use the <Page Up> or <Page Down> key to set the desired value.

System Time

Sets the system time. The time format is hour, minute, and second. For example, 1 p.m. is 13:00:00. Use <Enter> to switch between the Hour, Minute, and Second fields and use the <Page Up> or <Page Down> key to set the desired value.

Access Level

Displays the current access level depending on the type of password protection used. (If no password is set, the default will display as **Administrator**.) The Administrator level allows you to make changes to all BIOS settings; the User level only allows you to make changes to certain BIOS settings but not all.

2-5 BIOS



☞ **Boot Option Priorities**

Specifies the overall boot order from the available devices. Removable storage devices that support GPT format will be prefixed with "UEFI:" string on the boot device list. To boot from an operating system that supports GPT partitioning, select the device prefixed with "UEFI:" string.

Or if you want to install an operating system that supports GPT partitioning such as Windows 10 64-bit, select the optical drive that contains the Windows 10 64-bit installation disk and is prefixed with "UEFI:" string.

☞ **Hard Drive/CD/DVD ROM Drive/Floppy Drive/Network Device BBS Priorities**

Specifies the boot order for a specific device type, such as hard drives, optical drives, floppy disk drives, and devices that support Boot from LAN function, etc. Press <Enter> on this item to enter the submenu that presents the devices of the same type that are connected. This item is present only if at least one device for this type is installed.

☞ **Bootup NumLock State**

Enables or disables Numlock feature on the numeric keypad of the keyboard after the POST. (Default: On)

☞ **Security Option**

Specifies whether a password is required every time the system boots, or only when you enter BIOS Setup. After configuring this item, set the password(s) under the **Administrator Password/User Password** item.

- ▶▶ Setup A password is only required for entering the BIOS Setup program.
- ▶▶ System A password is required for booting the system and for entering the BIOS Setup program. (Default)

☞ **Full Screen LOGO Show**

Allows you to determine whether to display the GIGABYTE Logo at system startup. **Disabled** skips the GIGABYTE Logo when the system starts up. (Default: Enabled)

☞ **Fast Boot**

Enables or disables Fast Boot to shorten the OS boot process. **Ultra Fast** provides the fastest bootup speed. (Default: Disabled)

☞ **SATA Support**

- ▶▶ All Sata Devices All SATA devices are functional in the operating system and during the POST.
- ▶▶ Last Boot HDD Only Except for the previous boot drive, all SATA devices are disabled before the OS boot process completes. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

☞ **VGA Support**

Allows you to select which type of operating system to boot.

- ▶▶ Auto Enables legacy option ROM only.
- ▶▶ EFI Driver Enables EFI option ROM. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

☞ **USB Support**

- ▶▶ Disabled All USB devices are disabled before the OS boot process completes.
- ▶▶ Full Initial All USB devices are functional in the operating system and during the POST. (Default)
- ▶▶ Partial Initial Part of the USB devices are disabled before the OS boot process completes.

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is disabled when **Fast Boot** is set to **Ultra Fast**.

☞ **PS2 Devices Support**

- ▶▶ Disabled All PS/2 devices are disabled before the OS boot process completes.
- ▶▶ Enabled All PS/2 devices are functional in the operating system and during the POST. (Default)

This item is configurable only when **Fast Boot** is set to **Enabled**. This function is **disabled** when **Fast Boot** is set to **Ultra Fast**.

☞ **NetWork Stack Driver Support**

- ▶▶ Disabled Disables booting from the network. (Default)
- ▶▶ Enabled Enables booting from the network.

This item is configurable only when **Fast Boot** is set to **Enabled** or **Ultra Fast**.

☞ **CSM Support**

Enables or disables UEFI CSM (Compatibility Support Module) to support a legacy PC boot process.

- ▶▶ Enabled Enables UEFI CSM. (Default)
- ▶▶ Disabled Disables UEFI CSM and supports UEFI BIOS boot process only.

☞ **LAN PXE Boot Option ROM**

Allows you to select whether to enable the legacy option ROM for the LAN controller. (Default: Disabled)

This item is configurable only when **CSM Support** is set to **Enabled**.

☞ **Storage Boot Option Control**

Allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller.

- ▶▶ Disabled Disables option ROM.
- ▶▶ UEFI Only Enables UEFI option ROM only.
- ▶▶ Legacy Only Enables legacy option ROM only. (Default)

This item is configurable only when **CSM Support** is set to **Enabled**.

☞ **Other PCI Device ROM Priority**

Allows you to select whether to enable the UEFI or Legacy option ROM for the PCI device controller other than the LAN, storage device, and graphics controllers.

- ▶▶ Disabled Disables option ROM.
- ▶▶ UEFI Only Enables UEFI option ROM only. (Default)
- ▶▶ Legacy Only Enables legacy option ROM only.

This item is configurable only when **CSM Support** is set to **Enabled**.

