X399 AORUS Gaming 7

User's Manual

Rev. 1003

12ME-X39AGM7-1003R

For more product details, please visit GIGABYTE's website.

To reduce the impacts on global warming, the packaging materials of this product are recyclable and reusable. GIGABYTE works with you to protect the environment.

Wireless Module Country Approvals:

United States: FCC: PD98265NG	Indonesia: 46840/SDPPI/2016 4625	South Korea: MSIP-CRM-INT-8265NGW
Canada: IC: 1000M-8265NG		
Australia & New-Zealand:	Japan: R 003-160104 T D160055003 5.15~5.35GHz indoor use only	Taiwan: CCAH16LP3150T2
China: CMIIT ID: 2016AJ2775 (M)		UAE: TRA Registered No.: ER46868/16 Dealer No.: 0018841/09
European Union:	Serbia: И011 16	Ukraine: 028
India: 2.4GHz: NR-ETA/4791 5GHZ: NR-ETA/4792	Singapore: Complies with IDA standards DB 02941	

See the latest safety and regulatory documents at GIGABYTE's website.

Documentation Classifications

In order to assist in the use of this product, GIGABYTE provides the following types of documentations:

- ■ For quick set-up of the product, read the Quick Installation Guide included with the product.
- ■ For detailed product information, carefully read the User's Manual.

For product-related information, check on our website at: http://www.gigabyte.com

Identifying Your Motherboard Revision

The revision number on your motherboard looks like this: "REV: X.X." For example, "REV: 1.0" means the revision of the motherboard is 1.0. Check your motherboard revision before updating motherboard BIOS, drivers, or when looking for technical information.

Example:
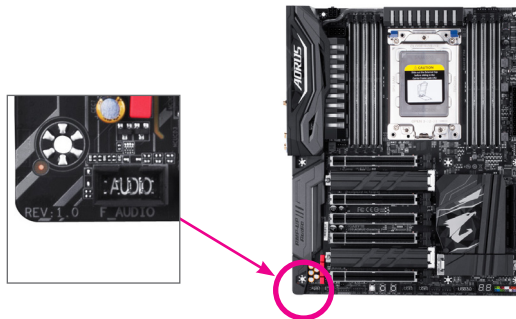
Table of Contents

Box Contents

- ☑ X399 AORUS Gaming 7 motherboard
- ☑ Motherboard driver disk
- ☑ User's Manual
- ☑ Quick Installation Guide
- ☑ Four SATA cables
- ☑ I/O Shield
- ☑ One Wi-Fi antenna
- ☑ One GC-SLI23P SLI bridge connector
- ☑ One G Connector
- ☑ One digital LED strip adapter cable
- ☑ Two RGB (RGBW) LED strip extension cables
- ☑ Two Velcro Cable Ties
- ☑ Two thermistor cables
- ☑ One M.2 screw kit
- ☑ One T20 star wrench

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.

Optional Items

- ☐ 2-port USB 2.0 bracket (Part No. 12CR1-1UB030-6*R)
- ☐ eSATA bracket (Part No. 12CF1-3SATPW-4*R)
- ☐ 3.5" Front Panel with 2 USB 3.1 Gen 1 ports (Part No. 12CR1-FPX582-2*R)

X399 AORUS Gaming 7 Motherboard Layout
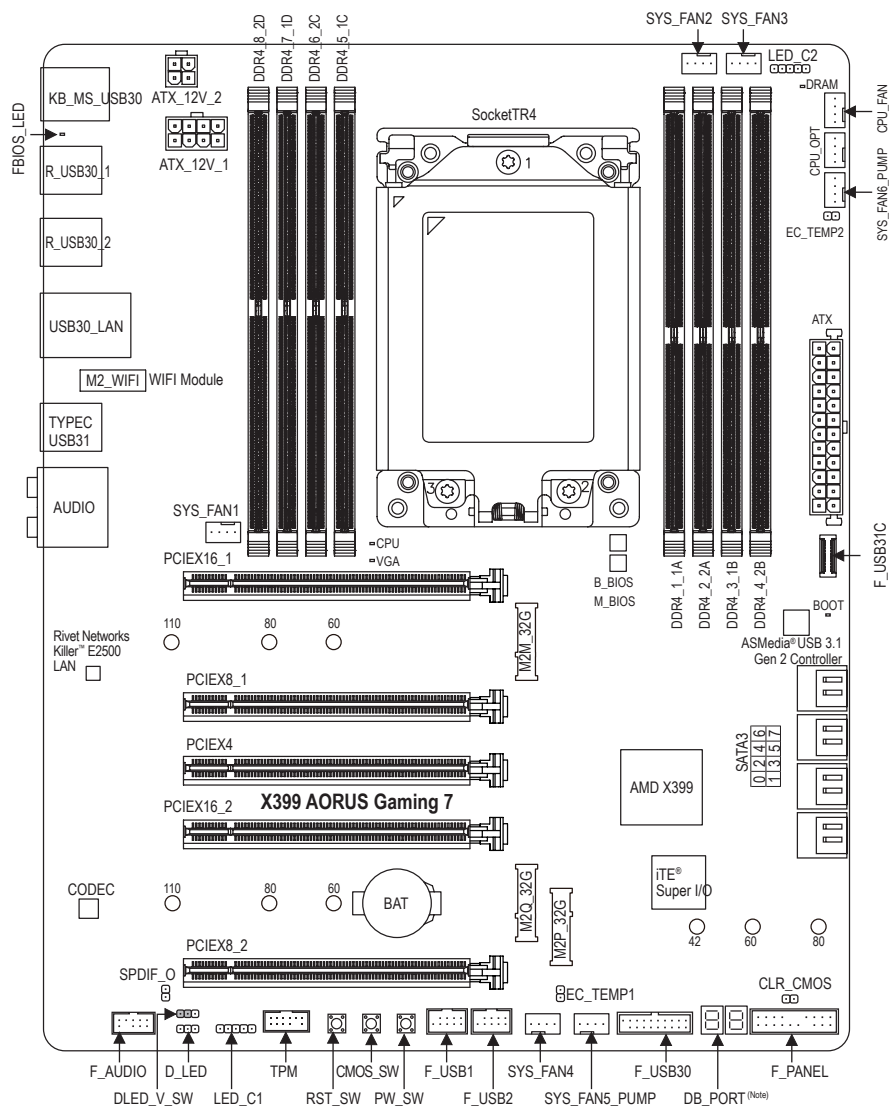
(Note)   For debug code information, please refer to Chapter 6.

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	◆	SocketTR4: - AMD Ryzen™ Threadripper™ processor (Go to GIGABYTE's website for the latest CPU support list.)
Chipset	◆	AMD X399
Memory	◆ ◆ ◆ ◆ ◆ ◆	8 x DDR4 DIMM sockets supporting up to 128 GB of system memory Quad channel memory architecture Support for DDR4 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	◆ ◆ ◆ ◆ ◆	Realtek® ALC1220 codec Support for Sound BlasterX 720° High Definition Audio 2/4/5.1/7.1-channel Support for S/PDIF Out
LAN	◆	Rivet Networks Killer™ E2500 LAN chip (10/100/1000 Mbit)
Wireless Communication Module	◆ ◆ ◆	Wi-Fi 802.11 a/b/g/n/ac, supporting 2.4/5 GHz Dual-Band BLUETOOTH 4.2, 4.1, BLE, 4.0, 3.0, 2.1+EDR Support for 11ac wireless standard and up to 867 Mbps data rate 　　* Actual data rate may vary depending on environment and equipment.
Expansion Slots	◆ ◆ ◆	2 x PCI Express x16 slots, running at x16 (PCIEX16_1, PCIEX16_2) 2 x PCI Express x16 slots, running at x8 (PCIEX8_1, PCIEX8_2) (The PCIEX16 and PCIEX8 slots conform to PCI Express 3.0 standard.) 1 x PCI Express x16 slot, running at x4 (PCIEX4) (The PCIEX4 slot conforms to PCI Express 2.0 standard.)
Multi-Graphics Technology	◆ ◆	Support for AMD Quad-GPU CrossFire™ and 4-Way/3-Way/2-Way AMD CrossFire™ technologies Support for NVIDIA® Quad-GPU SLI™ and 4-Way/3-Way/2-Way NVIDIA® SLI™ technologies
Storage Interface	◆ ◆ ◆ ◆	2 x M.2 connectors (Socket 3, M key, type 2260/2280/22110 SATA and PCIe x4/x2 SSD support) (M2M_32G)(M2Q_32G) 1 x M.2 connector (Socket 3, M key, type 2242/2260/2280 SATA and PCIe x4/x2 SSD support) (M2P_32G) 8 x SATA 6Gb/s connectors Support for RAID 0, RAID 1, and RAID 10
USB	◆ ◆	CPU: - 8 x USB 3.1 Gen 1 ports on the back panel Chipset+ASMedia® USB 3.1 Gen 2 Controller: - 1 x USB Type-C™ port with USB 3.1 Gen 2 support, available through the internal USB header

USB	◆	Chipset:
		- 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
		- 2 x USB 3.1 Gen 1 ports available through the internal USB header
		- 4 x USB 2.0/1.1 ports available through the internal USB headers
Internal Connectors	◆	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 digital LED strip header
	◆	1 x digital LED strip power select jumper
	◆	2 x RGB (RGBW) LED strip headers
	◆	3 x M.2 Socket 3 connectors
	◆	8 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™ header with USB 3.1 Gen 2 support
	◆	1 x USB 3.1 Gen 1 header
	◆	2 x USB 2.0/1.1 headers
	◆	1 x Trusted Platform Module (TPM) header (2x6 pin, for the GC-TPM2.0_S module only)
	◆	1 x power button
	◆	1 x reset button
	◆	1 x Clear CMOS button
	◆	2 x temperature sensor headers
	◆	1 x Clear CMOS jumper
Back Panel Connectors	◆	1 x PS/2 keyboard/mouse port
	◆	1 x USB Type-C™ port, with USB 3.1 Gen 2 support
	◆	1 x USB 3.1 Gen 2 Type-A port (red)
	◆	8 x USB 3.1 Gen 1 ports
	◆	1 x RJ-45 port
	◆	2 x MMCX antenna connectors (2T2R)
	◆	1 x optical S/PDIF Out connector
	◆	5 x audio jacks (Center/Subwoofer Speaker Out, Rear Speaker Out, Line In, Line Out, Mic In)
I/O Controller	◆	iTE® I/O Controller Chip
Hardware Monitor	◆	Voltage detection
	◆	Temperature detection
	◆	Fan speed detection
	◆	Water cooling flow rate detection

Hardware Monitor	◆ Overheating warning ◆ Fan fail warning ◆ Fan speed control * Whether the fan (pump) speed control function is supported will depend on the fan (pump) you install.
BIOS	◆ 2 x 128 Mbit flash ◆ Use of licensed AMI UEFI BIOS ◆ Support for DualBIOS™ ◆ Support for Q-Flash Plus * The USB flash drive used must be a USB 2.0 flash drive. ◆ PnP 1.0a, DMI 2.7, WfM 2.0, SM BIOS 2.7, ACPI 5.0

Unique Features	◆ Support for APP Center
	       * 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
	  - BIOS Setup
	  - Color Temperature
	  - 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	◆ Norton® Internet Security (OEM version) ◆ XSplit Gamecaster + Broadcaster (12 months license)
Operating System	◆ Support for Windows 10 64-bit
Form Factor	◆ 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 and CPU Cooler

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.
• Prepare a T20 star screwdriver or use the included T20 star wrench.
• 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.

1-3-1 Installing the CPU

SocketTR4

CPU Load Plate Screw

Pin One Triangle

CPU Socket Cap

CPU Load Plate Screws

CPU

Pin One Triangle

CPU Carrier Frame

The CPU carrier frame must be slided into the CPU rail frame with the CPU. Do not remove the CPU from the CPU carrier frame.

Follow the steps below to correctly install the CPU into the motherboard CPU socket.

- **Before installing the CPU, make sure to turn off the computer and unplug the power cord from the power outlet to prevent damage to the CPU.**
- **To protect the socket contacts, do not remove the CPU socket cap unless the CPU is inserted into the CPU socket. Save the cap properly and always replace it when the CPU is removed.**

Screw 1
Screw 3   Screw 2

Step 1:
On the CPU metal load plate, there are three screws marked as 1, 2, 3. To loosen/tighten these screws, you need a T20 star screwdriver (or use the included T20 star wrench). The OPEN and CLOSE markings indicate in what order to loosen/tighten the screws.
To open the CPU metal load plate, loosen the screws in 3>2>1 sequence.
To close the CPU metal load plate, tighten the screws in 1>2>3 sequence.
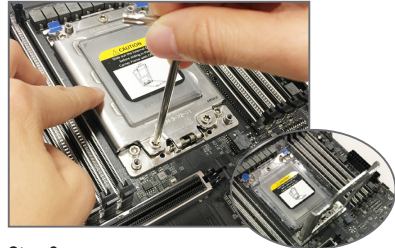
Step 2:
To open the CPU metal load plate, start by loosening Screw 3, then Screw 2, and finally Screw 1. After all three screws are loosened, gently lift the load plate to its fully open position.

Step 3:
Use your fingers to pull up the tabs on the two sides of the CPU rail frame to release the CPU rail frame from the CPU socket. Then lift the rail frame.

Step 4:
Use one hand to hold the rail frame and the other to slide the CPU socket cap out of the rail frame.
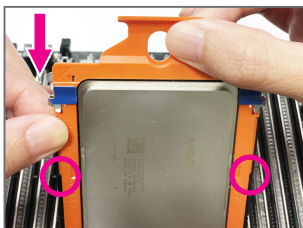
Step 5:
Grasp the top portion of the CPU carrier frame and align the edges of the CPU carrier frame with the rails of the CPU rail frame. Then slide the carrier frame into the rails until the it stops sliding in. (Grasp the CPU carrier frame carefully, do not touch the socket contacts.)

CPU Rail Frame Rails

Make sure the edges of the CPU carrier frame are installed correctly on the rails.
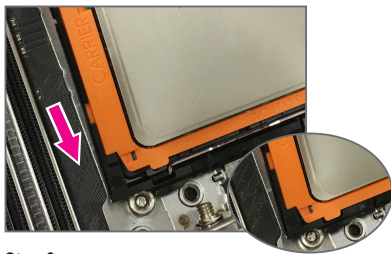
Step 6:
Push the carrier frame into place and you will hear a "click" sound when it is pushed to the bottom.

Warning ! The CPU carrier frame cannot be placed outside the rails.

Step 7:
After installing the CPU, use two fingers to push down on the upper portion of the sides of the CPU carrier frame to fasten the rail frame back to the CPU socket.
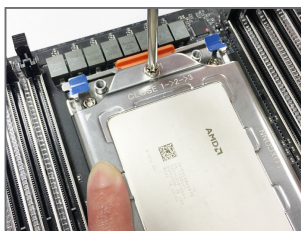
Step 8:
Close the metal load plate. With one finger pressing down on the load plate, begin tightening Screw 1 slightly. Then do the same to Screw 2 and Screw 3. Next, fully tighten the three screws. Make sure the motherboard is placed on a stable surface during the tightening process.

1-3-2   Installing the CPU Cooler

Refer to the steps below to correctly install the CPU cooler on the motherboard. For a 180W CPU, we recommend that you install a water cooling system to ensure proper heat dissipation and a stable system operation. (Actual installation process may differ depending the CPU cooler to be used. Refer to the user's manual for your CPU cooler.)

CPU Cooler Mounting Holes

CPU Cooler Mounting Holes
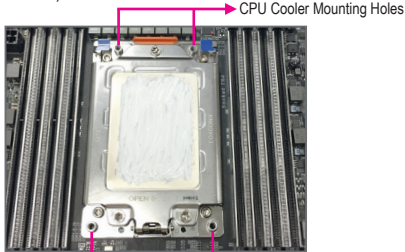
Step 1:
Apply an even and thin layer of thermal grease on the surface of the installed CPU.
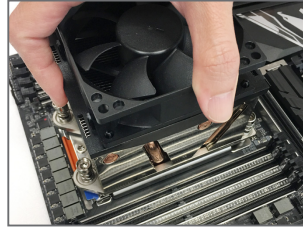
Step 2:
Place the cooler atop the CPU, aligning the four mounting screws with the mounting holes around the CPU socket. (Note that the spacing between the upper two screws is not the same as that between the lower two screws, please make sure to align the screws correctly).
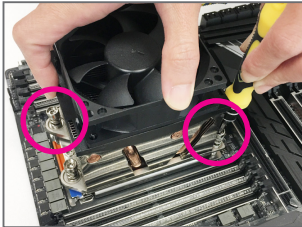
Step 3:
Use one hand to hold the cooler and the other to tighten the screws in a diagonal sequence with a T20 star screwdriver. Begin tightening a screw with a few turns and repeat with the screw diagonally opposite the one you just tightened. Then do the same to the other pair. Next, fully tighten the four screws.
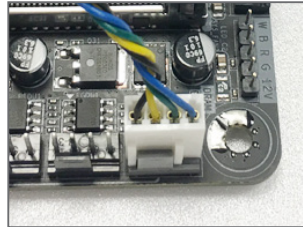
Step 4:
Finally, attach the power connector of the CPU cooler to the CPU fan header (CPU_FAN) on the motherboard.

Use extreme care when removing the CPU cooler because the thermal grease/tape between the CPU cooler and CPU may adhere to the CPU. Inadequately removing the CPU cooler may damage the CPU.
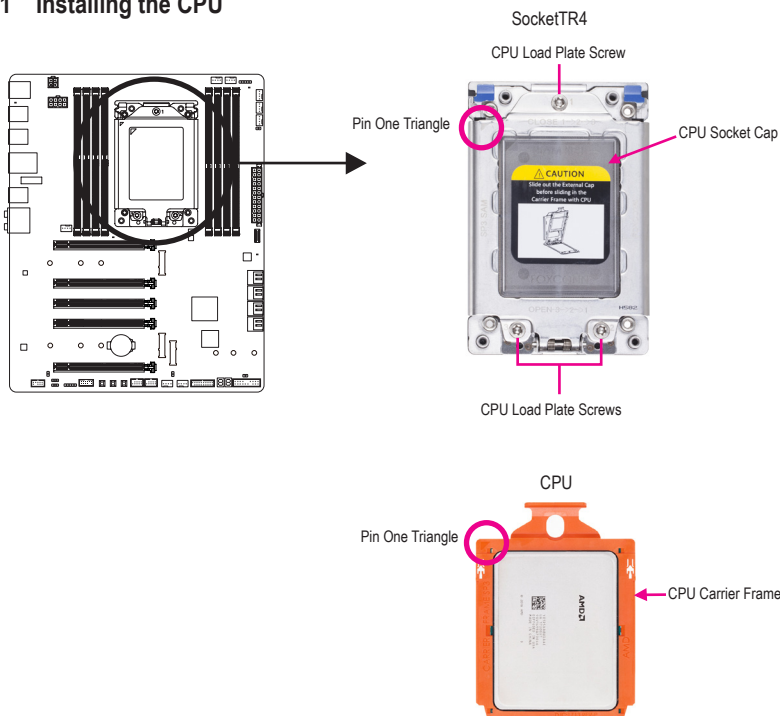
1-4 Installing the Memory

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.

