

GA-X99-UD3

User's Manual

Rev. 1001

12ME-X99UD3-1001R



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-X99-UD3**

conforms with the essential requirements of the following directives:

2004/108/EC EMC Directive:

- | | |
|--|---------------------------|
| <input checked="" type="checkbox"/> Conduction & Radiated Emissions: | EN 55022:2010 |
| <input checked="" type="checkbox"/> Immunity: | EN 55024:2010 |
| <input checked="" type="checkbox"/> Power-line harmonics: | EN 61000-3-2:2006+A2:2009 |
| <input checked="" type="checkbox"/> Power-line flicker: | EN 61000-3-3:2008 |

2006/95/EC LVD Directive

- | | |
|---|-------------------------|
| <input checked="" type="checkbox"/> Safety: | EN60950-1:2006+A12:2011 |
|---|-------------------------|

2011/65/EU RoHS Directive

- | | |
|---|--|
| <input checked="" type="checkbox"/> 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: Aug. 22, 2014

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-X99-UD3

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: Aug. 22, 2014

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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:

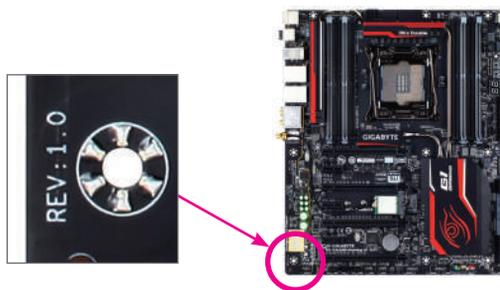


Table of Contents

Box Contents	6
Optional Items	6
GA-X99-UD3 Motherboard Layout	7
GA-X99-UD3 Motherboard Block Diagram.....	8
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 4 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.....	21
1-8 Internal Connectors.....	23
Chapter 2 BIOS Setup	37
2-1 Startup Screen	38
2-2 The Main Menu	39
2-3 M.I.T.	42
2-4 System Information	54
2-5 BIOS Features	55
2-6 Peripherals	58
2-7 Chipset.....	59
2-8 Power Management.....	62
2-9 Save & Exit.....	64

Chapter 3 Configuring SATA Hard Drive(s).....	65
3-1 Configuring SATA Controllers.....	65
3-2 Installing the SATA RAID/AHCI Driver and Operating System.....	77
Chapter 4 Appendix.....	81
Drivers Installation.....	81
Regulatory Statements.....	82
Contact Us	87

Box Contents

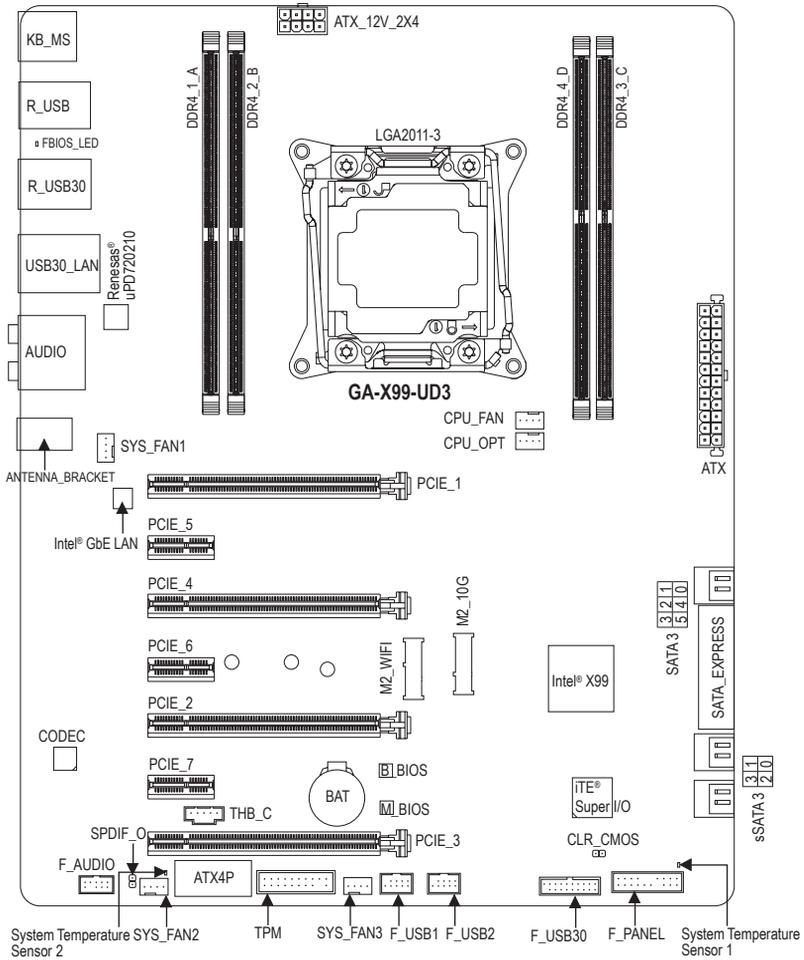
- GA-X99-UD3 motherboard
- Motherboard driver disk
- User's Manual
- Quick Installation Guide
- Four SATA cables
- I/O Shield
- One 2-Way SLI bridge connector
- One 2-Way CrossFire bridge connector

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.

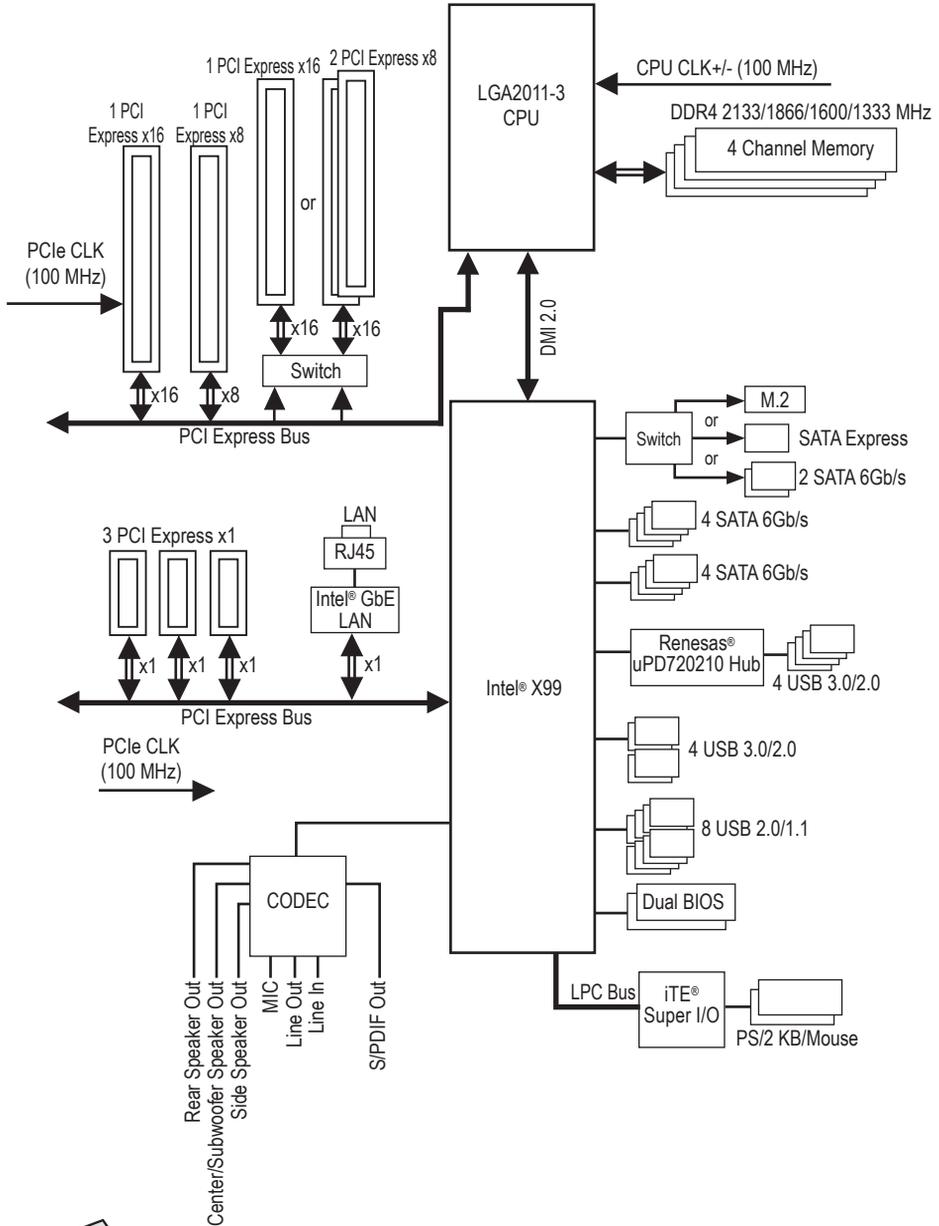
Optional Items

- 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)
- 3-Way SLI bridge connector (GC-3SLI) (Part No. 5C3SLI-00-10*)
- 3-Way SLI bridge connector (GC-3SLI-X99) (Part No. 5C3SLIX99-00-10*)
- 4-Way SLI bridge connector (GC-4SLI) (Part No. 5C4SLI-00-10*)

GA-X99-UD3 Motherboard Layout



GA-X99-UD3 Motherboard Block Diagram



For detailed product information/limitation(s), refer to "1-2 Product Specifications."

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 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 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.

1-2 Product Specifications

 CPU	<ul style="list-style-type: none"> ◆ Support for Intel® Core™ i7 processors in the LGA2011-3 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® X99 Express 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. ◆ 4 channel memory architecture ◆ Support for DDR4 2133/1866/1600/1333 MHz memory modules ◆ Support for non-ECC memory modules ◆ Support for Extreme Memory Profile (XMP) memory modules ◆ Support for RDIMM 1Rx8 memory modules (operate in non-ECC mode) (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
 Audio	<ul style="list-style-type: none"> ◆ Realtek® ALC1150 codec ◆ High Definition Audio ◆ 2/4/5.1/7.1-channel ◆ Support for S/PDIF Out
 LAN	<ul style="list-style-type: none"> ◆ Intel® GbE LAN chip (10/100/1000 Mbit)
 Expansion Slots	<ul style="list-style-type: none"> ◆ 2 x PCI Express x16 slots, running at x16 (PCIE_1, PCIE_2) <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 PCIE_1 slot; if you are installing two PCI Express graphics cards, it is recommended that you install them in the PCIE_1 and PCIE_2 slots. ◆ 2 x PCI Express x16 slots, running at x8 (PCIE_3, PCIE_4) <ul style="list-style-type: none"> * The PCIE_4 slot shares bandwidth with the PCIE_1 slot. When the PCIE_4 slot is populated, the PCIE_1 slot will operate at up to x8 mode. * When an i7-5820K CPU is installed, the PCIE_2 slot operates at up to x8 mode and the PCIE_3 operates at up to x4 mode. <p>(All PCI Express x16 slots conform to PCI Express 3.0 standard.)</p> <ul style="list-style-type: none"> ◆ 3 x PCI Express x1 slots <p>(The PCI Express x1 slots conform to PCI Express 2.0 standard.)</p> <ul style="list-style-type: none"> ◆ 1 x M.2 Socket 1 connector for the wireless communication module (M2_WIFI)
 Multi-Graphics Technology	<ul style="list-style-type: none"> ◆ Support for 4-Way/3-Way/2-Way AMD CrossFire™/NVIDIA® SLI™ technology <ul style="list-style-type: none"> * The 4-Way NVIDIA® SLI™ configuration is not supported when an i7-5820K CPU is installed. To set up a 3-Way SLI configuration, refer to "1-6 Setting up AMD CrossFire™/NVIDIA® SLI™ Configuration."
 Storage Interface	<ul style="list-style-type: none"> ◆ Chipset: <ul style="list-style-type: none"> - 1 x M.2 Socket 3 connector (M2_10G) - 1 x SATA Express connector - 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"> * Only AHCI mode is supported when an M.2 PCIe SSD or a SATA Express device is installed. <p>(M2_10G, SATA Express, and SATA3 4/5 connectors can only be used one at a time. The SATA3 4/5 connectors will become unavailable when an M.2 SSD is installed in the M2_10G connector.)</p>

