

GA-X170-Extreme ECC

User's Manual

Rev. 1001

12ME-X170EEC-1001R



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.

Declaration of Conformity

We, Manufacturer/Importer,

G.B.T. Technology Trading GmbH

Address: Bullenkoppel 16, 22047 Hamburg, Germany

Declare that the product

Product Type: **Motherboard**

Product Name: **GA-X170-Extreme ECC**

conforms with the essential requirements of the following directives:

- EMC Directive 2004/108/EC (until 2016/04/19), 2014/530/EU (after 2016/04/20):**
 - Conduction & Radiated Emissions: EN 55022:2010/AC2011
 - Immunity: EN 55024:2010
 - Power-line harmonics: EN 61000-3-2:2006+A2:2009
 - Power-line flicker: EN 61000-3-3:2013

- Low Voltage Directive 2006/95/EC (until 2016/04/19), 2014/35/EU (after 2016/04/20):**
 - Safety: EN60950-1:2006+A11:2009+A12:2011+A2:2013

- RoHS Directive 2011/65/EU**

Restriction of use of certain substances in electronic equipment: This product does not contain any of the restricted substances listed in Annex II, in concentrations and applications banned by the directive.

- CE marking**



Signature: Timmy Huang

(Name)

Date: Feb. 16, 2016

Name:

Timmy Huang

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2.1077(a)



Responsible Party Name: **G.B.T. INC. (U.S.A)**

Address: **17358 Railroad Street**

City of Industry, CA 91748

Phone/Fax No: (626) 854-9338/ (626) 854-9326

hereby declares that the product

Product Name: Motherboard

Model Number: GA-X170-Extreme ECC

Conforms to the following specifications:

FCC Part 15, Subpart B, Section 15.107(a) and Section 15.109

(a), Class B Digital Device

Supplementary Information:

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

Representative Person's Name: ERIC LU

Signature: Eric Lu

Date: Feb. 16, 2016

Copyright

© 2016 GIGA-BYTE TECHNOLOGY CO., LTD. All rights reserved.

The trademarks mentioned in this manual are legally registered to their respective owners.

Disclaimer

Information in this manual is protected by copyright laws and is the property of GIGABYTE. Changes to the specifications and features in this manual may be made by GIGABYTE without prior notice.

No part of this manual may be reproduced, copied, translated, transmitted, or published in any form or by any means without GIGABYTE's prior written permission.

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:

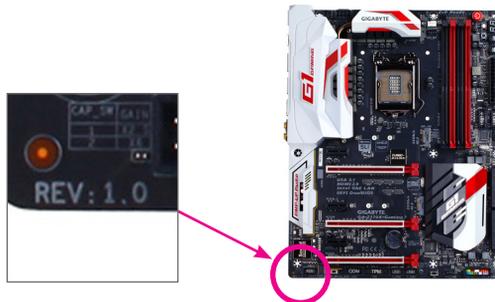


Table of Contents

Box Contents	6
Optional Items	6
GA-X170-Extreme ECC Motherboard Layout	7
Chapter 1 Hardware Installation	9
1-1 Installation Precautions	9
1-2 Product Specifications	10
1-3 Installing the CPU and CPU Cooler	13
1-3-1 Installing the CPU	13
1-3-2 Installing the CPU Cooler	15
1-4 Installing the Memory	16
1-4-1 Dual Channel Memory Configuration	16
1-4-2 Installing a Memory	17
1-5 Installing an Expansion Card	18
1-6 Setting up AMD CrossFire™/NVIDIA® SLI™ Configuration	19
1-7 Back Panel Connectors	20
1-8 Onboard Buttons and Switches	22
1-9 Changing the Operational Amplifier	24
1-10 Internal Connectors	25
Chapter 2 BIOS Setup	37
2-1 Startup Screen	38
2-2 The Main Menu	39
2-3 M.I.T.	40
2-4 System Information	53
2-5 BIOS Features	54
2-6 Peripherals	57
2-7 Chipset	60
2-8 Power Management	61
2-9 Save & Exit	63
Chapter 3 Configuring a RAID Set	65
3-1 Configuring SATA Controllers	65
3-2 Installing the SATA RAID/AHCI Driver and Operating System	75

Chapter 4 Drivers Installation.....	79
4-1 Drivers & Software	79
4-2 Application Software	80
4-3 Information	80
Chapter 5 Unique Features.....	81
5-1 BIOS Update Utilities	81
5-1-1 Updating the BIOS with the Q-Flash Utility.....	81
5-1-2 Updating the BIOS with the @BIOS Utility	84
5-2 Smart Switch	85
Chapter 6 Appendix.....	87
6-1 Killer Network Manager.....	87
6-2 Configuring Audio Input and Output	88
6-2-1 Configuring 2/5.1-Channel Audio.....	88
6-2-2 Creative Software Suite.....	88
6-2-3 Configuring S/PDIF Out.....	92
6-2-4 Configuring Audio Recording	93
6-2-5 Using the Sound Recorder	95
6-3 Troubleshooting.....	96
6-3-1 Frequently Asked Questions	96
6-3-2 Troubleshooting Procedure	97
6-4 Debug LED Codes	99
 Regulatory Statements.....	 103
Contact Us	107

Box Contents

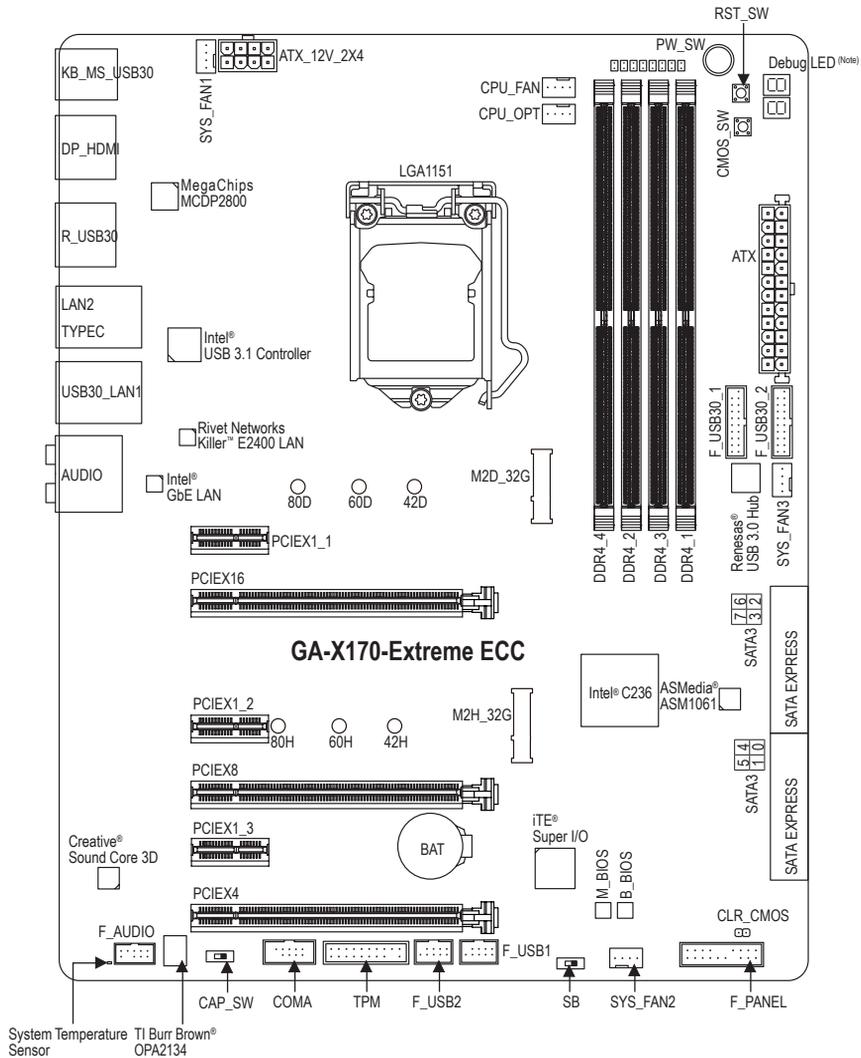
- GA-X170-Extreme ECC motherboard
- Motherboard driver disk
- User's Manual
- Quick Installation Guide
- Four SATA cables
- I/O Shield
- One 2-Way SLI bridge connector
- One G Connector
- One pack of back I/O dust covers
- Two velcro cable ties
- One hard drive cable label
- One door hanger

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 3.0/2.0 ports (Part No. 12CR1-FPX582-2*R)
- HDMI-to-DVI adapter (Part No. 12CT2-HDMI01-1*R)
- COM port cable (Part No. 12CF1-1CM001-3*R)

GA-X170-Extreme ECC 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	<ul style="list-style-type: none"> ◆ Support for Intel® Xeon® E3-1200 v5 processors/Intel® Core™ i3 processors/Intel® Pentium® processors/Intel® Celeron® processors in the LGA1151 package (Go to GIGABYTE's website for the latest CPU support list.) ◆ L3 cache varies with CPU
	Chipset	<ul style="list-style-type: none"> ◆ Intel® C236 Chipset
	Memory	<ul style="list-style-type: none"> ◆ 4 x DDR4 DIMM sockets supporting up to 64 GB of system memory <ul style="list-style-type: none"> * Due to a Windows 32-bit operating system limitation, when more than 4 GB of physical memory is installed, the actual memory size displayed will be less than the size of the physical memory installed. ◆ Dual channel memory architecture ◆ Support for DDR4 2133 MHz memory modules ◆ Support for ECC UDIMM 1Rx8/2Rx8 memory modules <ul style="list-style-type: none"> * To support ECC, you must install an Intel® Xeon processor. ◆ Support for non-ECC UDIMM 1Rx8/2Rx8/1Rx16 memory modules (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
	Onboard Graphics	<ul style="list-style-type: none"> ◆ Integrated Graphics Processor-Intel® HD Graphics support: <ul style="list-style-type: none"> - 1 x DisplayPort, supporting a maximum resolution of 4096x2304@60 Hz <ul style="list-style-type: none"> * Support for DisplayPort 1.2 version. ◆ Integrated Graphics Processor-MegaChips MCDP2800 chip: <ul style="list-style-type: none"> - 1 x HDMI port, supporting a maximum resolution of 4096x2160@60 Hz <ul style="list-style-type: none"> * Support for HDMI 2.0 version. (Requires the latest Intel® graphics driver from the GIGABYTE website.) ◆ Maximum shared memory of 512 MB
	Audio	<ul style="list-style-type: none"> ◆ Creative® Sound Core 3D chip ◆ Support for Sound Blaster Recon3Di ◆ TI Burr Brown® OPA2134 operational amplifier ◆ High Definition Audio ◆ 2/5.1-channel ◆ Support for S/PDIF Out
	LAN	<ul style="list-style-type: none"> ◆ 1 x Intel® GbE LAN chip (10/100/1000 Mbit)(LAN1) ◆ 1 x Rivet Networks Killer™ E2400 chip (10/100/1000 Mbit) (LAN2) <ul style="list-style-type: none"> * Teaming is not supported.
	Expansion Slots	<ul style="list-style-type: none"> ◆ 1 x PCI Express x16 slot, running at x16 (PCIEX16) <ul style="list-style-type: none"> * For optimum performance, if only one PCI Express graphics card is to be installed, be sure to install it in the PCIEX16 slot. ◆ 1 x PCI Express x16 slot, running at x8 (PCIEX8) <ul style="list-style-type: none"> * The PCIEX8 slot shares bandwidth with the PCIEX16 slot. When the PCIEX8 slot is populated, the PCIEX16 slot will operate at up to x8 mode. ◆ 1 x PCI Express x16 slot, running at x4 (PCIEX4) <ul style="list-style-type: none"> * The PCIEX4 slot shares bandwidth with the M2H_32G connector. The PCIEX4 slot will become unavailable when an SSD is installed in the M2H_32G connector. ◆ 3 x PCI Express x1 slots (All of the PCI Express slots conform to PCI Express 3.0 standard.)
	Multi-Graphics Technology	<ul style="list-style-type: none"> ◆ Support for 3-Way/2-Way AMD CrossFire™ and 2-Way NVIDIA® SLI™ Technology

 Storage Interface	<ul style="list-style-type: none"> ◆ Chipset: <ul style="list-style-type: none"> - 2 x M.2 connectors (Socket 3, M key, type 2242/2260/2280 SATA and PCIe x4/x2/x1 SSD support) <ul style="list-style-type: none"> * If the iRSTe Support item in BIOS Setup is set to Enabled, the RAID function will become unavailable when an M.2 PCIe SSD is installed. (Refer to Chapter 2, "BIOS Setup," "Peripherals," for more information.) - 3 x SATA Express connectors - 6 x SATA 6Gb/s connectors (SATA3 0~5) - Support for RAID 0, RAID 1, RAID 5, and RAID 10 <ul style="list-style-type: none"> * Refer to "1-10 Internal Connectors," for the supported configurations with the M.2, SATA Express, and SATA connectors. ◆ ASMedia® ASM1061 chip: <ul style="list-style-type: none"> - 2 x SATA 6Gb/s connectors (SATA3 6~7), supporting AHCI mode only
 USB	<ul style="list-style-type: none"> ◆ Chipset: <ul style="list-style-type: none"> - 5 x USB 3.0/2.0 ports on the back panel - 4 x USB 2.0/1.1 ports (available through the internal USB headers) ◆ Chipset+Renesas® USB 3.0 Hub: <ul style="list-style-type: none"> - 4 x USB 3.0/2.0 ports (available through the internal USB headers) ◆ Chipset+Intel® USB 3.1 Controller: <ul style="list-style-type: none"> - 1 x USB Type-C™ port on the back panel, with USB 3.1 support - 1 x USB 3.1 Type-A port (red) on the back panel
 Internal Connectors	<ul style="list-style-type: none"> ◆ 1 x 24-pin ATX main power connector ◆ 1 x 8-pin ATX 12V power connector ◆ 2 x M.2 Socket 3 connectors ◆ 3 x SATA Express connectors ◆ 8 x SATA 6Gb/s connectors ◆ 1 x CPU fan header ◆ 1 x water cooling fan header (CPU_OPT) ◆ 3 x system fan headers ◆ 1 x front panel header ◆ 1 x front panel audio header ◆ 2 x USB 3.0/2.0 headers ◆ 2 x USB 2.0/1.1 headers ◆ 1 x Trusted Platform Module (TPM) header ◆ 1 x serial port header ◆ 1 x Clear CMOS jumper ◆ 1 x power button ◆ 1 x reset button ◆ 1 x Clear CMOS button ◆ 1 x audio gain control switch ◆ Voltage Measurement Points ◆ 1 x BIOS switch

 Back Panel Connectors	<ul style="list-style-type: none"> ◆ 1 x PS/2 keyboard/mouse port ◆ 1 x DisplayPort ◆ 1 x HDMI port ◆ 1 x USB Type-C™ port, with USB 3.1 support ◆ 1 x USB 3.1 Type-A port (red) ◆ 5 x USB 3.0/2.0 ports ◆ 2 x RJ-45 ports ◆ 1 x optical S/PDIF Out connector ◆ 5 x audio jacks (Center/Subwoofer Speaker Out, Rear Speaker Out, Line In/Mic In, Line Out, Headphone)
 I/O Controller	<ul style="list-style-type: none"> ◆ iTE® I/O Controller Chip
 Hardware Monitor	<ul style="list-style-type: none"> ◆ System voltage detection ◆ CPU/System/Chipset temperature detection ◆ CPU/CPU OPT/System fan speed detection ◆ CPU/System/Chipset overheating warning ◆ CPU/CPU OPT/System fan fail warning ◆ CPU/CPU OPT/System fan speed control <ul style="list-style-type: none"> * Whether the fan speed control function is supported will depend on the cooler you install.
 BIOS	<ul style="list-style-type: none"> ◆ 2 x 128 Mbit flash ◆ Use of licensed AMI UEFI BIOS ◆ Support for DualBIOS™ ◆ PnP 1.0a, DMI 2.7, WfM 2.0, SM BIOS 2.7, ACPI 5.0
 Unique Features	<ul style="list-style-type: none"> ◆ Support for APP Center <ul style="list-style-type: none"> * Available applications in APP Center may vary by motherboard model. Supported functions of each application may also vary depending on motherboard specifications. - @BIOS - ON/OFF Charge ◆ Support for Q-Flash ◆ Support for Smart Switch ◆ Support for Xpress Install
 Bundled Software	<ul style="list-style-type: none"> ◆ Norton® Internet Security (OEM version) ◆ Intel® Smart Response Technology (Only for iRST mode)
 Operating System	<ul style="list-style-type: none"> ◆ Support for Windows 10/8.1 64-bit ◆ Support for Windows 7 32-bit/64-bit <ul style="list-style-type: none"> * Please download the "Windows USB Installation Tool" from GIGABYTE's website and install it before installing Windows 7.
 Form Factor	<ul style="list-style-type: none"> ◆ ATX Form Factor; 30.5cm x 24.4cm

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



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



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

1-3 Installing the CPU and CPU Cooler

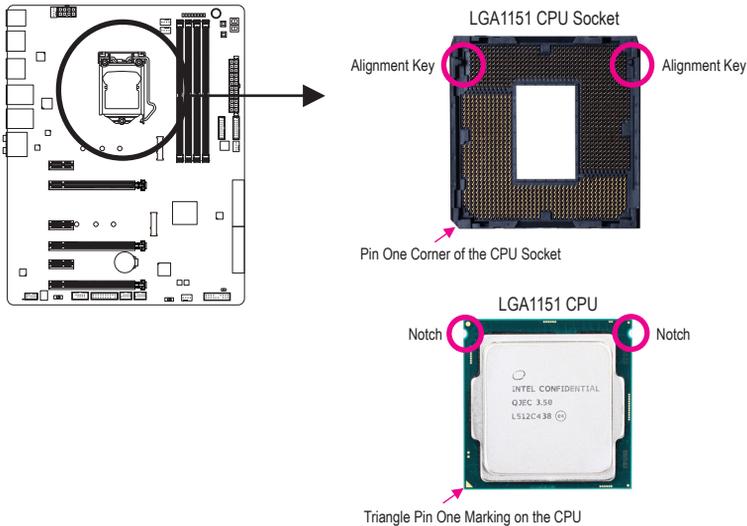


Read the following guidelines before you begin to install the CPU:

- 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.
- Locate the pin one of the CPU. The CPU cannot be inserted if oriented incorrectly. (Or you may locate the notches on both sides of the CPU and alignment keys on the CPU socket.)
- 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

A. Locate the alignment keys on the motherboard CPU socket and the notches on the CPU.

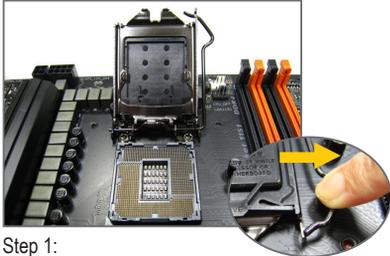


Please visit GIGABYTE's website for details on hardware installation.