1-4-1 Quad Channel Memory Configuration

This motherboard supports Quad Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity of the memory. The eight DDR4 memory sockets are divided into four channels and each channel has two memory sockets as following:
▶ Channel A: DDR4_1_1A, DDR4_2_2A
▶ Channel B: DDR4_3_1B, DDR4_4_2B
▶ Channel C: DDR4_5_1C, DDR4_6_2C
▶ Channel D: DDR4_7_1D, DDR4_8_2D
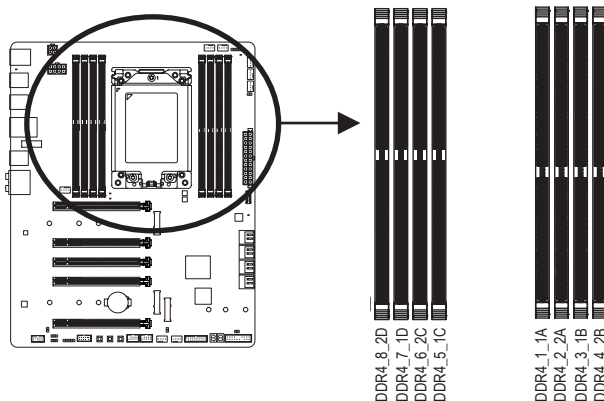
▶ Refer to the table below for memory installation according to the number of the memory modules you want to install:

	DDR4_8_2D	DDR4_7_1D	DDR4_6_2C	DDR4_5_1C	DDR4_1_1A	DDR4_2_2A	DDR4_3_1B	DDR4_4_2B
1 Module	✕	✕	✕	✕	✕	✔	✕	✕
2 Modules	✕	✕	✕	✕	✕	✔	✕	✔
4 Modules	✔	✕	✔	✕	✕	✔	✕	✔
6 Modules	✔	✔	✔	✕	✕	✔	✔	✔
8 Modules	✔	✔	✔	✔	✔	✔	✔	✔

✔ : Installed, ✕ : Not Installed.

Note: When installing the memory, make sure to begin with the second socket of each channel, such as DDR4_2_2A, DDR4_4_2B, DDR4_6_2C, or DDR4_8_2D.

1-4-2   Installing a Memory

⚠️ **Before installing a memory module, make sure to turn off the computer and unplug the power cord from the power outlet to prevent damage to the memory module. DDR4 and DDR3 DIMMs are not compatible to each other or DDR2 DIMMs. Be sure to install DDR4 DIMMs on this motherboard.**

Notch

DDR4 DIMM
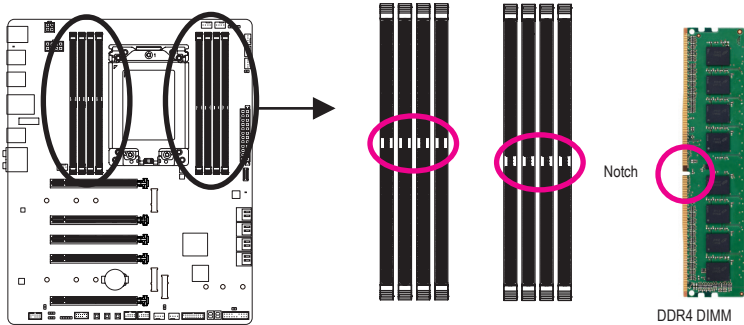
A DDR4 memory module has a notch, so it can only fit in one direction. Follow the steps below to correctly install your memory modules in the memory sockets.
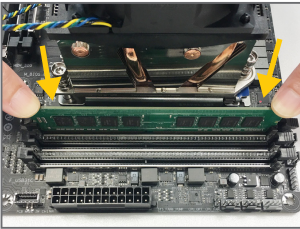
Step 1:
Note the orientation of the memory module. Spread the retaining clip at the right end of the memory socket. Place the memory module on the socket. As indicated in the picture on the left, place your fingers on the top edge of the memory, push down on the memory and insert it vertically into the memory socket.
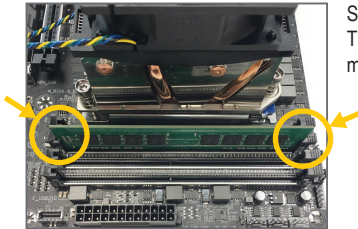
Step 2:
The clip at the right end of the socket will snap into place when the memory module is securely inserted.

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.

PCI Express x16 Slot
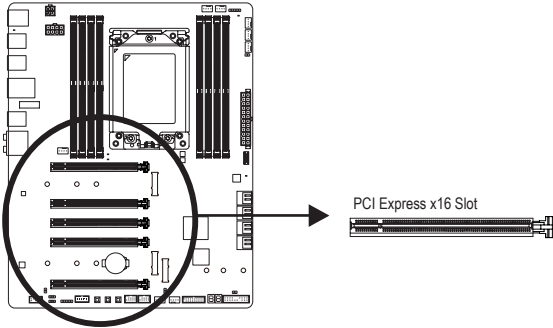
Follow the steps below to correctly install your expansion card in the expansion slot.
1. Locate an expansion slot that supports your card. Remove the metal slot cover from the chassis back panel.
2. Align the card with the slot, and press down on the card until it is fully seated in the slot.
3. Make sure the metal contacts on the card are completely inserted into the slot.
4. Secure the card's metal bracket to the chassis back panel with a screw.
5. After installing all expansion cards, replace the chassis cover(s).
6. Turn on your computer. If necessary, go to BIOS Setup to make any required BIOS changes for your expansion card(s).
7. Install the driver provided with the expansion card in your operating system.

Example: Installing and Removing a PCI Express Graphics Card:

•   Installing a Graphics Card:
    Gently push down on the top edge of the card until it is fully inserted into the PCI Express slot. Make sure the card is securely seated in the slot and does not rock.
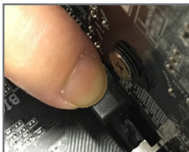
•   Removing the Card:
    Gently push back on the lever on the slot and then lift the card straight out from the slot.

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
  (For the latest GPUs that support the 4-way/3-way CrossFire/SLI technology, please refer to the AMD/NVIDIA® website.) (Note 1)
- CrossFire(Note 2)/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.
Step 2:
Insert the CrossFire (Note 2)/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_1 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 **Gaming\Global Settings** and ensure **AMD CrossFire** is set to **On**.
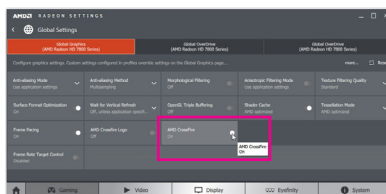
C-2. To Enable SLI Function
After installing the graphics card driver in the operating system, go to the **NVIDIA Control Panel**. Browse to the **Configure SLI, Surround, PhysX** screen and ensure **Maximize 3D performance** is enabled.
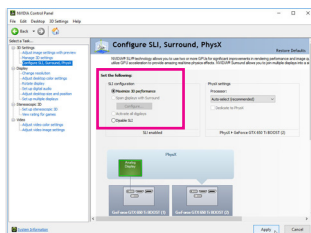
(Note 1)   When using dual core graphics cards, only 2-way is supported.
(Note 2)   The bridge connector(s) may be needed or not depending on your graphics cards.

> 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
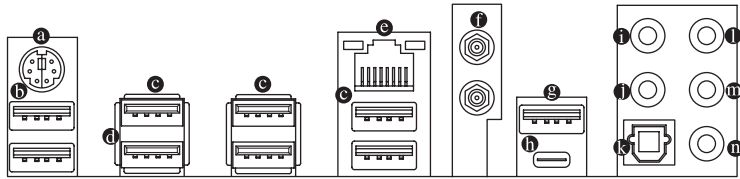
ⓐ PS/2 Keyboard/Mouse Port

Use this port to connect a PS/2 mouse or keyboard.

ⓑ 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.

ⓒ 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.

ⓓ USB 3.1 Gen 1 Port (White)

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. Before using Q-Flash Plus, make sure to insert the USB flash drive (Note) into this port first.

ⓔ 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   Activity LED

LAN Port
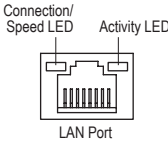
Connection/Speed LED:

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
Off	No data transmission or receiving is occurring

ⓕ 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.

ⓖ 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.

ⓗ 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.

(Note)   The USB flash drive used must be a USB 2.0 flash drive.

i **Center/Subwoofer Speaker Out**

Use this audio jack to connect center/subwoofer speakers in a 5.1/7.1-channel audio configuration.

j **Rear Speaker Out**

This jack can be used to connect rear speakers in a 4/5.1/7.1-channel audio configuration.

k **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.

l **Line In**

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

m **Line Out**

The line out jack. This jack supports audio amplifying function. For better sound quality, it is recommended that you connect your headphone/speaker to this jack (actual effects may vary by the device being used). Use this audio jack for a headphone or 2-channel speaker. This jack can be used to connect front speakers in a 4/5.1/7.1-channel audio configuration.

n **Mic In**

The Mic in jack.

- To enable or configure the audio amplifying function for the Line out jack, please access the HD Audio Manager application.
- 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 using the HD Audio Manager application.
- Refer to the instructions on setting up a 2/4/5.1/7.1-channel audio configuration in Chapter 6, "Configuring 2/4/5.1/7.1-Channel Audio."

- 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.

1-8 Onboard LEDs and Buttons

Status LEDs

The status LEDs show whether the CPU, graphics card, memory, and operating system are working properly after system power-on. If the CPU/VGA/DRAM 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.
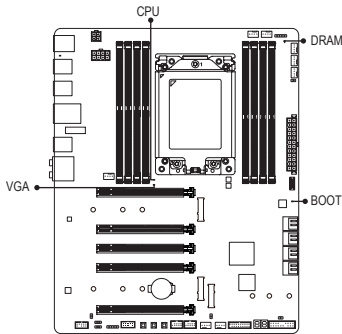
CPU: CPU status LED
VGA: Graphics card status LED
DRAM: Memory status LED
BOOT: Operating system status LED

Quick Buttons

This motherboard has 3 quick buttons: power button, reset button and clear CMOS button. The power button and reset button allow 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. Use this button to clear the BIOS configuration and reset the CMOS values to factory defaults when needed.
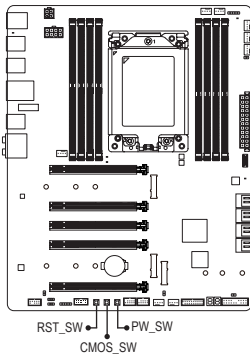
PW_SW: Power Button
RST_SW: Reset Button
CMOS_SW: Clear CMOS Button

- 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).

1-9 Internal Connectors
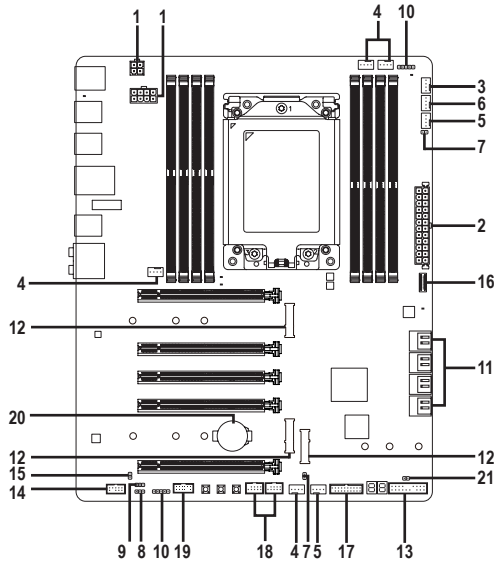
1)	ATX_12V_1/ATX_12V_2	12)	M2M_32G/M2Q_32G/M2P_32G
2)	ATX	13)	F_PANEL
3)	CPU_FAN	14)	F_AUDIO
4)	SYS_FAN1/2/3/4	15)	SPDIF_O
5)	SYS_FAN5/6_PUMP	16)	F_USB31C
6)	CPU_OPT	17)	F_USB30
7)	EC_TEMP1/EC_TEMP2	18)	F_USB1/F_USB2
8)	D_LED	19)	TPM
9)	DLED_V_SW	20)	BAT
10)	LED_C1/LED_C2	21)	CLR_CMOS
11)	SATA3 0/1/2/3/4/5/6/7		

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_1/ATX_12V_2/ATX (2x2, 2x4 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.
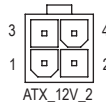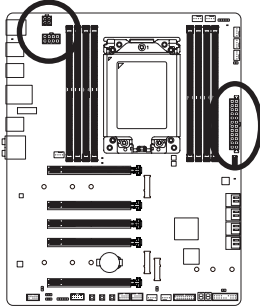
ATX_12V_2:

Pin No.	Definition
1	GND
2	GND
3	+12V
4	+12V
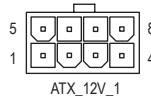
ATX_12V_1:

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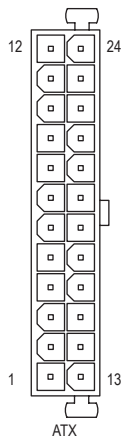
ATX:

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/SYS_FAN2/SYS_FAN3/SYS_FAN4 (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 motherboard supports CPU fan speed control, which requires the use of a CPU fan with fan speed control design. For optimum heat dissipation, it is recommended that a system fan be installed inside the chassis.

CPU_FAN

SYS_FAN1/SYS_FAN2/
SYS_FAN3

SYS_FAN4

Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control
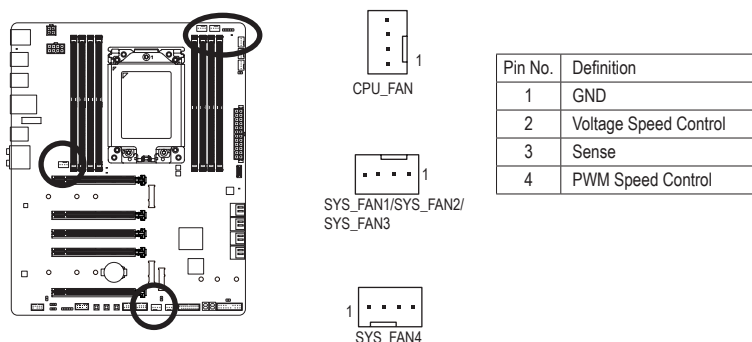
5) SYS_FAN5_PUMP/SYS_FAN6_PUMP (System Fan/Water Cooling Pump Headers)

The fan/pump 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. 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
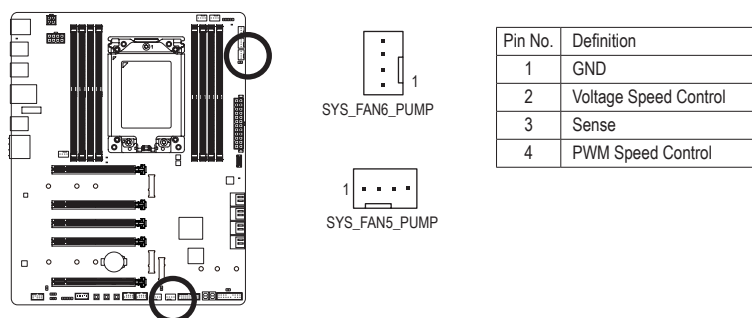
SYS_FAN6_PUMP

SYS_FAN5_PUMP

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.

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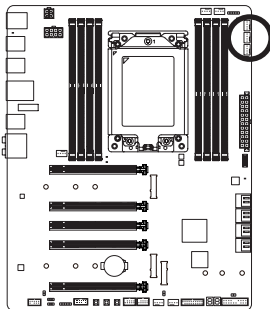
Pin No.	Definition
1	GND
2	Voltage Speed Control
3	Sense
4	PWM Speed Control

> • 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.

7) EC_TEMP1/EC_TEMP2 (Temperature Sensor Headers)

Connect the thermistor cables to the headers for temperature detection.
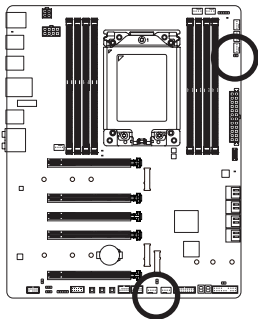
EC_TEMP2

EC_TEMP1

Pin No.	Definition
1	SENSOR IN
2	GND

8) D_LED (Digital LED Strip Header)

The header 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_SW jumper accordingly.
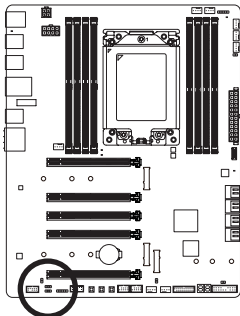
Pin No.	Definition
1	V
2	D
3	G

Connecting a 3-pin digital LED strip:
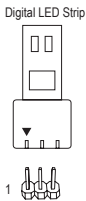
The power pin (marked with a triangle on the plug) of the LED strip must be connected to Pin 1 of the digital LED strip header. Incorrect connection may lead to the damage of the LED strip.

Connecting a 4-pin digital LED strip (using the included digital LED strip adapter cable):
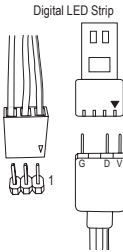
Connect one end of the included digital LED strip adapter cable to this header and the other end to your digital LED strip. The triangle marking on the plug of the adapter cable must be connected to Pin 1 of the header. The "V" pin of the other end of the adapter cable must be connected to the power 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," or Chapter 5, "Unique Features," "APP Center\RGB Fusion."

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.

9) DLED_V_SW (Digital LED Strip Power Select Jumper)

This jumper allows you to select the supply voltage of the D_LED header. 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.
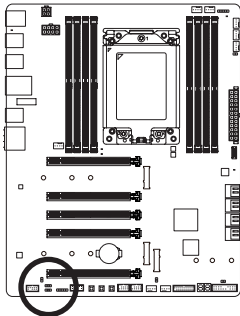
1-2: 5V (Default)

2-3: 12V

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

The header 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.

LED_C2

1

LED_C1

1

Pin No.	Definition
1	12V
2	G
3	R
4	B
5	W
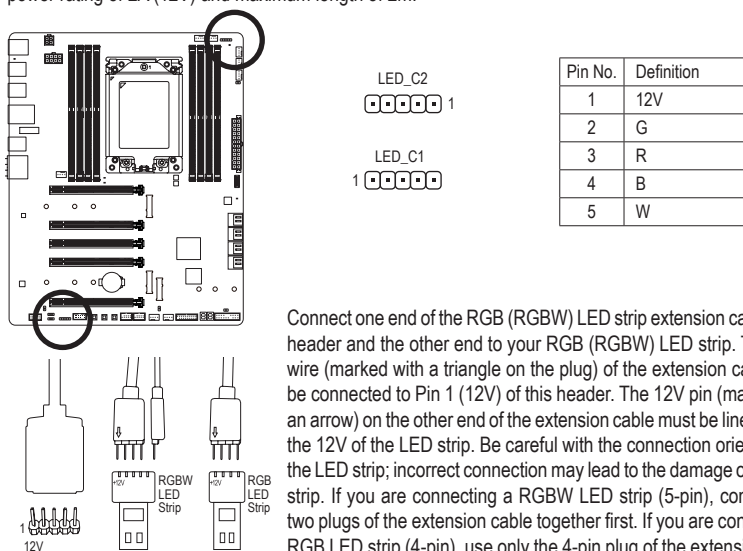
Connect one end of the RGB (RGBW) LED strip extension cable to the header and the other end to your RGB (RGBW) LED strip. The black wire (marked with a triangle on the plug) of the extension cable must be connected to Pin 1 (12V) of this header. The 12V pin (marked with an arrow) on the other end of 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.

RGBW LED Strip

RGB LED Strip

12V

For how to turn on/off the lights of the LED strip, refer to the instructions on in Chapter 2, "BIOS Setup," "Peripherals," or Chapter 5, "Unique Features," "APP Center\RGB Fusion."