	Storage Interface	<ul style="list-style-type: none"> ◆ Chipset: <ul style="list-style-type: none"> - 4 x SATA 6Gb/s connectors (sSATA3 0~3), supporting IDE and AHCI modes only (An operating system installed on the SATA3 0~5 ports cannot be used on the sSATA3 0~3 ports.)
	USB	<ul style="list-style-type: none"> ◆ Chipset: <ul style="list-style-type: none"> - 4 x USB 3.0/2.0 ports (2 ports on the back panel, 2 ports available through the internal USB header) - 8 x USB 2.0/1.1 ports (4 ports on the back panel, 4 ports available through the internal USB headers) ◆ Chipset + Renesas® uPD720210 USB 3.0 Hub: <ul style="list-style-type: none"> - 4 x USB 3.0/2.0 ports on the back panel
	Internal Connectors	<ul style="list-style-type: none"> ◆ 1 x 24-pin ATX main power connector ◆ 1 x 8-pin ATX 12V power connector ◆ 1 x PCIe power connector ◆ 1 x M.2 Socket 3 connector ◆ 1 x SATA Express connector ◆ 10 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 ◆ 1 x USB 3.0/2.0 header ◆ 2 x USB 2.0/1.1 headers ◆ 1 x Trusted Platform Module (TPM) header ◆ 1 x Thunderbolt add-in card connector ◆ 1 x Clear CMOS jumper
	Back Panel Connectors	<ul style="list-style-type: none"> ◆ 1 x PS/2 keyboard port ◆ 1 x PS/2 mouse port ◆ 6 x USB 3.0/2.0 ports ◆ 4 x USB 2.0/1.1 ports ◆ 1 x RJ-45 port ◆ 1 x optical S/PDIF Out connector ◆ 5 x audio jacks (Center/Subwoofer Speaker Out, Rear Speaker Out, Line In, Line Out, Mic In) ◆ 2 x Wi-Fi antenna connector holes
	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™ ◆ Support for Q-Flash Plus ◆ 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 differ by motherboard model. Supported functions of each application may also differ depending on motherboard specifications. - @BIOS - Ambient LED - EasyTune - EZ Setup - Fast Boot - Cloud Station - ON/OFF Charge - Smart TimeLock - Smart Recovery 2 - System Information Viewer - USB Blocker - V-Tuner ◆ 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 ◆ cFosSpeed
	Operating System	<ul style="list-style-type: none"> ◆ Support for Windows 8.1/8/7
	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 the [Support & Downloads\Utility](#) page on GIGABYTE's website to check the supported operating system(s) for the software listed in the "Unique Features" and "Bundled Software" columns.

1-3 Installing the CPU and CPU Cooler

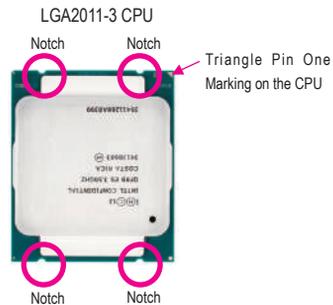
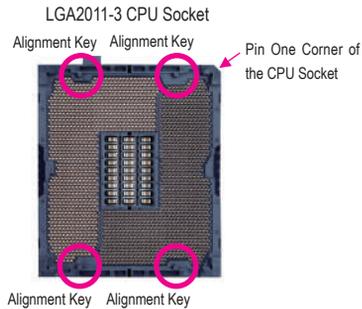
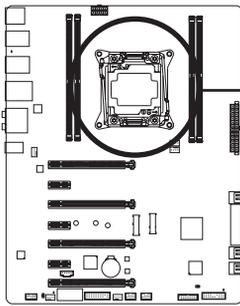


Read the following guidelines before you begin to install the CPU:

- 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

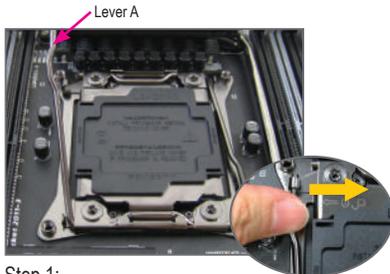
A. Locate the alignment keys on the motherboard CPU socket and the notches on the CPU.



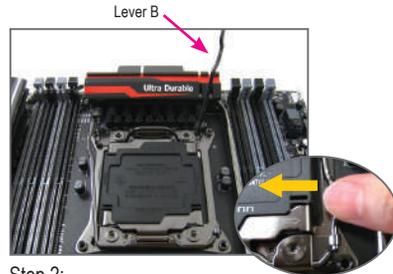
B. Follow the steps below to correctly install the CPU into the motherboard CPU socket.



- 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.



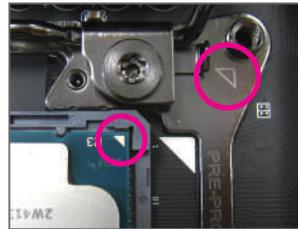
Step 1:
Push the lever closest to the "unlock" mark "☐" (below referred as lever A) down and away from the socket to release it.



Step 2:
Push the lever closest to the "lock" mark "☐" (below referred as lever B) down and away from the socket. Then lift the lever.



Step 3:
Gently press lever A to allow the load plate to rise. Open the load plate. Note: DO NOT touch the socket contacts after the load plate is opened.



Step 4:
Hold the CPU with your thumb and index fingers. Align the CPU pin one mark (triangle) with the triangle mark on metal socket frame and carefully insert the CPU into the socket vertically.



Step 5:
Once the CPU is properly inserted, carefully replace the load plate. Then secure lever B under its retention tab.



Step 6:
Finally, secure lever A under its retention tab to complete the installation of the CPU. Then carefully remove the plastic cover. Save it properly and always replace it when the CPU is not installed.

1-3-2 Installing the CPU Cooler

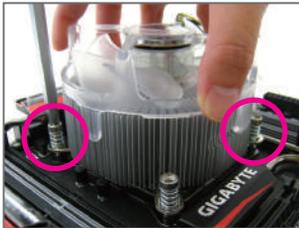
Refer to the steps below to correctly install the CPU cooler on the motherboard. (Actual installation process may differ depending the CPU cooler to be used. Refer to the user's manual for your CPU cooler.)



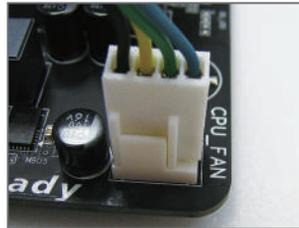
Step 1:
Apply an even and thin layer of thermal grease on the surface of the installed CPU.



Step 2:
Place the cooler atop the CPU, aligning the four mounting screws with the mounting holes on the ILM.



Step 3:
Use one hand to hold the cooler and the other to tighten the screws in a diagonal sequence with a screw driver. Begin tightening a screw with a few turns and repeat with the screw diagonally opposite the one you just tightened. Then do the same to the other pair. Next, fully tighten the four screws.



Step 4:
Finally, attach the power connector of the CPU cooler to the CPU fan header (CPU_FAN) on the motherboard.



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

1-4 Installing the Memory



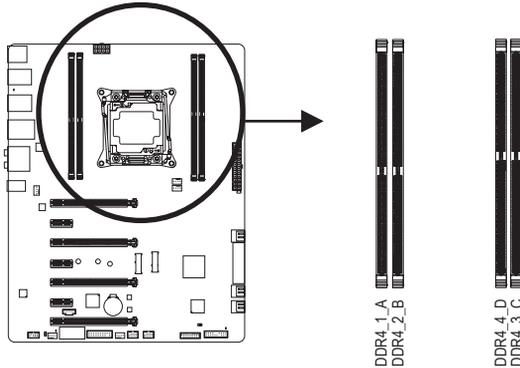
Read the following guidelines before you begin to install the memory:

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

1-4-1 4 Channel Memory Configuration

This motherboard provides four DDR4 memory sockets and supports 4 Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity of the memory. The four DDR4 memory sockets are divided into four channels and each channel has one memory socket as following:

- ▶▶ Channel A: DDR4_1_A
- ▶▶ Channel B: DDR4_2_B
- ▶▶ Channel C: DDR4_3_C
- ▶▶ Channel D: DDR4_4_D



▶▶ Refer to the table below for memory installation according to the number of the memory modules you want to install:

	DDR4_1_A	DDR4_2_B	DDR4_4_D	DDR4_3_C
1 Module	--	●	--	--
2 Modules	--	●	●	--
4 Modules	●	●	●	●

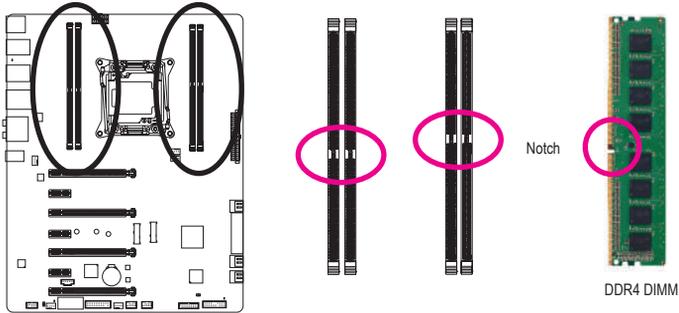
Note 1: If you are using a RDIMM memory, make sure it is a 1Rx8 one.

Note 2: To ensure memory compatibility, we do not recommend that you install RDIMM and UDIMM memory at the same time.

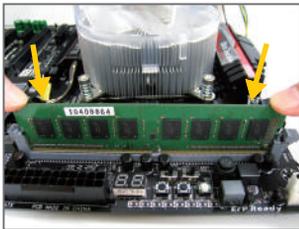
1-4-2 Installing a Memory



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.

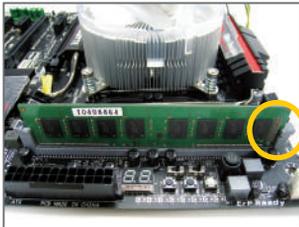


A DDR4 memory module has a notch, so it can only fit in one direction. Follow the steps below to correctly install your memory modules in the memory sockets.