- ☞ **Network Stack**
Disables or enables booting from the network to install a GPT format OS, such as installing the OS from the Windows Deployment Services server. (Default: Disabled)
- ☞ **Ipv4 PXE Support**
Enables or disables IPv4 PXE Support. This item is configurable only when **Network Stack** is enabled.
- ☞ **Ipv4 HTTP Support**
Enables or disables HTTP boot support for IPv4. This item is configurable only when **Network Stack** is enabled.
- ☞ **Ipv6 PXE Support**
Enables or disables IPv6 PXE Support. This item is configurable only when **Network Stack** is enabled.
- ☞ **Ipv6 HTTP Support**
Enables or disables HTTP boot support for IPv6. This item is configurable only when **Network Stack** is enabled.

- ☞ **Administrator Password**
Allows you to configure an administrator password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. Differing from the user password, the administrator password allows you to make changes to all BIOS settings.
- ☞ **User Password**
Allows you to configure a user password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering BIOS Setup. However, the user password only allows you to make changes to certain BIOS settings but not all. To cancel the password, press <Enter> on the password item and when requested for the password, enter the correct one first. When prompted for a new password, press <Enter> without entering any password. Press <Enter> again when prompted to confirm.
NOTE: Before setting the User Password, be sure to set the Administrator Password first.

2-6 Peripherals



- **AMD CPU FTPM**
Enables or disables the TPM 2.0 function integrated in the AMD CPU. (Default: Disabled)
- **Initial Display Output**
Specifies the first initiation of the monitor display from the PCI Express graphics cards.
 - ▶▶ PCIe 1 Slot Sets the graphics card on the PCIEX16 slot as the first display. (Default)
 - ▶▶ PCIe 2 Slot Sets the graphics card on the PCIEX8 slot as the first display.
 - ▶▶ PCIe 3 Slot Sets the graphics card on the PCIEX4 slot as the first display.
- **RGB Fusion**
Allows you to set the LED lighting mode for the motherboard.
 - ▶▶ Off Disables this function.
 - ▶▶ Pulse Mode All LEDs simultaneously fade in and fade out.
 - ▶▶ Color Cycle All LEDs simultaneously cycle through a full spectrum of colors.
 - ▶▶ Static Mode All LEDs emit a single color. (Default)
 - ▶▶ Flash Mode All LEDs simultaneously flash on and off.
 - ▶▶ Double Flash All LEDs flash in an interlaced pattern.
- **LEDs in Sleep, Hibernation, and Soft Off States**
Allows you to set the lighting mode of the motherboard LEDs in system S3/S4/S5 state. This feature is supported only with a 5V digital LED strip.
 - ▶▶ Off Disables the selected lighting mode when the system enters S3/S4/S5 state. (Default)
 - ▶▶ On Enables the selected lighting mode when the system enters S3/S4/S5 state.
- **Legacy USB Support**
Allows USB keyboard/mouse to be used in MS-DOS. (Default: Enabled)
- **XHCI Hand-off**
Determines whether to enable XHCI Hand-off feature for an operating system without XHCI Hand-off support. (Default: Enabled)
- **EHCI Hand-off**
Determines whether to enable EHCI Hand-off feature for an operating system without EHCI Hand-off support. (Default: Disabled)

☞ **Port 60/64 Emulation**

Enables or disables emulation of I/O ports 64h and 60h. This should be enabled for full legacy support for USB keyboards/mice in MS-DOS or in operating system that does not natively support USB devices. (Default: Disabled)

☞ **USB Mass Storage Driver Support**

Enables or disables support for USB storage devices. (Default: Enabled)

☞ **Mass Storage Devices**

Displays a list of connected USB mass storage devices. This item appears only when a USB storage device is installed.

☞ **DAC-UP 2 Rear USB 3.0 (Output Voltage of USB 3.1 Gen 1 Ports on the Back Panel)**

Allows you to increase the output voltage of the USB 3.1 Gen 1 ports on the back panel (the ones next to the audio jacks) to strengthen the stability of your USB device(s).

- ▶▶ Normal Keeps the original output voltage. (Default)
- ▶▶ Disable USB bus power Disables the power of the USB connectors. High-end audio players may connect their own external USB power source.
- ▶▶ Voltage Compensation +0.1V Adds 0.1V to the original output voltage.
- ▶▶ Voltage Compensation +0.2V Adds 0.2V to the original output voltage.
- ▶▶ Voltage Compensation +0.3V Adds 0.3V to the original output voltage.

☞ **HD Audio Controller**

Enables or disables the onboard audio function. (Default: Enabled)

If you wish to install a 3rd party add-in audio card instead of using the onboard audio, set this item to **Disabled**.

☞ **Above 4G Decoding**

Enables or disables 64-bit capable devices to be decoded in above 4 GB address space (only if your system supports 64-bit PCI decoding). Set to **Enabled** if more than one advanced graphics card are installed and their drivers are not able to be launched when entering the operating system (because of the limited 4 GB memory address space). (Default: Disabled)

▶ **AMD CBS**

This sub-menu provides AMD CBS-related configuration options.