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) SATA3 0/1/2/3/4/5/6/7 (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 AMD Chipset supports RAID 0, RAID 1, and RAID 10. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.

SATA3

0	2	4	6
1	3	5	7

7

7

1

1

Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND
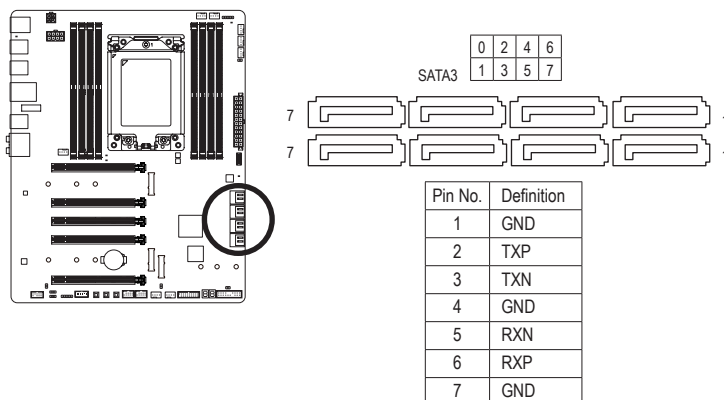
12) M2M_32G/M2Q_32G/M2P_32G (M.2 Socket 3 Connectors)

The M.2 connectors support M.2 SATA SSDs and M.2 PCIe SSDs and support SATA RAID configuration. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.
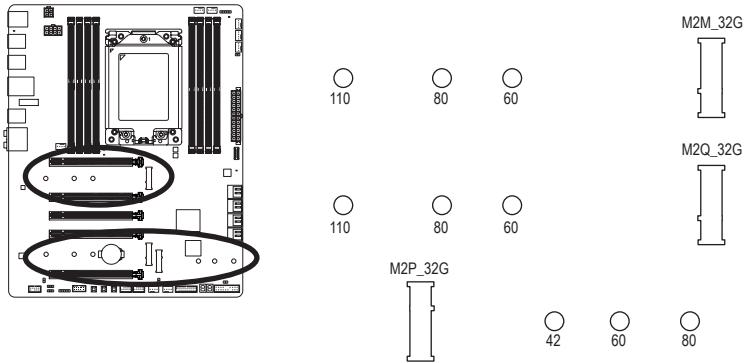
Follow the steps below to correctly install an M.2 SSD in the M.2 connector.
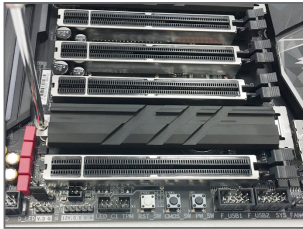
Step 1:
Get a screw and a standoff from the included M.2 screw kit. Locate the M.2 connector where you will install the M.2 SSD, use a screwdriver to unfasten the screw on the heatsink and then remove the heatsink.
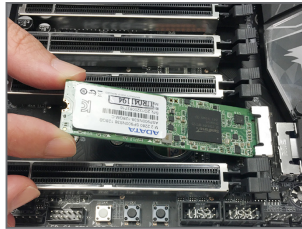
Step 2:
Locate the proper mounting hole for the M.2 SSD to be installed and then tighten the standoff first. Insert the M.2 SSD into the M.2 connector at an angle.
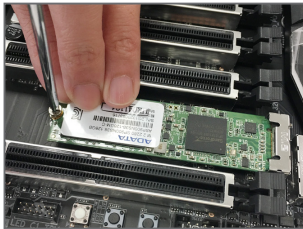
Step 3:
Press the M.2 SSD down and then secure it with the screw. Replace the heatsink and secure it to the original hole.

Step 4:
The installation is completed, as shown in the picture above.

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

13) 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.
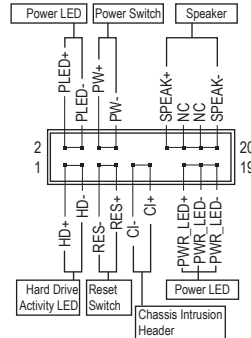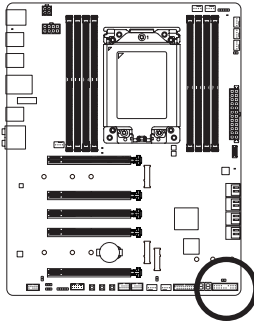
- **PLED/PWR_LED** (Power LED, Yellow/Purple):

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.

14) 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.
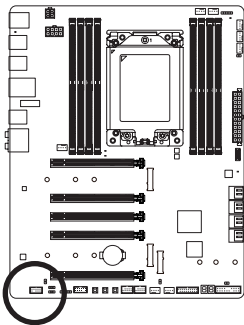
Pin No.	Definition
1	MIC2_L
2	GND
3	MIC2_R
4	NC
5	LINE2_R
6	Sense
7	FAUDIO_JD
8	No Pin
9	LINE2_L
10	Sense

> 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.

15) 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.
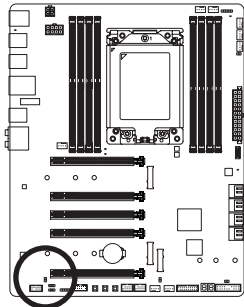
Pin No.	Definition
1	SPDIFO
2	GND

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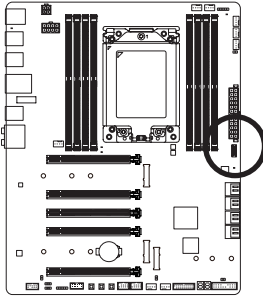
Pin No.	Definition	Pin No.	Definition
1	VBUS	11	VBUS
2	TX1+	12	TX2+
3	TX1-	13	TX2-
4	GND	14	GND
5	RX1+	15	RX2+
6	RX1-	16	RX2-
7	VBUS	17	GND
8	CC1	18	D-
9	NC	19	D+
10	NC	20	CC2

17) F_USB30 (USB 3.1 Gen 1 Header)

The header conforms to USB 3.1 Gen 1 and USB 2.0 specification and 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.
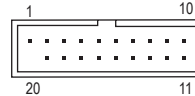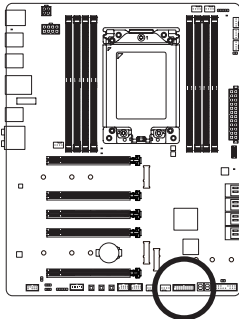
Pin No.	Definition	Pin No.	Definition
1	VBUS	11	D2+
2	SSRX1-	12	D2-
3	SSRX1+	13	GND
4	GND	14	SSTX2+
5	SSTX1-	15	SSTX2-
6	SSTX1+	16	GND
7	GND	17	SSRX2+
8	D1-	18	SSRX2-
9	D1+	19	VBUS
10	NC	20	No Pin

⚠️ Prior to installing the USB front panel, be sure to turn off your computer and unplug the power cord from the power outlet to prevent damage to the USB front panel.

18) 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.
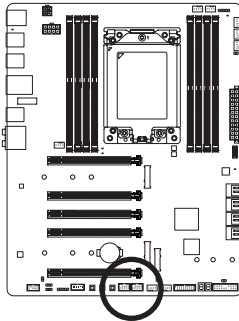
Pin No.	Definition
1	Power (5V)
2	Power (5V)
3	USB DX-
4	USB DY-
5	USB DX+
6	USB DY+
7	GND
8	GND
9	No Pin
10	NC

⚠ • Do not plug the IEEE 1394 bracket (2x5-pin) cable into the USB 2.0/1.1 header.
• Prior to installing the USB bracket, be sure to turn off your computer and unplug the power cord from the power outlet to prevent damage to the USB bracket.

19) TPM (Trusted Platform Module Header)

You may connect a TPM (Trusted Platform Module) to this header.
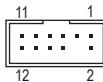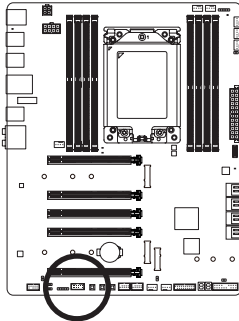
Pin No.	Definition
1	LAD0
2	VCC3
3	LAD1
4	No Pin
5	LAD2
6	LCLK
7	LAD3
8	GND
9	LFRAME
10	NC
11	SERIRQ
12	LRESET

20) 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.
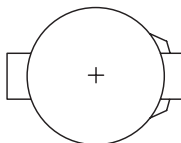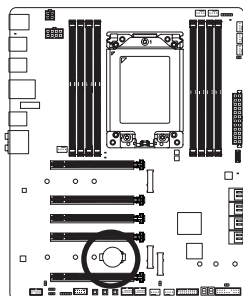
You may clear the CMOS values by removing the battery:
1. Turn off your computer and unplug the power cord.
2. Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making 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.

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.
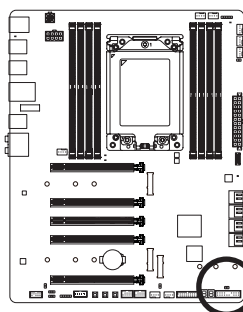
Open: Normal

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).

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.
For instructions on using the Q-Flash and @BIOS utilities, refer to Chapter 5, "BIOS Update Utilities."

> • 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/ CMOS_SW button 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.

DEL：BIOS SETUP\Q-FLASH   F9：SYSTEM INFORMATION   F12：BOOT MENU   END：Q-FLASH   ⎯ Function Keys
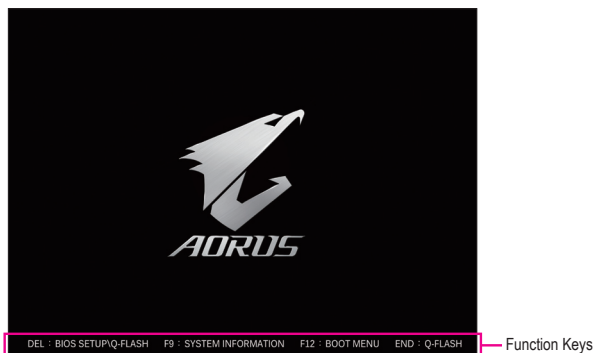
Function Keys:

<DEL>: BIOS SETUP\Q-FLASH

    Press the <Delete> key to enter BIOS Setup or to access the Q-Flash utility in BIOS Setup.

<F9>: SYSTEM INFORMATION

    Press the <F9> key to display your system information.

<F12>: BOOT MENU

    Boot Menu allows you to set the first boot device without entering BIOS Setup. In Boot Menu, use the up arrow key <↑> or the down arrow key <↓> to select the first boot device, then press <Enter> to accept. The system will boot from the device immediately.

    Note: The setting in Boot Menu is effective for one time only. After system restart, the device boot order will still be based on BIOS Setup settings.

<END>: Q-FLASH

    Press the <End> key to access the Q-Flash utility directly without having to enter BIOS Setup first.

2-2 The Main Menu

Classic Setup
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.
(Sample BIOS Version: D22)

Setup Menus — Configuration Items — Current Settings — Quick Access Bar allows you to enter Easy Mode, select BIOS default language, configure fan settings, or enter Q-Flash. — System Time — Hardware Information
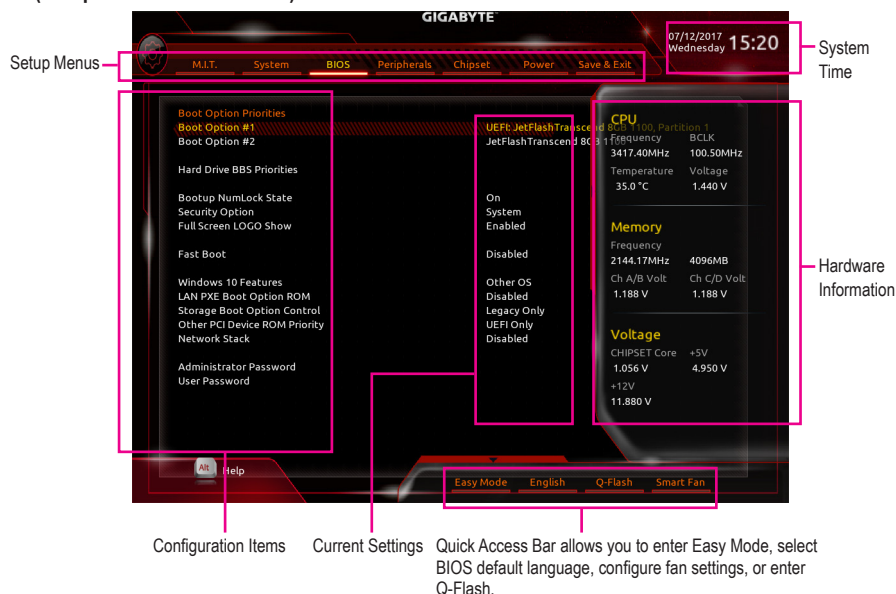
Classic Setup Function Keys

<←><→>	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

B. Easy Mode

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 or press <F2> to switch to the Classic Setup screen.
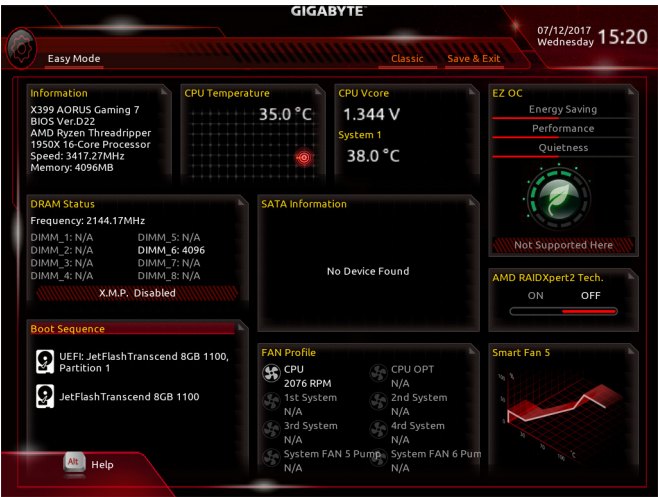
2-3 M.I.T.

⚠️ 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**

☞ **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 C6 mode in system halt state. When enabled, the CPU core frequency will be reduced during system halt state to decrease power consumption. The C6 state is a more enhanced power-saving state than C1. (Default: Enabled)
- **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)

☎ **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)

☎ **Opcache Control**
   Enables or disables Opcache. **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.

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

▶ **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.

  Memory Timing Mode
Manual and **Advanced Manual** allows the **Channel Interleaving**, **Rank Interleaving**, and memory timing settings below to be configurable. Options are: Auto (default), Manual, Advanced 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.

  Channel Interleaving
Enables or disables memory channel interleaving. **Enabled** allows the system to simultaneously access different channels of the memory to increase memory performance and stability. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

  Rank Interleaving
Enables or disables memory rank interleaving. **Enabled** allows the system to simultaneously access different ranks of the memory to increase memory performance and stability. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

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

- **Memory Interleaving**
  Enables or disables memory bank interleaving. **Enabled** allows the system to simultaneously access different banks of the memory to increase memory performance and stability. Options are: Auto (default), None, Channel, Die, and Socket. **Auto** lets the BIOS automatically configure this setting.
- **BankGroupSwap**
  Enables or disables Bank Group Swap. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- **Gear Down Mode**
  Enables or disables memory Geardown mode. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- **CLDO_VDDP Control**
  Allows you to determine whether to manually change the CLDO_VDDP voltage. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- **CLDO_VDDP voltage**
  Allows you to manually change the CLDO_VDDP voltage. This item is configurable only when **CLDO_VDDP Control** is set to **Manual**.

▶ **Channel A/B/C/D Memory Sub Timings**
  This sub-menu provides memory timing settings for each channel of memory. The respective timing setting screens are configurable only when **Memory Timing Mode** is set to **Manual** or **Advanced 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/Vcore SOC/CPU VDD18/DRAM Channel A/B Voltage/DRAM Channel C/D Voltage/DDRVpp A/B/DDRVpp C/D/+3.3V/+5V/5VSB/CHIPSET Core/+12V/VCORE SIO**
  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**
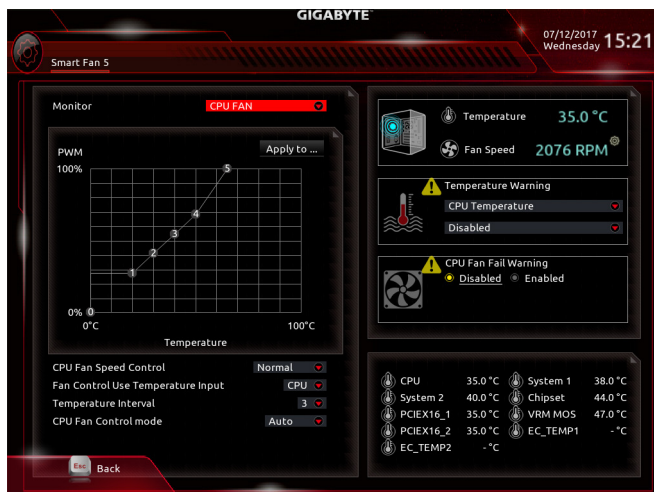
∟ **Monitor**
  Allows you to select a target to monitor and to make further adjustment. (Default: CPU FAN)

∟ **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.

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

∟ **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.

☞ **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.

☞ **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.

2-5 BIOS
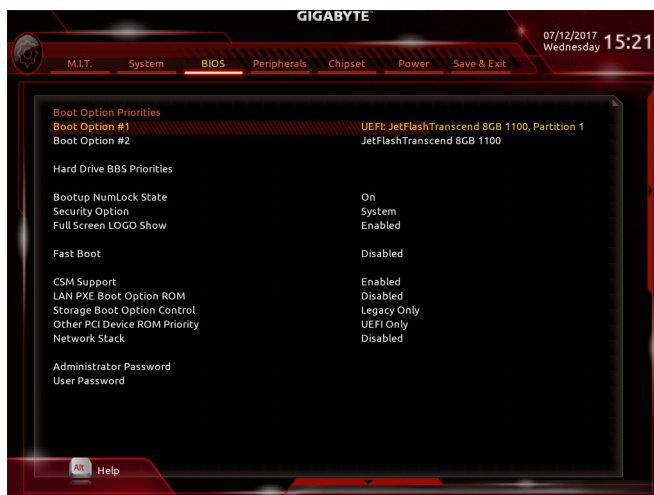
 Boot Option Priorities
Specifies the overall boot order from the available devices. Removable storage devices that support GPT format will be prefixed with "UEFI:" string on the boot device list. To boot from an operating system that supports GPT partitioning, select the device prefixed with "UEFI:" 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**
    ▸ Last Boot HDD Only Except for the previous boot drive, all SATA devices are disabled before the OS
          boot process completes. (Default)
    ▸ All Sata Devices   All SATA devices are functional in the operating system and during the POST.
    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 installed PCI Express graphics cards.
- ▷ PCIe 1 Slot   Sets the graphics card on the PCIEX16_1 slot as the first display. (Default)
- ▷ PCIe 2 Slot   Sets the graphics card on the PCIEX8_1 slot as the first display.
- ▷ PCIe 3 Slot   Sets the graphics card on the PCIEX4 slot as the first display.
- ▷ PCIe 4 Slot   Sets the graphics card on the PCIEX16_2 slot as the first display.
- ▷ PCIe 5 Slot   Sets the graphics card on the PCIEX8_2 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)
- **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 below the PS/2 keyboard/mouse port) 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.
- **OnBoard LAN Controller**
  Enables or disables the onboard LAN function. (Default: Enabled)
- **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)

▶ **Trusted Computing**
  Enables or disables Trusted Platform Module (TPM).