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:

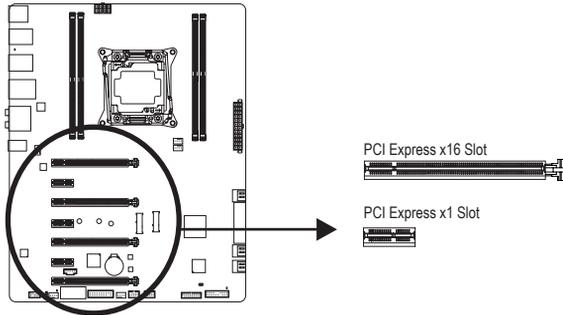
The clip at the right end of the socket will snap into place when the memory module is securely inserted.

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 8.1/8/7 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/4-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. Current GPUs that support 3-Way/4-Way SLI™ technology include the NVIDIA® 8800 GTX, 8800 Ultra, 9800 GTX, GTX 260, GTX 280, GTX 470, GTX 480, GTX 570, GTX 580, GTX 590, and GTX 600 series.) For the latest GPU support information, please refer to the AMD/NVIDIA® website.) ^(Note 1)
- CrossFire^(Note 2)/SLI^(Note 3) bridge connectors
- A power supply with sufficient power is recommended (Refer to the manual of your graphics cards for the power requirement)

B. Connecting the Graphics Cards

Step 1:

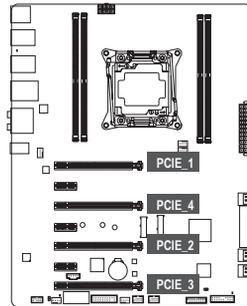
Observe the steps in "1-5 Installing an Expansion Card" and install CrossFire/SLI graphics cards on the PCI Express x16 slots.

Step 2:

Insert the CrossFire^(Note 2)/SLI bridge connectors in the CrossFire/SLI gold edge connectors on top of the cards.

Step 3:

Plug the display cable into the graphics card on the PCIE_1 slot.



►► Refer to the table below when an i7-5960X or i7-5930K CPU is installed:

	1 Graphics Card	2 Graphics Cards	3 Graphics Cards	4 Graphics Cards
PCIE_1	●	●	●	●
PCIE_4	--	--	--	●
PCIE_2	--	●	●	●
PCIE_3	--	--	●	●



To set up a 3-Way SLI configuration, use the GC-3SLI-X99 bridge connector.

►► Refer to the table below for setting up a 3-Way SLI configuration with an i7-5820K CPU. Make sure to use the GC-3SLI bridge connector.

	1 Graphics Card	2 Graphics Cards	3 Graphics Cards
PCIE_1	●	●	●
PCIE_4	--	--	●
PCIE_2	--	●	●
PCIE_3	--	--	--

(Note 1) The 4-Way SLI configuration is not supported when an i7-5820K CPU is installed.

(Note 2) The bridge connector(s) may be needed or not depending on your graphics cards.

(Note 3) The 3-Way and 4-Way bridge connectors are optional.



- 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.
- When two or more graphics cards are installed, we recommend that you connect the power cable from the power supply to the ATX4P connector to ensure system stability.

C. Configuring the Graphics Card Driver

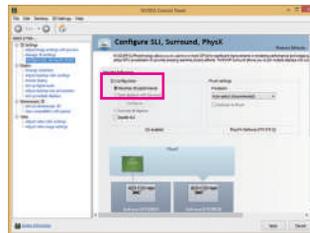
C-1. To Enable CrossFire Function

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.)

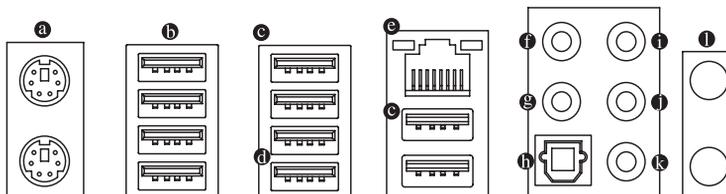


C-2. To Enable SLI Function

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.



1-7 Back Panel Connectors



a PS/2 Keyboard and PS/2 Mouse Port

Use the upper port (green) to connect a PS/2 mouse and the lower port (purple) to connect a PS/2 keyboard.

b USB 2.0/1.1 Port

The USB port supports the USB 2.0/1.1 specification. Use this port for USB devices such as a USB keyboard/mouse, USB printer, USB flash drive and etc.

c USB 3.0/2.0 Port

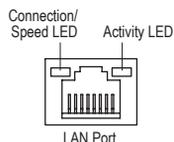
The USB 3.0 port supports the USB 3.0 specification and is compatible to the USB 2.0/1.1 specification. Use this port for USB devices such as a USB keyboard/mouse, USB printer, USB flash drive and etc.

e USB 3.0/2.0 Port (White)

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 such as a USB keyboard/mouse, USB printer, USB flash drive and etc. Before using Q-Flash Plus, make sure to insert the USB flash drive into this port first.

e RJ-45 LAN Port

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



Connection/Speed LED:

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

Activity LED:

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

f Center/Subwoofer Speaker Out Jack (Orange)

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

g Rear Speaker Out Jack (Black)

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

h 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.

i Line In Jack (Blue)

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



- 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 **Line Out Jack (Green)**

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

❷ **Mic In Jack (Pink)**

The Mic in jack. Microphones must be connected to this jack.

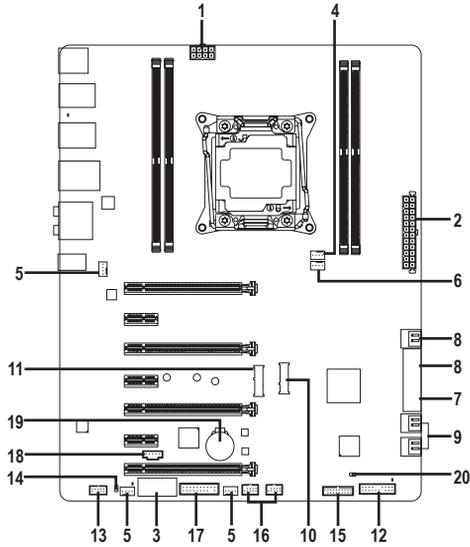
❸ **Wi-Fi Antenna Connector Holes**

Secure the antenna connectors, washers, and nuts onto the holes.



The audio jacks can be reconfigured to perform different functions via the audio software (supported functions may vary based on hardware specification). If you install a Side Speaker, you need to retask other audio jack to be Side Speaker out. Only microphones still **MUST** be connected to the default Mic in jack.

1-8 Internal Connectors



1)	ATX_12V_2X4	11)	M2_WIFI
2)	ATX	12)	F_PANEL
3)	ATX4P	13)	F_AUDIO
4)	CPU_FAN	14)	SPDIF_O
5)	SYS_FAN1/2/3	15)	F_USB30
6)	CPU_OPT	16)	F_USB1/F_USB2
7)	SATA_EXPRESS	17)	TPM
8)	SATA3 0/1/2/3/4/5	18)	THB_C
9)	sSATA3 0/1/2/3	19)	BAT
10)	M2_10G	20)	CLR_CMOS



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.

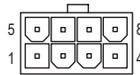
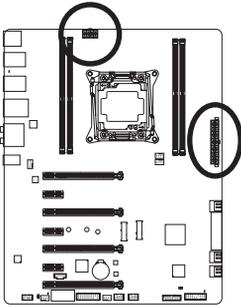
1/2) ATX_12V_2X4/ATX (2x4 12V Power Connector and 2x12 Main Power Connector)

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.



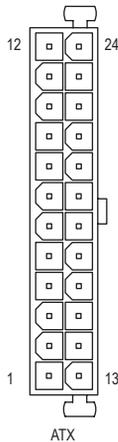
To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power supply is used that does not provide the required power, the result can lead to an unstable or unbootable system.



ATX_12V_2X4

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

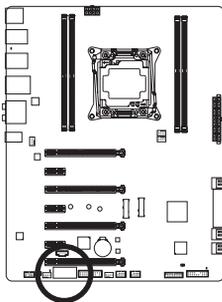


ATX:

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) ATX4P (PCIe Power Connector)

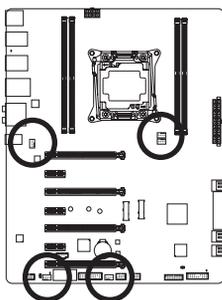
The power connector provide auxiliary power to the onboard PCI Express x16 slots. When two or more graphics cards are installed, we recommend that you connect the power cable from the power supply to the ATX4P connector to ensure system stability.



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

4/5) 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

CPU_FAN:

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



SYS_FAN1



SYS_FAN2/3

SYS_FAN1/2/3:

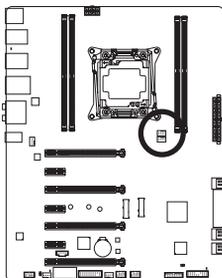
Pin No.	Definition
1	GND
2	Speed Control
3	Sense
4	VCC



- 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.

6) CPU_OPT (Water Cooling CPU Fan Header)

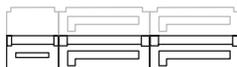
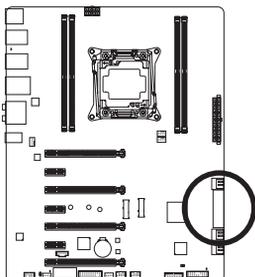
The fan header is 4-pin and possesses a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The speed control function requires the use of a fan with fan speed control design.



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

7) SATA_EXPRESS (SATA Express Connector)

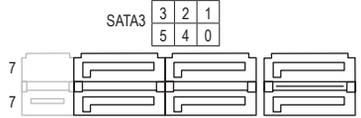
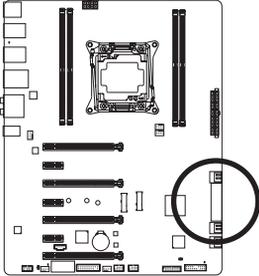
The SATA Express connector supports a single SATA Express device.



M2_10G, SATA Express, and SATA3 4/5 connectors can only be used one at a time. The SATA3 4/5 connectors will become unavailable when an M.2 SSD is installed.

8) SATA3 0/1/2/3/4/5 (SATA 6Gb/s Connectors)

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



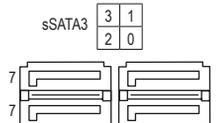
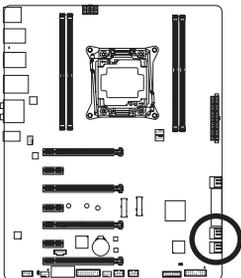
Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND



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

9) sSATA3 0/1/2/3 (SATA 6Gb/s Connectors)

The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standards. Only AHCI and IDE modes are supported. Each SATA connector supports a single SATA device.



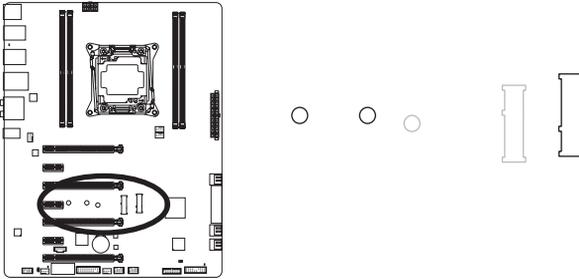
Pin No.	Definition
1	GND
2	TXP
3	TXN
4	GND
5	RXN
6	RXP
7	GND



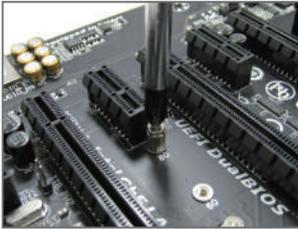
To enable hot-plugging for the SATA ports, refer to Chapter 2, "BIOS Setup," "Chipset\PCH sSATA Configuration," for more information.