B. 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 protective plastic cover unless the CPU is inserted into the CPU socket. Save the cover properly and replace it if the CPU is removed.



Step 1:
Gently press the CPU socket lever handle down and away from the socket with your finger. Then completely lift the CPU socket lever and the metal load plate/plastic cover will be lifted as well.



Step 2:
Hold the CPU with your thumb and index fingers. Align the CPU pin one marking (triangle) with the pin one corner of the CPU socket (or you may align the CPU notches with the socket alignment keys) and gently insert the CPU into position.



Step 3:
Once the CPU is properly inserted, carefully replace the load plate. When replacing the load plate, make sure the front end of the load plate is under the shoulder screw. Then press the CPU socket lever. The protective plastic cover may pop off from the load plate during the process of engaging the lever. Remove the cover. (Save the cover properly and always replace it when the CPU is not installed.)



Step 4:
Finally, secure the lever under its retention tab to complete the installation of the CPU.



NOTE:

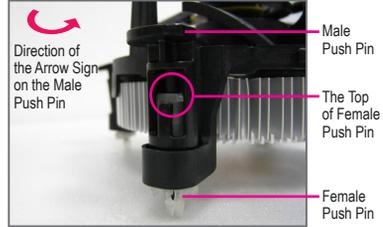
Hold the CPU socket lever by the handle, not the lever base portion.

1-3-2 Installing the CPU Cooler

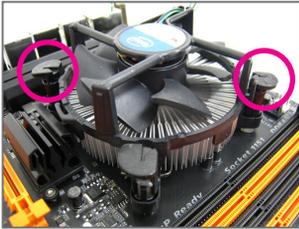
Refer to the steps below to correctly install the CPU cooler on the motherboard. (Actual installation process may differ depending on the CPU cooler to be used. Refer to the user's manual for your CPU cooler.)



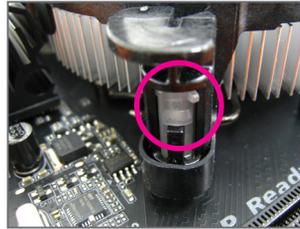
Step 1:
Apply an even and thin layer of thermal grease on the surface of the installed CPU.



Step 2:
Before installing the cooler, note the direction of the arrow sign ↻ on the male push pin. (Turning the push pin along the direction of arrow is to remove the cooler, on the contrary, is to install.)



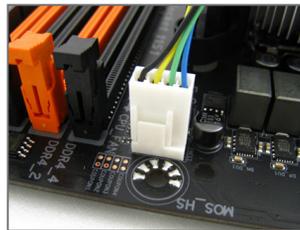
Step 3:
Place the cooler atop the CPU, aligning the four push pins through the pin holes on the motherboard. Push down on the push pins diagonally.



Step 4:
You should hear a "click" when pushing down each push pin. Check that the Male and Female push pins are joined closely. (Refer to your CPU cooler installation manual for instructions on installing the cooler.)



Step 5:
After the installation, check the back of the motherboard. If the push pin is inserted as the picture above shows, the installation is complete.



Step 6:
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.

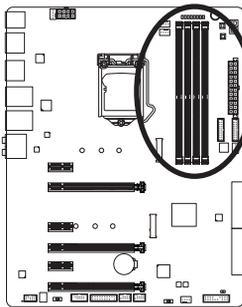
1-4-1 Dual Channel Memory Configuration

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

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

▶▶ Channel A: DDR4_2, DDR4_4

▶▶ Channel B: DDR4_1, DDR4_3



▶▶ Dual Channel Memory Configurations Table

	DDR4_4	DDR4_2	DDR4_3	DDR4_1
2 Modules	--	DS/SS	--	DS/SS
	DS/SS	--	DS/SS	--
4 Modules	DS/SS	DS/SS	DS/SS	DS/SS

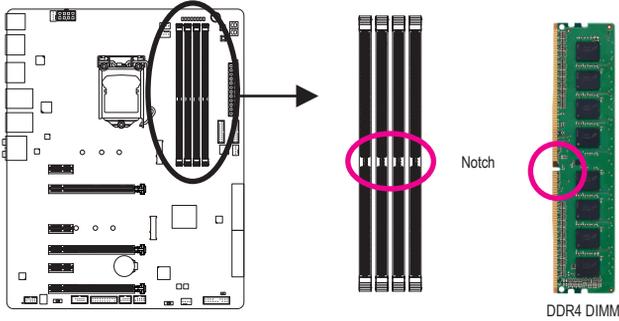
(SS=Single-Sided, DS=Double-Sided, "--"=No Memory)

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

1. Dual Channel mode cannot be enabled if only one memory module is installed.
2. When enabling Dual Channel mode with two or four memory modules, it is recommended that memory of the same capacity, brand, speed, and chips be used and installed in the same colored sockets.

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.



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.



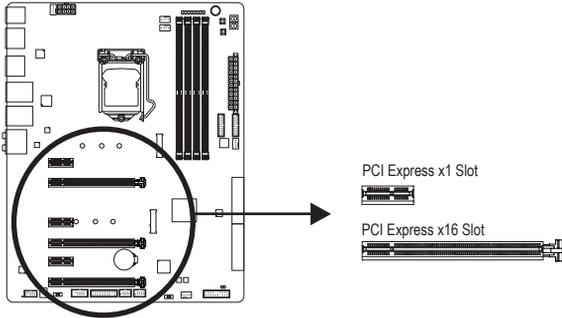
Step 2:
The clip at the right end of the socket will snap into place when the memory module is securely inserted.

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.



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 10/8.1/7 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
(Current GPUs that support 3-Way CrossFire technology include the ATI Radeon™ HD 3800, HD 4800, HD 5800 series, and AMD Radeon™ HD 6800, HD 6900, HD 7800, and HD 7900 series. For the latest GPU support information, please refer to the AMD website.)
- CrossFire^(Note)/SLI bridge connectors
- A power supply with sufficient power is recommended (Refer to the manual of your graphics cards for the power requirement)

B. Connecting the Graphics Cards

Step 1:

Observe the steps in "1-5 Installing an Expansion Card" and install CrossFire/SLI graphics cards on the PCI Express x16 slots.

Step 2:

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

Step 3:

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

C. Configuring the Graphics Card Driver

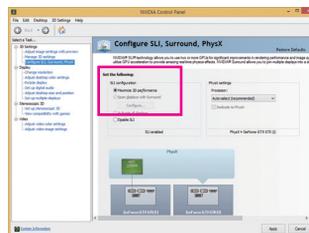
C-1. To Enable CrossFire Function

After installing the graphics card driver in the operating system, go to the **AMD Catalyst Control Center**. Browse to **Performance/AMD CrossFire™** and ensure the **Enable AMD CrossFireX** check box is selected. If your system has more than two CrossFire cards, select the GPU combination you want to use and click **Apply**. (Available combination options are dependent on the number of graphics cards.)



C-2. To Enable SLI Function

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

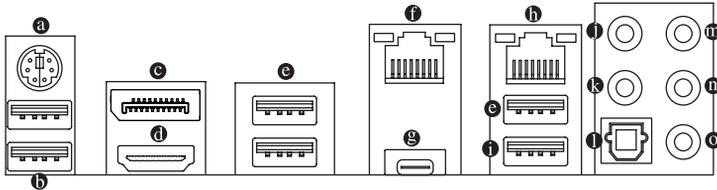


(Note) The bridge connector(s) may be needed or not depending on your graphics cards.



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

1-7 Back Panel Connectors



a PS/2 Keyboard/Mouse Port

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

b USB 3.0/2.0 Port

The USB 3.0 port supports the USB 3.0 specification and is compatible to the USB 2.0/1.1 specification. You can connect a USB DAC to this port or use this port for USB devices.

c DisplayPort

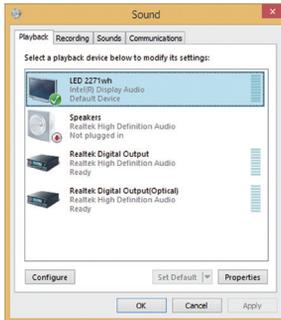
DisplayPort delivers high quality digital imaging and audio, supporting bi-directional audio transmission. DisplayPort can support both DPCP and HDCP content protection mechanisms. You can use this port to connect your DisplayPort-supported monitor. The maximum supported resolution is 4096x2304@60 Hz, but the actual resolutions supported are dependent on the monitor being used.

d HDMI Port

HDMI™ The HDMI port is HDCP compliant and supports Dolby True HD and DTS HD Master Audio formats. It also supports up to 192 KHz/16bit 8-channel LPCM audio output. You can use this port to connect your HDMI-supported monitor. The maximum supported resolution is 4096x2160@60 Hz, but the actual resolutions supported are dependent on the monitor being used.



After installing the HDMI/DisplayPort device, make sure to set the default sound playback device to HDMI/DisplayPort. (The item name may differ depending on your operating system.)



In Windows 8.1, select Apps>Control Panel>Hardware and Sound>Sound>Playback, set Intel(R) Display Audio to the default playback device.

e USB 3.0/2.0 Port

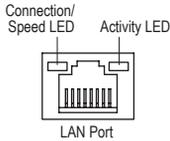
The USB 3.0 port supports the USB 3.0 specification and is compatible to the USB 2.0/1.1 specification. Use this port for USB devices.



- 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.

❶ RJ-45 LAN Port (LAN2)

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.



State	Description
Orange	1 Gbps data rate
Green	100 Mbps data rate
Off	10 Mbps data rate

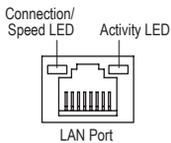
State	Description
Blinking	Data transmission or receiving is occurring
Off	No data transmission or receiving is occurring

❷ USB Type-C™ Port

The reversible USB port supports the USB 3.1 specification and is compatible to the USB 3.0/2.0 specification. Use this port for USB devices.

❸ RJ-45 LAN Port (LAN1)

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



Connection/Speed LED:

State	Description
Orange	1 Gbps data rate
Green	100 Mbps data rate
Off	10 Mbps data rate

Activity LED:

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

❹ USB 3.1 Type-A Port (Red)

The USB 3.1 Type-A port supports the USB 3.1 specification and is compatible to the USB 3.0/2.0/1.1 specification. Use this port for USB devices.

❺ Line In/Mic In

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

❻ Line Out

The line out jack. Use this audio jack for a 2-channel speaker. This jack can be used to connect front speakers in a 5.1-channel audio configuration.

❼ 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.

❽ Center/Subwoofer Speaker Out

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

❾ Rear Speaker Out

Use this audio jack to connect rear speakers in a 5.1-channel audio configuration.

❿ Headphone

This audio output jack supports audio amplifying function. For better sound quality, it is recommended that you connect your headphone to this jack.

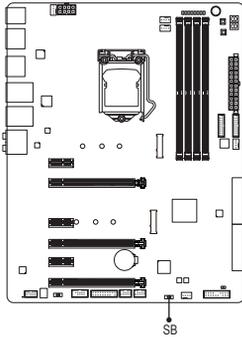


Refer to the instructions on setting up a 2/5.1-channel audio configuration in Chapter 6, "Configuring 2/5.1-Channel Audio."

1-8 Onboard Buttons and Switches

BIOS Switch

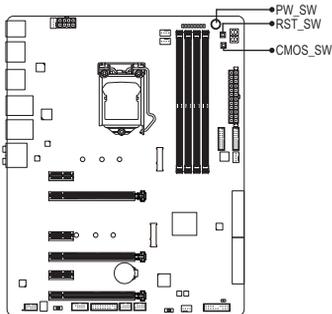
The SB switch allows enabling or disabling of the Dual BIOS function.



-  1: Dual BIOS
-  2: Single BIOS

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.



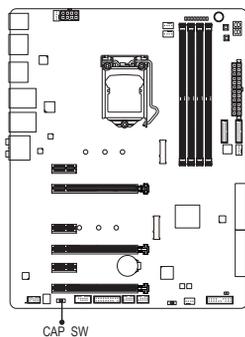
- PW_SW:** Power Button
- RST_SW:** Reset Button
- CMOS_SW:** Clear CMOS Button



- Always turn off your computer and unplug the power cord from the power outlet before clearing the CMOS values.
- **NOTE:** 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).

Audio Gain Control Switch

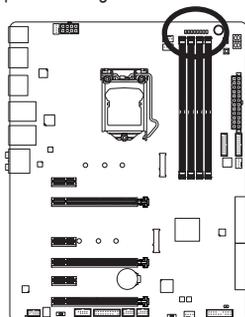
The switch allows for audio gain control for the headphone/speaker out jack on the back panel. Please set it according to your headphone specification (actual effects may vary by the device being used).



- 
 1: 2.5x (Default)
 2: 6x

Voltage Measurement Points

Use a multimeter to measure the following motherboard voltages. You can employ following way to measure component voltages.



- Pin 1 — VCCIO
- Pin 1 — VAXG
- Pin 1 — VDIMM
- Pin 1 — DDRVTT
- Pin 1 — PCHIO
- Pin 1 — VSA
- Pin 1 — VCORE
- Pin 1 — VPP_25V

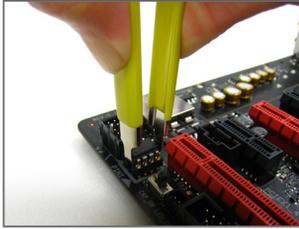
Pin No.	Definition
1	Power
2	GND



Steps:

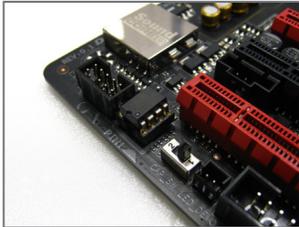
Connect the red lead of the multimeter to the pin 1 (Power) of a voltage measurement point and the black lead to the pin 2 (ground).

1-9 Changing the Operational Amplifier



Step 1:

Use an IC extractor to carefully grip the IC's sides and extract it from the socket.



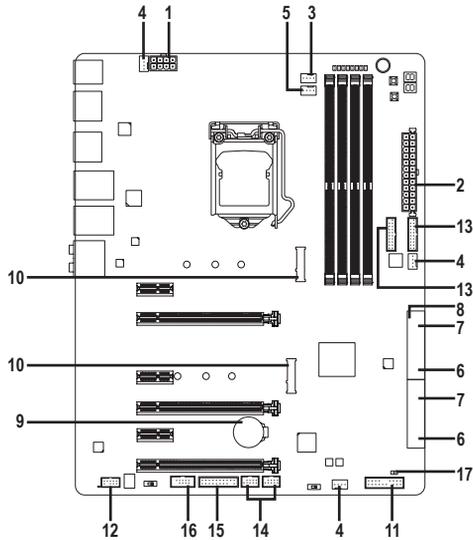
Step 2:

Align the notch on your OP chip with the notch on the socket and gently press the chip into the socket until seated.



For purchasing the IC extractor and OP Chip, please contact the local dealer.

1-10 Internal Connectors



1)	ATX_12V_2X4	10)	M2D_32G/M2H_32G
2)	ATX	11)	F_PANEL
3)	CPU_FAN	12)	F_AUDIO
4)	SYS_FAN1/2/3	13)	F_USB30_1/F_USB30_2
5)	CPU_OPT	14)	F_USB1/F_USB2
6)	SATA EXPRESS	15)	TPM
7)	SATA3 0/1/2/3/4/5	16)	COMA
8)	SATA3 6/7	17)	CLR_CMOS
9)	BAT		



Read the following guidelines before connecting external devices:

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

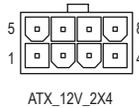
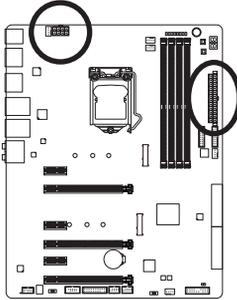
1/2) ATX_12V_2X4/ATX (2x4 12V Power Connector and 2x12 Main Power Connector)

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.