2-7   Chipset

☎ **IOMMU**

Enables or disables AMD IOMMU support. (Default: Enabled)

☎ **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 (AHCI) 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 (SATA3 0~7 Connectors)**

Enables or disables the integrated SATA controllers. (Default: Enabled)

☎ **Chipset SATA Port 0/1/2/3/4/5/6/7 (SATA3 0~7 Connectors)**

Displays the information of the connected SATA device.

2-8 Power

- **AC BACK**

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

- **Power On By Keyboard**

    Allows the system to be turned on by a PS/2 keyboard wake-up event.
    Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead.
    - ▶▶ Disabled   Disables this function. (Default)
    - ▶▶ Any Key   Press any key to turn on the system.
    - ▶▶ Keyboard 98   Press POWER button on the Windows 98 keyboard to turn on the system.
    - ▶▶ Password   Set a password with 1~5 characters to turn on the system.

- **Power On Password**

    Set the password when **Power On By Keyboard** is set to **Password**.
    Press <Enter> on this item and set a password with up to 5 characters and then press <Enter> to accept.
    To turn on the system, enter the password and press <Enter>.
    Note: To cancel the password, press <Enter> on this item. When prompted for the password, press <Enter>
    again without entering the password to clear the password settings.

- **Power On By Mouse**

    Allows the system to be turned on by a PS/2 mouse wake-up event.
    Note: To use this function, you need an ATX power supply providing at least 1A on the +5VSB lead.
    - ▶▶ Disabled   Disables this function. (Default)
    - ▶▶ Move   Move the mouse to turn on the system.
    - ▶▶ Double Click   Double click on left button on the mouse to turn on the system.

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

☎ **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.

☎ **S3 Save Mode**
Allows you to determine whether to let the system enter power-saving mode in system S3 state. (Default: Disabled)

☎ **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)

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 defaults
   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).

Chapter 3   Configuring a RAID Set

RAID Levels

	RAID 0	RAID 1	RAID 10
Minimum Number of Hard Drives	≥2	2	4
Array Capacity	Number of hard drives * Size of the smallest drive	Size of the smallest drive	(Number of hard drives/2) * Size of the smallest drive
Fault Tolerance	No	Yes	Yes

To configure SATA hard drive(s), follow the steps below:
A.   Install hard drive(s) in your computer.
B.   Configure SATA controller mode in BIOS Setup.
C.   Configure a RAID array in RAID BIOS (Note)
D.   Install the SATA RAID/AHCI driver and operating system

Before you begin
- •   At least two SATA hard drives or M.2 SATA SSDs (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity).
- •   A Windows setup disk.
- •   Motherboard driver disk.
- •   A USB thumb drive.

3-1   Configuring SATA Controllers

A. Installing SATA hard drive(s) in your computer
Install the hard drives/SSDs in the SATA/M.2 connectors on the motherboard. Then connect the power connectors from your power supply to the hard drives.

(Note)   Skip this step if you do not want to create RAID array on the SATA controller.

B. Configuring SATA controller mode in BIOS Setup
Make sure to configure the SATA controller mode correctly in system BIOS Setup.
Step 1:
Turn on your computer and press <Delete> to enter BIOS Setup during the POST (Power-On Self-Test). Under
Chipset, ensure **Chipset SATA Port Enable** is enabled. Set **SATA Mode** to **RAID** (Figure 1).

Figure 1

The BIOS Setup menus described in this section may differ from the exact settings for your motherboard. The actual BIOS Setup menu options you will see shall depend on the motherboard you have and the BIOS version.

C. UEFI RAID Configuration
Step 1:
In BIOS Setup, go to **BIOS** and set **CSM Support** to **Disabled** (Figure 2). Save the changes and exit BIOS Setup.

Figure 2

Step 2:
After the system reboot, enter BIOS Setup again. Then enter the **Peripherals\RAIDXpert2 Configuration Utility** sub-menu (Figure 3).

Figure 3

Step 3:
On the RAIDXpert2 Configuration Utility screen, press <Enter> on **Array Management** to enter the **Create Array** screen. Then, select a RAID level (Figure 4). RAID levels supported include RAID 0, RAID 1, and RAID 10 (the selections available depend on the number of the hard drives being installed). Next, press <Enter> on **Select Physical Disks** to enter the **Select Physical Disks** screen.

Figure 4

Step 4:
On the **Select Physical Disks** screen, select the hard drives to be included in the RAID array and set them to **Enabled**. Next, use the down arrow key to move to **Apply Changes** and press <Enter> (Figure 5).Then return to the previous screen and set the **Array Size**, **Array Size Unit**, **Read Cache Policy** and **Write Cache Policy**.

Figure 5

Step 5:
After setting the capacity, move to **Create Array** and press <Enter> to begin. (Figure 6)

<div align="center">Figure 6</div>

After completing, you'll be brought back to the **Array Management** screen. Under **Manage Array Properties** you can see the new RAID volume and information on RAID level, array name, array capacity, etc. (Figure 7)

<div align="center">Figure 7</div>

Delete RAID Volume

To delete a RAID array, select the array to be deleted on the **RAIDXpert2 Configuration Utility\Array Management\Delete Array** screen. Press <Enter> on **Delete Array** to enter the **Delete** screen. Then set **Confirm** to **Enabled** and press <Enter> on **Yes** (Figure 8).
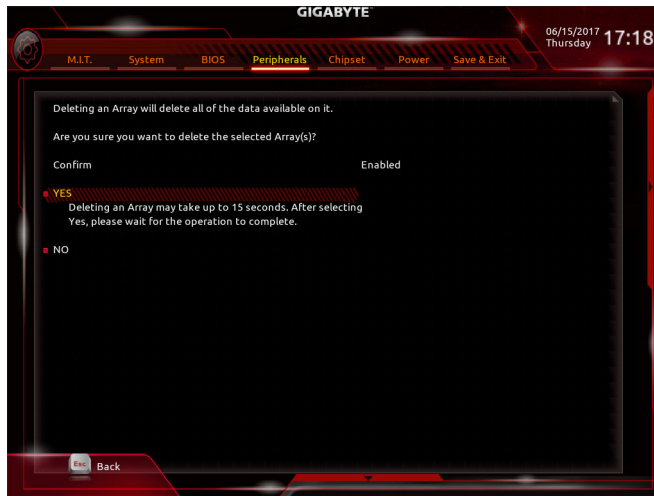
Figure 8

3-2 Installing the SATA RAID/AHCI Driver and Operating System

With the correct BIOS settings, you are ready to install the operating system.

A. Installing Windows

As some operating systems already include SATA RAID/AHCI driver, you do not need to install separate RAID/AHCI driver during the Windows installation process. After the operating system is installed, we recommend that you install all required drivers from the motherboard driver disk using "Xpress Install" to ensure system performance and compatibility. If the operating system to be installed requires that you provide additional SATA RAID/AHCI driver during the OS installation process, please refer to the steps below:

Step 1:
Copy the **Hw10** folder under the **\Boot** folder in the driver disk to your USB thumb drive.

Step 2:
Boot from the Windows setup disk and perform standard OS installation steps. When the screen requesting you to load the driver appears, select **Browse**.

Step 3:
Insert the USB thumb drive and then browse to the location of the driver. The location of the driver is as follows:
Windows 64-bit: \Hw10\RAID\x64

Step 4:
On the next screen, select **AMD-RAID Bottom Device** and click **Next**. Then repeat Step 2 and Step 3. When a screen as shown in Figure 1 appears, select **AMD-RAID Controller** and click **Next** to load the driver. Finally, continue the OS installation.
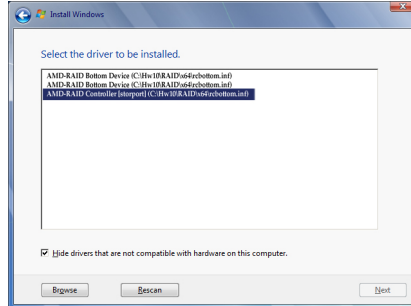
Figure 1

B. Rebuilding an Array
Rebuilding is the process of restoring data to a hard drive from other drives in the array. Rebuilding applies only to fault-tolerant arrays such as RAID 1 and RAID 10 arrays. To replace the old drive, make sure to use a new drive of equal or greater capacity. The procedures below assume a new drive is added to replace a failed drive to rebuild a RAID 1 array.

While in the operating system, make sure the Chipset and RAID drivers have been installed from the motherboard driver disk. Next, on the driver disk autorun screen, select **AMD Raid Utility** in **Application Software\Install Application Software** to install. Then, double-click the **RAIDXpert2** icon on the desktop to launch the RAID utility.
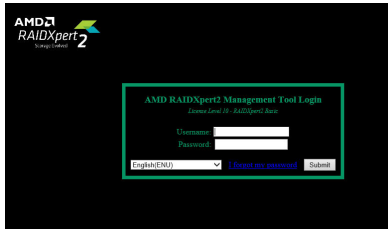
Step 1:
Enter the login ID and password (default: "admin"), and then click **Submit** to launch **AMD RAIDXpert2**.
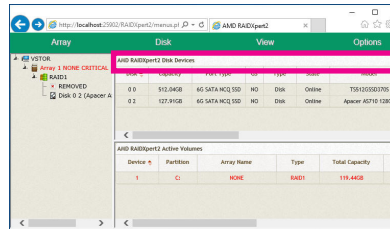
Step 2:
In the **Disk Devices** section, left-click your mouse twice on the newly-added hard drive.
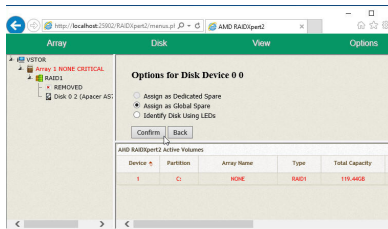
Step 3:
On the next screen, select **Assign as Global Spare** and click **Confirm**.
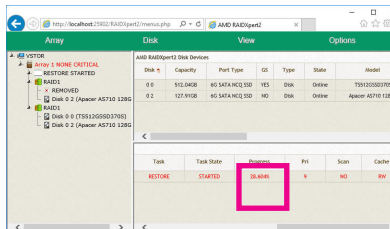
Step 4:
During the rebuild process, you can select the array that is being built (displayed in red) in the **Active Volumes** section to check the current progress.
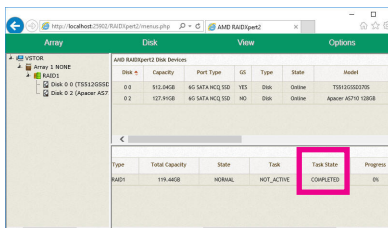
Step 5:
Then rebuild is complete when the **Task State** column shows "COMPLETED."

Chapter 4   Drivers Installation

• Before installing the drivers, first install the operating system.
• After installing the operating system, insert the motherboard driver disk into your optical drive. Click on the message "Tap to choose what happens with this disc" on the top-right corner of the screen and select "Run **Run**.exe." (Or go to My Computer, double-click the optical drive and execute the Run.exe program.)

4-1   Drivers & Software

"Xpress Install" will automatically scan your system and then list all of the drivers that are recommended to install. You can click the **Xpress Install** button and "Xpress Install" will install all of the selected drivers. Or click the arrow [⚙ Install] icon to individually install the drivers you need.
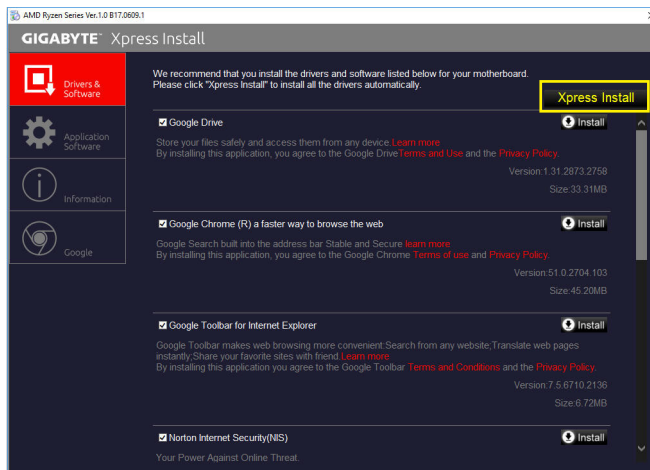
• Please ignore the popup dialog box(es) (e.g. the **Found New Hardware Wizard**) displayed when "Xpress Install" is installing the drivers. Failure to do so may affect the driver installation.
• Some device drivers will restart your system automatically during the driver installation. After the system restart, "Xpress Install" will continue to install other drivers.

4-2   Application Software

This page displays the apps that GIGABYTE develops and some free software. You can select the apps you want and click the **Install** ![Install icon] icon to begin the installation.
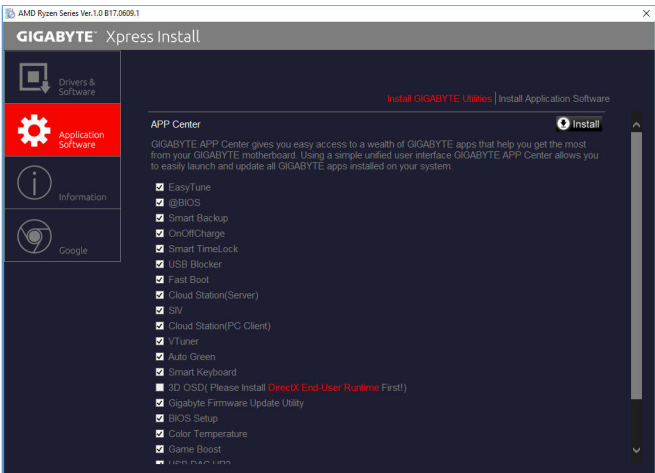
4-3   Information

This page provides detailed information on the drivers on the driver disk. The **Contact** page provides contact information of the GIGABYTE Taiwan headquarter. You can click the URL on this page to link to the GIGA-BYTE website to check more information on the GIGABYTE headquarter or worldwide branch offices.
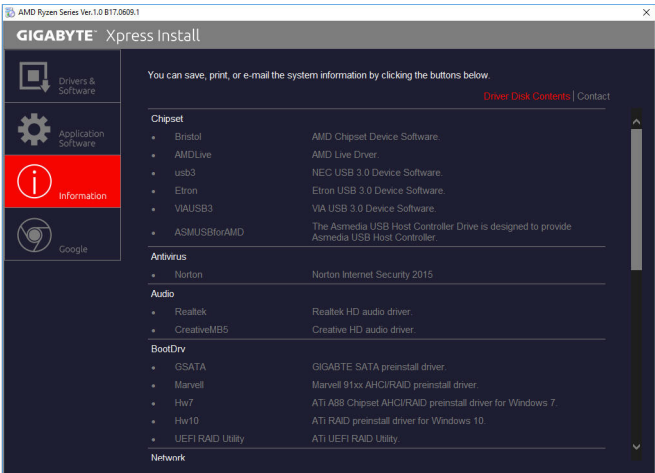
Chapter 5   Unique Features

5-1   BIOS Update Utilities

GIGABYTE motherboards provide two unique BIOS update tools, Q-Flash™ and @BIOS™. GIGABYTE Q-Flash and @BIOS are easy-to-use and allow you to update the BIOS without the need to enter MS-DOS mode. Additionally, this motherboard features the DualBIOS™ design and supports Q-Flash Plus, providing multiple protection for the safety and stability of your computer.

What is DualBIOS™?
Motherboards that support DualBIOS have two BIOS onboard, a main BIOS and a backup BIOS. Normally, the system works on the main BIOS. However, if the main BIOS is corrupted or damaged, the backup BIOS will take over on the next system boot to ensure normal system operation. For the sake of system safety, users cannot update the backup BIOS manually.

What is Q-Flash Plus?
Q-Flash Plus is a new solution derived from DualBIOS™. When both the main and backup BIOS fail during system boot, Q-Flash Plus will be automatically launched and then recover BIOS data from the USB flash drive connected to a specific USB port.

What is Q-Flash™?
With Q-Flash you can update the system BIOS without having to enter operating systems like MS-DOS or Window first. Embedded in the BIOS, the Q-Flash tool frees you from the hassles of going through complicated BIOS flashing process.

What is @BIOS™?
@BIOS allows you to update the system BIOS while in the Windows environment. @BIOS will download the latest BIOS file from the nearest @BIOS server site and update the BIOS.

5-1-1   Updating the BIOS with the Q-Flash Utility

A. Before You Begin
1. From GIGABYTE's website, download the latest compressed BIOS update file that matches your motherboard model.
2. Extract the file and save the new BIOS file (e.g. X399AORUSGaming7.F1) to your USB flash drive, or hard drive. Note: The USB flash drive or hard drive must use FAT32/16/12 file system.
3. Restart the system. During the POST, press the <End> key to enter Q-Flash. Note: You can access Q-Flash by either pressing the <End> key during the POST or click the **Q-Flash** icon (or press the <F8> key) in BIOS Setup. However, if the BIOS update file is saved to a hard drive in RAID/AHCI mode or a hard drive attached to an independent SATA controller, use the <End> key during the POST to access Q-Flash.

⚠️ Because BIOS flashing is potentially risky, please do it with caution. Inadequate BIOS flashing may result in system malfunction.

Select **Q-Flash** to access Q-Flash

B. Updating the BIOS

In the main menu of Q-Flash, use the keyboard or mouse to select an item to execute. When updating the BIOS, choose the location where the BIOS file is saved. The following procedure assumes that you have saved the BIOS file to a USB flash drive.

Step 1:
1. Insert the USB flash drive containing the BIOS file into the computer. In the main screen of Q-Flash, select **Update BIOS**.

> •   The **Save BIOS** option allows you to save the current BIOS file.
> •   Q-Flash only supports USB flash drive or hard drives using FAT32/16/12 file system.
> •   If the BIOS update file is saved to a hard drive in RAID/AHCI mode or a hard drive attached to an independent SATA controller, use the <End> key during the POST to access Q-Flash.

2. Select the BIOS update file.

⚠️ **Make sure the BIOS update file matches your motherboard model.**

Step 2:

The screen will show that the BIOS file is being read from your USB flash drive. Please select **Fast** or **Intact** to begin the BIOS update. The screen will then display the update process.

⚠️ • **Do not turn off or restart the system when the system is reading/updating the BIOS.**
   • **Do not remove the USB flash drive or hard drive when the system is updating the BIOS.**

Step 3:

The system will restart after the update process is complete.

Step 4:

During the POST, press <Delete> to enter BIOS Setup. Select **Load Optimized Defaults** on the **Save & Exit** screen and press <Enter> to load BIOS defaults. System will re-detect all peripheral devices after a BIOS update, so we recommend that you reload BIOS defaults.

Select **Yes** to load BIOS defaults

Step 5:

Select **Save & Exit Setup** and press <Enter>. And then select **Yes** to save settings to CMOS and exit BIOS Setup. The procedure is complete after the system restarts.