10) M2_10G (M.2 Socket 3 Connector)

You can insert an M.2 SSD into this connector.



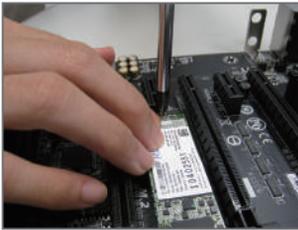
Follow the steps below to correctly install an M.2 SSD in the M2_10G connector.



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 oblique angle.



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



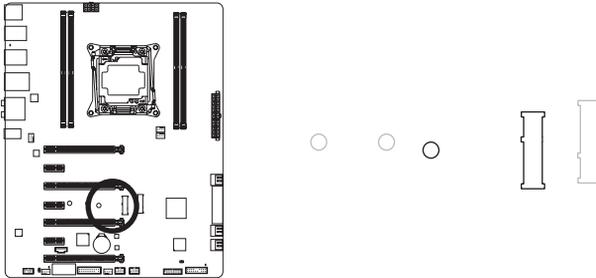
Step 4:
The installation is completed, as shown in the picture above.



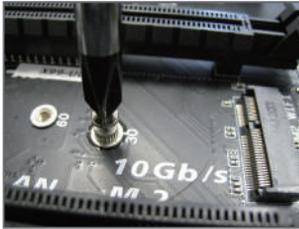
- On the motherboard there are two length adjustment holes for the M.2 SSD. Select the proper hole for the M.2 SSD to be installed and refasten the screw and nut.
- M2_10G, SATA Express, and SATA3 4/5 connectors can only be used one at a time. The SATA3 4/5 connectors will become unavailable when an M.2 SSD is installed.

11) M2_WIFI (M.2 Socket 1 Connector)

You can insert an M.2 Wi-Fi module into this connector.



Follow the steps below to correctly install an M.2 Wi-Fi module in the M.2 Wi-Fi connector.



Step 1:
Use a screw driver to unfasten the screw from the motherboard.



Step 2:
Slide the M.2 Wi-Fi module into the connector at an oblique angle.



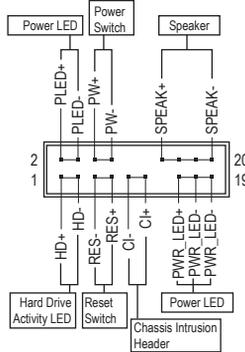
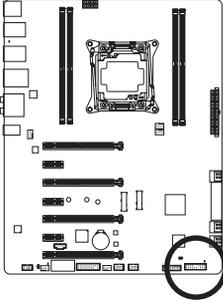
Step 3:
Press the M.2 Wi-Fi module down and then secure it with the screw.



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

12) 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).

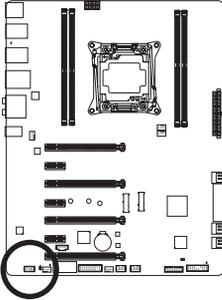
- **PW** (Power Switch, Red):
Connects to the power switch on the chassis front panel. You may configure the way to turn off your system using the power switch (refer to Chapter 2, "BIOS Setup," "Power Management," for more information).
- **SPEAK** (Speaker, Orange):
Connects to the speaker on the chassis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



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.

13) F_AUDIO (Front Panel Audio Header)

The front panel audio header supports Intel High Definition audio (HD) and AC'97 audio. 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.



For HD Front Panel Audio:

Pin No.	Definition
1	MIC2_L
2	GND
3	MIC2_R
4	-ACZ_DET
5	LINE2_R
6	GND
7	FAUDIO_JD
8	No Pin
9	LINE2_L
10	GND

For AC'97 Front Panel Audio:

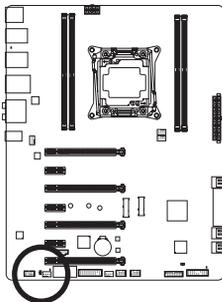
Pin No.	Definition
1	MIC
2	GND
3	MIC Power
4	NC
5	Line Out (R)
6	NC
7	NC
8	No Pin
9	Line Out (L)
10	NC



- The front panel audio header supports HD audio by default.
- Audio signals will be present on both of the front and back panel audio connections simultaneously.
- 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.

14) SPDIF_O (S/PDIF Out Header)

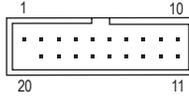
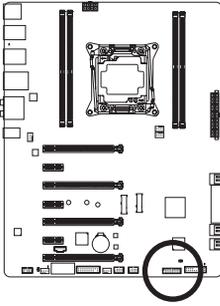
This header supports digital S/PDIF Out and connects a S/PDIF digital audio cable (provided by expansion cards) for digital audio output from your motherboard to certain expansion cards like graphics cards and sound cards. For example, some graphics cards may require you to use a S/PDIF digital audio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



Pin No.	Definition
1	SPDIFO
2	GND

15) F_USB30 (USB 3.0/2.0 Header)

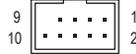
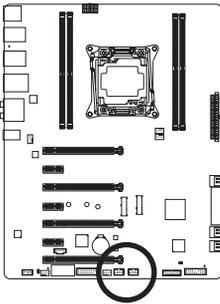
The header conforms to USB 3.0/2.0 specification and can provide two USB ports. For purchasing the optional 3.5" front panel that provides two USB 3.0/2.0 ports, please contact the local dealer.



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

16) 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.



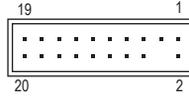
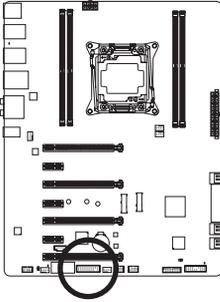
Pin No.	Definition
1	Power (5V)
2	Power (5V)
3	USB DX-
4	USB DY-
5	USB DX+
6	USB DY+
7	GND
8	GND
9	No Pin
10	NC



- 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.

17) TPM (Trusted Platform Module Header)

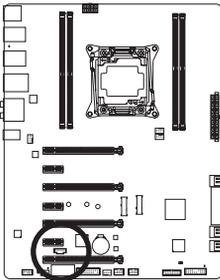
You may connect a TPM (Trusted Platform Module) to this header.



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

18) THB_C (Thunderbolt Add-In Card Connector)

This connector is for a GIGABYTE Thunderbolt add-in card.



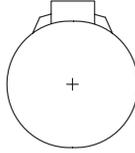
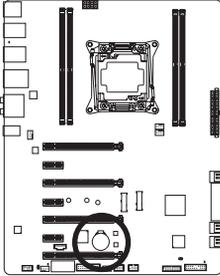
Pin No.	Definition
1	GPIOA
2	GPIOB
3	N_SLP_S3
4	N_S4_S5
5	GND



Supports a Thunderbolt™ add-in card.

19) 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:

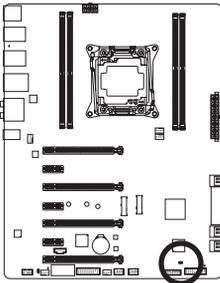
1. Turn off your computer and unplug the power cord.
2. Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making them short for 5 seconds.)
3. Replace the battery.
4.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

20) 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/clear CMOS jumper in Chapter 1 for how to clear the CMOS values.)

2-1 Startup Screen

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



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.

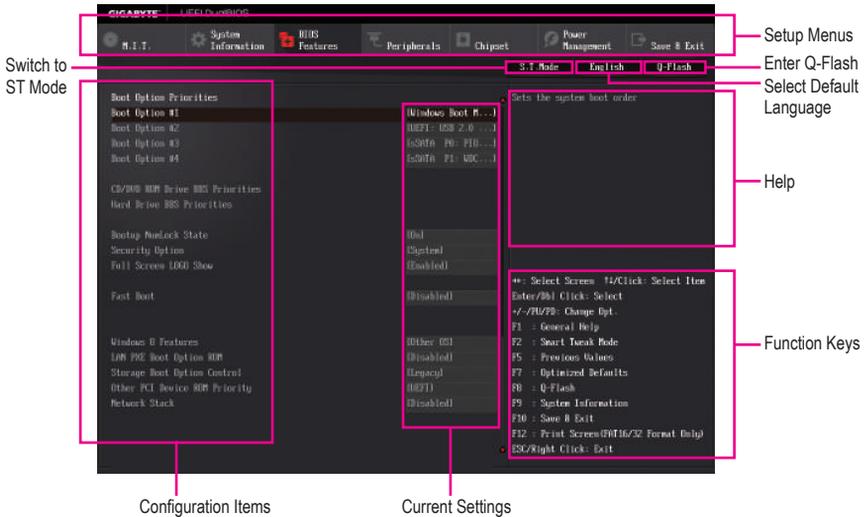
<END>: Q-FLASH

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

C. Classic Setup

Classic Setup is the conventional BIOS Setup interface where you can press the arrow keys on your keyboard to move among the items and press <Enter> to accept or enter a sub-menu. Or you can use your mouse to select the item you want.

(Sample BIOS Version: F1e)



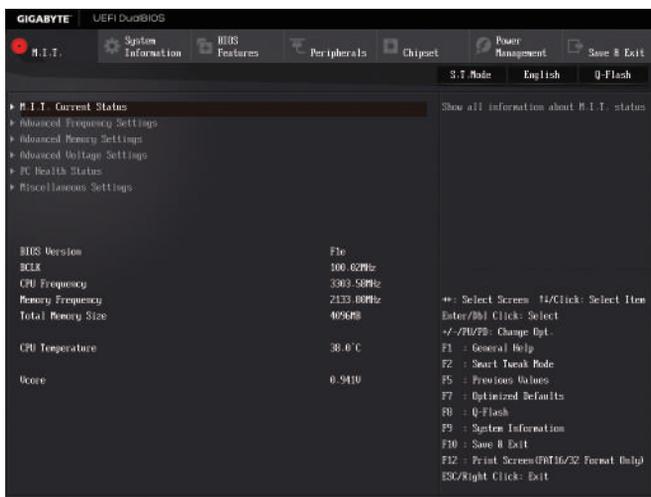
Classic Setup Function Keys

<←><→>	Move the selection bar to select a setup menu
<↑><↓>	Move the selection bar to select an configuration item on a menu
<Enter>	Execute command or enter a menu
<+></Page Up>	Increase the numeric value or make changes
<-></Page Down>	Decrease the numeric value or make changes
<F1>	Show descriptions of the function keys
<F2>	Switch to ST Mode or Startup Guide screen
<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

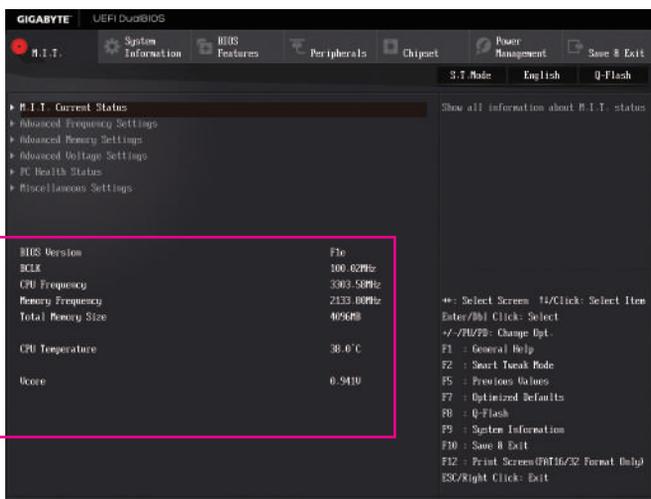
BIOS Setup Menus

- **M.I.T.**
Use this menu to configure the clock, frequency, and voltages of your CPU and memory, etc. Or check the system/CPU temperatures, voltages, and fan speeds.
- **System Information**
Use this menu to configure the default language used by the BIOS and system time and date.
- **BIOS Features**
Use this menu to configure the device boot order and advanced features available on the CPU.
- **Peripherals**
Use this menu to configure all peripheral devices, such as USB, display settings, etc.
- **Chipset**
Use this menu to configure Chipset-related options, such as SATA, onboard LAN, etc.
- **Power Management**
Use this menu to configure all the power-saving functions.
- **Save & Exit**
Save all the changes made in the BIOS Setup program to the CMOS and exit BIOS Setup. You can save the current BIOS settings to a profile or load optimized defaults for optimal-performance system operations.