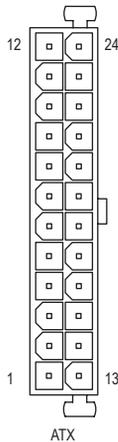


To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power supply is used that does not provide the required power, the result can lead to an unstable or unbootable system.



ATX_12V_2X4:

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

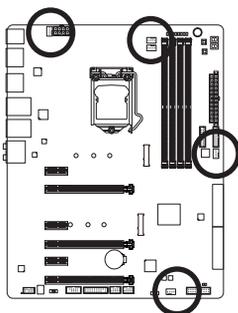


ATX:

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_FAN1/2/3 (Fan Headers)

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



CPU_FAN:

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

SYS_FAN1/2/3:

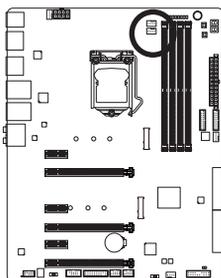
Pin No.	Definition
1	GND
2	Speed Control
3	Sense
4	VCC



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

5) CPU_OPT (Water Cooling CPU Fan Header)

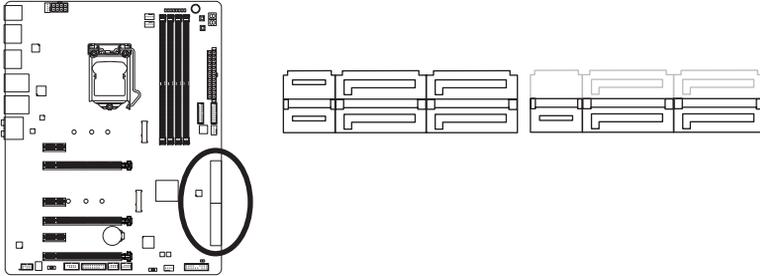
The fan header is 4-pin and possesses a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The speed control function requires the use of a fan with fan speed control design.



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

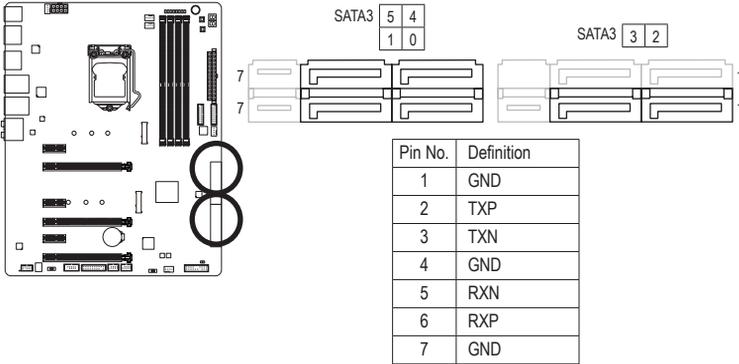
6) SATA EXPRESS (SATA Express Connectors)

Each SATA Express connector supports a single SATA Express device.



7) SATA3 0/1/2/3/4/5 (SATA 6Gb/s Connectors, Controlled by Intel® C236 Chipset)

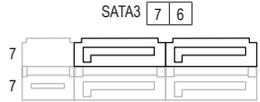
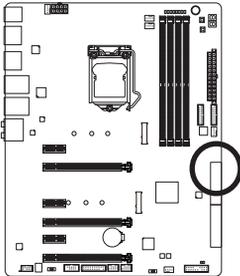
The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA device. The Intel® Chipset supports RAID 0, RAID 1, RAID 5, and RAID 10. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.



To enable hot-plugging for the SATA ports, refer to Chapter 2, "BIOS Setup," "Peripherals\SATA Configuration," for more information.

8) SATA3 6/7 (SATA 6Gb/s Connectors, Controlled by ASMedia® ASM1061 Chip)

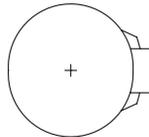
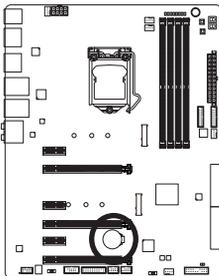
The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA device.



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

9) 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:

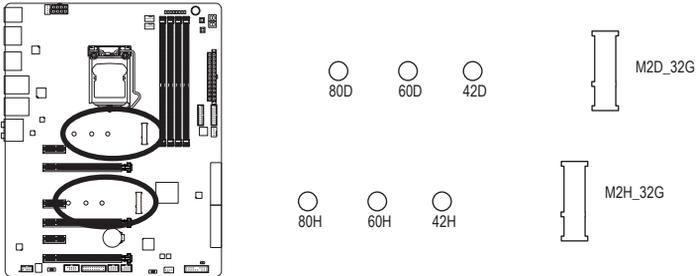
1. Turn off your computer and unplug the power cord.
2. Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making them short for 5 seconds.)
3. Replace the battery.
4.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



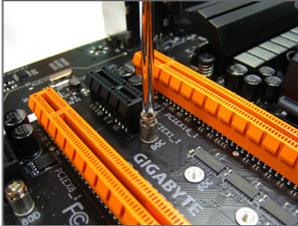
- Always turn off your computer and unplug the power cord before replacing the battery.
- Replace the battery with an equivalent one. Danger of explosion if the battery is replaced with an incorrect model.
- Contact the place of purchase or local dealer if you are not able to replace the battery by yourself 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.

10) M2D_32G/M2H_32G (M.2 Socket 3 Connectors)

The M.2 connectors support M.2 SATA SSDs and M.2 PCIe SSDs and support RAID configuration through the Intel® Chipset. Please note that an M.2 PCIe SSD cannot be used to create a RAID set either with an M.2 SATA SSD or a SATA hard drive. To create a RAID array with an M.2 PCIe SSD, you must set up the configuration in UEFI BIOS mode. Refer to Chapter 3, "Configuring a RAID Set," for instructions on configuring a RAID array.



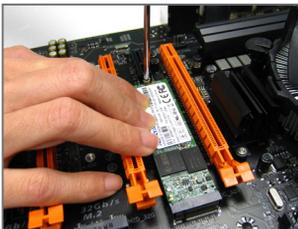
Follow the steps below to correctly install an M.2 SSD in the M.2 connector.



Step 1:
Use a screw driver to unfasten the screw and nut from the motherboard. Locate the proper mounting hole for the M.2 SSD to be installed and then screw the nut first.



Step 2:
Slide the M.2 SSD into the connector at an angle.



Step 3:
Press the M.2 SSD down and then secure it with the screw.



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 nut.
- If the **iRSTe Support** item in BIOS Setup is set to **Enabled**, the RAID function will become unavailable when an M.2 PCIe SSD is installed. (Refer to Chapter 2, "BIOS Setup," "Peripherals," for more information.)

▶▶ When installing different types of M.2 SSDs (including SATA SSDs, PCIe x4 SSDs, and PCIe x2 SSDs), be sure to refer to the supported configurations in the tables below according to the operating mode of your SATA controller (AHCI mode or RAID mode).

• **AHCI mode:**

M2D_32G M.2 connector

Connector	SATA3_0	SATA3_1	SATA3_2	SATA3_3	SATA3_4	SATA3_5
Type of SSD	SATA Express		SATA Express		SATA Express	
M.2 SATA SSD	✓	✓	✓	✗	✓	✓
				✗		✓
M.2 PCIe x4 SSD	✗	✗	✗	✗	✓	✓
	✓ (Note 1)			✗	✓	
M.2 PCIe x2 SSD	✓	✓	✗	✗	✓	✓
				✗		✓
No M.2 SSDs Installed	✓	✓	✓	✓	✓	✓

✓ : Supported, ✗ : Not supported.

M2H_32G M.2 connector

Connector	SATA3_0	SATA3_1	SATA3_2	SATA3_3	SATA3_4	SATA3_5
Type of SSD	SATA Express		SATA Express		SATA Express	
M.2 SATA SSD	✗	✓	✓	✓	✓	✓
						✓
M.2 PCIe x4 SSD	✓	✓	✓	✓	✓	✓
		✓		✓		✓
M.2 PCIe x2 SSD	✓	✓	✓	✓	✓	✓
					✓	✓
No M.2 SSDs Installed	✓	✓	✓	✓	✓	✓

✓ : Supported, ✗ : Not supported.

• **RAID mode^(Note 2):**

M2D_32G M.2 connector

Connector	SATA3_0	SATA3_1	SATA3_2	SATA3_3	SATA3_4	SATA3_5
Type of SSD	SATA Express		SATA Express		SATA Express	
M.2 SATA SSD	✓	✓	✓	✗	✓	✓
				✗		✓
M.2 PCIe x4 SSD	✗	✗	✗	✗	✓	✗
	✓ (Note 1)			✗		✗
M.2 PCIe x2 SSD	✓	✓	✗	✗	✓	✗
				✗	✗	
No M.2 SSDs Installed	✓	✓	✓	✓	✓	✓

✓ : Supported, ✗ : Not supported.

M2H_32G M.2 connector

Connector	SATA3_0	SATA3_1	SATA3_2	SATA3_3	SATA3_4	SATA3_5
Type of SSD	SATA Express		SATA Express		SATA Express	
M.2 SATA SSD	✗	✓	✓	✓	✓	✓
						✓
M.2 PCIe x4 SSD	✓	✓	✓	✓	✓	✗
					✗	
M.2 PCIe x2 SSD	✓	✓	✓	✓	✓	✗
					✗	
No M.2 SSDs Installed	✓	✓	✓	✓	✓	✓

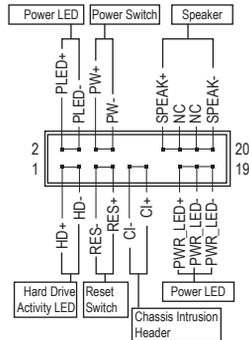
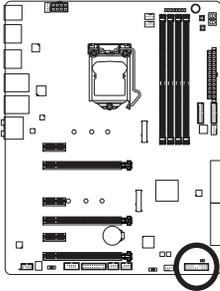
✓ : Supported, ✗ : Not supported.

(Note 1) The PCIe x4 SSD runs at x2 speed.

(Note 2) If the **iRSTe Support** item in BIOS Setup is set to **Enabled**, the RAID function will become unavailable when an M.2 PCIe SSD is installed. (Refer to Chapter 2, "BIOS Setup," "Peripherals," for more information.)

11) 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).

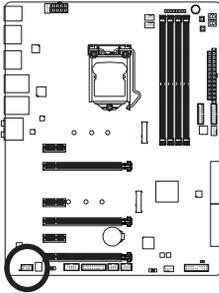
- **PW** (Power Switch, Red):
Connects to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch (refer to Chapter 2, "BIOS Setup," "Power Management," for more information).
- **SPEAK** (Speaker, Orange):
Connects to the speaker on the chassis 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.

12) F_AUDIO (Front Panel Audio Header)

The front panel audio header supports Intel® 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.



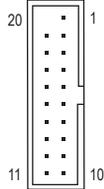
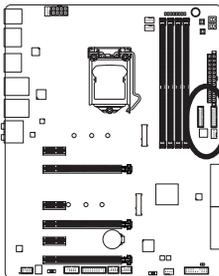
Pin No.	Definition
1	MIC2_L
2	GND
3	MIC2_R
4	FP_DET
5	LINE2_R
6	NC
7	GND
8	No Pin
9	LINE2_L
10	Sense



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.

13) F_USB30_1/F_USB30_2 (USB 3.0/2.0 Headers)

The headers conform to USB 3.0/2.0 specification and each header can provide two USB ports. For purchasing the optional 3.5" front panel that provides two USB 3.0/2.0 ports, please contact the local dealer.



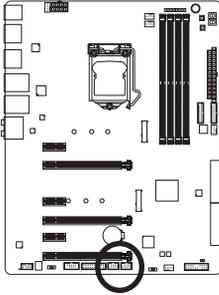
Pin No.	Definition	Pin No.	Definition
1	VBUS	11	D2+
2	SSRX1-	12	D2-
3	SSRX1+	13	GND
4	GND	14	SSTX2+
5	SSTX1-	15	SSTX2-
6	SSTX1+	16	GND
7	GND	17	SSRX2+
8	D1-	18	SSRX2-
9	D1+	19	VBUS
10	NC	20	No Pin



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.

14) 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.



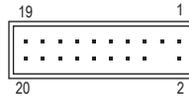
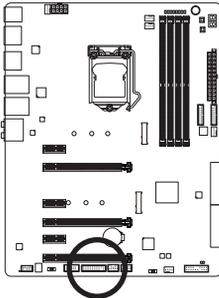
Pin No.	Definition
1	Power (5V)
2	Power (5V)
3	USB DX-
4	USB DY-
5	USB DX+
6	USB DY+
7	GND
8	GND
9	No Pin
10	NC



- 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.

15) TPM (Trusted Platform Module Header)

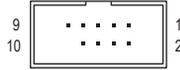
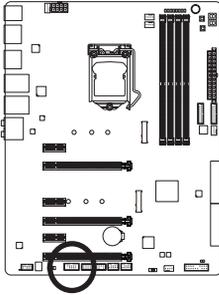
You may connect a TPM (Trusted Platform Module) to this header.



Pin No.	Definition	Pin No.	Definition
1	LCLK	11	LAD0
2	GND	12	GND
3	LFRAME	13	NC
4	No Pin	14	NC
5	LRESET	15	SB3V
6	NC	16	SERIRQ
7	LAD3	17	GND
8	LAD2	18	NC
9	VCC3	19	NC
10	LAD1	20	SUSCLK

16) COMA (Serial Port Header)

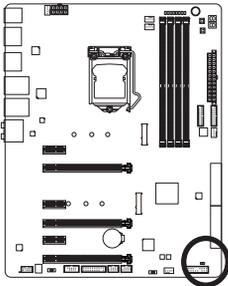
The COM header can provide one serial port via an optional COM port cable. For purchasing the optional COM port cable, please contact the local dealer.



Pin No.	Definition
1	NDCCD-
2	NSIN
3	NSOUT
4	NDTR-
5	GND
6	NDSR-
7	NRTS-
8	NCTS-
9	NRI-
10	No Pin

17) 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 or the clear CMOS jumper/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.



Function Keys:

: 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.

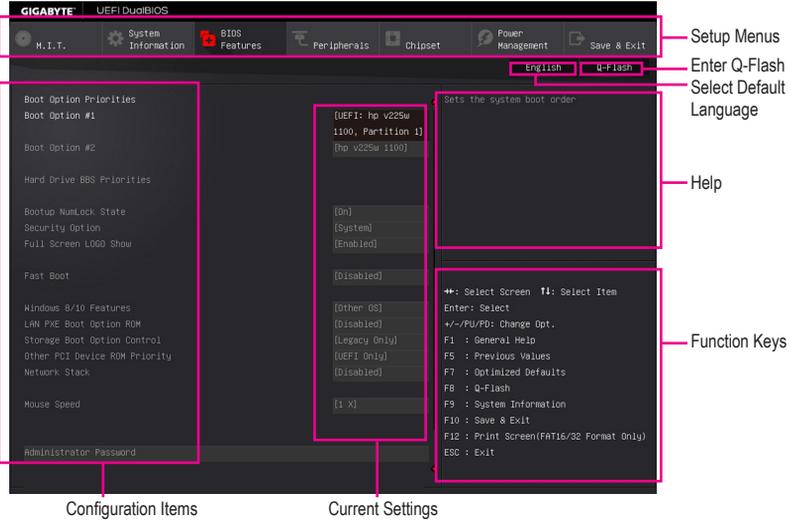
<END>: Q-FLASH

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

2-2 The Main Menu

The Main Menu

On the main menu of the BIOS Setup program, press arrow keys 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: F2a)



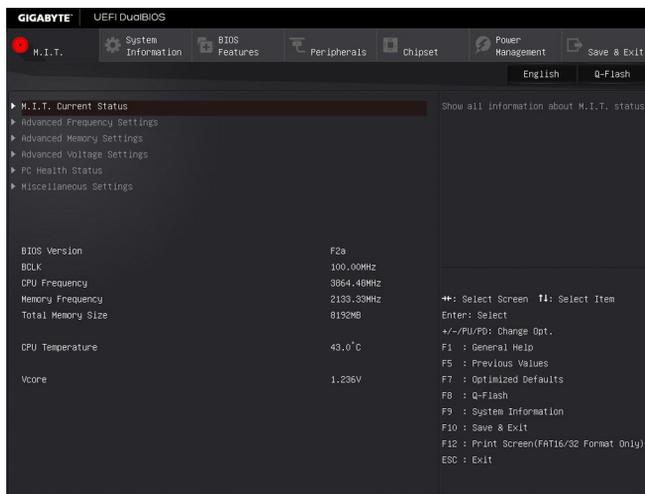
BIOS Setup Program Function Keys

<<->>>	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
<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

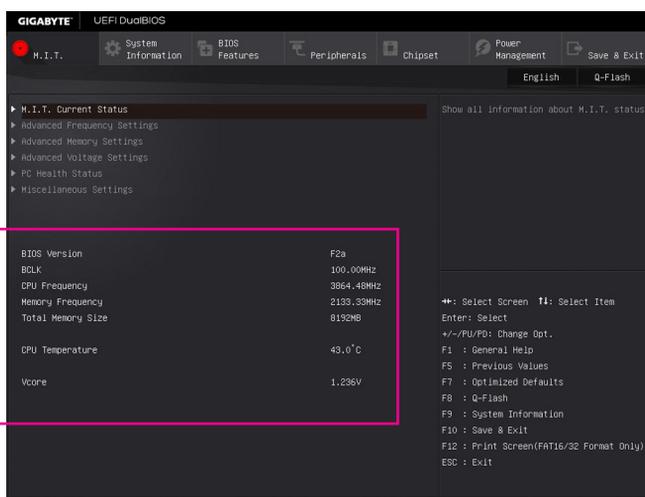


- When the system is not stable as usual, select the **Load Optimized Defaults** item to set your system to its defaults.
- The BIOS Setup menus described in this chapter are for reference only and may differ by BIOS version.