5-1-2   Updating the BIOS with the @BIOS Utility

A. Before You Begin
1. In Windows, close all applications and TSR (Terminate and Stay Resident) programs. This helps prevent unexpected failures when performing a BIOS update.
2. If the BIOS is being updated via the Internet, ensure the Internet connection is stable and do NOT interrupt the Internet connection (for example, avoid a power loss or switching off the Internet). Failure to do so may result in a corrupted BIOS or a system that is unable to start.
3. GIGABYTE product warranty does not cover any BIOS damage or system failure resulting from an inadequate BIOS flashing.
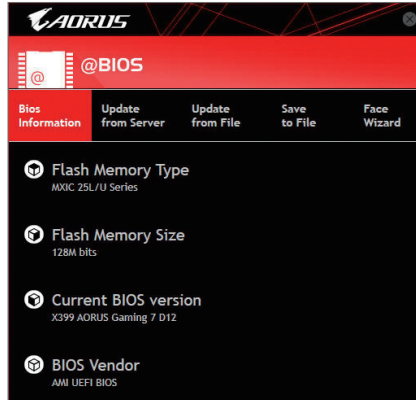
B. Using @BIOS
1. Update the BIOS Using the Internet Update Function:
Click **Update from Server**, select the @BIOS server site closest to your location and then download the BIOS file that matches your motherboard model. Follow the on-screen instructions to complete.
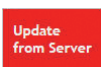
If the BIOS update file for your motherboard is not present on the @BIOS server site, please manually download the BIOS update file from GIGABYTE's website and follow the instructions in "Update the BIOS without Using the Internet Update Function" below.
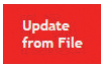
2. Update the BIOS without Using the Internet Update Function:
Click **Update from File**, then select the location where you save the BIOS update file obtained from the Internet or through other source. Follow the on-screen instructions to complete.

3. Save the Current BIOS File:

Click **Save to File** to save the current BIOS file.
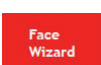
4. Change the Boot-up Logo:
Click **Upload new image** in Face-Wizard and you will be able to change the boot-up logo with your own picture, creating a personalized boot-up screen. Click **Backup current image** to save the current boot-up logo.

Supported image formats include jpg, bmp, and gif.

C. After Updating the BIOS
Restart your system after updating the BIOS.

- Make sure that the BIOS file to be flashed matches your motherboard model. Updating the BIOS with an incorrect BIOS file could cause your system not to boot.
- Do not turn off the system or remove the power during the BIOS update process, or the BIOS may corrupt and the system may not boot.

5-1-3　Using Q-Flash Plus

A. Before You Begin
1. From GIGABYTE's website, download the latest compressed BIOS update file that matches your motherboard model.
2. Uncompress the downloaded BIOS file, save it to your USB flash drive, and rename it to **GIGABYTE.bin**.
    Note: The USB flash drive must use the FAT32/16 file system and it must be a USB 2.0 flash drive.
3. Insert the USB flash drive into the white USB port on the back panel.

B. Using Q-Flash Plus
If both the main and backup BIOS fail during system boot, wait for 15-20 seconds, the system will automatically search and match the BIOS file in the USB flash drive on the white USB port. The FBIOS_LED will flash when the BIOS matching and flashing activities start.
Wait for 2-3 minutes and the FBIOS_LED will stop flashing when the main BIOS flashing is complete.

> After the main BIOS is flashed, the system will reboot automatically and then DualBIOS™ will continue to update the backup BIOS. After completion, the system will reboot again and boot from the main BIOS for normal operation.

5-2 APP Center

GIGABYTE App Center gives you easy access to a wealth of GIGABYTE apps that help you get the most from your GIGABYTE motherboard (Note). Using a simple, unified user interface, GIGABYTE App Center allows you to easily launch all GIGABYTE apps installed on your system, check related updates online, and download the apps, drivers, and BIOS.

Running the APP Center
Insert the motherboard driver disk. On the Autorun screen, go to **Application Software\Install GIGABYTE Utilities** to install GIGABYTE App Center and the selected apps. Restart your computer after the installation is complete. In Desktop mode, click the App Center icon [icon] in the notification area to launch the App Center utility (Figure 1). On the main menu, you can select an app to run or click **LiveUpdate** to update an app online.

Figure 1

If the App Center is closed, you can restart it by clicking **Launch App Center** on the Start menu (Figure 2).
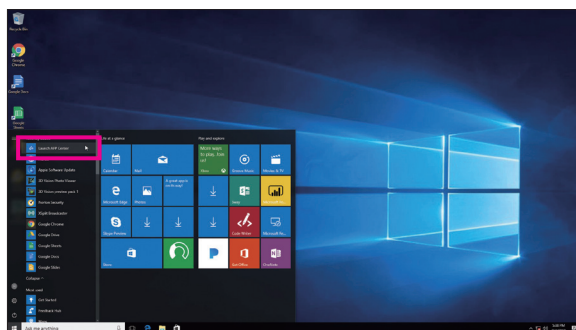
Figure 2

(Note)   Available applications in APP Center may differ by motherboard model. Supported functions of each application may also vary depending on motherboard specifications.

5-2-1   3D OSD

3D OSD (Note) automatically detects and displays your system information during games, allowing you to easily get hold of your system information without switching between screens.

The 3D OSD Interface
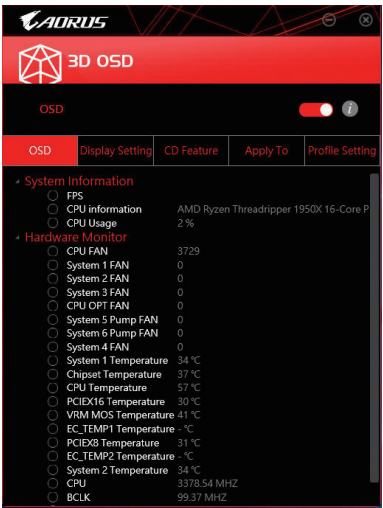
Using 3D OSD
Main Menu:
Allows you to enable or disable the 3D OSD feature and to select the type of real-time system information you wish to display. 3D OSD will detect and display a list of available options.

Configuration Menu:
Allows you to set a hotkey for enabling /disabling 3D OSD and specify the font size/location/color of the displayed information.

(Note)   Please ensure that DirectX End-User Runtime has been installed on your system prior to installing 3D OSD.

5-2-2 AutoGreen

AutoGreen [(Note)] is an easy-to-use tool that provides users with simple options to enable system power savings via a Bluetooth-enabled smart phone/tablet device. When the device is out of the range of the computer's Bluetooth receiver, the system will enter the specified power saving mode. Before using this app, you need to turn on Bluetooth on both your computer and smart phone/tablet device.

The AutoGreen Interface
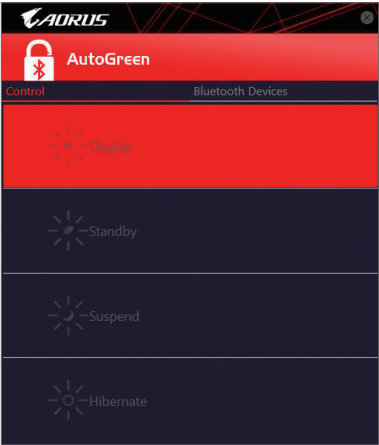
Control Tab:
The **Control** tab allows you to select a system power saving mode.

Button	Description
Disable	Disables this function
Standby	Enters Power on Suspend mode
Suspend	Enters Suspend to RAM mode
Hibernate	Enters Suspend to Disk mode

Bluetooth Devices Tab:
The **Bluetooth** tab allows you to pair your smart phone/tablet device with the Bluetooth receiver on your computer. Press **Refresh** to let AutoGreen search for the Bluetooth devices around you. A message will appear on both your computer and smart phone/tablet device prompting you to compare the passcodes on the two devices. Confirm to complete the pairing process.

(Note) Once your smart phone/tablet device has been paired with your AutoGreen-enabled computer, you'll not be able to use it to connect to other Bluetooth device(s).

5-2-3   BIOS Setup

This app provides information on your motherboard model and BIOS version. You can also use it to select the default language used by the BIOS and set the system time/power management settings.

The BIOS Setup Interface
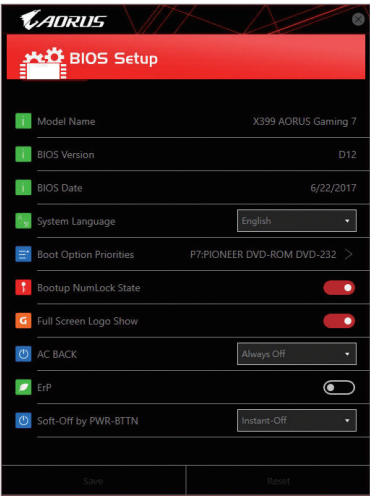
Using BIOS Setup:
- **System Language:**
  Allows you to select the default language used by the BIOS.
- **Boot Option Priorities:**
  Allows you to specify the overall boot order from the available devices.
- **Bootup NumLock State:**
  Allows you to enable or disable Numlock feature on the numeric keypad of the keyboard after the POST.
- **Full Screen LOGO Show:**
  Allows you to determine whether to display the GIGABYTE Logo at system startup.
- **AC BACK:**
  Determines the state of the system after the return of power from an AC power loss.

Button	Description
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.

- **ErP:**
  Allows you to determine whether to let the system consume least power in S5 (shutdown) state.
- **Soft-Off by PWR-BTTN:**
  Allows you to configures the way to turn off the computer in MS-DOS mode using the power button.

Button	Description
Instant-Off	Press the power button and then the system will be turned off instantly.
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.

After you configure the settings, click **Save** and restart the system. If you click the **Reset** button, the system will load the optimal BIOS default settings.

5-2-4　Color Temperature

GIGABYTE Color Temperature is a simple interface which allows you to directly adjust the monitor color temperature and reduce the blue light to protect your eyes.

The Color Temperature Interface
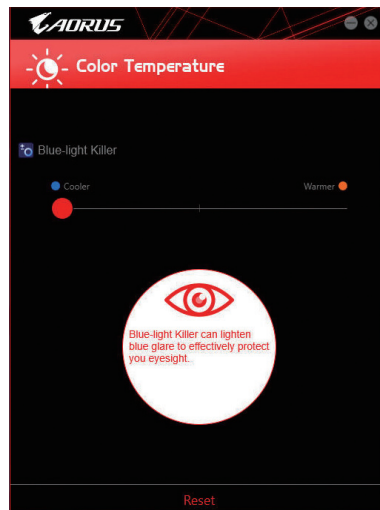
Using Color Temperature
You can use the slider for adjustment. To close the app, click the ▣ icon on the top right corner. Clicking the **Reset** button reverts to the default settings.

5-2-5 Cloud Station

GIGABYTE Cloud Station (Server) is composed of HomeCloud, GIGABYTE Remote, Remote OC, and HotSpot, which allow your smart phone, tablet device, and remote computer to communicate, share resources, and control the host computer via wireless connection. Cloud Station allows your computer to share files with another computer that has Cloud Station (Server) installed.

Before You Begin:
• To use HomeCloud, GIGABYTE Remote, and Remote OC, you must install GIGABYTE Cloud Station on your smart phone/tablet device. (For Android systems, please download the app from Google Play; for iOS systems, please download it from App Store.) [Note 1]
• To share HomeCloud files between computers, you need to install Cloud Station (Server) on the host computer and Cloud Station on the remote computer.
• Your smart phone/tablet device must have Android 4.0/iOS 6.0 or above version.
• The first time you use HomeCloud, GIGABYTE Remote, and Remote OC, you must sign in with your Google/Facebook/Windows Live account. Be sure to use the same account to sign in on your smart phone/tablet device and computers.

HomeCloud
HomeCloud allows you to upload/download/back up files [Note 2] from your smart phone/tablet device/computer to the host computer.

The HomeCloud Interface
Cloud Station (Server):
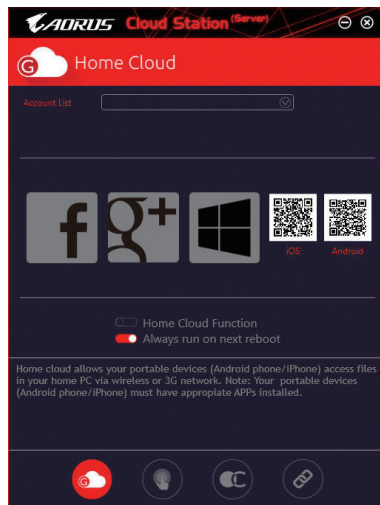
(Note 1) You can use your smart phone/tablet device to scan the QR code on the HomeCloud UI to link to the download page of the GIGABYTE Cloud Station on App Store or Google Play.
(Note 2) For iOS systems, the file types are limited to image/video files.

Cloud Station:
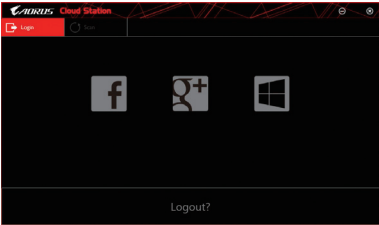
Using HomeCloud
Step 1:
Launch HomeCloud on the host computer (installed with Cloud Station (Server)), sign in with your Google/ Facebook/Windows Live account or select the account on the **Account List**. Then enable **HomeCloud Function**. To automatically enable this function after system reboot, enable **Always run on next reboot**.
Step 2:
Run Cloud Station on your smart phone/tablet device/remote computer, sign in with the same account you use for HomeCloud on your host computer. Tap on **HomeCloud** to perform the following functions:

On the Host Computer:

Option	Function
Account List	Displays currently signed in account(s).
Remove	Remove the selected account.
Share Folder	Displays the shared folder directory of the currently signed in account.
Open Folder	Access the shared folder of the currently signed in account.

On the Smart Phone/Tablet Device/Remote Computer:

Option	Function
All Picture Files	File Upload: Tap on the folder, browse and select the files inside. Tap on the menu icon and select **Upload selected Files** to upload the files to your computer. File Download: Tap on the folder and then tap on the menu icon, select **Download Files**. You can browse the files and select the files that you want to download to your smart phone/tablet device.
All Music Files	
All Video Files	
All Files	
User Contacts	Tap on the folder and then tap on the menu icon to use the options including **Backup to remote**, **Restore From remote**, **View Remote Contact**, and **Reselect Computers**.
Call Log	

GIGABYTE Remote

GIGABYTE Remote allows you to use your smart phone/tablet device to remotely control the mouse/keyboard/Windows Media Player on your computer.

The GIGABYTE Remote Interface
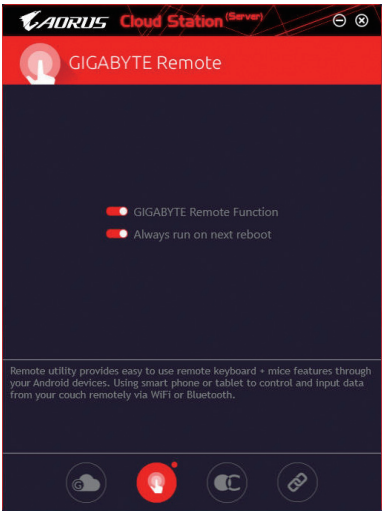
Using GIGABYTE Remote

Step 1:

On the host computer, launch GIGABYTE Remote and enable **GIGABYTE Remote Function**. To automatically enable this function after system reboot, enable **Always run on next reboot**.

Step 2:

Run GIGABYTE Cloud Station on your smart phone/tablet device, sign in with the same account you use for HomeCloud on your computer. Tap on **Remote Control** to perform the following remote controls:

On the Smart Phone/Tablet Device:

Option	Function
Mouse	Remotely perform mouse functionalities including dragging, right/left-clicking, and holding the mouse left button.
Keyboard	Remotely control your keyboard such as text input (tap on Real-Time Mode to type texts) or deletion.
Media	Remotely configure and control the currently running Windows Media Player application on your computer.

Remote OC

Remote OC provides you with remote control options including overclocking and system tweaking, system monitoring plus the ability to also remotely power down/reset the PC when needed.

The Remote OC Interface
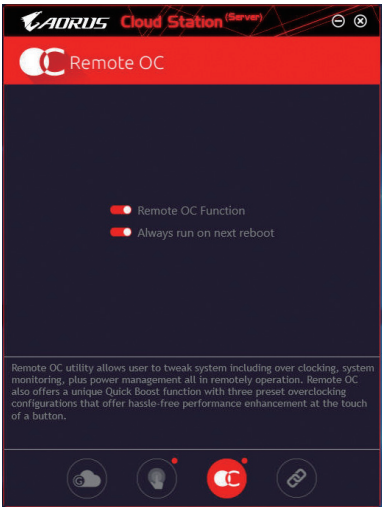
Using Remote OC

Step 1:

On the host computer, launch Remote OC and enable **Remote OC Function**. To automatically enable this function after system reboot, enable **Always run on next reboot**.

Step 2:

Run GIGABYTE Cloud Station on your smart phone/tablet device, sign in with the same account you use for HomeCloud on your computer. Tap on **Remote OC** to perform the following functions:

On the Smart Phone/Tablet Device:

Option	Function
Tuner	Allows you to change CPU/memory frequency and voltage settings.
INFO	Displays the system information, including the CPU, motherboard, and memory.
HW MONIT	Allows you to monitor system temperatures, voltages, and fan speeds.
QUICK BOOST	Provides you with three preset overclocking configurations.
CONTROL	Allows you to remotely reboot or shut down your computer.

HotSpot

HotSpot turns your computer into a virtual wireless access point and allows you to share your connection with your other wireless devices. Make sure your computer has been connected to a network and Wi-Fi is enabled.

The HotSpot Interface
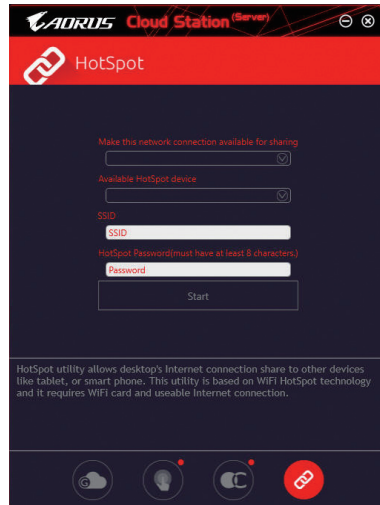
Using HotSpot:

Configuring your host computer:

The options are as follows. Make sure to click **Start** to complete.

• **Make this network connection available for sharing:**

   Select a currently running network connection you want to share.

• **Available HotSpot device:**

   Select a network virtual adapter. If there are more than one Wi-Fi card on your computer, you need to select the one you want to use from the list.

• **SSID:**

   The hotspot SSID name. You can keep the default name or create your own one.

• **HotSpot Password(must have at least 8 characters):**

   The password is required when other wireless devices want to access the Internet through the virtual wireless access point. You can keep the default name or create your own one. The password must have at least 8 characters and cannot be empty.

Sharing your connection with other wireless devices:

First make sure Wi-Fi is enabled on the wireless devices. Then browse to the network configuration screen, search for available Wi-Fi networks, and tap the name of your virtual wireless access point, enter the password, and confirm.
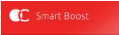
5-2-6 EasyTune

GIGABYTE's EasyTune is a simple and easy-to-use interface that allows users to fine-tune their system settings or do overclock/overvoltage in Windows environment.