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.)

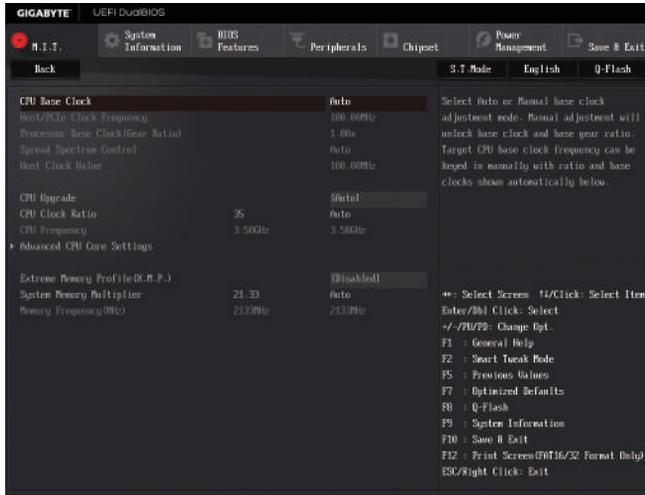


This section provides information on the BIOS version, CPU base clock, CPU frequency, memory frequency, total memory size, CPU temperature and CPU voltage, etc.

▶ M.I.T. Current Status

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

▶ Advanced Frequency Settings



⊞ CPU Base Clock

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

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

⊞ Host/PCIe Clock Frequency ^(Note)

Allows you to manually set the host clock frequency (which controls CPU, PCIe, and memory frequencies) in 0.01 MHz increments.

This item is configurable only when **CPU Base Clock** is set to **Manual**.

⊞ Processor Base Clock (Gear Ratio) ^(Note)

Allows you to configure the Processor Base Clock by multiplying the **Host/PCIe Clock Frequency** by several preset host clock multipliers. This item is configurable only when **CPU Base Clock** is set to **Manual**.

⊞ Spread Spectrum Control ^(Note)

Enables or disables CPU/PCIe Spread Spectrum. (Default: Auto)

This item is configurable only when **CPU Base Clock** is set to **Manual**.

⊞ Host Clock Value

This value is determined by multiplying the **Host/PCIe Clock Frequency** value by the **Processor Base Clock (Gear Ratio)** value.

⊞ CPU Upgrade ^(Note)

Allows you to set the CPU frequency. Options may vary depending on the CPU being used. (Default: Auto)

⊞ CPU Clock Ratio

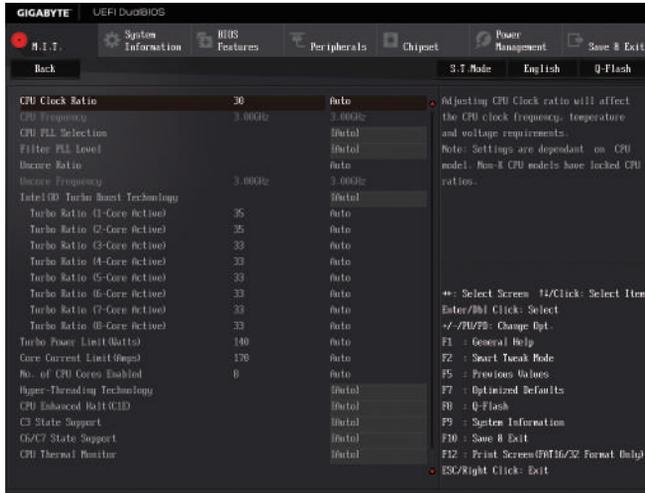
Allows you to alter the clock ratio for the installed CPU. The adjustable range is dependent on the CPU being installed.

⊞ CPU Frequency

Displays the current operating CPU frequency.

(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.

▶ 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.

☞ CPU PLL Selection

Allows you to set the CPU PLL. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ Filter PLL Level

Allows you to set the Filter PLL. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ 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.

☞ 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)

☞ Turbo Power Limit (Watts)

Allows you to set a power limit for CPU Turbo mode. When the CPU power consumption exceeds the specified power limit, the CPU will automatically reduce the core frequency in order to reduce the power. **Auto** sets the power 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 1)
 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 1)
 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 1)
 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 1)
 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 1)
 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)
- ☞ **CPU Thermal Monitor** ^(Note 1)
 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 1)
 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)
- ☞ **Extreme Memory Profile (X.M.P.)** ^(Note 2)
 Allows the BIOS to read the SPD data on XMP memory module(s) to enhance memory performance when enabled.

 - ▶▶ Disabled Disables this function. (Default)
 - ▶▶ Profile1 Uses Profile 1 settings.
 - ▶▶ Profile2 ^(Note 2) Uses Profile 2 settings.
- ☞ **System Memory Multiplier**
 Allows you to set the system memory multiplier. **Auto** sets memory multiplier according to memory SPD data. (Default: Auto)

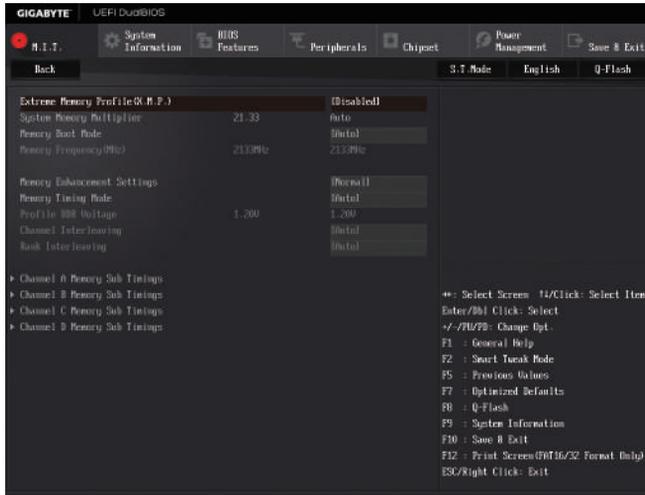
(Note 1) This item is present only when you install a CPU that supports this feature. For more information about Intel® CPUs' unique features, please visit Intel's website.

(Note 2) This item is present only when you install a CPU and a memory module that supports this feature.

Memory Frequency (MHz)

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

Advanced Memory Settings



Extreme Memory Profile (X.M.P.) ^(Note), System Memory Multiplier, Memory Frequency(MHz)

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

Memory Boot Mode

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

Profile DDR Voltage

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

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

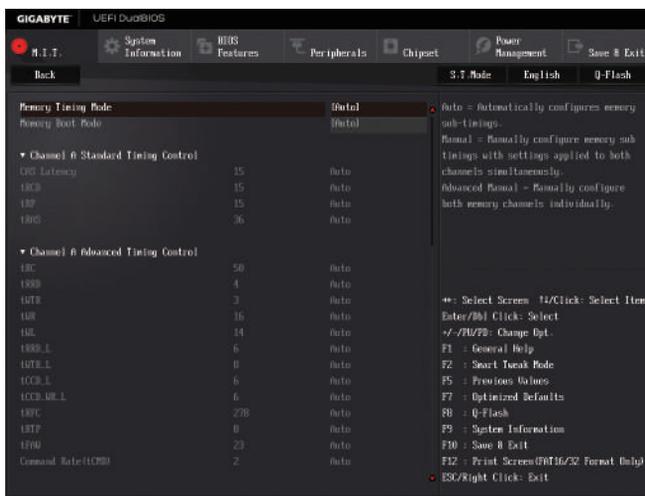
Channel Interleaving

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

Rank Interleaving

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

Channel A/B/C/D Memory Sub Timings

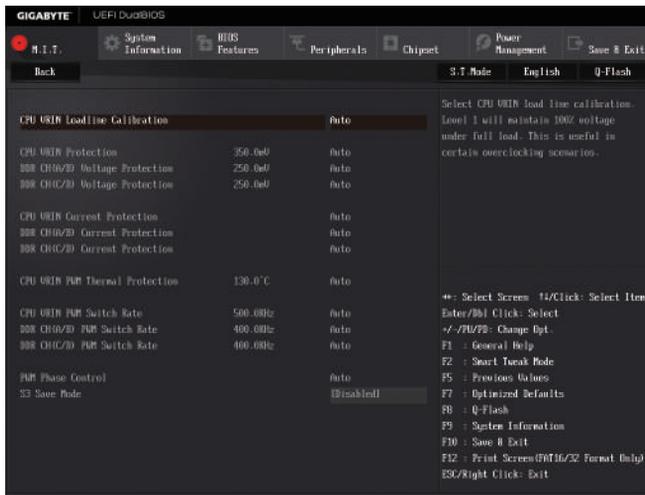


This sub-menu provides memory timing settings for each channel of memory. This sub-menu provides memory timing settings for each channel of memory. The respective timing setting screens are configurable only when **Memory Timing Mode** is set to **Manual** or **Advanced Manual**. Note: Your system may 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 VRIN Loadline Calibration

Allows you to set the Load-Line Calibration level for the CPU VRIN. The levels are (from highest to lowest): Extreme, Turbo, High, Medium, Low, and Standard. Selecting a higher level keeps the CPU VRIN 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 VRIN Protection

Allows you to set the over-current protection level for the CPU VRIN voltage. The adjustable range is from 150.0mV to 400.0mV. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

- ☞ **DDR CH(A/B) Voltage Protection**
 Allows you to set the voltage limit on Channel A and Channel B memory voltage for over-voltage protection. The adjustable range is from 150.0mV to 325.0mV. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **DDR CH(C/D) Voltage Protection**
 Allows you to set the voltage limit on Channel C and Channel D memory voltage for over-voltage protection. The adjustable range is from 150.0mV to 325.0mV. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **CPU VRIN Current Protection**
 Allows you to set the over-current protection level for the CPU VRIN voltage.

 - ▶▶ Auto Lets the BIOS automatically configure this setting. (Default)
 - ▶▶ Standard~Extreme Selects Standard, Low, Medium, High, Turbo, or Extreme which represents different level of over-current protection for the CPU VRIN voltage.
- ☞ **DDR CH(A/B) Current Protection**
 Allows you to set the over-current protection level for Channel A and Channel B memory voltage.