2-3 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.)

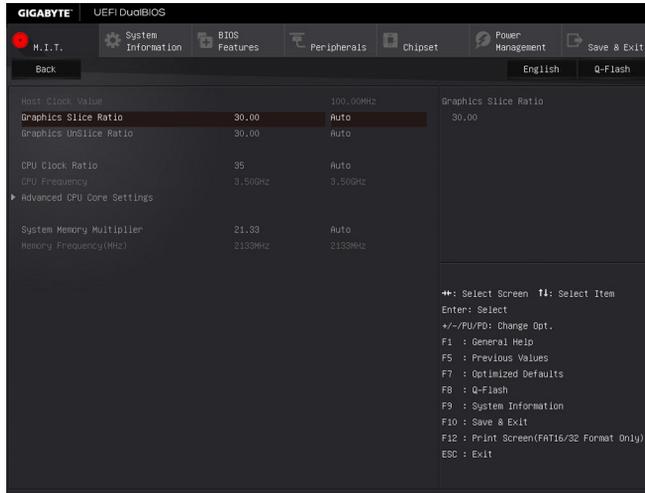


This section provides information on the BIOS version, CPU base clock, CPU frequency, memory frequency, total memory size, CPU temperature and Vcore, etc.

▶ **M.I.T. Current Status**

This screen provides information on CPU/memory frequencies/parameters.

▶ **Advanced Frequency Settings**



↳ **Graphics Slice Ratio**

Allows you to set the Graphics Slice Ratio.

↳ **Graphics UnSlice Ratio**

Allows you to set the Graphics UnSlice Ratio.

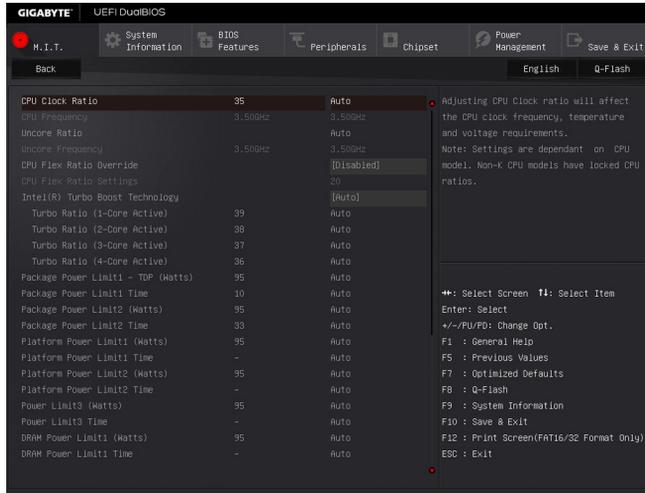
↳ **CPU Clock Ratio**

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.

☞ Uncore Ratio

Allows you to set the CPU Uncore ratio. The adjustable range is dependent on the CPU being used.

☞ Uncore Frequency

Displays the current CPU Uncore frequency.

☞ CPU Flex Ratio Override

Enables or disables the CPU Flex Ratio. The maximum CPU clock ratio will be based on the **CPU Flex Ratio Settings** value if **CPU Clock Ratio** is set to **Auto**. (Default: Disabled)

☞ CPU Flex Ratio Settings

Allows you to set the CPU Flex Ratio. The adjustable range may vary by CPU. (Default: 20)

☞ Intel(R) Turbo Boost Technology ^(Note)

Allows you to determine whether to enable the Intel CPU Turbo Boost technology. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ Turbo Ratio ^(Note)

Allows you to set the CPU Turbo ratios for different number of active cores. **Auto** sets the CPU Turbo ratios according to the CPU specifications. (Default: Auto)

☞ Power Limit TDP (Watts) / Power Limit Time

Allows you to set the power limit for CPU Turbo mode and how long it takes to operate at the specified power limit. If the specified value is exceeded, the CPU will automatically reduce the core frequency in order to reduce the power. **Auto** sets the current limit according to the CPU specifications. (Default: Auto)

(Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

- ⌄ **Core Current Limit (Amps)**
Allows you to set a current limit for CPU Turbo mode. When the CPU current exceeds the specified current limit, the CPU will automatically reduce the core frequency in order to reduce the current. **Auto** sets the power limit according to the CPU specifications. (Default: Auto)
- ⌄ **No. of CPU Cores Enabled** ^(Note)
Allows you to select the number of CPU cores to enable in an Intel® multi-core CPU (the number of CPU cores may vary by CPU). **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **Hyper-Threading Technology** ^(Note)
Allows you to determine whether to enable multi-threading technology when using an Intel® CPU that supports this function. This feature only works for operating systems that support multi-processor mode. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **CPU Enhanced Halt (C1E)** ^(Note)
Enables or disables Intel® CPU Enhanced Halt (C1E) function, a CPU power-saving function in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **C3 State Support** ^(Note)
Allows you to determine whether to let the CPU enter C3 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C3 state is a more enhanced power-saving state than C1. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **C6/C7 State Support** ^(Note)
Allows you to determine whether to let the CPU enter C6/C7 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C6/C7 state is a more enhanced power-saving state than C3. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **C8 State Support** ^(Note)
Allows you to determine whether to let the CPU enter C8 mode in system halt state. When enabled, the CPU core frequency and voltage will be reduced during system halt state to decrease power consumption. The C8 state is a more enhanced power-saving state than C6/C7. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **Package C State Limit** ^(Note)
Allows you to specify the C-state limit for the processor. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **CPU Thermal Monitor** ^(Note)
Enables or disables Intel® Thermal Monitor function, a CPU overheating protection function. When enabled, the CPU core frequency and voltage will be reduced when the CPU is overheated. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ⌄ **CPU EIST Function** ^(Note)
Enables or disables Enhanced Intel® Speed Step Technology (EIST). Depending on CPU loading, Intel EIST technology can dynamically and effectively lower the CPU voltage and core frequency to decrease average power consumption and heat production. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

(Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

☞ **Voltage Optimization**

Allows you to determine whether to enable voltage optimization to reduce power consumption. (Default: Enabled)

☞ **Residency State Regulation (RSR)**

Allows you to determine whether to automatically lower the CPU turbo ratio if the CPU voltage/temperature is too high. (Default: Enabled)

☞ **Hardware Prefetcher**

Allows you to determine whether to enable hardware prefetcher to prefetch data and instructions from the memory into the cache. (Default: Enabled)

☞ **Adjacent Cache Line Prefetch**

Allows you to determine whether to enable the adjacent cache line prefetch mechanism that lets the processor retrieve the requested cache line as well as the subsequent cache line. (Default: Enabled)

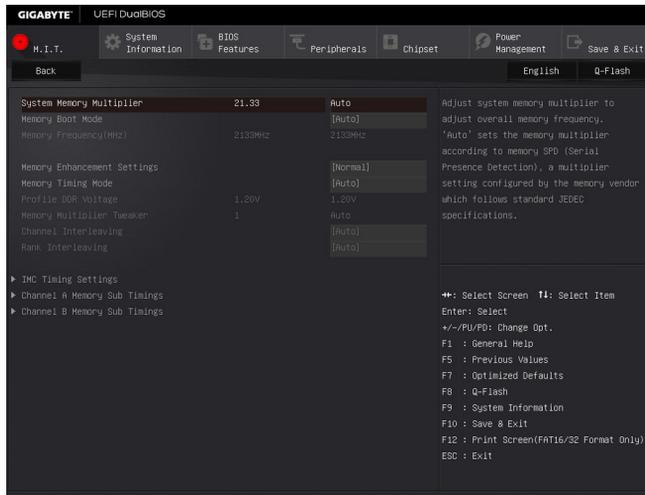
☞ **System Memory Multiplier**

Allows you to set the system memory multiplier. **Auto** sets memory multiplier according to memory SPD data. (Default: Auto)

☞ **Memory Frequency (MHz)**

The first memory frequency value is the normal operating frequency of the memory being used; the second is the memory frequency that is automatically adjusted according to the **System Memory Multiplier** settings.

▶ Advanced Memory Settings



- ☞ **System Memory Multiplier, Memory Frequency(MHz)**
The settings above are synchronous to those under the same items on the **Advanced Frequency Settings** menu.
- ☞ **Memory Boot Mode** (Note)
Provides memory detection and training methods.
 - ▶▶ Auto Lets the BIOS automatically configure this setting. (Default)
 - ▶▶ Enable Fast Boot Skip memory detection and training in some specific criteria for faster memory boot.
 - ▶▶ Disable Fast Boot Detect and train memory at every single boot.
- ☞ **Memory Enhancement Settings**
Provides three different memory performance enhancement settings: Normal (basic performance), Enhanced Stability, and Enhanced Performance. (Default: Normal)
- ☞ **Memory Timing Mode**
Manual and **Advanced Manual** allows the **Memory Multiplier Tweaker**, **Channel Interleaving**, **Rank Interleaving**, and memory timing settings below to be configurable. Options are: Auto (default), Manual, Advanced Manual.
- ☞ **Profile DDR Voltage**
Displays the memory voltage.
- ☞ **Memory Multiplier Tweaker**
Provides different levels of memory auto-tuning. (Default: Auto)
- ☞ **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)

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

☞ **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)

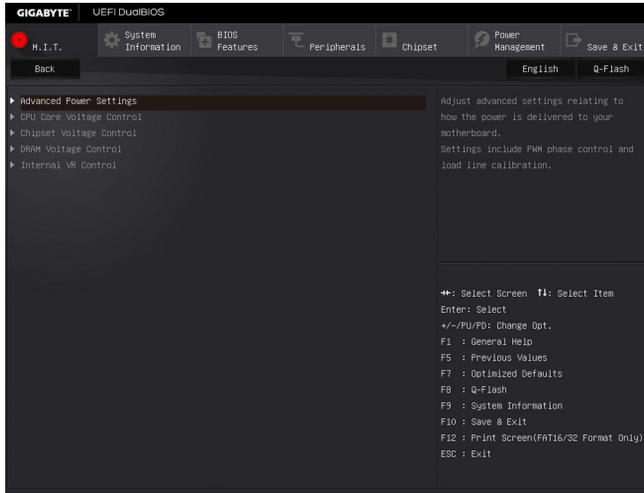
▶ **IMC Timing Settings**

This sub-menu provides options for tuning memory compatibility and stability.

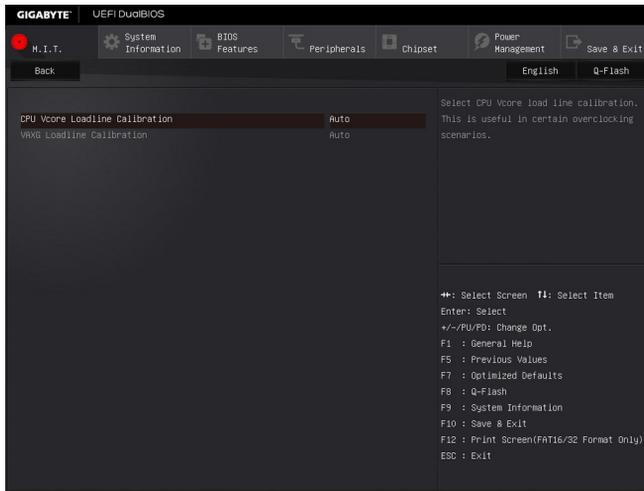
▶ **Channel A/B Memory Sub Timings**

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



▶ Advanced Power Settings



🔗 CPU Vcore Loadline Calibration

Allows you to configure Load-Line Calibration for the CPU Vcore voltage. Selecting a higher level keeps the CPU Vcore voltage more consistent with what is set in BIOS under heavy load. **Auto** lets the BIOS automatically configure this setting and sets the voltage following Intel's specifications. (Default: Auto)

🔗 VAXG Loadline Calibration

Allows you to configure Load-Line Calibration for the CPU VAXG voltage. Selecting a higher level keeps the CPU VAXG voltage more consistent with what is set in BIOS under heavy load. **Auto** lets the BIOS automatically configure this setting and sets the voltage following Intel's specifications. (Default: Auto)

▶ **CPU Core Voltage Control**

This section provides CPU voltage control options.

▶ **Chipset Voltage Control**

This section provides Chipset voltage control options.

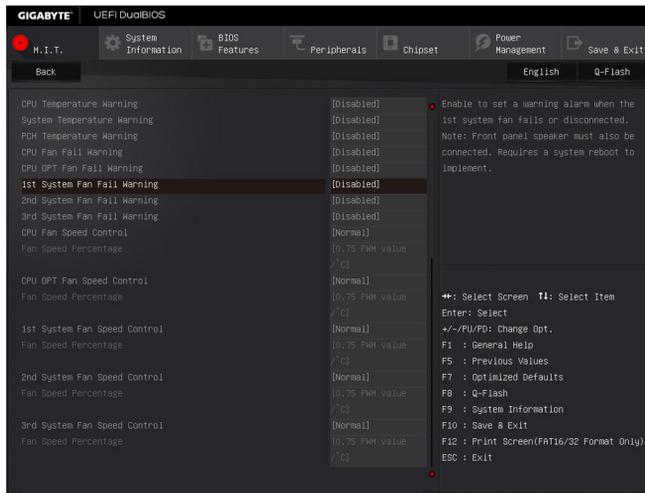
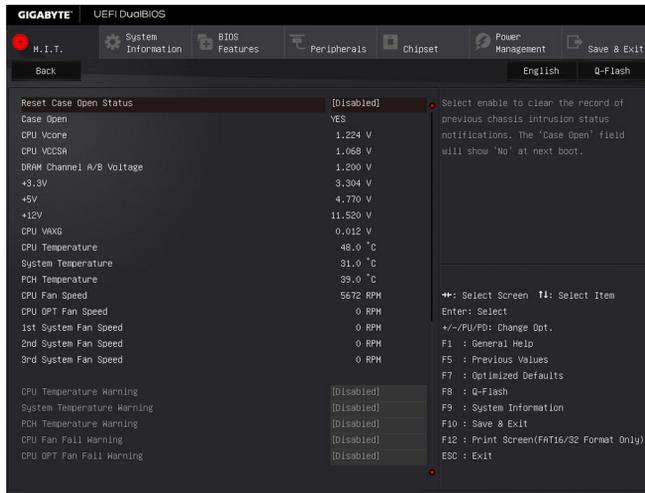
▶ **DRAM Voltage Control**

This section provides memory voltage control options.

▶ **Internal VR Control**

This section provides VR voltage control options.

▶ PC Health Status



🔗 Reset Case Open Status

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

🔗 Case Open

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

- ⊞ **CPU Vcore/CPU VCCSA/DRAM Channel A/B Voltage/+3.3V/+5V/+12V/CPU VAXG**
Displays the current system voltages.
- ⊞ **CPU/PCH Temperature**
Displays current CPU/Chipset temperature.
- ⊞ **System Temperature**
Displays current system temperature detected by the system temperature sensor on the motherboard.
- ⊞ **CPU/CPU OPT/System Fan Speed**
Displays current CPU/CPU_OPT/system fan speeds.
- ⊞ **CPU/System/PCH Temperature Warning**
Sets the warning threshold for CPU/system/Chipset temperature. When temperature exceeds the threshold, BIOS will emit warning sound. Options are: Disabled (default), 60°C/140°F, 70°C/158°F, 80°C/176°F, 90°C/194°F.
- ⊞ **CPU/CPU OPT/System Fan Fail Warning**
Allows the system to emit warning sound if the fan is not connected or fails. Check the fan condition or fan connection when this occurs. (Default: Disabled)
- ⊞ **CPU Fan Speed Control (CPU_FAN Connector)**
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 CPU 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 under the **Fan Speed Percentage** item.
 - ▶▶ Full Speed Allows the fan to run at full speeds.
- ⊞ **Fan Speed Percentage**
Allows you to control the fan speed. This item is configurable only when **CPU Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /°C ~ 2.50 PWM value /°C.
- ⊞ **CPU OPT Fan Speed Control (CPU_OPT Connector)**
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 CPU 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 under the **Fan Speed Percentage** item.
 - ▶▶ Full Speed Allows the fan to run at full speeds.
- ⊞ **Fan Speed Percentage**
Allows you to control the fan speed. This item is configurable only when **CPU OPT Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /°C ~ 2.50 PWM value /°C.

☞ **1st System Fan Speed Control (SYS_FAN1 Connector)**

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 system 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 under the **Fan Speed Percentage** item.
- ▶▶ Full Speed Allows the fan to run at full speeds.

☞ **Fan Speed Percentage**

Allows you to control the fan speed. This item is configurable only when **1st System Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /°C ~ 2.50 PWM value /°C.

☞ **2nd System Fan Speed Control (SYS_FAN2 Connector)**

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 system 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 under the **Fan Speed Percentage** item.
- ▶▶ Full Speed Allows the fan to run at full speeds.