The EasyTune Interface
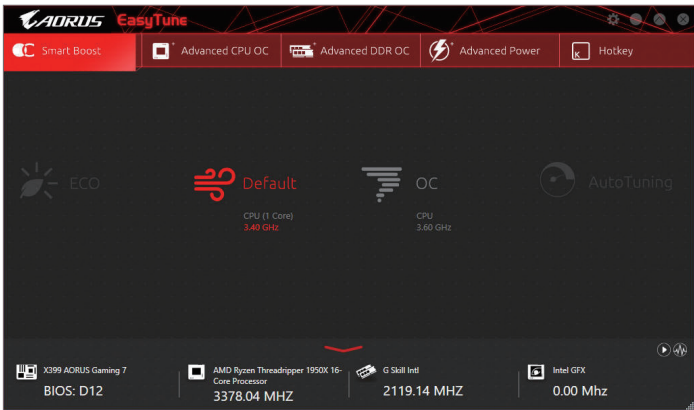
Tabs Information

Tab	Description
Smart Boost	The **Smart Boost** tab provides you with different levels of CPU frequency to choose to achieve desired system performance. After making changes, be sure to restart your system for these changes to take effect.
Advanced CPU OC	The **Advanced CPU OC** tab allows you to set CPU base clock, frequency, and voltages, and integrated graphics frequency. You can save the current settings to a profile. You can create up to 2 profiles.
Advanced DDR OC	The **Advanced DDR OC** tab allows you to set the memory clock.
Advanced Power	The **Advanced Power** tab allows you to adjust voltages.
Hotkey	The **HotKey** tab allows you to set hotkeys for your profiles.

Available functions in EasyTune may vary by motherboard model and CPU. Grayed-out area(s) indicates that the item is not configurable or the function is not supported.

Incorrectly doing overclock/overvoltage may result in damage to the hardware components such as CPU, chipset, and memory and reduce the useful life of these components. Before you do the overclock/overvoltage, make sure that you fully know each function of EasyTune, or system instability or other unexpected results may occur.

5-2-7　Fast Boot

Through the simple GIGABYTE Fast Boot interface, you can enable or change the Fast Boot or Next Boot After AC Power Loss setting right in the operating system.

The Fast Boot Interface
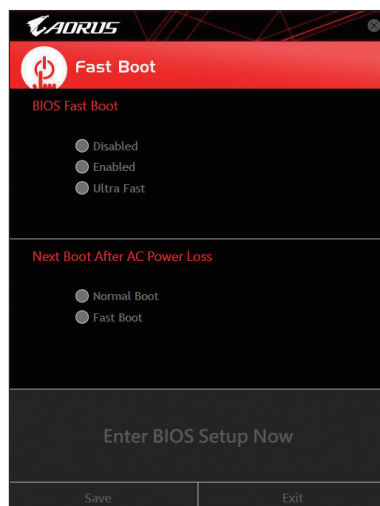
Using Fast Boot
• **BIOS Fast Boot:**
  This option is the same as the **Fast Boot** option [(Note 1)] in BIOS Setup. It allows you to enable or disable the fast boot function to shorten OS boot time.
• **Next Boot After AC Power Loss:** [(Note 2)]
  This option is the same as the **Next Boot After AC Power Loss** option [(Note 2)] in BIOS Setup. It allows you to select the system bootup mode upon the return of an AC power loss. (This mode is configurable only when **BIOS Fast Boot** is set to **Enabled** or **Ultra Fast**.)

After you configure the settings, click **Save** to save and click **Exit**. The settings will take effect on next boot. If you click the **Enter BIOS Setup Now** button, the system will restart and enter BIOS Setup immediately.

(Note 1)　For more details about this function, refer to Chapter 2, "BIOS Setup."
(Note 2)　Whether this item is supported depends on the product being received.

5-2-8   Game Boost

This app allows you to flexibly manage your applications to optimize your gaming performance by freeing up system resources and memory usage.

The Game Boost Interface
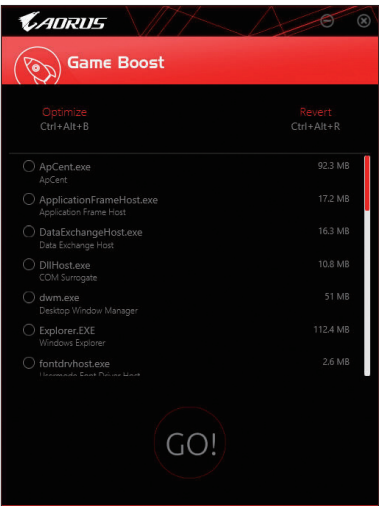
Using Game Boost

Select the application you want to suspend and then click **Go** to optimize your system for gaming. To revert the computer back to the state it was before, click **Revert**. In addition, two hotkeys are provided as follows:

• Optimize(Ctrl+Alt+B): Automatically optimizes your gaming platform and gaming performance.

• Revert(Ctrl+Alt+R): Restores your computer back to the state before the gaming begins.

5-2-9 RGB Fusion

This application allows you to enable or specify the lighting mode of the onboard LEDs and rear panel LEDs [(Note 1)] while in the Windows environment.

The RGB Fusion Interface
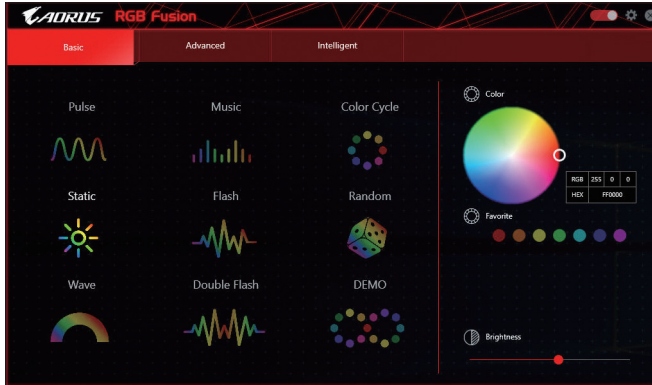
Using RGB Fusion
*   **The [icon] icon on the top right corner:** Allows you to enable or disable the LED lighting.
    The [icon] icon on the top right corner: Allows your computer to connect to the GIGABYTE RGB Fusion app installed on your handheld devices. [(Note 2)]

*   **Basic [(Note 3)]:** Allows to you to configure the lighting behaviour of all LEDs/armor LEDs.
    Pulse ─ All LEDs simultaneously fade in and fade out.
    Music ─ All LEDs are synchronized with your music.
    Color Cycle ─ All LEDs simultaneously cycle through a full spectrum of colors.
    Static ─ All LEDs emit a single color.
    Flash ─ All LEDs simultaneously flash on and off.
    Random ─ Single LED regions flash randomly.
    Wave ─ A full color spectrum cascades throughout the armor LED.
    Double Flash ─ All LEDs flash in an interlaced pattern.
    DEMO ─ The LEDs/digital LED strip cycle through a full spectrum of analog/digital colors.

(Note 1)   This function is available only on motherboards with an I/O shield that has audio LEDs.
(Note 2)   Please download the **RGB Fusion** app from App Store or Google Play.
(Note 3)   Regions/Modes/Colors available may vary by motherboard.
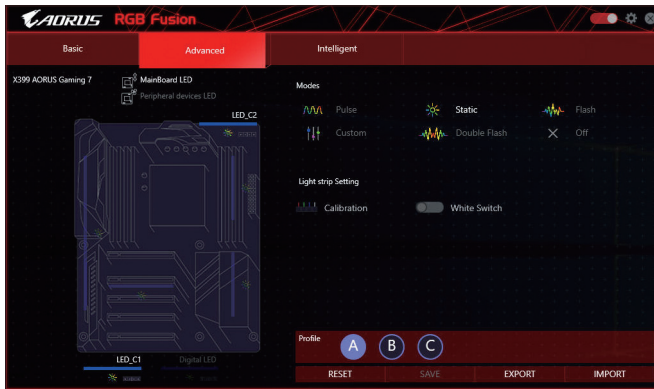
- **Advanced** [(Note)]: Allows you to configure the lighting behaviour and color of the LEDs in each region. You can save the settings as a profile and create up to three customized profiles.

  Pulse ─ The selected region LEDs simultaneously fade in and fade out.

  Static ─ The selected region LEDs emit a single color.

  Flash ─ The selected region LEDs simultaneously flash on and off.

  Custom ─ The selected region LEDs can customize the Color stop, mode, color, transition and duration.

  Double Flash ─ The selected region LEDs flash in an interlaced pattern.

  Off ─ Disable the selected region LEDs.

  Digital Light ─ Provides multiple digital lighting mode throughout the armor LED and LED strip.

  Calibration ─ Calibrate LED colors.

- **Intelligent:** LEDs emit various colors based on the condition of your PC.

(Note)   Regions/Modes/Colors available may vary by motherboard.

5-2-10 Smart TimeLock

GIGABYTE Smart TimeLock allows you to effectively manage computer or Internet usage time with simple rules and options.

The Smart TimeLock Interface
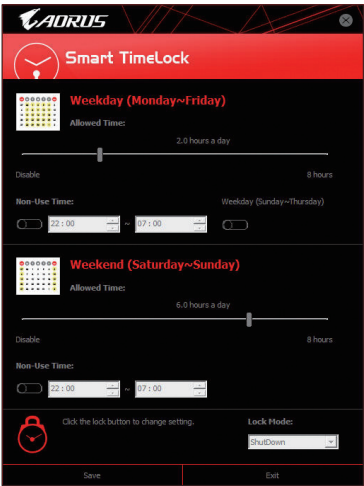
Using Smart TimeLock
Click the lock icon ⏱ on the bottom left corner and enter the password [(Note)]. Set the time when a user can or cannot use your computer for weekdays and weekends. The **Lock Mode** on the bottom right corner allows you to choose to turn off the computer or only close the Internet connection during the specified time period. Click **Save** to save the settings and click **Exit** to exit.

An alert will appear 15 minutes and 1 minute prior to the default shutdown time. When the alert appears, you can enter the password to extend the usage time or click **Cancel** to close the alert. If you respond **Cancel**, you will be requested to enter the password to extend the usage time again when the default shutdown time arrives, or the computer will shutdown right away.

(Note)   You can set the User Password in the system BIOS Setup program to prevent the system time being changed by other users.

5-2-11 Smart Keyboard

GIGABYTE Smart Keyboard allows you to set your own hotkeys using the F1 through F12 keys. You can use the customized hotkeys to change the mouse sensitivity, replace a word or password, open a file or an application, all of which helps to make the most out of your keyboard and mouse.

The Smart Keyboard Interface
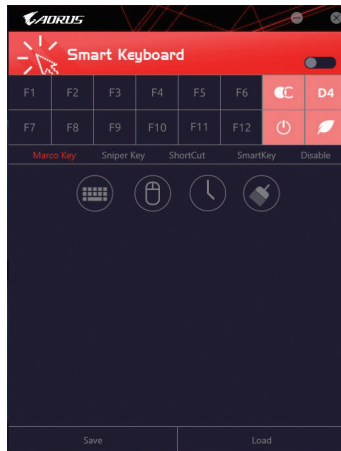
Using Smart Keyboard
Select one of the F1 through F12 keys and configure the following functions:
*   **Marco Key:**
    Allows you to assign key strokes to the selected key, or use the key to record mouse location, or set time interval between each keystroke.
*   **Sniper Key:**
    Using this option, you can switch the mouse sensitivity when you are in sniper mode for better sniper accuracy.
*   **Smart Cut:**
    Allows you to create keyboard shortcuts for a file or an application.
*   **Smart Key:**
    Allows you to give the selected key the ability to replace to a word or password.
*   **Disable:**
    Allows you to disable the functionality of particular key(s).

After completing the settings, make sure to click **Enable keyboard monitor function** on the top right corner.

*   **Save:**
    Save current settings as a profile.
*   **Load:**
    Load a previously save profile.

(Note)   It is recommended that Smart Keyboard be closed if it violates the end user license agreement of your game.

5-2-12 Smart Backup

Smart Backup allows you to back up a partition as an image file every hour. You can use these images to restore your system or files when needed.
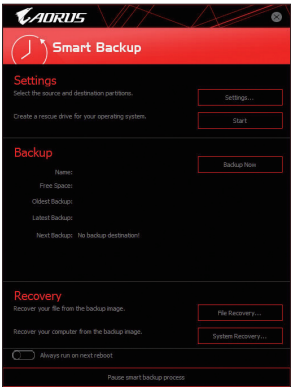
The Smart Backup main menu:

Button	Description
Settings	Allows you to select the source and destination partition
Start	Allows you to create a rescue drive
Backup Now	Allows you to perform the backup immediately
File Recovery...	Allows you to recover your files from the backup image
System Recovery...	Allows you to recover your system from the backup image

• Smart Backup only supports NTFS file system.
• You need to select the destination partition in **Settings** the first time you use Smart Backup.
• The **Backup Now** button will be available only after 10 minutes you have logged in Windows.
• Select the **Always run on next reboot** checkbox to automatically enable Smart Backup after system reboot.
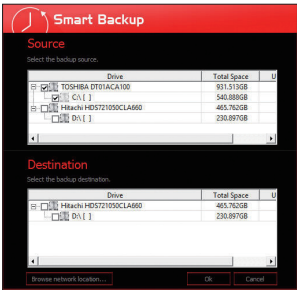
Creating a backup:
Click the **Settings** button on the main menu. In the **Settings** dialog box, select the source partition and destination partition and click **OK**. The initial backup will start after 10 minutes and regular backup will be performed hourly. Note: By default, all partitions on the system drive are selected as the backup source. The backup destination cannot be on the same partition as the backup source.

Saving the backup to a network location:
If you want to save the backup to a network location, select **Browse network location**. Make sure your computer and the computer where you want to save the backup are in the same domain. Choose the network location where you want to store the backup and enter the user name and password. Follow the on-screen instructions to complete.
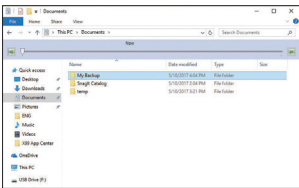
Recovering a file:
Click the **File Recovery** button on the main menu. Use the time slider on the top of the popped out window to select a previous backup time. The right pane will display the backed-up partitions in the backup destination (in the **My Backup** folder). Browse to the file you want and copy it.
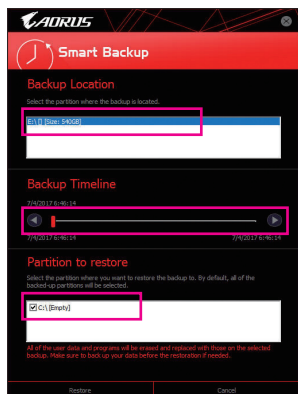
Recovering your system with Smart Backup:

Steps:
1. Click the **System Recovery** button on the main menu.
2. Select the location where your backup is saved.
3. Use the time slider to select a time point.
4. Select a partition backup created on the selected time point and click **Restore**.
5. Confirm whether to restart your system to proceed with the restore immediately or later. Once you respond "Yes" the system will restart to the Windows recovery environment. Follow the onscreen instructions to restore your system.

⚠ All of your files and programs will be deleted and replaced with those on the selected backup. If needed, be sure to make a copy of your data before the restore.

5-2-13 Smart HUD

GIGABYTE Smart HUD provides you with the ability to watch a video on YouTube or Twitch simultaneously during gameplay by simply setting the URLs on the UI. The easy-to-use UI allows you to memorize frequently used URLs, set window position and size, and change window transparency. Also, you can control Smart HUD videos and volume with hotkeys.

The Smart HUD Interface
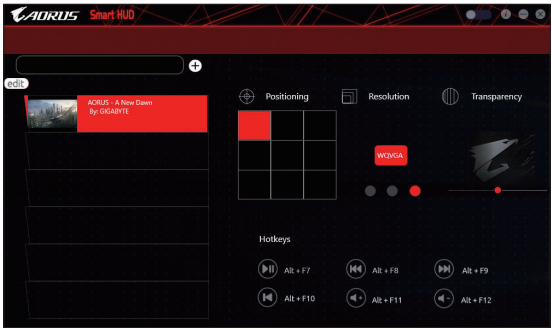
Using Smart HUD
• The icon on the top right corner:
  Allows you to open the Smart HUD window.

• **Configuration Menu:**

【 + 】 / edit	Add or remove video URLs or add preference.
Positioning	Select the window position.
Resolution	Select the window size.
Transparency	Set the window transparency.

• **Hot Keys:**

Alt + F7	Start, pause
Alt + F8	Fast forward
Alt + F9	Fast backward
Alt + F10	Replay
Alt + F11	Increase the volume
Alt + F12	Decrease the volume

(Note)   Please ensure that DirectX End-User Runtime has been installed on your system prior to installing Smart HUD.
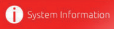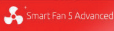
5-2-14 System Information Viewer

GIGABYTE System Information Viewer allows you to monitor and adjust the fan speed in the operating system. You can also display the hardware monitor information on the desktop to view the system status at any time.

The System Information Viewer Interface

Tabs Information

Tab	Description
System Information	The **System Information** tab provides information on the installed CPU, motherboard, and the BIOS version.
Smart Fan 5 Auto	The **Smart Fan 5 Auto** tab allows you to specify a Smart Fan mode.
Smart Fan 5 Advanced	The **Smart Fan 5 Advance** tab allows you to adjust the smart fan speed. The fans will run at different speeds according to system temperatures. Using the **Smart Fan** option you can adjust the fan's workload according system temperatures or you can fix the fan speeds using the **RPM Fixed Mode** option. Click the **Calibrate** button and the fan speed will be shown in relation to overall fan workload after calibration. The **Reset** button can revert the fan settings back to the last saved values.
System Alert	The **System Alerts** tab allows you to monitor hardware temperature, voltage and fan speed, and set temperature/fan speed alarm.
Record	The **Record** tab allows you to record changes in system voltages, temperatures, and fan speeds. Please note, the recording will stop if you exit the **Record** tab during the recording process.

The speed control function requires the use of a fan with fan speed control design.

5-2-15 USB Blocker

GIGABYTE USB Blocker provides you with an easy-to-use interface that allows you to block certain USB device types on your PC. Devices classes that are blocked will be ignored by the operating system.

The USB Blocker Interface
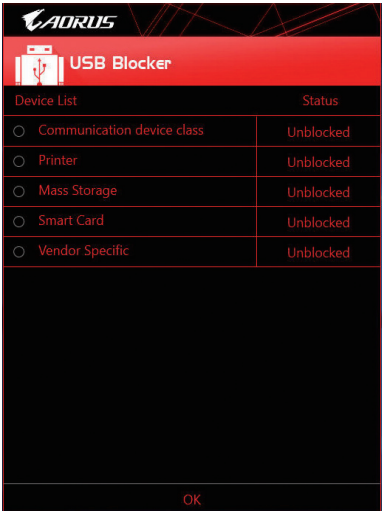
Using USB Blocker
Select the class of USB device that you would like to block or unblock. Double left-click to change the **Blocked** or **Unblocked** status and click **OK**. Then enter your password and click **OK** to complete.

5-2-16 USB DAC-UP 2

GIGABYTE USB DAC-UP 2 allows you to increase the output voltage of the USB 3.1 Gen 1 ports on the front or back panel to strengthen the stability of your USB device(s).

The USB DAC-UP 2 Interface
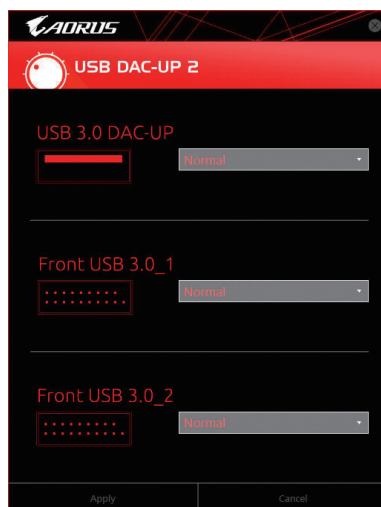
Using USB DAC-UP 2
Click the drop down list on the right of the USB 3.1 Gen 1 connector you want to adjust the voltage and choose an option. Then click **Apply**. After the system restarts, the settings will be synchronized with the BIOS settings. The options are as follows:

• Normal: Keeps the original output voltage.
• 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.