 - ▶▶ Auto Lets the BIOS automatically configure this setting. (Default)
 - ▶▶ Standard~Extreme Selects Standard, Low, Medium, High, Turbo, or Extreme which represents different level of over-current protection for the memory voltage.
- ☞ **DDR CH(C/D) Current Protection**
 Allows you to set the over-current protection level for Channel C and Channel D memory voltage.

 - ▶▶ Auto Lets the BIOS automatically configure this setting. (Default)
 - ▶▶ Standard~Extreme Selects Standard, Low, Medium, High, Turbo, or Extreme which represents different level of over-current protection for the memory voltage.
- ☞ **CPU VRIN PWM Thermal Protection**
 Allows you to set the PWM thermal protection threshold for the CPU VRIN. The adjustable range is from 120°C~130°C. (Default: Auto)
- ☞ **CPU VRIN PWM Switch Rate**
 Allows you to set the CPU VRIN PWM frequency. The adjustable range is from 400.0KHz to 600.0KHz. (Default: Auto)
- ☞ **DDR CH(A/B) PWM Switch Rate**
 Allows you to set the PWM frequency for Channel A and Channel B memory. The adjustable range is from 300.0KHz to 500.0KHz. (Default: Auto)
- ☞ **DDR CH(C/D) PWM Switch Rate**
 Allows you to set the PWM frequency for Channel C and Channel D memory. The adjustable range is from 300.0KHz to 500.0KHz. (Default: Auto)
- ☞ **PWM Phase Control**
 Allows you to automatically change the PWM phase according to the CPU load. The power-saving levels are (from lowest to highest): eXm Perf (Extreme Performance), High Perf (High Performance), Perf (Performance), Balanced, Mid PWR (Mid Power), and Lite PWR (Light Power). **Auto** lets the BIOS automatically configure this setting. (Default: Auto)
- ☞ **S3 Save Mode**
 Determines whether to allow memory voltage to drop to a power-saving level when the system is in S3 state. (Default: Disabled)
- ▶ **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.

▶ PC Health Status



ⓘ Reset Case Open Status

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

- ☞ **Case Open**
Displays the detection status of the chassis intrusion detection device attached to the motherboard CI header. If the system chassis cover is removed, this field will show "Yes", otherwise it will show "No". To clear the chassis intrusion status record, set **Reset Case Open Status** to **Enabled**, save the settings to the CMOS, and then restart your system.
- ☞ **CPU Vcore/CPU VRIN/CPU VCCIO/DRAM Channel A/B Voltage/DRAM Channel C/D Voltage/DDRVP Channel A/B Voltage/DDRVP Channel C/D Voltage/+5V/PCH IO/PCH Core/+12V**
Displays the current system voltages.
- ☞ **CPU Temperature/PCH Temperature**
Displays current CPU/Chipset temperature.
- ☞ **1st System Temperature/2nd System Temperature**
Displays current system temperatures detected by each 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)**

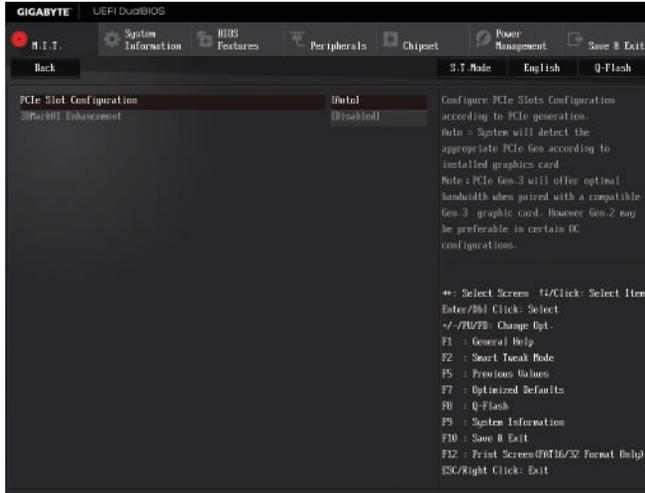
Allows you to determine whether to enable the fan speed control function and adjust the fan speed.

- ▶▶ 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



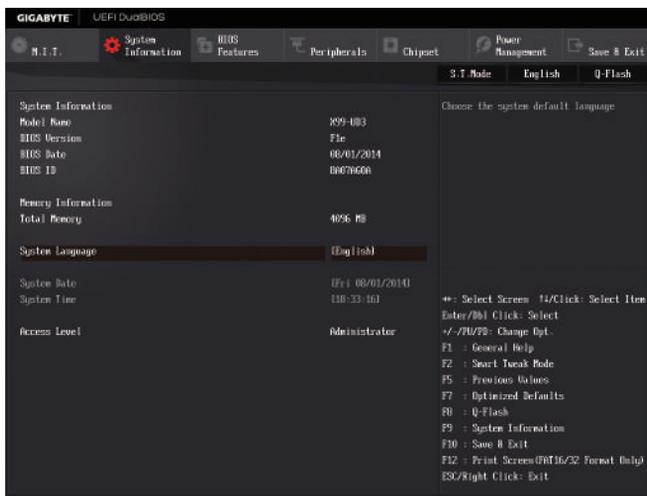
☞ PCIe Slot Configuration

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

☞ 3DMark01 Enhancement

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

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 peripherals.

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 13:0:0. 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 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 Features** is set to **Windows 8**.

☞ **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.

- ▶▶ Do not launch Disables option ROM.
- ▶▶ Legacy Enables legacy option ROM only. (Default)
- ▶▶ UEFI 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.

- ▶▶ Legacy Enables legacy option ROM only.
- ▶▶ UEFI 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.

☞ **Administrator Password**

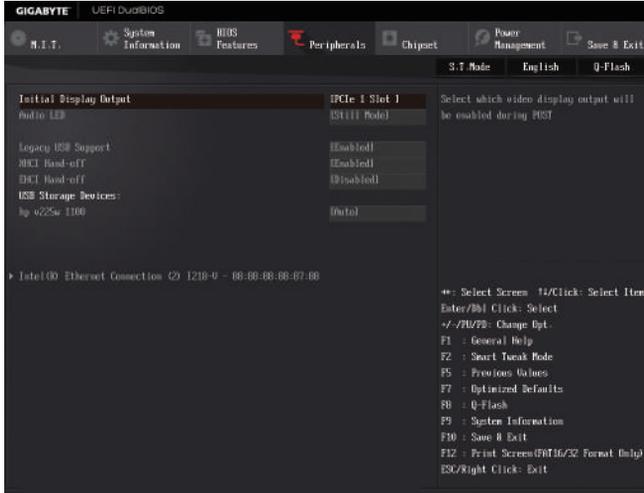
Allows you to configure an administrator password. Press <Enter> on this item, type the password, and then press <Enter>. You will be requested to confirm the password. Type the password again and press <Enter>. You must enter the administrator password (or user password) at system startup and when entering 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.

2-6 Peripherals



Initial Display Output

Specifies the first initiation of the monitor display from the PCI Express graphics cards.

- ▶▶ PCIe 1 Slot Sets the graphics card on the PCIE_1 slot as the first display. (Default)
- ▶▶ PCIe 2 Slot Sets the graphics card on the PCIE_2 slot as the first display.
- ▶▶ PCIe 3 Slot Sets the graphics card on the PCIE_3 slot as the first display.
- ▶▶ PCIe 4 Slot Sets the graphics card on the PCIE_4 slot as the first display.

Audio LED

Enables or disables the onboard audio LED function.

- ▶▶ Off Disables this function.
- ▶▶ Still Mode The LED stays 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.

Legacy USB Support

Allows USB keyboard/mouse to be used in MS-DOS. (Default: Enabled)

XHCI Hand-off

Determines whether to enable XHCI Hand-off feature for an operating system without XHCI Hand-off support. (Default: Enabled)

EHCI Hand-off

Determines whether to enable EHCI Hand-off feature for an operating system without EHCI Hand-off support. (Default: Disabled)

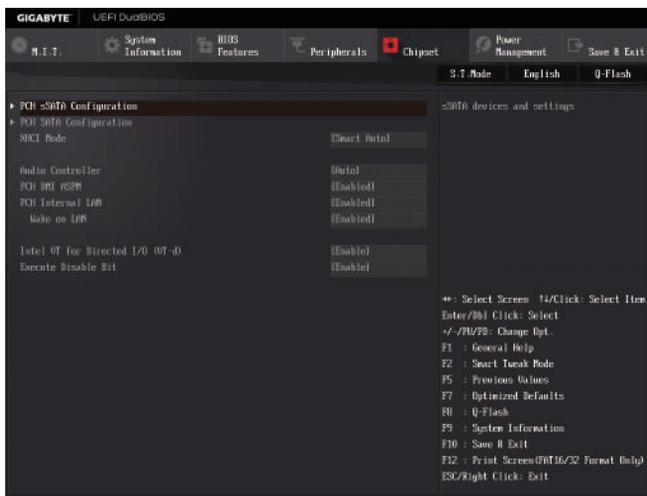
USB Storage Devices

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

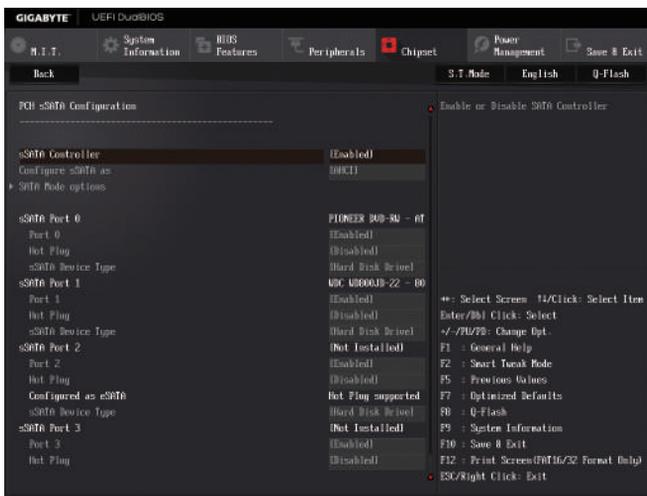
Intel(R) Ethernet Connection

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

2-7 Chipset



▶ PCI sSATA Configuration (sSATA3 0~3 Connectors)



☞ sSATA Controller

Enables or disables the integrated SATA controllers that control the sSATA3 0~3 connectors. (Default: Enabled)

☞ Configure sSATA as

Allows you to decide whether to configure the SATA controllers to AHCI mode.

- ▶▶ IDE Configures the SATA controllers to IDE mode.
- ▶▶ 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)

▶ SATA Mode options

This sub-menu provides SATA-related configuration options.