☞ **Fan Speed Percentage**

Allows you to control the fan speed. This item is configurable only when **2nd System Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /°C ~ 2.50 PWM value /°C.

☞ **3rd System Fan Speed Control (SYS_FAN3 Connector)**

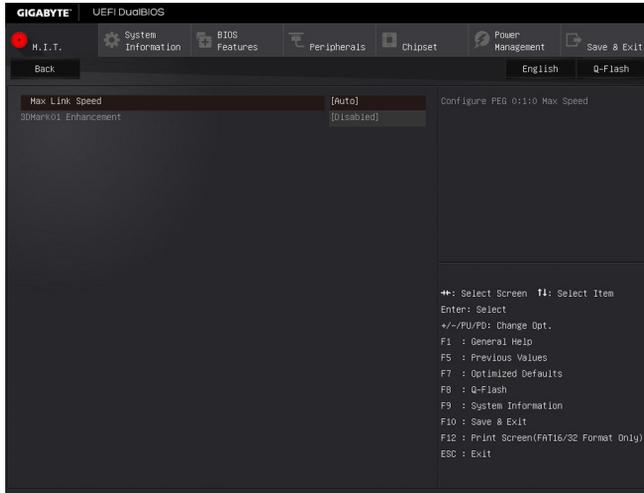
Allows you to determine whether to enable the fan speed control function and adjust the fan speed.

- ▶▶ Normal Allows the fan to run at different speeds according to the system 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 under the **Fan Speed Percentage** item.
- ▶▶ Full Speed Allows the fan to run at full speeds.

☞ **Fan Speed Percentage**

Allows you to control the fan speed. This item is configurable only when **3rd System Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /°C ~ 2.50 PWM value /°C.

► Miscellaneous Settings



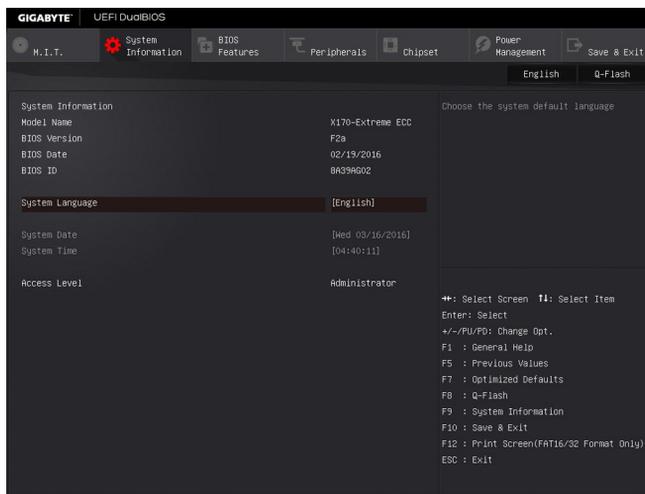
🔗 Max Link Speed

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)

2-4 System Information



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

System Language

Selects the default language used by the BIOS.

System Date

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

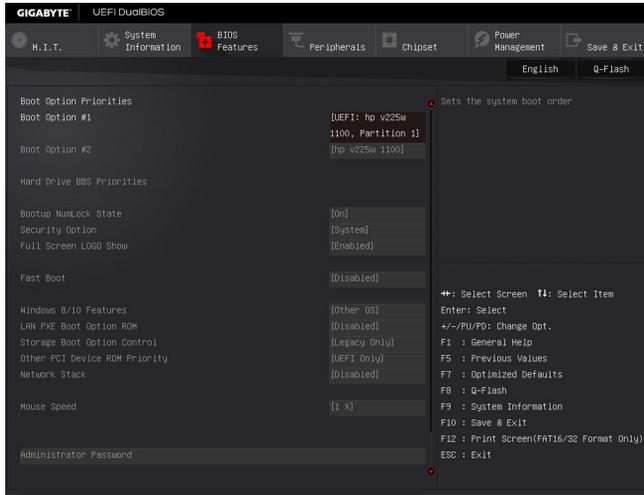
System Time

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

Access Level

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

2-5 BIOS Features



☞ **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 7 64-bit, select the optical drive that contains the Windows 7 64-bit installation disk and is prefixed with "UEFI:" string.

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

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

☞ **Bootup NumLock State**

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

☞ **Security Option**

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

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

☞ **Full Screen LOGO Show**

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

☞ **Fast Boot**

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

☞ **SATA Support**

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

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.
- ▶▶ Partial Initial Part of the USB devices are disabled before the OS boot process completes. (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**.

☞ **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**.

☞ **Next Boot After AC Power Loss**

- ▶▶ Normal Boot Enables normal bootup upon the return of the AC power. (Default)
- ▶▶ Fast Boot Keeps the Fast Boot settings upon the return of the AC power.

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

☞ **Windows 8/10 Features**

Allows you to select the operating system to be installed. (Default: Other OS)

☞ **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.

This item is configurable only when **Windows 8/10 Features** is set to **Windows 8/10** or **Windows 8/10 WHQL**.

☞ **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.
- ▶ Legacy Only Enables legacy option ROM only. (Default)
- ▶ UEFI Only Enables UEFI option ROM only.

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

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.

☞ **Ipv6 PXE Support**

Enables or disables IPv6 PXE Support. This item is configurable only when **Network Stack** is enabled.

☞ **Mouse Speed**

Allows you to set the mouse cursor movement speed. (Default: 1 X)

☞ **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.

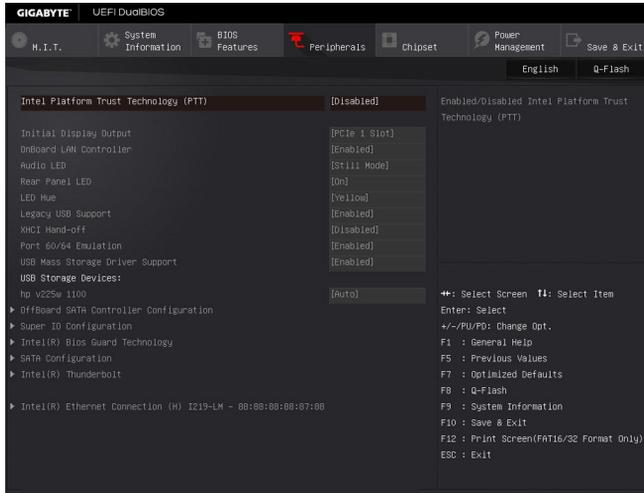
☞ **User Password**

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



Intel Platform Trust Technology (PTT)

Enables or disables Intel® PTT Technology. (Default: Disabled)

Initial Display Output

Specifies the first initiation of the monitor display from the installed PCI Express graphics card or the onboard graphics.

- ▶▶ IGFX Sets the onboard graphics as the first display.
- ▶▶ PCIe 1 Slot Sets the graphics card on the PCIEX16 slot as the first display. (Default)
- ▶▶ PCIe 2 Slot Sets the graphics card on the PCIEX8 slot as the first display.
- ▶▶ PCIe 3 Slot Sets the graphics card on the PCIEX4 slot as the first display.

OnBoard LAN Controller (Rivet Networks Killer™ E2400 LAN Chip, LAN2)

Enables or disables the Rivet Networks Killer™ E2400 LAN function. (Default: Enabled)
If you wish to install a 3rd party add-in network card instead of using the onboard LAN, set this item to **Disabled**.

Audio LED

Enables or disables the onboard audio LED function.

- ▶▶ Off Disables this function.
- ▶▶ Still Mode The LEDs stay constantly on. (Default)
- ▶▶ Beat Mode The brightness of the LED changes according to the music rhythm.
- ▶▶ Pulse Mode The brightness of the LED changes slowly and smoothly like breath.

LED Hue

Allows you to change the color of the audio LEDs. (Default: Yellow)

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: Disabled)

- ☞ **Port 60/64 Emulation**
 Enables or disables emulation of I/O ports 64h and 60h. This should be enabled for full legacy support for USB keyboards/mice in MS-DOS or in operating system that does not natively support USB devices. (Default: Enabled)
- ☞ **USB Mass Storage Driver Support**
 Enables or disables support for USB storage devices. (Default: Enabled)
- ☞ **USB Storage Devices**
 Displays a list of connected USB mass storage devices. This item appears only when a USB storage device is installed.
- ▶ **OffBoard SATA Controller Configuration**
 Displays information on your M.2 PCIe SSD if installed.
- ▶ **Trusted Computing 2.0**
 This sub-menu appears only when **Intel Platform Trust Technology** is set to **Enabled**.
- ☞ **Security Device Support**
 Enables or disables Trusted Platform Module (TPM). (Default: Enable)
- ☞ **TPM 20 InterfaceType**
 Allows you to select the communication interface for the TPM 2.0 device. Set to **External TPM2.0** if you install an Infineon TPM 2.0 module (optional). (Default: PTT)
- ☞ **Device Select**
 Allows you to select whether to support TPM 1.2 or TPM 2.0 device. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ▶ **Super IO Configuration**
- ☞ **Serial Port 1**
 Enables or disables the onboard serial port. (Default: Enabled)
- ▶ **Intel(R) Bios Guard Technology**
 Enables or disables the Intel® BIOS Guard feature, which protects the BIOS from malicious attacks.
- ▶ **SATA Configuration**
- ☞ **SATA Controller(s)**
 Enables or disables the integrated SATA controllers. (Default: Enabled)
- ☞ **SATA Mode Selection**
 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)
- ☞ **iRSTe Support**
 Allows you to set the Intel® Rapid Storage Technology disk management mode. Note: If you change the settings after the operating system is installed, the operating system may be corrupted.

 - ▶ Enabled Enables Intel® Rapid Storage Technology enterprise mode. (Default)
 - ▶ Disabled Enables Intel® Rapid Storage Technology mode.

☞ **Aggressive LPM Support**

Enables or disables the power saving feature, ALPM (Aggressive Link Power Management), for the Chipset SATA controllers. (Default: Enabled)

☞ **Port 0/1/2/3/4/5**

Enables or disables each SATA port. (Default: Enabled)

☞ **Hot plug**

Enables or disable the hot plug capability for each SATA port. (Default: Disabled)

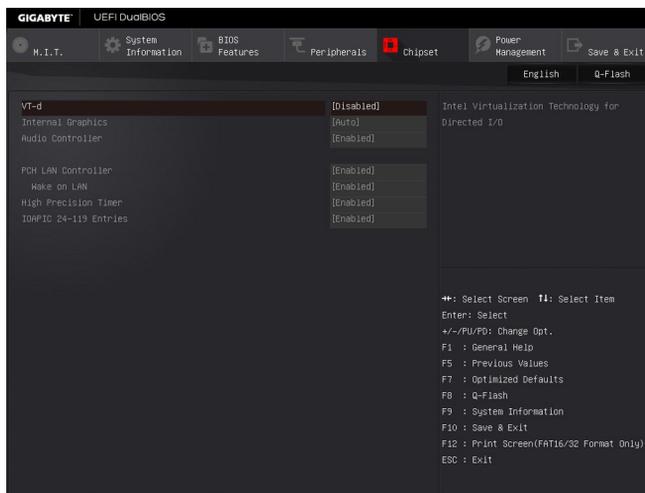
☞ **External SATA**

Enables or disables support for external SATA devices. (Default: Disabled)

▶ **Intel(R) Ethernet Network Connection**

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

2-7 Chipset



⊞ **VT-d** (Note)

Enables or disables Intel® Virtualization Technology for Directed I/O. (Default: Disabled)

⊞ **Internal Graphics**

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

⊞ **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**.

⊞ **PCH LAN Controller (Intel® GbE LAN Chip, LAN1)**

Enables or disables the Intel® GbE LAN function. (Default: Enabled)

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

⊞ **Wake on LAN**

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

⊞ **High Precision Timer**

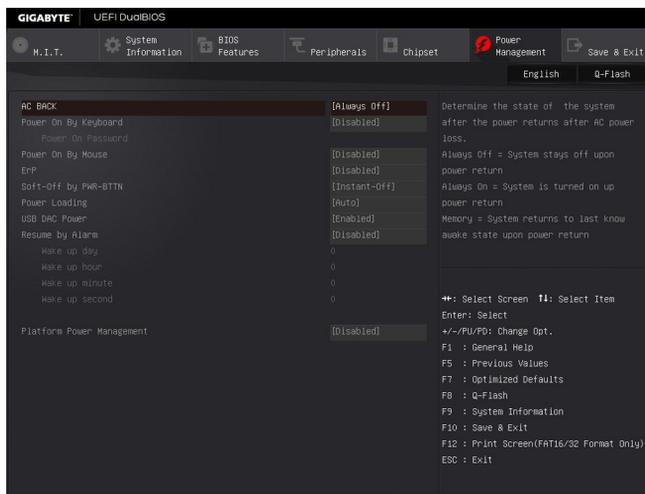
Enables or disables High Precision Event Timer (HPET) in the operating system. (Default: Enabled)

⊞ **IOAPIC 24-119 Entries**

Enables or disables this function. (Default: Enabled)

(Note) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

2-8 Power Management



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.

Power Loading

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

USB DAC Power

Enables or disables the power for the USB DAC connector on the back panel. For a USB DAC that has independent power, set this item to **Disabled**. (Default: Enabled)

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.

Platform Power Management

Enables or disables the Active State Power Management function (ASPM). (Default: Disabled)

PEG ASPM

Allows you to configure the ASPM mode for the device connected to the CPU PEG bus. This item is configurable only when **Platform Power Management** is set to **Enabled**. (Default: Enabled)

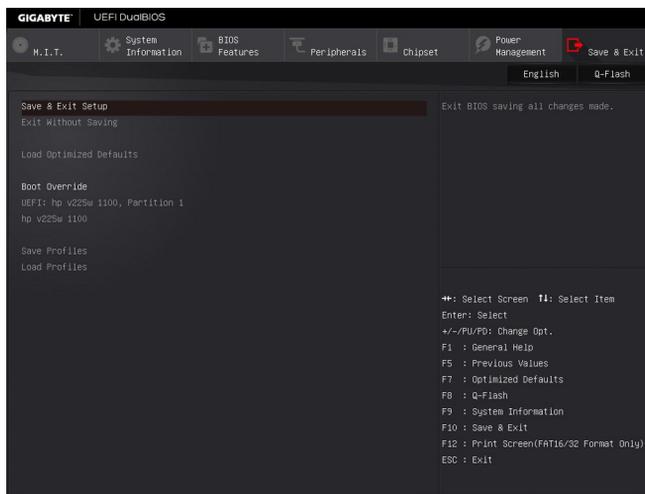
PCH ASPM

Allows you to configure the ASPM mode for the device connected to Chipset's PCI Express bus. This item is configurable only when **Platform Power Management** is set to **Enabled**. (Default: Enabled)

DMI Link ASPM Control

Allows you to configure the ASPM mode for both CPU side and Chipset side of the DMI link. This item is configurable only when **Platform Power Management** is set to **Enabled**. (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 5	RAID 10
Minimum Number of Hard Drives	≥2	2	≥3	≥4
Array Capacity	Number of hard drives * Size of the smallest drive	Size of the smallest drive	(Number of hard drives - 1) * Size of the smallest drive	(Number of hard drives/2) * Size of the smallest drive
Fault Tolerance	No	Yes	Yes	Yes

To create a RAID set, follow the steps below:

- A. Install SATA hard drive(s) in your computer.
- B. Configure SATA controller mode in BIOS Setup.
- C. Configure a RAID array in RAID BIOS. ^(Note 1)
- D. Install the SATA RAID/AHCI driver and operating system.

Before you begin, please prepare the following items:

- At least two SATA hard drives or M.2 SSDs ^{(Note 2) (Note 3)} (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). ^(Note 4)
- A Windows setup disk.
- Motherboard driver disk.
- A USB thumb drive.

3-1 Configuring SATA Controllers

A. Installing hard drives

Connect the SATA signal cables to SATA hard drives and the Intel® Chipset controlled SATA ports (SATA3 0~5) on the motherboard. Then connect the power connectors from your power supply to the hard drives. Or install your M.2 SSD(s) in the M.2 connector(s) on the motherboard.

(Note 1) Skip this step if you do not want to create RAID array on the SATA controller.

(Note 2) An M.2 PCIe SSD cannot be used to set up a RAID set either with an M.2 SATA SSD or a SATA hard drive.

(Note 3) If the **iRSTe Support** item in BIOS Setup is set to **Enabled**, the RAID function will become unavailable when an M.2 PCIe SSD is installed. (Refer to Chapter 2, "BIOS Setup," "Peripherals," for more information.)

(Note 4) Refer to Chapter 1, "Internal Connectors," "M.2 Socket 3 Connector," for the configuration tables of SATA hard drives and M.2 SSDs.

B. Configuring SATA controller mode in BIOS Setup

(The following instructions are based on Intel® Rapid Storage Technology enterprise (Intel® RSTe))
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). Go to **Peripherals\SATA Configuration**, make sure **SATA Controller(s)** is enabled. To create RAID, set **SATA Mode Selection** to **RAID** and **iRSTe Support** to **Enabled** (Figure 1).



Figure 1

Step 2:

If you want to configure UEFI RAID, follow the steps in "C-1." To enter the legacy RAID ROM, save the settings and exit BIOS Setup. Refer to "C-2" for more information.



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-1. UEFI RAID Configuration

Only Windows 10/8.1 64-bit supports UEFI RAID configuration.

Step 1:

In BIOS Setup, go to **BIOS Features** and set **Windows 8/10 Features** to **Windows 8/10** and **CSM Support** to **Disabled** (Figure 2). Save the changes and exit BIOS Setup.