(Note)   Connectors available may vary by motherboard.

5-2-17 V-Tuner

GIGABYTE V-Tuner [(Note 1)] allows you to easily fine-tune your graphics card in the Windows environment. You can manually overclock the GPU and memory [(Note 2)] or adjust the fan speed and power settings. It also allows you to monitor your graphics card status at any time.

The V-Tuner Interface
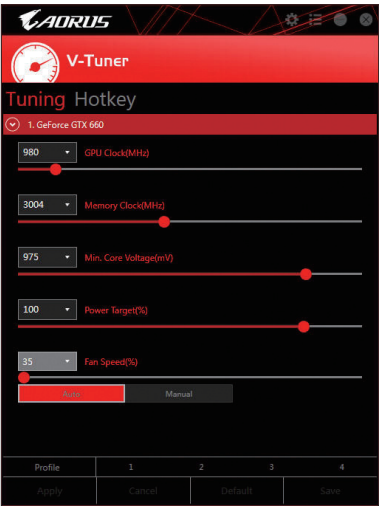
Using V-Tuner
You can manually select the values of each item or use the sliders for adjustment and then click **Apply**. To set the fan speed you need to select **Manual** first. You can save the current settings to a profile and create up to 4 profiles. To check the graphics card status, you can click the icon on the top right corner.

(Note 1)   Before using V-Tuner, be sure to install the graphics card driver first.
(Note 2)   Items available may vary by graphics cards.

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Chapter 6   Appendix

6-1   Killer Control Center

The Killer Control Center allows you to view your network connection status and Internet bandwidth and to configure your network settings. After installing the LAN driver, click the Start menu icon ▦ and search for **Killer Networking>Killer Control Center**. Or click on the 🗗 icon in the notification area. After setting up your network connection, perform a speed test on the **Settings** page.

Overview
This page shows the total internet [(Note)] traffic received by the system in real time and application priorities.

Apps
On this page, you can determine an application's default traffic priority over the Internet connection. In the **Priority** column, you can assign a priority level for each application, with 1 being the important and 6 being the least important.
You can change the upload and download bandwidth for each application as well. Drag the gray square on the right end of an application to change the bandwidth.
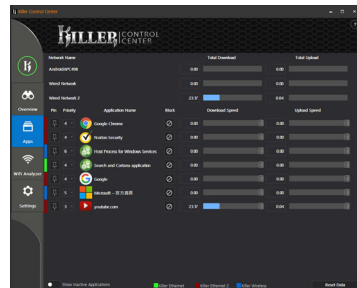
Wifi Analyzer
This page shows nearby networks in 2.4 Ghz and 5 Ghz, and what channels each network is occupying.

Settings
This page shows basic network information. You can change the speed limits for each network.
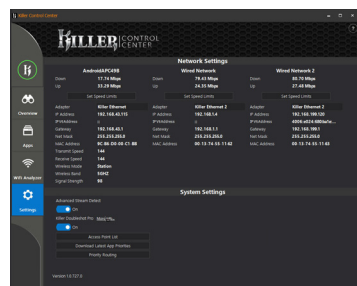
(Note)   Enabling the **Killer Doubleshot Pro** feature on the **Settings** page allows multiple Killer products to operate at the same time.

6-2   Configuring Audio Input and Output

6-2-1   Configuring 2/4/5.1/7.1-Channel Audio

The motherboard provides five audio jacks on the back panel which support 2/4/5.1/7.1-channel (Note) audio. The picture to the right shows the default audio jack assignments.

Center/Subwoofer Speaker Out
Rear Speaker Out
Line In
Front Speaker Out
Mic In
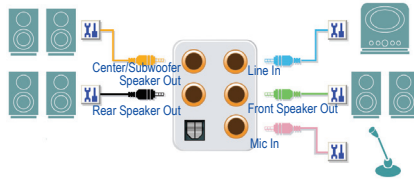
•   To configure 4/5.1/7.1-channel audio, you have to retask either the Line in or Mic in jack to be Side speaker out through the audio driver.
•   Audio signals will be present on both of the front and back panel audio connections simultaneously. If you want to mute the back panel audio (only supported when using an HD front panel audio module), refer to instructions on the next page.

High Definition Audio (HD Audio)
HD Audio includes multiple high quality digital-to-analog converters (DACs) and features multistreaming capabilities that allow multiple audio streams (in and out) to be simultaneously processed. For example, users can listen to MP3 music, have an Internet chat, make a telephone call over the Internet, and etc. all at the same time.

A. Configuring Speakers
(The following instructions use Windows 10 as the example operating system.)

Step 1:
After installing the audio driver, restart your computer. On the Windows desktop, click the **Realtek HD Audio Manager** icon in the notification area ![icon] to access the **HD Audio Manager**.
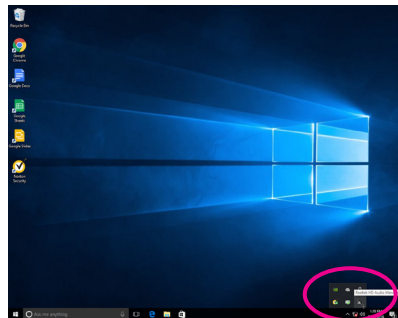
(Note)   2/4/5.1/7.1-Channel Audio Configurations:
Refer to the following for multi-channel speaker configurations.
•   2-channel audio: Headphone or Line out.
•   4-channel audio: Front speaker out and Rear speaker out.
•   5.1-channel audio: Front speaker out, Rear speaker out, and Center/Subwoofer speaker out.
•   7.1-channel audio: Front speaker out, Rear speaker out, Center/Subwoofer speaker out, and Side speaker out.

Step 2:
Connect an audio device to an audio jack. The **The current connected device is** dialog box appears. Select the device according to the type of device you connect. Then click **OK**.
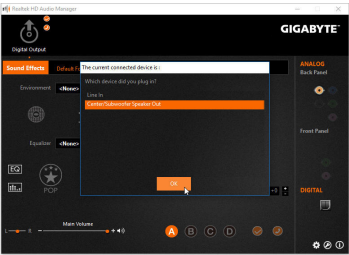
Step 3:
On the **Speakers** screen, click the **Speaker Configuration** tab. In the **Speaker Configuration** list, select **Stereo**, **Quadraphonic**, **5.1 Speaker**, or **7.1 Speaker** according to the type of speaker configuration you wish to set up. Then the speaker setup is completed.
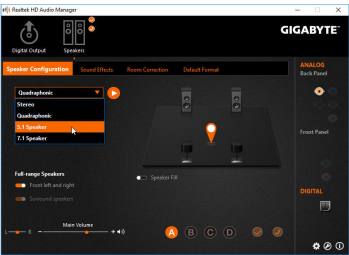
B. Enabling Smart Headphone Amp

The Smart Headphone Amp feature automatically detects impedance of your head-worn audio device, whether earbuds or high-end headphones to provide optimal audio dynamics. To enable this feature, connect your head-worn audio device to the Line Out jack and then select **Stereo** on the **Speaker** screen. Enable the **Smart Headphone Amp** feature under the **Stereo** item. The **Headphone Power** list below allows you to manually set the level of headphone volume, preventing the volume from being too high or too low.
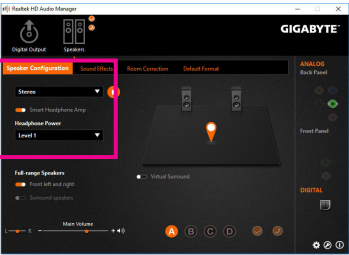
C. Configuring Sound Effect

You may configure an audio environment on the **Sound Effects** tab.

D. Muting the Back Panel Audio (For HD Audio Only)

Click **Device advanced settings** icon ⚙ on the right bottom of the screen to open the **Device advanced settings** dialog box. Select the **Mute the rear output device, when a front headphone plugged in** check box. Click **OK** to complete.
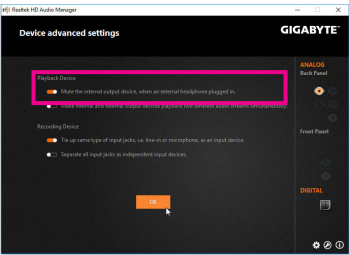
6-2-2 Configuring S/PDIF Out

The S/PDIF Out jack can transmit audio signals to an external decoder for decoding to get the best audio quality.

1. Connecting a S/PDIF Out Cable:
Connect a S/PDIF optical cable to an external decoder for transmitting the S/PDIF digital audio signals.

Connects to a S/PDIF optical cable
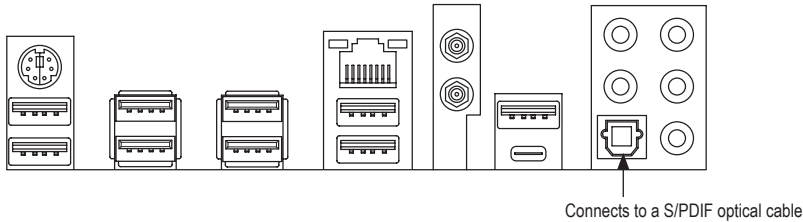
2. Configuring S/PDIF Out:
On the **Digital Output** screen, click the **Default Format** tab and then select the sample rate and bit depth. Click **OK** to complete.
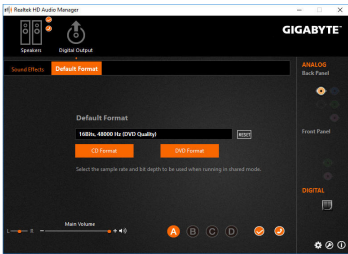
6-2-3   Configuring Microphone Recording

Step 1:
After installing the audio driver, restart your computer. On the Windows desktop, click the **Realtek HD Audio Manager** icon in the notification area ![icon] to access the **HD Audio Manager**.
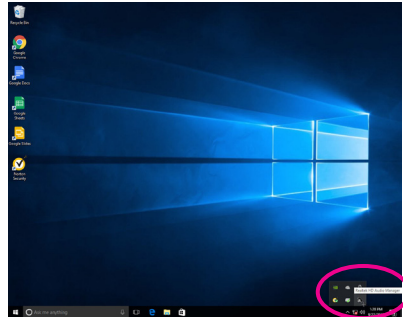
Step 2:
Connect your microphone to the Mic in jack (pink) on the back panel or the Mic in jack (pink) on the front panel. Then configure the jack for microphone functionality. Note: The microphone functions on the front panel and back panel cannot be used at the same time.
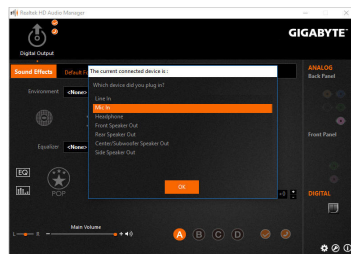
Step 3:
Go to the **Microphone** screen. Do not mute the recording volume, or you'll not be able to record the sound. To hear the sound being recorded during the recording process, do not mute the playback volume. It is recommended that you set the volumes at a middle level.
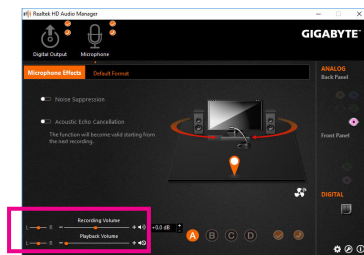
Step 4:
To raise the recording and playback volume for the microphone, you can set the Microphone Boost level on the right of the **Recording Volume** slider.
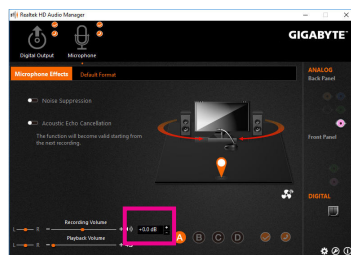
* Enabling Stereo Mix

If the HD Audio Manager does not display the recording device you wish to use, refer to the steps below. The following steps explain how to enable Stereo Mix (which may be needed when you want to record sound from your computer).

Step 1:
Locate the icon in the notification area and right-click on this icon. Select **Recording devices**.
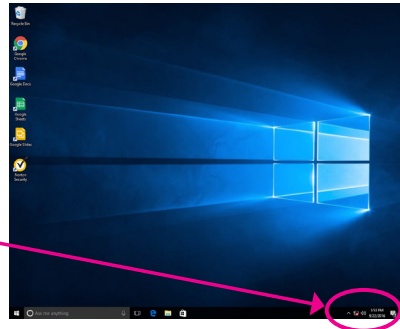
Step 2:
On the **Recording** tab, right-click on **Stereo Mix** item and select **Enable**. Then set it as the default device. (if you do not see **Stereo Mix**, right-click on an empty space and select **Show Disabled Devices**.)
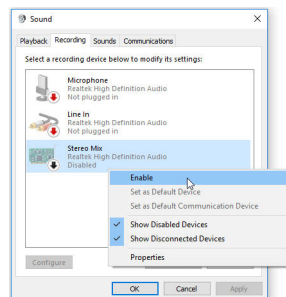
Step 3:
Now you can access the **HD Audio Manager** to configure **Stereo Mix** and use **Voice Recorder** to record the sound.
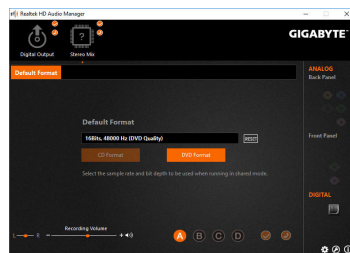
6-2-4　Using the Voice Recorder

After setting up the audio input device, to open the **Voice Recorder,** go to the Start menu and search for **Voice Recorder**.
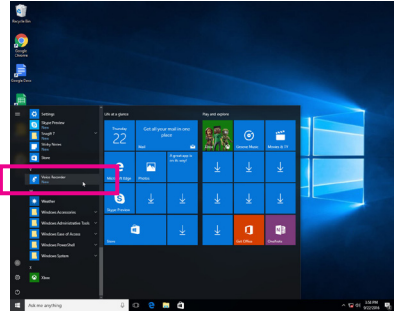
A. Recording Audio
1. To begin the recording, click the **Record** icon .
2. To stop the recording, click the **Stop recording** icon .

B. Playing the Recorded Sound
The recordings will saved in Documents>Sound Recordings. Voice Recorder records audio in MPEG-4 (.m4a) format. You can play the recording with a digital media player program that supports the audio file format.

6-2-5 Sound BlasterX 720°

Launch the Sound Blaster Connect 2 utility from the Start menu or click the icon in the notification area.

Dashboard:
BlasterX Experience gives you a selection of professionally tuned audio profiles. The customizable audio profiles create a unique and optimal sound experience for popular game titles and most of your playback needs. Select a BlasterX Experience, view the current audio preset, and the adjust the settings based on your needs, such as enable Reality 3D to enhance immersion or enable/disable equalizer, Scout Mode, etc.
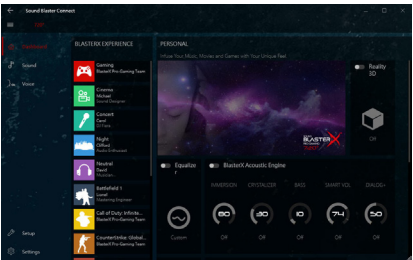
Sound:
Each audio preset can be further customized according to your acoustic preference for music, games and movies.
- Reality 3D
  Boost and enhance 3D immersion for your entertainment in music, movies and games.
- Equalizer
  Select from a plethora of Equalizer presets to match your audio, or enhance the bass or treble to your liking with our graphic equalizer.
- ACOUSTIC ENGINE
  Enhance and tweak your auditory experience to perfection with intelligent controls powered by BlasterX Acoustic Engine.
- SCOUT 2.0
  A new and improved Scout Mode that not only lets you hear, but also visualize your enemies on the battle field. Scout Radar transforms your mobile device into a radar display that reveals your enemy's location in realtime. Now, besides hearing your enemies, you can actually visualize and pinpoint your enemy's position. (Requires an Internet connection and the Scout Radar mobile app must be installed on your mobile device.)
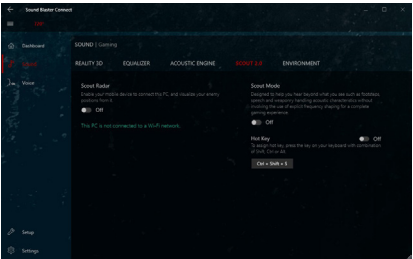
The screen shot of the Scout Radar app
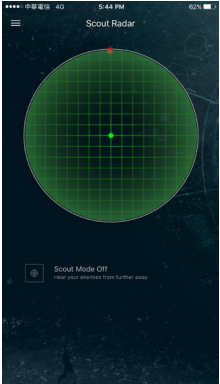
Please note the following when using the Scout Radar feature:
- The Scout Radar feature is not supported if you connect the output device to the Line out jack on the front panel.
- Download the Scout Radar app from App Store or Google Play and install it on your mobile device.
- Your mobile device and PC have to connect to the Internet via the same router.
- If you use a headphone as the audio output device, go to "Setup\Select Speaker Configuration" to select 4.0/5.1/7.1-channel and set **Enable headphone mode for your speaker output** to **On**.

- **Environment**
  State-of-the-art multi-environment rendering and reverb modeling offers a realistic and immersive 3D gaming experience to add more immersion to your listening experience.

Voice Settings:
Improve your voice quality and inject fun into your in-game chats, broadcasts to social media with voice enhancements.
- **Clarity**
  Powered by Crystal Voice,you can significantly reduce noise and feedback as you speak in real-time.
  Noise Reduction enables the speaker to be heard clearly over background noise
  Acoustic Echo Cancellation eliminates echoes and enables the speaker to listen to the other party clearly.
  Smart Volume automatically adjusts the loudness of the speaker's voice to maintain a consistent volume level.
  Voice Enhancer enhances the tone of your voice to suit your usage. Select a list of presets.
- **VOICE MORPH**
  Have fun changing your voice to different characters during game play,game casting or recordings. Select one of the many Voice Morph options to enhance your tone or create interesting accents and sound like a completely different person.
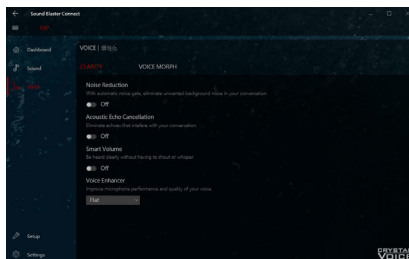
Setup:
For the best listening experience, you can optimize the audio output to work with your preferred audio device.
- **Speakers**
  Set the audio output according to your connected headphones/speakers.
- **Calibration**
  Sound Blaster Connect can help you calibrate your speakers to match the unique acoustics of your room, so you always get the best audio possible.
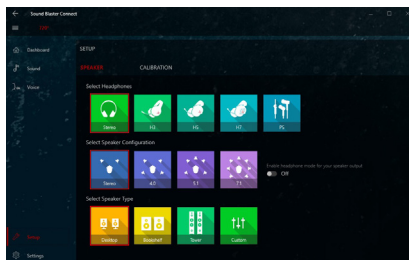
Settings:
Set application language and the distance measuring unit, or check for software updates (requires an Internet connection). Or revert all of the settings to the factory defaults.
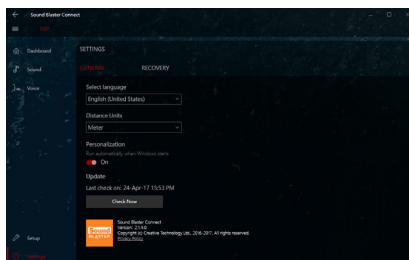
(Note)   For more information on Sound BlasterX 720°, please visit the CREATIVE® website.