☞ sSATA Port0/1/2/3

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

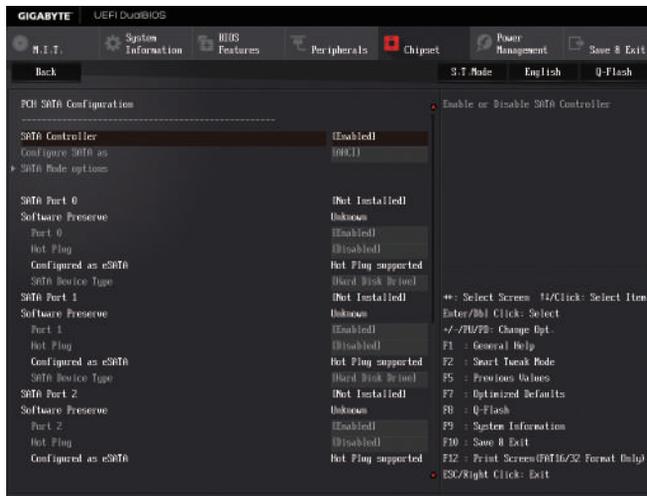
☞ Hot plug

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

☞ sSATA Device Type

Allows you to select the type of the device connected to the SATA port. (Default: Hard Disk Drive)

▶ PCH SATA Configuration (SATA3 0~5 Connectors)



☞ SATA Controller

Enables or disables the integrated SATA controllers that control the SATA3 0~5 connectors. (Default: Enabled)

☞ Configure SATA as

Enables or disables RAID for the SATA controllers or configures the SATA controllers to AHCI mode.

- ▶▶ IDE Configures the SATA controller to IDE 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)

▶ SATA Mode options

This sub-menu provides SATA-related configuration options.

☞ SATA 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)

☞ **SATA Device Type**

Allows you to select the type of the device connected to the SATA port. (Default: Hard Disk Drive)

☞ **XHCI Mode**

Allows you to determine the operating mode for the xHCI controller in OS.

- ▶▶ **Smart Auto** This mode is available only when the BIOS supports the xHCI controller in the pre-boot environment. This mode is similar to **Auto**, but it adds the capability to route the ports to xHCI or EHCI according to setting used in previous boots (for non-G3 boot) in the pre-boot environment. This allows the use of USB 3.0 devices prior to OS boot. xHCI controller enabling and rerouting should follow the steps in **Auto**, when previous boot routes ports to EHCI. Note: This is the recommended mode when BIOS has xHCI pre-boot support. (Default)
- ▶▶ **Auto** BIOS routes the sharable ports to EHCI controller. Then it uses ACPI protocols to provide an option to enable the xHCI controller and reroute the sharable ports. Note: This is the recommended mode when BIOS does NOT have xHCI pre-boot support.
- ▶▶ **Enabled** All shared ports are eventually routed to the xHCI controller during the BIOS boot process. If BIOS does not have pre-boot support for the xHCI controller, it should initially route the sharable ports to the EHCI controller and then prior to OS boot it should route the ports to xHCI controller. Note: OS has to provide support for the xHCI controller in this mode. If the OS does not provide support, all sharable ports won't work.
- ▶▶ **Disabled** The USB 3.0 ports are routed to the EHCI controller and the xHCI controller is turned off. All USB 3.0 devices function as High Speed devices regardless of xHCI software support/availability.
- ▶▶ **Manual** Allows you to determine whether to rout the USB 3.0 ports to the xHCI or EHCI controller before booting to OS, and also provides you with options to manually rout each USB 3.0/2.0 port to xHCI or EHCI.

☞ **Audio Controller**

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

☞ **PCH DMI ASPM**

Allows you to configure the ASPM mode for Chipset DMI link. (Default: Enabled)

☞ **PCH Internal LAN**

Enables or disables the onboard 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)

☞ **Intel VT for Directed I/O (VT-d) ^(Note)**

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

☞ **Execute Disable Bit ^(Note)**

Enables or disables Intel® Execute Disable Bit function. This function may enhance protection for the computer, reducing exposure to viruses and malicious buffer overflow attacks when working with its supporting software and system. (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)

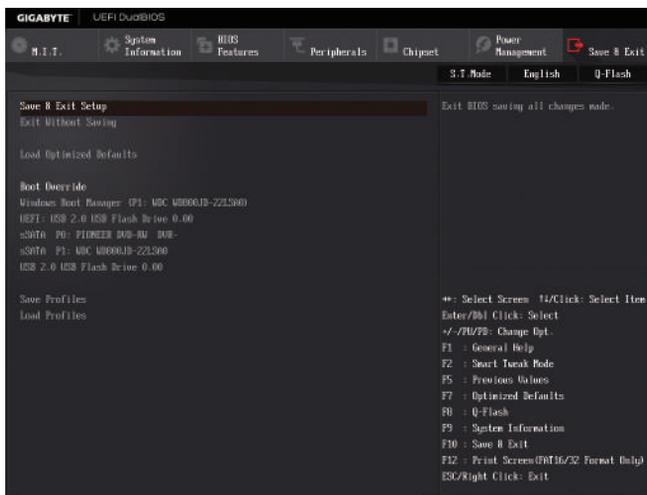
☞ **Resume by Alarm**

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.

2-9 Save & Exit



Save & Exit Setup

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

Exit Without Saving

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

Load Optimized Defaults

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

Boot Override

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

Save Profiles

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

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 configure SATA hard drive(s), 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. ^(Note 2)

Before you begin, please prepare the following items:

- At least two SATA hard drives (to ensure optimal performance, it is recommended that you use two hard drives with identical model and capacity). If you do not want to create RAID, you may prepare only one hard drive.
- A Windows setup disk.
- Motherboard driver disk.
- A USB thumb drive.

3-1 Configuring SATA Controllers

A. Installing SATA hard drive(s) in your computer

Attach one end of the SATA signal cable to the rear of the SATA hard drive and the other end to available SATA port on the motherboard. If you want to configure a RAID set, make sure to connect the hard drives to the SATA3 0~5 ports. Then connect the power connector from your power supply to the hard drive.

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

(Note 2) Required when the SATA controller is set to AHCI or RAID mode.

B. Configuring SATA controller mode in BIOS Setup

Make sure to configure the SATA controller mode correctly in system BIOS Setup.

Step 1:

Turn on your computer and press <Delete> to enter BIOS Setup during the POST (Power-On Self-Test). Go to **Chipset/PCB SATA Configuration**, make sure **SATA Controller** is enabled. To create RAID, set **Configure SATA as** to **RAID** (Figure 1). If you do not want to create RAID, set this item to **IDE** or **AHCI**.

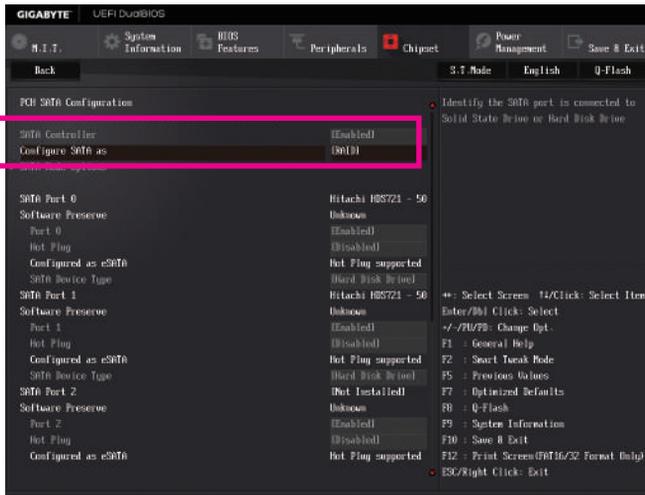


Figure 1

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 8.1/8 64-bit supports UEFI RAID configuration.

Step 1:

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

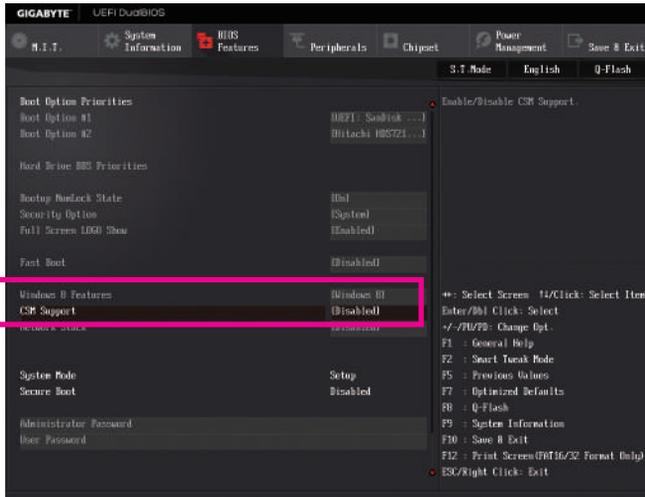


Figure 2

Step 2:

After the system reboot, enter BIOS Setup again. Then enter the **Peripherals\Intel(R) Rapid Storage Technology** sub-menu (Figure 3).

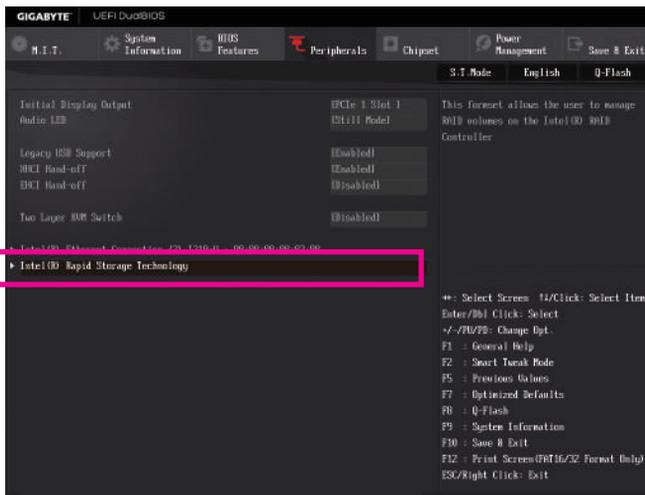


Figure 3

Step 3:

On the **Intel(R) Rapid Storage Technology** 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, RAID 1, 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**.

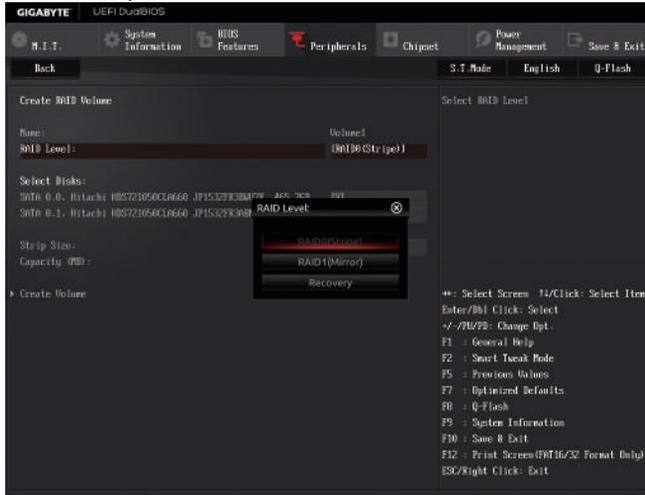


Figure 4

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.