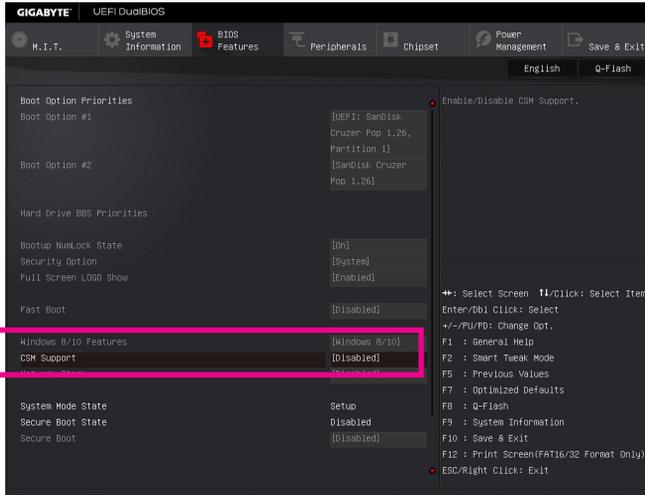


Figure 2

Step 2:

After the system reboot, enter BIOS Setup again. Then enter the **Peripherals/Intel RSTe SATA Controller** sub-menu (Figure 3).

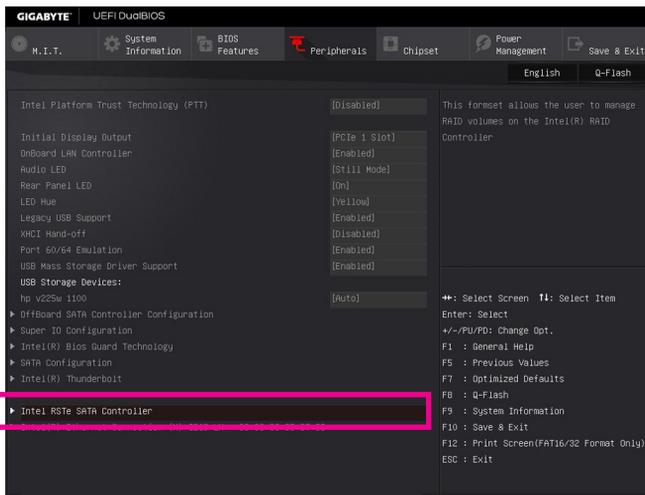


Figure 3

Step 3:

On the **Intel RSTe SATA Controller** menu, press <Enter> on **Create RAID Volume** to enter the **Create RAID Volume** screen. Enter a volume name with 1~16 letters (letters cannot be special characters) under the **Name** item and press <Enter>. Then, select a RAID level (Figure 4). RAID levels supported include RAID 0(Stripe), RAID 1(Mirror), Recovery, RAID 10, and RAID 5 (the selections available depend on the number of the hard drives being installed). Next, use the down arrow key to move to **Select Disks**.

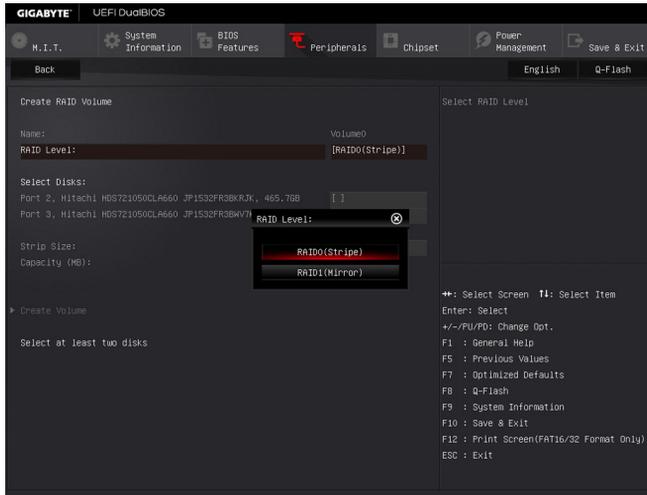


Figure 4

Step 4:

Under **Select Disks** item, select the hard drives to be included in the RAID array. Press the <Space> key on the hard drives to be selected (selected hard drives are marked with "X"). Then set the stripe block size (Figure 5). The stripe block size can be set from 4 KB to 128 KB. Once you have selected the stripe block size, set the volume capacity.



Figure 5

Step 5:

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

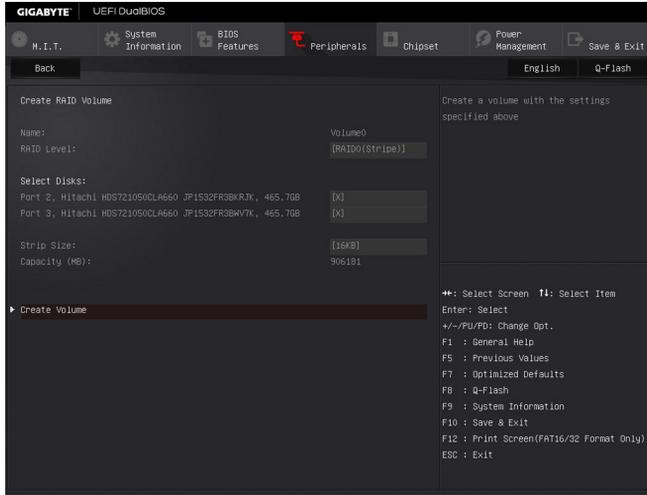


Figure 6

After completing, you'll be brought back to the **Intel RSTe SATA Controller** screen. Under **RAID Volumes** you can see the new RAID volume. To see more detailed information, press <Enter> on the volume to check for information on RAID level, stripe block size, array name, and array capacity, etc. (Figure 7)

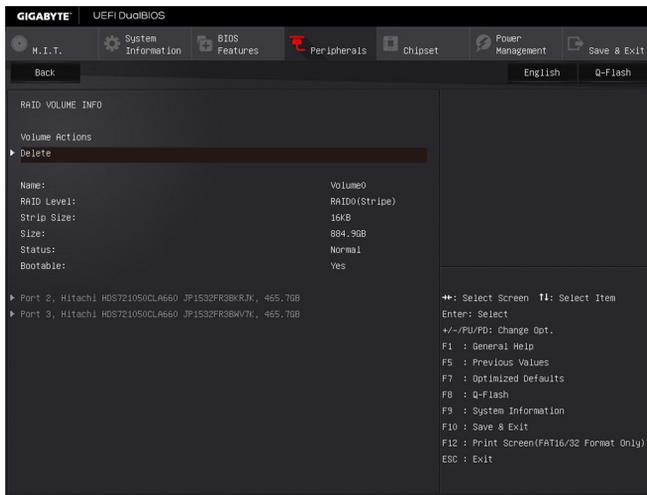


Figure 7

Delete RAID Volume

To delete a RAID array, press <Enter> on the volume to be deleted on the **Intel RSTe SATA Controller** screen. After entering the **RAID VOLUME INFO** screen, press <Enter> on **Delete** to enter the **Delete** screen. Press <Enter> on **Yes** (Figure 8).

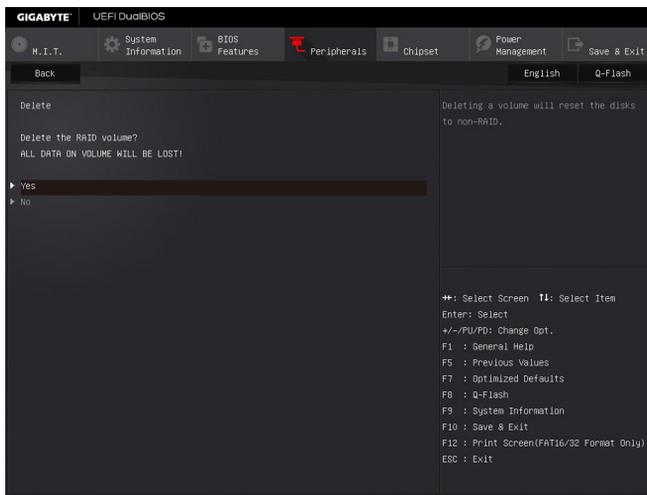


Figure 8

C-2. Configuring Legacy RAID ROM

Enter the Intel® legacy RAID BIOS setup utility to configure a RAID array. Skip this step and proceed with the installation of Windows operating system for a non-RAID configuration.

Step 1:

After the POST memory test begins and before the operating system boot begins, look for a message which says "Press <Ctrl-I> to enter Configuration Utility" (Figure 9). Press <Ctrl> + <I> to enter the RAID Configuration Utility.

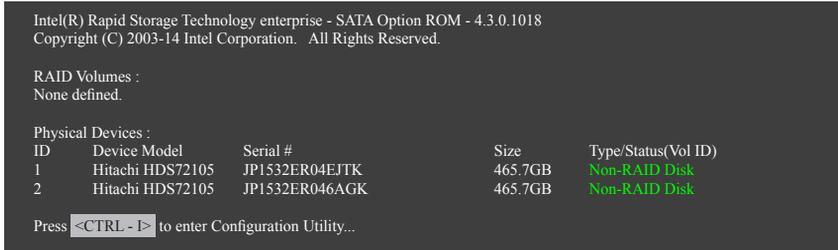


Figure 9

Step 2:

After you press <Ctrl> + <I>, the MAIN MENU screen will appear (Figure 10).

Create RAID Volume

If you want to create a RAID array, select **Create RAID Volume** in MAIN MENU and press <Enter>.

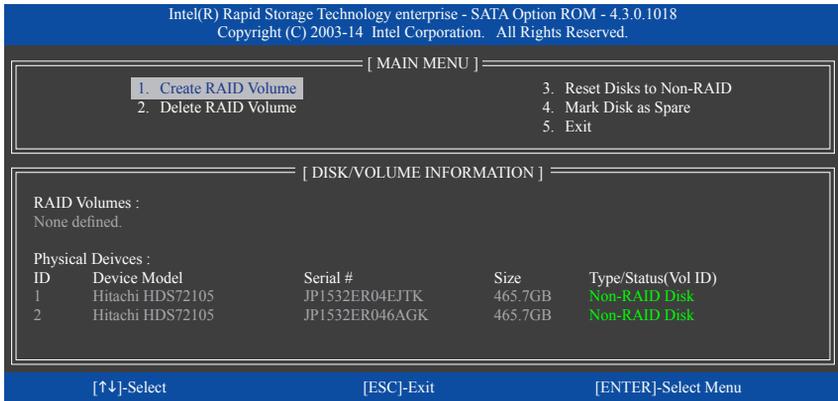


Figure 10

Step 3:

After entering the **CREATE VOLUME MENU** screen, enter a volume name with 1~16 letters (letters cannot be special characters) under the **Name** item and press <Enter>. Then, select a RAID level (Figure 11). RAID levels supported include RAID 0, RAID 1, RAID 10, and RAID 5 (the selections available depend on the number of the hard drives being installed). Press <Enter> to proceed.

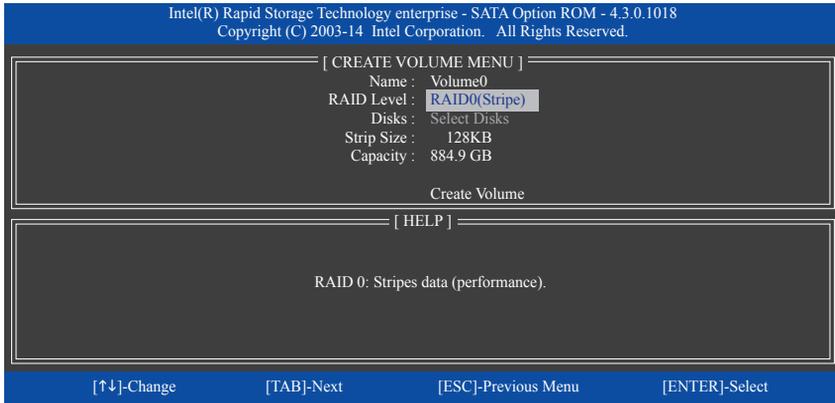


Figure 11

Step 4:

Under **Disks** item, select the hard drives to be included in the RAID array. If only two hard drives are installed, they will be automatically assigned to the array. Set the stripe block size (Figure 12) if necessary. The stripe block size can be set from 4 KB to 128 KB. Once you have selected the stripe block size, press <Enter>.

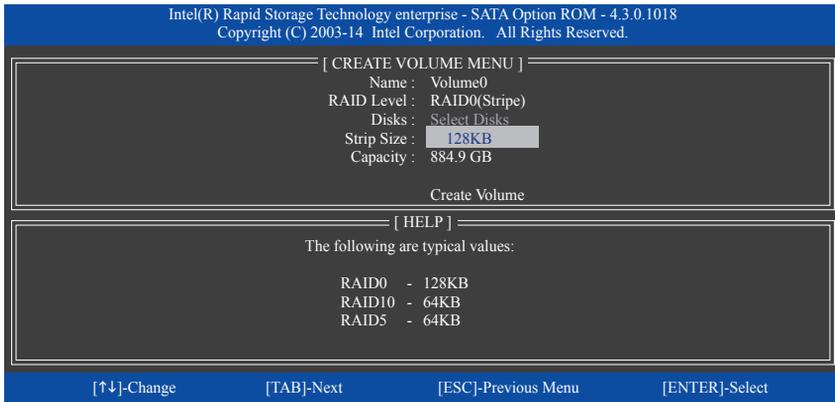


Figure 12

Step 5:

Enter the array capacity and press <Enter>. Finally press <Enter> on the **Create Volume** item to begin creating the RAID array. When prompted to confirm whether to create this volume, press <Y> to confirm or <N> to cancel (Figure 13).

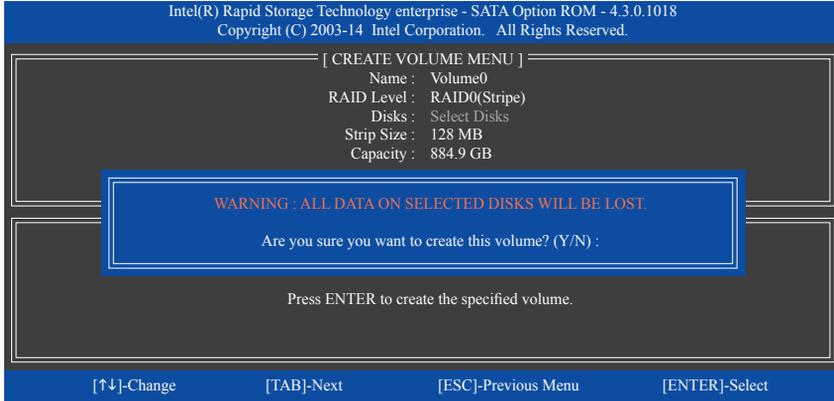


Figure 13

When completed, you can see detailed information about the RAID array in the **DISK/VOLUME INFORMATION** section, including the RAID level, stripe block size, array name, and array capacity, etc. (Figure 14)

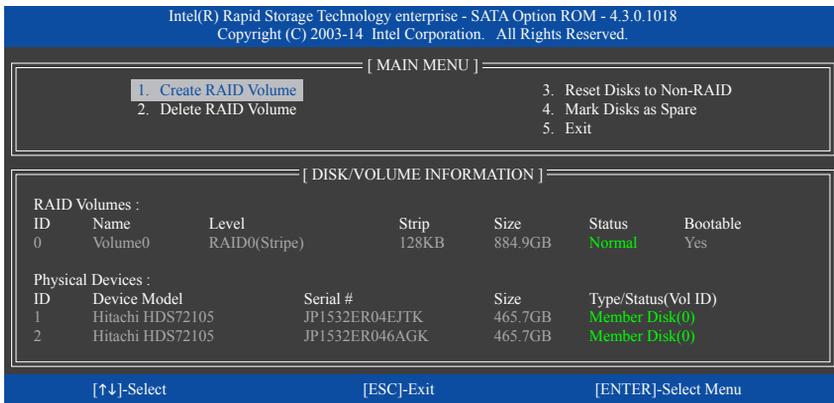


Figure 14

To exit the RAID BIOS utility, press <Esc> or select **5. Exit** in **MAIN MENU**.

Now, you can proceed to install the SATA RAID/AHCI driver and operating system.

Delete RAID Volume

To delete a RAID array, select **Delete RAID Volume** in **MAIN MENU** and press <Enter>. In the **DELETE VOLUME MENU** section, use the up or down arrow key to select the array to be deleted and press <Delete>. When prompted to confirm your selection (Figure 15), press <Y> to confirm or <N> to abort.

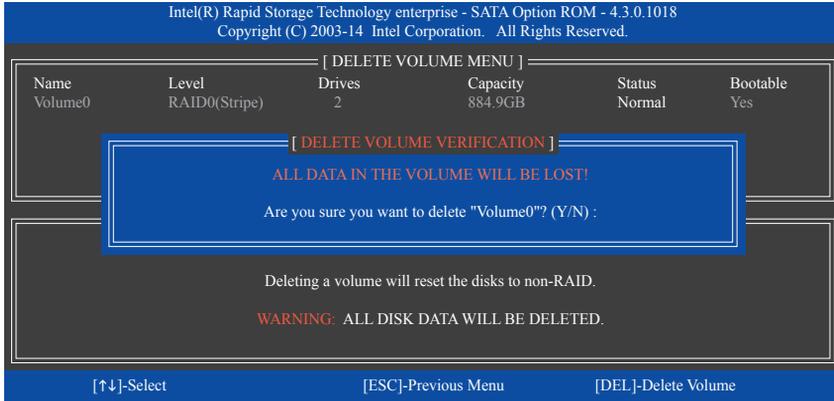


Figure 15

Mark Disk as Spare

If a hard drive in the RAID array is corrupted, the Spare drive will automatically replace the damaged one and the array will be rebuilt. This function is available only in fault-tolerant configurations, such as RAID 1, RAID 5, and RAID 10.