6-3   Troubleshooting

6-3-1   Frequently Asked Questions
To read more FAQs for your motherboard, please go to the **Support\FAQ** page on GIGABYTE's website.

Q: Why is the light of my keyboard/optical mouse still on after the computer shuts down?
A: Some motherboards provide a small amount of standby power after the computer shuts down and that's why the light is still
    on.

Q: How do I clear the CMOS values?
A: For motherboards that have a Clear CMOS button, press this button to clear the CMOS values (before doing this, please
    turn off the computer and unplug the power cord). For motherboards that have a Clear CMOS jumper, refer to the instruc-
    tions in Chapter 1 to short the jumper to clear the CMOS values. If your board doesn't have this jumper/button, refer to the
    instructions on the motherboard battery in Chapter 1. You can temporarily remove the battery from the battery holder to stop
    supplying power to the CMOS, which will clear the CMOS values after about one minute.

Q: Why do I still get a weak sound even though I have turned my speaker to the maximum volume?
A: Make sure your speaker is equipped with an internal amplifier. If not, try a speaker with power/amplifier.

6-3-2   Troubleshooting Procedure

If you encounter any troubles during system startup, follow the troubleshooting procedure below to solve the problem.

```
                          ┌──────────┐
                          │  START   │
                          └──────────┘
                                │
                                ▼
        ┌──────────────────────────────────────────────────────┐
        │ Turn off the power. Remove all peripherals, connecting│
        │ cables, and power cord etc.                           │
        └──────────────────────────────────────────────────────┘
                                │
                                ▼
        ┌──────────────────────────────────────────────┐          ┌────────────────────────┐
        │ Make sure the motherboard does not short-     │   Yes    │ Isolate the short      │
        │ circuit with the chassis or other metal       │ ───────► │ circuit.               │
        │ objects.                                      │          └────────────────────────┘
        └──────────────────────────────────────────────┘
                         No                                The problem is verified and solved.
                                ▼
        ┌──────────────────────────────────────────────┐          ┌────────────────────────┐
        │ Check if the CPU cooler is attached to the    │   No     │ Secure the CPU cooler  │
        │ CPU securely. Is the power connector of the   │ ───────► │ on the CPU. Connect the│
        │ CPU cooler connected to the CPU_FAN header    │          │ CPU cooler power cable │
        │ properly?                                     │          │ to the motherboard.    │
        └──────────────────────────────────────────────┘          └────────────────────────┘
                        Yes                                 The problem is verified and solved.
                                ▼
        ┌──────────────────────────────────────────────┐          ┌────────────────────────┐
        │ Check if the memory is installed properly on  │   No     │ Correctly insert the   │
        │ the memory slot.                              │ ───────► │ memory into the memory │
        │                                               │          │ socket.                │
        └──────────────────────────────────────────────┘          └────────────────────────┘
                        Yes                                 The problem is verified and solved.
                                ▼
        ┌──────────────────────────────────────────────┐
        │ Insert the graphics card. Connect the ATX main│
        │ power cable and the 12V power cable. Turn on   │
        │ the power to start the computer.              │
        └──────────────────────────────────────────────┘
                                │
                 Make sure the graphics card is securely seated in the
                 expansion slot and power connectors are firmly attached.
                                ▼
                          ┌──────────┐
                          │    A     │
                          └──────────┘

                         (Continued...)
```

```
                              ( A )
                                │
                                ▼
┌─────────────────────────────────────────────────────────┐        ┌──────────────────────┐
│  When the computer is turned on, is the CPU cooler running? │─No─▶ │ The power supply, CPU or │
└─────────────────────────────────────────────────────────┘        │ CPU socket might fail.   │
                  Yes ◀─────────────────────────────┐              └──────────────────────┘
                   │          The problem is verified and solved.
                   ▼
┌─────────────────────────────────────────────────────────┐        ┌──────────────────────┐
│         Check if there is display on your monitor.          │─No─▶ │ The graphics card,      │
└─────────────────────────────────────────────────────────┘        │ expansion slot, or monitor │
                  Yes ◀─────────────────────────────┐              │ might fail.             │
                   │          The problem is verified and solved.   └──────────────────────┘
                   ▼
┌─────────────────────────────────────────────────────────┐
│ Turn off the computer. Plug in the keyboard and mouse and restart │
│ the computer.                                              │
└─────────────────────────────────────────────────────────┘
                   │
                   ▼
┌─────────────────────────────────────────────────────────┐        ┌──────────────────────┐
│        Check if the keyboard is working properly.           │─No─▶ │ The keyboard or keyboard │
└─────────────────────────────────────────────────────────┘        │ connector might fail.    │
                  Yes ◀─────────────────────────────┐              └──────────────────────┘
                   │          The problem is verified and solved.
                   ▼
┌─────────────────────────────────────────────────────────┐
│ Press <Delete> to enter BIOS Setup. Select "Load Optimized Defaults." │
│ Select "Save & Exit Setup" to save changes and exit BIOS Setup.  │
└─────────────────────────────────────────────────────────┘
                   │
                   ▼
┌─────────────────────────────────────────────────────────┐        ┌──────────────────────┐
│ Turn off the computer and connect the hard drive(s). Check if the system │─No─▶ │ The hard drive, connector, │
│ can boot successfully.                                     │        │ or cable might fail.     │
└─────────────────────────────────────────────────────────┘        └──────────────────────┘
                  Yes ◀─────────────────────────────┐
                   │          The problem is verified and solved.
                   ▼
┌─────────────────────────────────────────────────────────┐
│ Reinstall the operating system. Reinstall other devices one by one │
│ (install one device at one time and then boot the system to see if the │
│ device works successfully).                                │
└─────────────────────────────────────────────────────────┘
                   │
                   ▼
               ( END )
```

If the procedure above is unable to solve your problem, contact the place of purchase or local dealer for help. Or go to the **Support\Technical Support** page to submit your question. Our customer service staff will reply you as soon as possible.

6-4   Debug LED Codes

Regular Boot

Code	Description
10	PEI Core is started.
11	Pre-memory CPU initialization is started.
12~14	Reserved.
15	Pre-memory North-Bridge initialization is started.
16~18	Reserved.
19	Pre-memory South-Bridge initialization is started.
1A~2A	Reserved.
2B~2F	Memory initialization.
31	Memory installed.
32~36	CPU PEI initialization.
37~3A	IOH PEI initialization.
3B~3E	PCH PEI initialization.
3F~4F	Reserved.
60	DXE Core is started.
61	NVRAM initialization.
62	Installation of the PCH runtime services.
63~67	CPU DXE initialization is started.
68	PCI host bridge initialization is started.
69	IOH DXE initialization.
6A	IOH SMM initialization.
6B~6F	Reserved.
70	PCH DXE initialization.
71	PCH SMM initialization.
72	PCH devices initialization.
73~77	PCH DXE initialization (PCH module specific).
78	ACPI Core initialization.
79	CSM initialization is started.
7A~7F	Reserved for AMI use.
80~8F	Reserved for OEM use (OEM DXE initialization codes).
90	Phase transfer to BDS (Boot Device Selection) from DXE.
91	Issue event to connect drivers.

Code	Description
92	PCI Bus initialization is started.
93	PCI Bus hot plug initialization.
94	PCI Bus enumeration for detecting how many resources are requested.
95	Check PCI device requested resources.
96	Assign PCI device resources.
97	Console Output devices connect (ex. Monitor is lighted).
98	Console input devices connect (ex. PS2/USB keyboard/mouse are activated).
99	Super IO initialization.
9A	USB initialization is started.
9B	Issue reset during USB initialization process.
9C	Detect and install all currently connected USB devices.
9D	Activated all currently connected USB devices.
9E~9F	Reserved.
A0	IDE initialization is started.
A1	Issue reset during IDE initialization process.
A2	Detect and install all currently connected IDE devices.
A3	Activated all currently connected IDE devices.
A4	SCSI initialization is started.
A5	Issue reset during SCSI initialization process.
A6	Detect and install all currently connected SCSI devices.
A7	Activated all currently connected SCSI devices.
A8	Verify password if needed.
A9	BIOS Setup is started.
AA	Reserved.
AB	Wait user command in BIOS Setup.
AC	Reserved.
AD	Issue Ready To Boot event for OS Boot.
AE	Boot to Legacy OS.
AF	Exit Boot Services.
B0	Runtime AP installation begins.
B1	Runtime AP installation ends.
B2	Legacy Option ROM initialization.
B3	System reset if needed.

Code	Description
B4	USB device hot plug-in.
B5	PCI device hot plug.
B6	Clean-up of NVRAM.
B7	Reconfigure NVRAM settings.
B8~BF	Reserved.
C0~CF	Reserved.

S3 Resume

Code	Description
E0	S3 Resume is started (called from DXE IPL).
E1	Fill boot script data for S3 resume.
E2	Initializes VGA for S3 resume.
E3	OS S3 wake vector call.

Recovery

Code	Description
F0	Recovery mode will be triggered due to invalid firmware volume detection.
F1	Recovery mode will be triggered by user decision.
F2	Recovery is started.
F3	Recovery firmware image is found.
F4	Recovery firmware image is loaded.
F5~F7	Reserved for future AMI progress codes.

Error

Code	Description
50~55	Memory initialization error occurs.
56	Invalid CPU type or speed.
57	CPU mismatch.
58	CPU self test failed or possible CPU cache error.
59	CPU micro-code is not found or micro-code update is failed.
5A	Internal CPU error.
5B	Reset PPI is failed.
5C~5F	Reserved.
D0	CPU initialization error.
D1	IOH initialization error.

Code	Description
D2	PCH initialization error.
D3	Some of the Architectural Protocols are not available.
D4	PCI resource allocation error. Out of Resources.
D5	No Space for Legacy Option ROM initialization.
D6	No Console Output Devices are found.
D7	No Console Input Devices are found.
D8	It is an invalid password.
D9~DA	Can't load Boot Option.
DB	Flash update is failed.
DC	Reset protocol is failed.
DE~DF	Reserved.
E8	S3 resume is failed.
E9	S3 Resume PPI is not found.
EA	S3 Resume Boot Script is invalid.
EB	S3 OS Wake call is failed.
EC~EF	Reserved.
F8	Recovery PPI is invalid.
F9	Recovery capsule is not found.
FA	Invalid recovery capsule.
FB~FF	Reserved.

Regulatory Statements

Regulatory Notices
This document must not be copied without our written permission, and the contents there of must not be imparted to a third party nor be used for any unauthorized purpose. Contravention will be prosecuted. We believe that the information contained herein was accurate in all respects at the time of printing. GIGABYTE cannot, however, assume any responsibility for errors or omissions in this text. Also note that the information in this document is subject to change without notice and should not be construed as a commitment by GIGABYTE.

Our Commitment to Preserving the Environment
In addition to high-efficiency performance, all GIGABYTE motherboards fulfill European Union regulations for RoHS (Restriction of Certain Hazardous Substances in Electrical and Electronic Equipment) and WEEE (Waste Electrical and Electronic Equipment) environmental directives, as well as most major worldwide safety requirements. To prevent releases of harmful substances into the environment and to maximize the use of our natural resources, GIGABYTE provides the following information on how you can responsibly recycle or reuse most of the materials in your "end of life" product.

Restriction of Hazardous Substances (RoHS) Directive Statement
GIGABYTE products have not intended to add and safe from hazardous substances (Cd, Pb, Hg, Cr+6, PBDE and PBB). The parts and components have been carefully selected to meet RoHS requirement. Moreover, we at GIGABYTE are continuing our efforts to develop products that do not use internationally banned toxic chemicals.

Waste Electrical & Electronic Equipment (WEEE) Directive Statement
GIGABYTE will fulfill the national laws as interpreted from the 2002/96/EC WEEE (Waste Electrical and Electronic Equipment) directive. The WEEE Directive specifies the treatment, collection, recycling and disposal of electric and electronic devices and their components. Under the Directive, used equipment must be marked, collected separately, and disposed of properly.

WEEE Symbol Statement
The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, the device should be taken to the waste collection centers for activation of the treatment, collection, recycling and disposal procedure. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local government office, your household waste disposal service or where you purchased the product for details of environmentally safe recycling.
- When your electrical or electronic equipment is no longer useful to you, "take it back" to your local or regional waste collection administration for recycling.
- If you need further assistance in recycling, reusing in your "end of life" product, you may contact us at the Customer Care number listed in your product's user's manual and we will be glad to help you with your effort.

Finally, we suggest that you practice other environmentally friendly actions by understanding and using the energy-saving features of this product (where applicable), recycling the inner and outer packaging (including shipping containers) this product was delivered in, and by disposing of or recycling used batteries properly. With your help, we can reduce the amount of natural resources needed to produce electrical and electronic equipment, minimize the use of landfills for the disposal of "end of life" products, and generally improve our quality of life by ensuring that potentially hazardous substances are not released into the environment and are disposed of properly.

FCC Notice (U.S.A. Only)

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. WARNING: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates and radiates radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- • Reorient or relocate the receiving antenna.
- • Increase the separation between the equipment and receiver.
- • Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- • Consult a dealer or experienced TV/radio technician for help.

The user may find the following booklet prepared by the Federal Communications Commission helpful:

The Interference Handbook.

This booklet is available from the U.S. Government Printing Office, Washington, D.C.20402. Stock No.004-000-00345-4

Notice for 5GHz

Operations in the 5.15-5.25GHz band are restricted to indoor usage only. (For 5GHz only)

RF exposure statement

The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

<div style="border: 1px solid red; text-align: center;">

CAUTION:

The manufacturer is not responsible for any interference caused by unauthorized modifications and/or use of unauthorized antennas.
Such changes and/or modifications not expressly approved by the party responsible for compliance of this device could void the user's authority to operate the equipment.

</div>

Canada-Industry Canada (IC):

This device complies with Canadian RSS-210.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) this device may not cause interference, and

(2) this device must accept any interference, including interference that may cause undesired operation of the device.

Ce dispositif est conforme à la norme CNR-210 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes:

(1) le dispositif ne doit pas produire de brouillage préjudiciable, et

(2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Notice for 5GHz:

Caution :

(i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;

(ii) the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall comply with the e.i.r.p. limit; and

(iii) the maximum antenna gain permitted for devices in the band 5725-5825 MHz shall comply with the e.i.r.p. limits specified for point-to-point and non point-to-point operation as appropriate.

(iv) Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

Avertissement:

Le guide d'utilisation des dispositifs pour réseaux locaux doit inclure des instructions précises sur les restrictions susmentionnées, notamment :

(i) les dispositifs fonctionnant dans la bande 5 150-5 250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

(ii) le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5 250-5 350 MHz et 5 470-5 725 MHz doit se conformer à la limite de p.i.r.e.;

(iii) le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5 725-5 825 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

(iv) De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5 250-5 350 MHz et 5 650-5 850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

Radiation Exposure Statement:

The product comply with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

European Community Radio Equipment Directive (RED) Compliance Statement:

This equipment complies with all the requirements and other relevant provisions of Radio Equipment Directive 2014/53/EU.

This equipment is suitable for home and office use in all the European Community Member States and EFTA Member States.

The low band 5.15 -5.35 GHz is for indoor use only.

Restrictions d'utilisation en France:

Pour la France métropolitaine

2.400 - 2.4835 GHz (Canaux 1à 13) autorisé en usage intérieur

2.400 - 2.454 GHz (canaux 1 à 7) autorisé en usage extérieur

Pour la Guyane et la Réunion

2.400 - 2.4835 GHz (Canaux 1à 13) autorisé en usage intérieur

2.420 - 2.4835 GHz (canaux 5 à 13) autorisé en usage extérieur

Notice for Italy:

The use of these equipments is regulated by:

1. D.L.gs 1.8.2003, n. 259, article 104 (activity subject to general authorization) for outdoor use and article 105 (free use) for indoor use, in both cases for private use.

2. D.M. 28.5.03, for supply to public of RLAN access to networks and telecom services. L'uso degli apparati è regolamentato da:

1. D.L.gs 1.8.2003, n. 259, articoli 104 (attività soggette ad autorizzazione generale) se utilizzati al di fuori del proprio fondo e 105 (libero uso) se utilizzati entro il proprio fondo, in entrambi i casi per uso private.

2. D.M. 28.5.03, per la fornitura al pubblico dell'accesso R-LAN alle reti e ai servizi di telecomunicazioni.

Taiwan NCC Wireless Statements / 無線設備警告聲明:

<div align="center">低功率電波輻射性電機管理辦法</div>

第十二條: 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條: 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

在5.25-5.35秭赫頻帶內操作之無線資訊傳輸設備，限於室內使用。

Korea KCC NCC Wireless Statement:

5,25 GHz - 5,35 GHz 대역을 사용하는 무선 장치는 실내에서만 사용하도록 제한됩니다。

Japan Wireless Statement:

5.15GHz帯 ~ 5.35GHz帯: 屋内のみの使用。

Contact Us

- **GIGA-BYTE TECHNOLOGY CO., LTD.**

Address: No.6, Baoqiang Rd., Xindian Dist.,

New Taipei City 231, Taiwan

TEL: +886-2-8912-4000

FAX: +886-2-8912-4005

Tech. and Non-Tech. Support (Sales/Marketing) :

http://esupport.gigabyte.com

WEB address (English): http://www.gigabyte.com

WEB address (Chinese): http://www.gigabyte.tw

- **G.B.T. INC. - U.S.A.**

TEL: +1-626-854-9338

FAX: +1-626-854-9326

Tech. Support: http://esupport.gigabyte.com

Warranty Info: http://rma.gigabyte.us

Web address: http://www.gigabyte.us

- **G.B.T. INC (USA) - Mexico**

Tel: +1-626-854-9338 x 215 (Soporte de habla hispano)

FAX: +1-626-854-9326

Correo: soporte@gigabyte-usa.com

Tech. Support: http://rma.gigabyte.us

Web address: http://latam.giga-byte.com

- **Giga-Byte SINGAPORE PTE. LTD. - Singapore**

WEB address : http://www.gigabyte.sg

- **Thailand**

WEB address : http://th.giga-byte.com

- **Vietnam**

WEB address : http://www.gigabyte.vn

- **NINGBO G.B.T. TECH. TRADING CO., LTD. - China**

WEB address : http://www.gigabyte.cn

Shanghai

TEL: +86-21-63400912

FAX: +86-21-63400682

Beijing

TEL: +86-10-62102838

FAX: +86-10-62102848

Wuhan

TEL: +86-27-87685981

FAX: +86-27-87579461

GuangZhou

TEL: +86-20-87540700

FAX: +86-20-87544306

Chengdu

TEL: +86-28-85483135

FAX: +86-28-85256822

Xian

TEL: +86-29-85531943

FAX: +86-29-85510930

Shenyang

TEL: +86-24-83992342

FAX: +86-24-83992102

- **GIGABYTE TECHNOLOGY (INDIA) LIMITED - India**

WEB address : http://www.gigabyte.in

- **Saudi Arabia**

WEB address : http://www.gigabyte.com.sa

- **Gigabyte Technology Pty. Ltd. - Australia**

WEB address : http://www.gigabyte.com.au

- **G.B.T. TECHNOLOGY TRADING GMBH - Germany**
WEB address : http://www.gigabyte.de
- **G.B.T. TECH. CO., LTD. - U.K.**
WEB address : http://www.giga-byte.co.uk
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WEB address : http://www.gigabyte.kz

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