▶ **Intel(R) I211 Gigabit Network Connection**

This sub-menu provides information on LAN configuration and related configuration options.

▶ **Trusted Computing**

Enables or disables Trusted Platform Module (TPM).

2-7 Chipset



- ☞ **IOMMU**
Enables or disables AMD IOMMU support. (Default: Auto)

- ☞ **SATA Mode**
Enables or disables RAID for the SATA controllers integrated in the Chipset or configures the SATA controllers to AHCI mode.
 - ▶▶ RAID Enables RAID for the SATA controller.
 - ▶▶ AHCI Configures the SATA controllers to AHCI mode. Advanced Host Controller Interface (AHC) is an interface specification that allows the storage driver to enable advanced Serial ATA features such as Native Command Queuing and hot plug. (Default)

- ☞ **Chipset SATA Port Enable**
Enables or disables the integrated SATA controllers. (Default: Enabled)

- ☞ **Chipset SATA Port 0/1/2/3/4/5**
Displays the information of the connected SATA device(s).

2-8 Power



☞ AC BACK

Determines the state of the system after the return of power from an AC power loss.

- ▶▶ Memory The system returns to its last known awake state upon the return of the AC power.
- ▶▶ Always On The system is turned on upon the return of the AC power.
- ▶▶ Always Off The system stays off upon the return of the AC power. (Default)

☞ ErP

Determines whether to let the system consume least power in S5 (shutdown) state. Note: When this item is set to **Enabled**, the following functions will become unavailable: Resume by Alarm, power on by mouse, and power on by keyboard.

☞ Soft-Off by PWR-BTTN

Configures the way to turn off the computer in MS-DOS mode using the power button.

- ▶▶ Instant-Off Press the power button and then the system will be turned off instantly. (Default)
- ▶▶ Delay 4 Sec. Press and hold the power button for 4 seconds to turn off the system. If the power button is pressed for less than 4 seconds, the system will enter suspend mode.

☞ Power Loading

Enables or disables dummy load. When the power supply is at low load, a self-protection will activate causing it to shutdown or fail. If this occurs, please set to **Enabled**. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ Resume by Alarm

Determines whether to power on the system at a desired time. (Default: Disabled)

If enabled, set the date and time as following:

- ▶▶ Wake up day: Turn on the system at a specific time on each day or on a specific day in a month.
 - ▶▶ Wake up hour/minute/second: Set the time at which the system will be powered on automatically.
- Note: When using this function, avoid inadequate shutdown from the operating system or removal of the AC power, or the settings may not be effective.

☞ Wake on LAN

Enables or disables the wake on LAN function. (Default: Enabled)

☞ High Precision Event Timer

Enables or disables High Precision Event Timer (HPET) in the operating system. (Default: Enabled)

⦿ Rear Power Button Mode

Allows you to change the function of the power/reset button on the back panel.

- ▶▶ On/Off Sets this button to Power function. (Default)
- ▶▶ Reset Sets this button to Reset function.

⦿ CEC 2019 Ready

Allows you to select whether to allow the system to adjust power consumption when it is in shutdown, idle, or standby state in order to comply with the CEC (California Energy Commission) 2019 Standards. (Default: Disabled)

2-9 Save & Exit



⦿ Save & Exit Setup

Press <Enter> on this item and select **Yes**. This saves the changes to the CMOS and exits the BIOS Setup program. Select **No** or press <Esc> to return to the BIOS Setup Main Menu.

⦿ Exit Without Saving

Press <Enter> on this item and select **Yes**. This exits the BIOS Setup without saving the changes made in BIOS Setup to the CMOS. Select **No** or press <Esc> to return to the BIOS Setup Main Menu.

⦿ Load Optimized Defaults

Press <Enter> on this item and select **Yes** to load the optimal BIOS default settings. The BIOS default settings help the system to operate in optimum state. Always load the Optimized defaults after updating the BIOS or after clearing the CMOS values.

⦿ Boot Override

Allows you to select a device to boot immediately. Press <Enter> on the device you select and select **Yes** to confirm. Your system will restart automatically and boot from that device.

⦿ Save Profiles

This function allows you to save the current BIOS settings to a profile. You can create up to 8 profiles and save as Setup Profile 1~ Setup Profile 8. Press <Enter> to complete. Or you can select **Select File in HDD/FDD/USB** to save the profile to your storage device.

⦿ Load Profiles

If your system becomes unstable and you have loaded the BIOS default settings, you can use this function to load the BIOS settings from a profile created before, without the hassles of reconfiguring the BIOS settings. First select the profile you wish to load and then press <Enter> to complete. You can select **Select File in HDD/FDD/USB** to input the profile previously created from your storage device or load the profile automatically created by the BIOS, such as reverting the BIOS settings to the last settings that worked properly (last known good record).