Important guidelines:

- The Spare drive must have equal or greater capacity than the old one.
- The Spare drive is invisible and cannot be used to store data.

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 Intel® 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 **RSTe_f6_iaStorA_win8_64** or **RSTe_f6_iaStorA_win8_32** folder (depending on your OS version) under the **\\Boot\\RSTe_4.3.0.1223_F6-Driver** 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 folder (**RSTe_f6_iaStorA_win8_64** or **RSTe_f6_iaStorA_win8_32**) that you previously copied.

Step 4:

When a screen as shown in Figure 1 appears, select **Intel(R) C600+/C220+ series SATA AHCI Controller (D:\\RSTe_f6_iaStorA_win8_64\\iaAHCI.inf)** and click **Next** to load the driver and continue the OS installation.

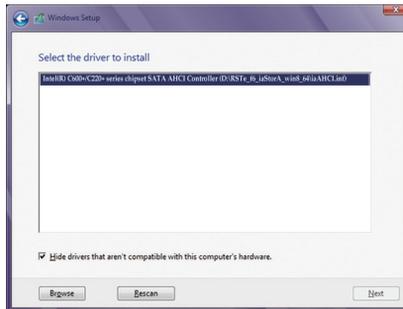


Figure 1

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, RAID 5 or RAID 10 arrays. The procedures below assume a new drive is added to replace a failed drive to rebuild a RAID 1 array. (Note: The new drive must have equal or greater capacity than the old one.)

Turn off your computer and replace the failed hard drive with a new one. Restart your computer.

• Enabling Automatic Rebuild

Step 1:

When the message "Press <Ctrl-> to enter Configuration Utility" appears, press <Ctrl> + <I> to enter the RAID Configuration Utility. The following screen appears after you enter the RAID Configuration Utility.

Intel(R) Rapid Storage Technology enterprise - SATA Option ROM - 4.3.0.1018
Copyright (C) 2003-14 Intel Corporation. All Rights Reserved.

[MAIN MENU]

[DEGRADED VOLUME DETECTED]

"Degraded volume and disk available for rebuilding detected. Selecting a disk initiates a rebuild. Rebuild completes in the operating system.

Select the port of the destination disk for rebuilding (ESC to exit):

ID	Drive Model	Serial #	Size
5	Hitachi HDS721050CLA	JP1532FR046M2K	465.7GB
4	Hitachi HDS72105	JP1532ER04EJTK	465.7GB
5	Hitachi HDS72105	JP1532FR046M2K	465.7GB

[↑↓]-Previous/Next [ENTER]-Select [ESC]-Exit

[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

Step 2:

Select the new hard drive to add into the array to be rebuilt and press <Enter>. The following screen appears, indicating that an automatic rebuild will be performed after you enter the operating system. If you do not enable automatic rebuild on this stage, you have to manually rebuild the array in the operating system (see the next page for more details).

Intel(R) Rapid Storage Technology enterprise - SATA Option ROM - 4.3.0.1018
Copyright (C) 2003-14 Intel Corporation. All Rights Reserved.

[MAIN MENU]

1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Mark Disks as Spare
5. Exit

[DISK/VOLUME INFORMATION]

RAID Volumes :

ID	Name	Level	Strip	Size	Status	Bootable
0	Volume0	RAID1(Mirror)	N/A	442.5GB	Rebuild	Yes

Physical Devices :

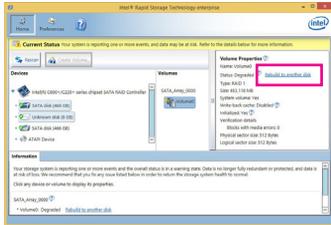
ID	Devices Model	Serial #	Size	Type/Status(Vol ID)
4	Hitachi HDS72105	JP1532ER04EJTK	465.7GB	Member Disk (0)
5	Hitachi HDS72105	JP1532FR046M2K	465.7GB	Non-RAID Disk

Volumes with "Rebuild" status will be rebuilt within the operating system.

[↑↓]-Select [ESC]-Exit [ENTER]-Select Menu

- **Performing the Rebuild in the Operating System**

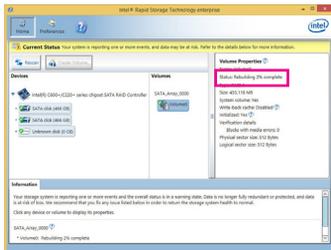
While in the operating system, make sure the chipset driver has been installed from the motherboard driver disk. Then launch the Intel® Rapid Storage Technology enterprise utility from the desktop.



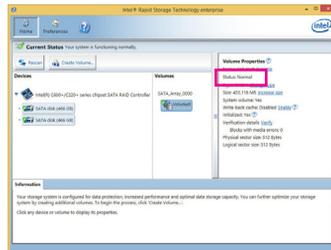
Step 1:
Go to the **Intel® Rapid Storage Technology enterprise** menu and click **Rebuild to another disk in Home**.



Step 2:
Select a new drive to rebuild the RAID and click **Rebuild**.



The **Status** item on the right of the screen displays the rebuild progress.



Step 3:
After the RAID 1 volume rebuilding, the **Status** will display as **Normal**.

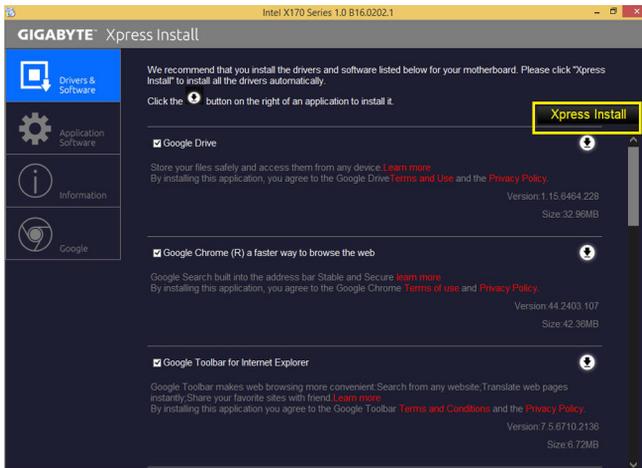
Chapter 4 Drivers Installation



- Before installing the drivers, first install the operating system. (The following instructions use Windows 8.1 as the example 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

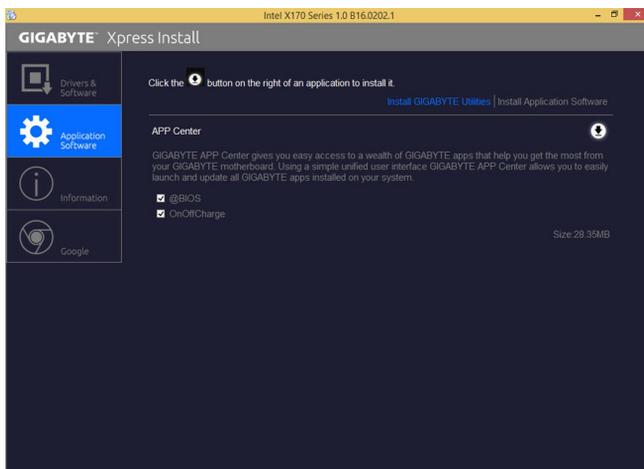
"Xpress Install" will automatically scan your system and then list all of the drivers that are recommended to install. You can click the **Xpress Install** button and "Xpress Install" will install all of the selected drivers. Or click the  icon to individually install the drivers you need.



- 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.

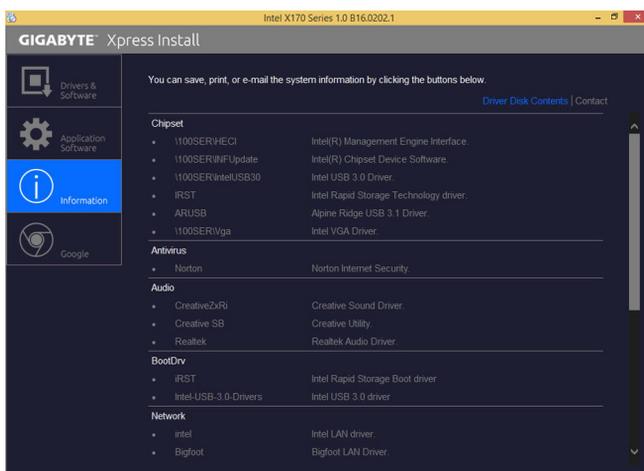
4-2 Application Software

This page displays the apps that GIGABYTE develops and some free software. You can select the apps you want and click the **Install**  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 GIGABYTE 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, 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 and copy the BIOS file to the main BIOS to ensure normal system operation. For the sake of system safety, users cannot update the backup BIOS manually.

What is Q-Flash™?

With Q-Flash you can update the system BIOS without having to enter operating systems like MS-DOS or Windows 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. X170ExtremeECC.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 pressing 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.

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 save the BIOS file to a USB flash drive.

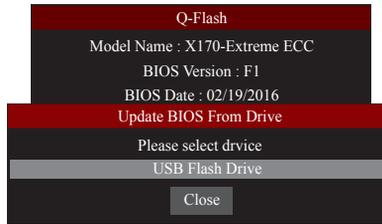
Step 1:

1. Insert the USB flash drive containing the BIOS file into the computer. In the main menu of Q-Flash, select **Update BIOS From Drive**.



- The **Save BIOS to Drive** 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 **USB Flash Drive**.



3. 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 **Quick Update** or **Normal Update** to begin the BIOS update. The screen will then display the update process.



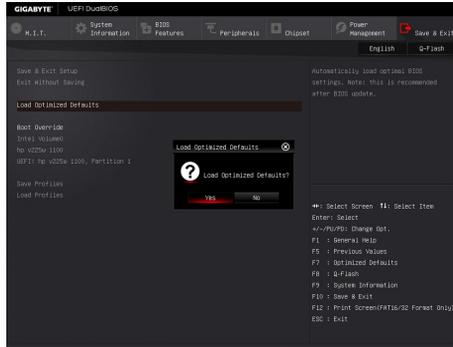
- **Do not turn off or restart the system when the system is reading/updating the BIOS.**
- **Do not remove the USB flash drive or hard drive when the system is updating the BIOS.**

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

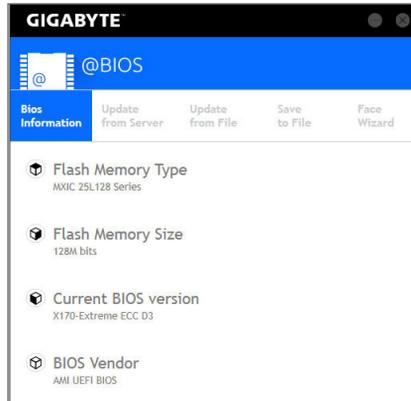
Step 5:

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:

Update from Server

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:

Update from File

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:

Save to File

Click **Save to File** to save the current BIOS file.

4. Change the Boot-up Logo:

Face Wizard

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.

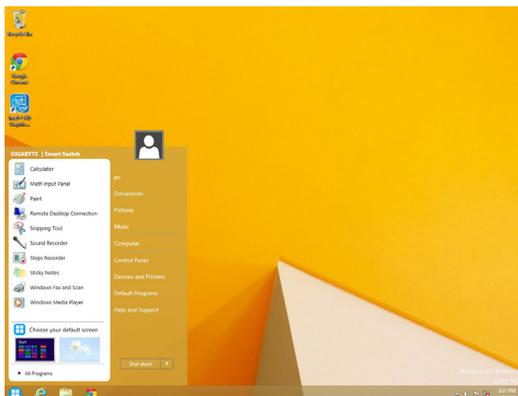


- Make sure that the BIOS file to be flashed matches your motherboard model. Updating the BIOS with an incorrect BIOS file could cause your system not to boot.
- Do not turn off the system or remove the power during the BIOS update process, or the BIOS may corrupt and the system may not boot.

5-2 Smart Switch

GIGABYTE Smart Switch provides you with the conventional Windows start menu, allowing you to easily access to the apps that you frequently use. You can also select the default screen displayed after you enter Windows.

The Smart Switch Interface



Using Smart Switch

The Smart Switch icon  will appear on the bottom left corner of the traditional Windows desktop screen after Smart Switch is installed. Left-click the icon to see the screen as that shown above and you can set the default screen displayed after you enter Windows.

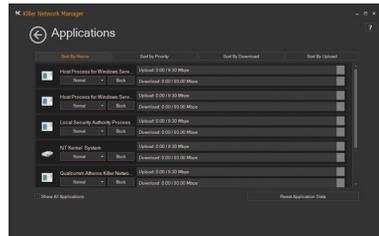
Chapter 6 Appendix

6-1 Killer Network Manager

The Killer Network Manager allows you to view your network connection status and Internet bandwidth and to configure your network settings. After installing the LAN driver, you can access the Killer Network Manager in Apps>Killer Networking>Killer Network Manager or click on the  icon in the notification area.

Applications

On the **Applications** configuration screen, you can set the priority for an application or online game to use the bandwidth to access the Internet. To change the priority, use the drop-down menu below the application's/game's icon to select a priority level. 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.



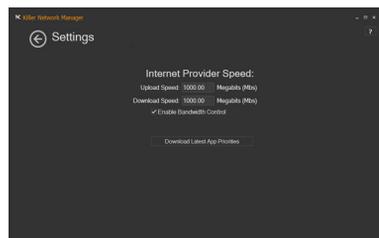
System Performance

This page allows you to view application traffic of your system.



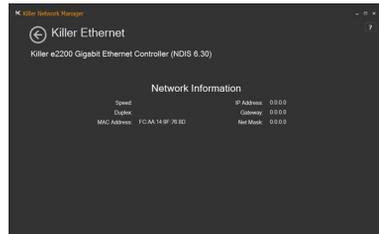
Settings

This page allows you to configure your wired network connection and Internet provider speed.



Killer Ethernet

This page allows you to check the current status of your network connection.

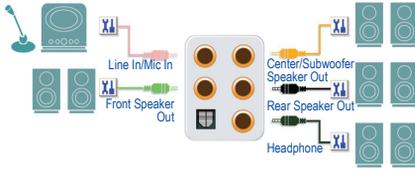


6-2 Configuring Audio Input and Output

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

The motherboard supports 2/5.1-channel audio. Refer to the following for speaker configurations.

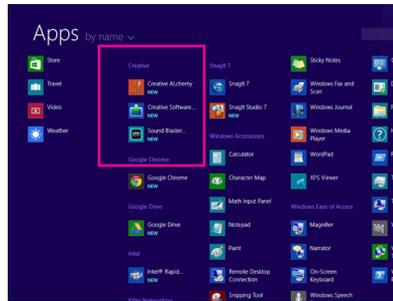
- 2-channel audio: Headphone or Line out.
- 5.1-channel audio: Front speaker out, Rear speaker out, and Center/Subwoofer speaker out.



6-2-2 Creative Software Suite

After installing the audio driver, you can find the Creative Software Suite in Apps>Creative.

The Creative Software Suite includes Creative Alchemy and Sound Blaster Recon3Di.

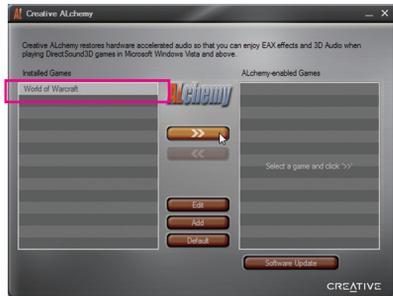


Creative Alchemy

Through the Creative Alchemy, you can enable EAX effects for your games to obtain the most realistic gaming experience.

Steps:

Go to Apps>Creative to launch Creative Alchemy. On the left panel, select the game for which you want to enable the EAX effects and add it to the right panel. You will see the EAX effects are enabled when the game is launched.



Sound Blaster Recon3Di

To launch the Sound Blaster Recon3Di Control Panel, go to Apps>Creative and select **Sound Blaster Recon3Di Control Panel** or click the  icon in the notification area.

SBX PRO STUDIO:

Click the SBX PRO STUDIO icon to enable or disable it. The sliders on the right side allow you to adjust the enhancement level for each feature.

- **Surround:**
Provides immersion control to enhance the natural sense of audio depth and spaciousness by creating virtual surround sound channels.
- **Crystalizer:**
Makes the music sound as good as the artist originally intended and adds an enhanced level of realism for movies and games.
- **Bass:**
This feature is available only when a stereo speaker or headphone is installed. It fills in the missing low frequency tones and gives the extra impact for a better entertainment experience. The Crossover Frequency feature is available only when a 2-channel stereo speaker system is installed.
- **Smart Volume:**
Addresses the problem of abrupt volume level changes during playback and between songs by automatically and continuously measuring volume, and intelligently applying gain and attenuation to compensate for those changes.
- **Dialog Plus:**
Enhances the voices in movies for clearer dialog, allowing the listener to hear the dialog over the rest of the soundtrack and over ambient noise in the listening environment.



CRYSTALVOICE:

This page allows you to select a recording device and adjust microphone volume/boost and related settings. It also allows you to configure CrystalVoice features.

- **FX:**
Morphs your voice into different characters and accents.
- **Smart Volume:**
Automatically adjusts the loudness of the speaker's voice to maintain a consistent volume level.
- **Noise Reduction:**
Eliminates unwanted background noise in your conversations.
- **Acoustic Echo Cancellation:**
Eliminates echoes that interfere with your conversation.



SCOUT MODE:

This page allows you to enable or disable Scout Mode. This feature enables you to hear your opponents from further away in FPS games, giving you a distinct tactical advantage in combat. You can set hot keys which can be used enable or disable this feature during games.



SPEAKERS/HEADPHONES:

This page allows you to set the output device to speakers or headphones and set up your speaker/headphone configurations. (Note: Speakers and headphones cannot be used at the same time. When the headphone function is selected, the sound will come out only from the front line out or rear headphone jack.)

Speaker/Headphone Configurations:

Depending on the connected devices, you can select **5.1 Surround**, **Stereo**, or **Headphones**. If a 5.1-channel configuration is set, you can cancel or open a specific speaker manually.



MIXER:

This page allows you to increase or decrease the playback and recording volumes for your input/output device.



EQUALIZER:

This panel allows you to adjust the strength of certain frequencies for your audio signals.



ADVANCED FEATURES:

This page allows you to play stereo mix to digital output. You can output the mixed audio signals simultaneously to the speakers and S/PDIF out to obtain 2-channel sound.

Note: When using this feature, the default playback device must be set to **Speaker**, not **SPDIF Out** in Windows Control Panel.



Other Features:

The **Profile** button allows you to save your settings on the **SPEAKERS/HEADPHONES**, **MIXER**, or **ADVANCED FEATURES** page to a profile. You can export your custom settings and share them with others or import others' custom settings.



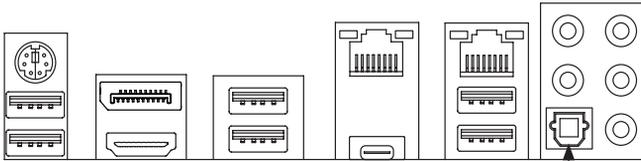
(Note) For more information on Sound Blaster Recon3Di, please visit the [CREATIVE® website](http://www.creative.com).

6-2-3 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.

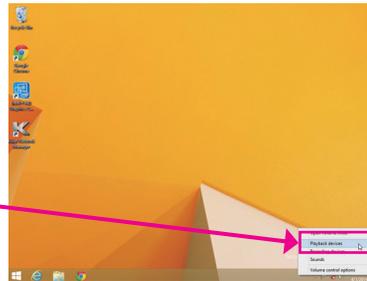


Connects to a S/PDIF optical cable

2. Configuring S/PDIF Out:

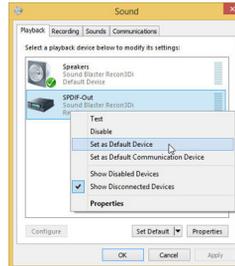
Step 1:

While in the operating system, right-click on the  icon in the notification area and select **Playback devices**.



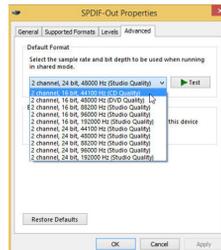
Step 2:

On the **Playback** tab, right-click on **SPDIF Out**, select **Set as Default Device**, and then open the **Properties** dialog box.



Step 3:

You can go to the **Supported Formats** tab to select the formats to be decoded or the **Advanced** tab to select the sample rate and bit depth.



6-2-4 Configuring Audio Recording

You can record the sound from the microphone or Line in device or record the sound from your computer.

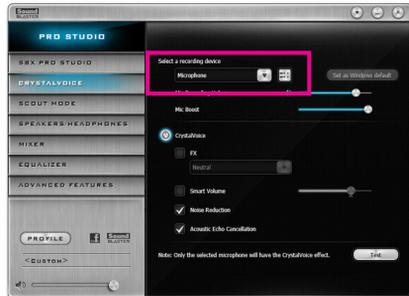
1. Configuring your microphone:

Step 1:

Connect your microphone to the Mic in jack on the back panel or the Mic in jack on the front panel.

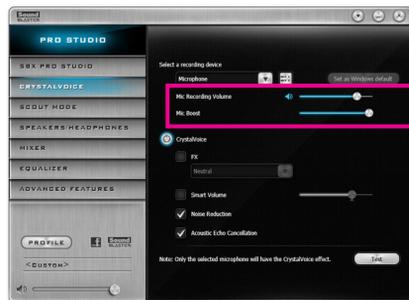
Note: The microphone functions on the front panel and back panel cannot be used at the same time.

Open the **Sound Blaster Recon3Di** control panel and go to the **CRYSTALVOICE** page. Make sure your microphone is correctly connected.



Step 2:

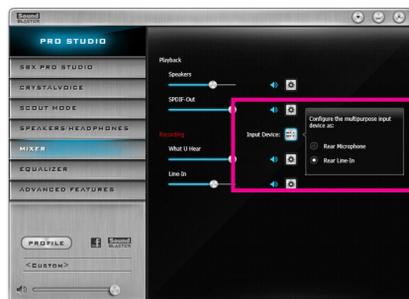
To hear the sound being recorded during the recording process, it is recommended that you set the **Mic volume** at a middle level. Do not mute the recording volume, or you'll not be able to record the sound. To raise the recording and playback volume for the microphone, use the **Mic Boost** slider and set the microphone boost level.



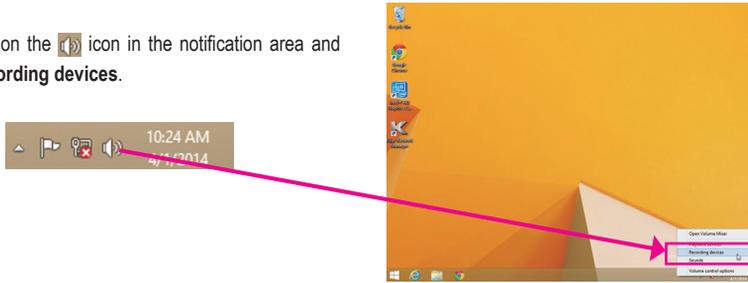
2. Configuring your Line in device:

Step 1:

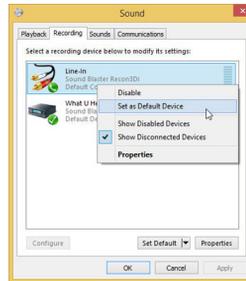
Open the **Sound Blaster Recon3Di** control panel and go to the **MIXER** page. In the **Recording** section, click the **Input Device** icon and select **Rear Line-In**. Later you can use the **Line-In** slider to set the volume.



Step 2:
Right-click on the  icon in the notification area and select **Recording devices**.

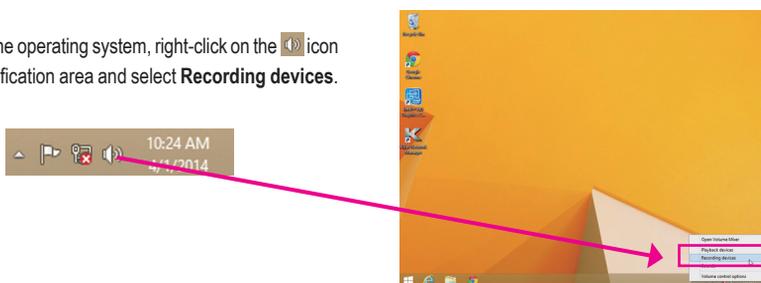


Step 3:
On the **Recording** tab, right-click on **Line-In**, and select **Set as Default Device**.

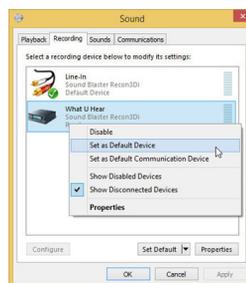


3. Recording the sound from your computer:

Step 1:
While in the operating system, right-click on the  icon in the notification area and select **Recording devices**.



Step 2:
On the **Recording** tab, right-click on **What U Hear** and select **Set as Default Device**.



Step 3:

Open the Sound Blaster Recon3Di Control Panel and go to the **Mixer** page. In the **REC** section, you can use the **What U Hear** slider to set the volume.



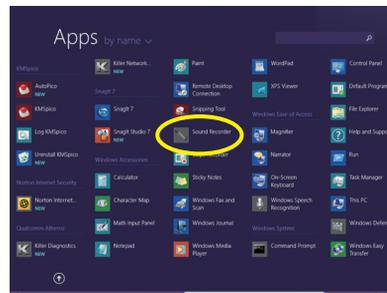
Step 4:

To open the **Sound Recorder**, move the mouse cursor to the bottom left corner of the screen, click the **Start** icon to switch to the **Start** screen (or press the Windows button on the keyboard). Click the **Apps** icon on the bottom left corner of the screen to access the **Apps** screen.



Step 5:

On this screen, click **Sound Recorder** for audio recording.



6-2-5 Using the Sound Recorder



A. Recording Sound

1. Make sure you have connected the sound input device (e.g. microphone) to the computer.
2. To record the audio, click the **Start Recording** button .
3. To stop recording audio, click the **Stop Recording** button .

Be sure to save the recorded audio file upon completion.

B. Playing the Recorded Sound

You can play your recording in a digital media player program that supports your audio file format.

6-3 Troubleshooting

6-3-1 Frequently Asked Questions

To read more FAQs for your motherboard, please go to the **SupportFAQ** 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?

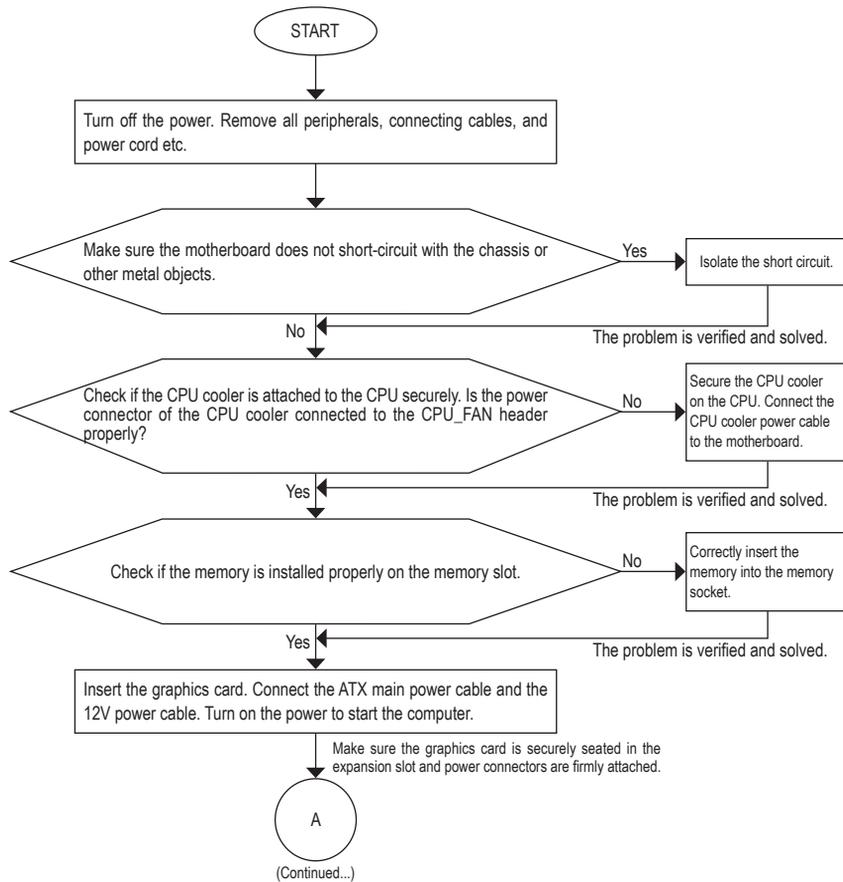
A: For motherboards that have a Clear CMOS button, press this button to clear the CMOS values (before doing this, please turn off the computer and unplug the power cord). For motherboards that have a Clear CMOS jumper, refer to the instructions in Chapter 1 to short the jumper to clear the CMOS values. 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.

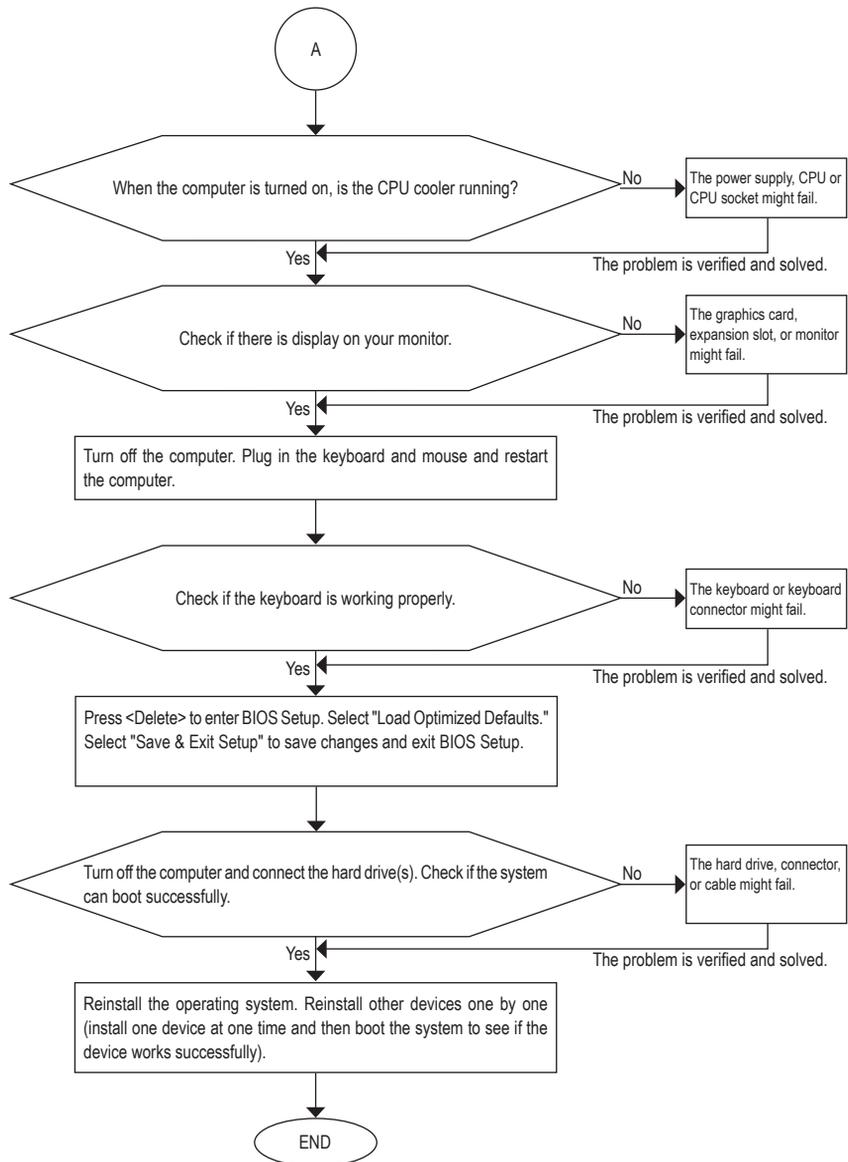
Q: Why do I still get a weak sound even though I have turned my speaker to the maximum volume?

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.





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 AML 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)

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, uses, and can radiate 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.

Canada, Industry Canada (IC) Notices / Canada, avis d'Industry Canada (IC)

- ◆ This Class B digital apparatus complies with Canadian ICES-003 and RSS-210.
- ◆ 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.
- ◆ Cet appareil numérique de classe B est conforme aux normes canadiennes ICES-003 et RSS-210.
- ◆ Son fonctionnement est soumis aux deux conditions suivantes : (1) cet appareil ne doit pas causer d'interférence et (2) cet appareil doit accepter toute interférence, notamment les interférences qui peuvent affecter son fonctionnement.



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>

- **Giga-Byte Technology B.V. - The Netherlands**

WEB address : <http://www.giga-byte.nl>

- **GIGABYTE TECHNOLOGY FRANCE - France**

WEB address : <http://www.gigabyte.fr>

- **Sweden**

WEB address : <http://www.gigabyte.se>

- **Italy**

WEB address : <http://www.giga-byte.it>

- **Spain**

WEB address : <http://www.giga-byte.es>

- **Greece**

WEB address : <http://www.gigabyte.com.gr>

- **Czech Republic**

WEB address : <http://www.gigabyte.cz>

- **Hungary**

WEB address : <http://www.giga-byte.hu>

- **Turkey**

WEB address : <http://www.gigabyte.com.tr>

- **Russia**

WEB address : <http://www.gigabyte.ru>

- **Poland**

WEB address : <http://www.gigabyte.pl>

- **Ukraine**

WEB address : <http://www.gigabyte.ua>

- **Romania**

WEB address : <http://www.gigabyte.com.ro>

- **Serbia**

WEB address : <http://www.gigabyte.co.rs>

- **Kazakhstan**

WEB address : <http://www.gigabyte.kz>

- **GIGABYTE eSupport**

To submit a technical or non-technical (Sales/Marketing) question, please link to:

<http://esupport.gigabyte.com>