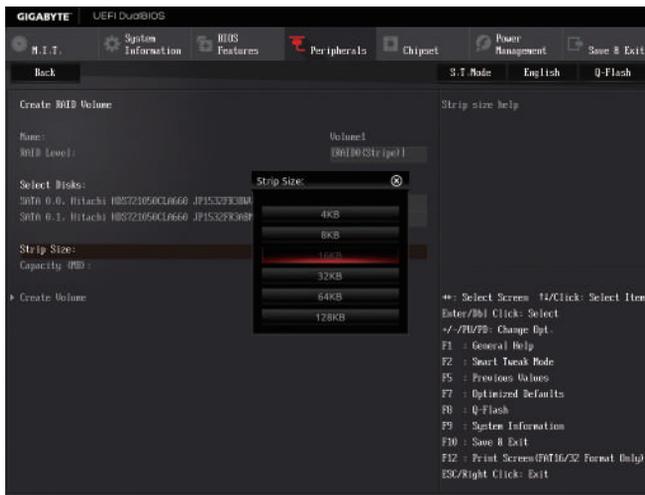


Figure 5

Step 5:

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

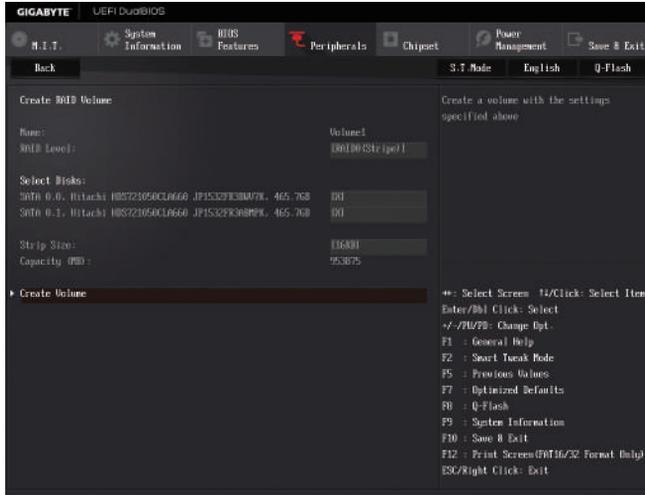


Figure 6

After completing, you'll be brought back to the **Intel(R) Rapid Storage Technology** 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)

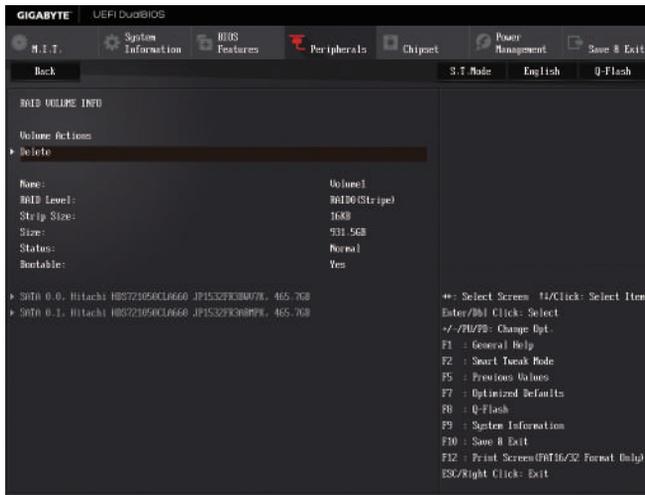


Figure 7

Delete RAID Volume

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

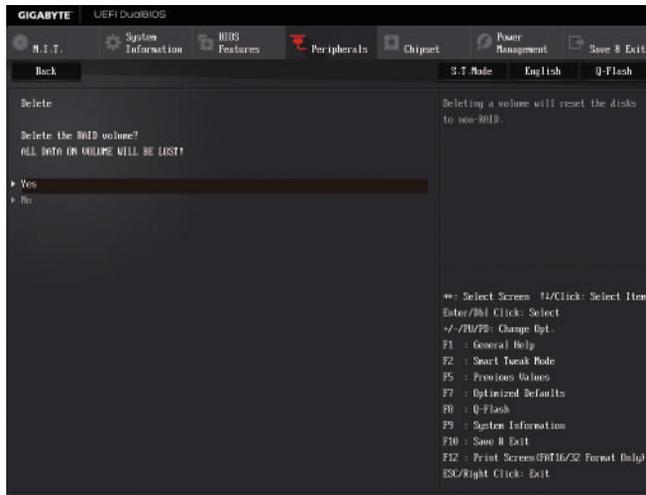


Figure 8

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.

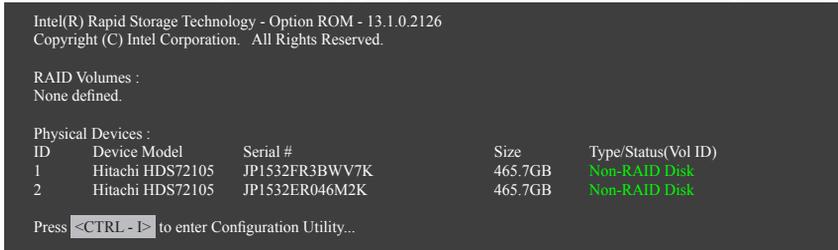


Figure 9

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>.

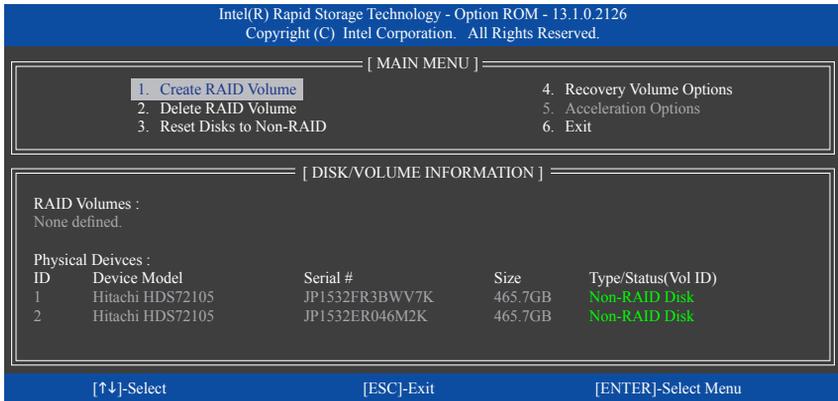


Figure 10

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.

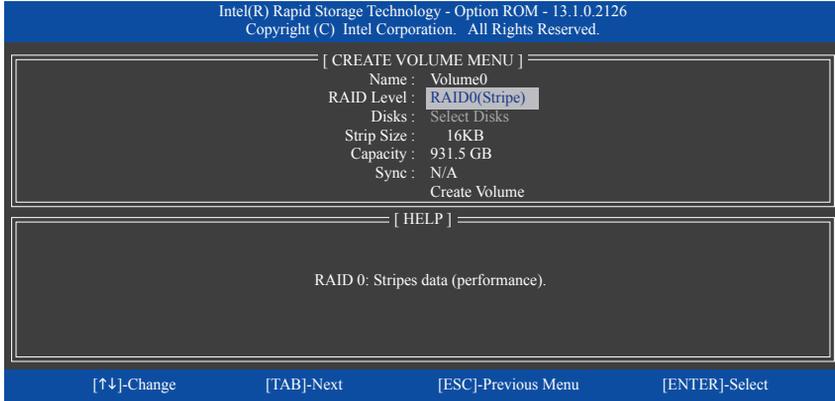


Figure 11

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>.

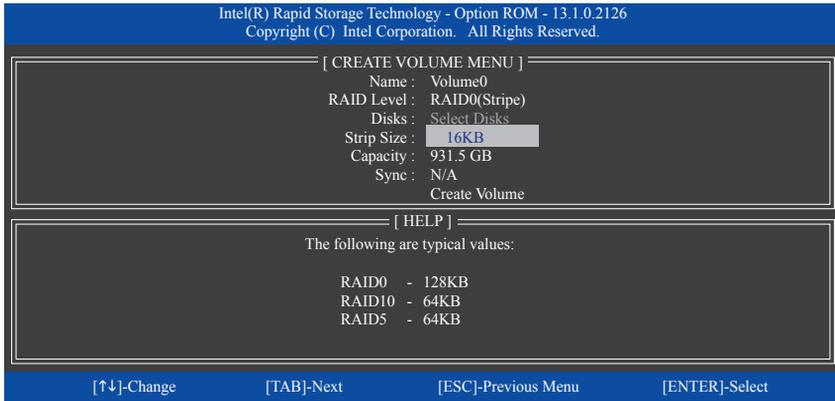


Figure 12

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).

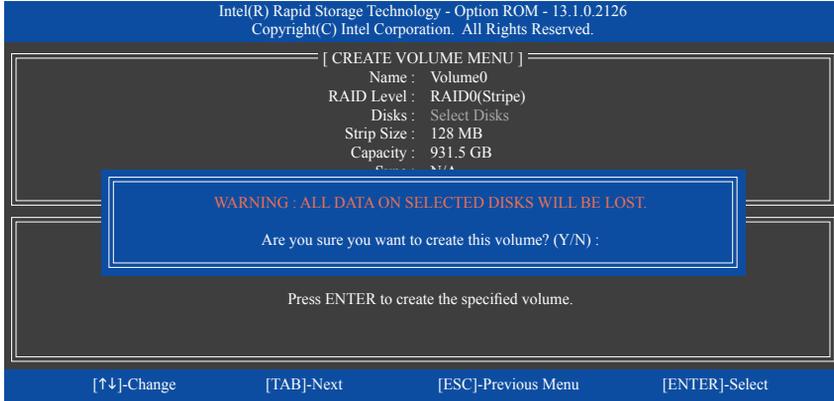


Figure 13

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)

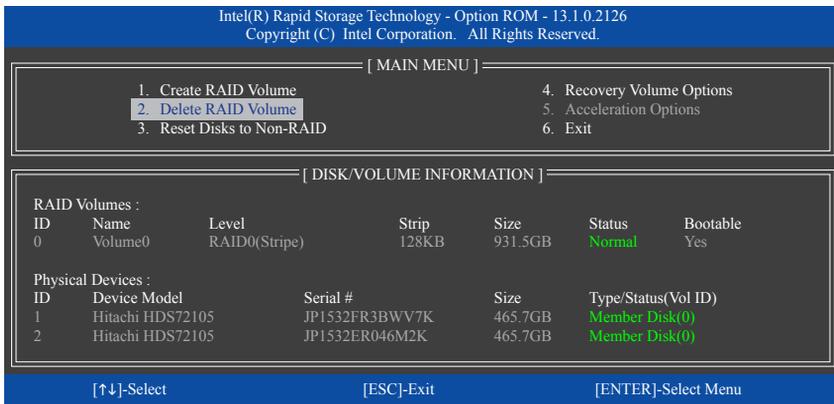


Figure 14

To exit the RAID BIOS utility, press <Esc> or select **6. Exit** in **MAIN MENU**.

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

Recovery Volume Options

Intel® Rapid Recover Technology provides data protection by allowing users to easily restore data and system operation using a designated recovery drive. With the Rapid Recovery Technology, which employs RAID 1 functionality, users can copy the data from the master drive to the recovery drive; if needed, the data on the recovery drive can be restored back to the master drive.

Before you begin:

- The recovery drive must have equal or greater capacity than the master drive.
- A recovery volume can be created with two hard drives only. A recovery volume and a RAID array cannot co-exist in the system at the same time, that is, if you have already created a recovery volume, you are unable to create a RAID array.
- By default, only the master drive can be viewed in the operating system; the recovery drive is hidden.

Step 1:

Select **Create RAID Volume** in **MAIN MENU** and press <Enter> (Figure 15).

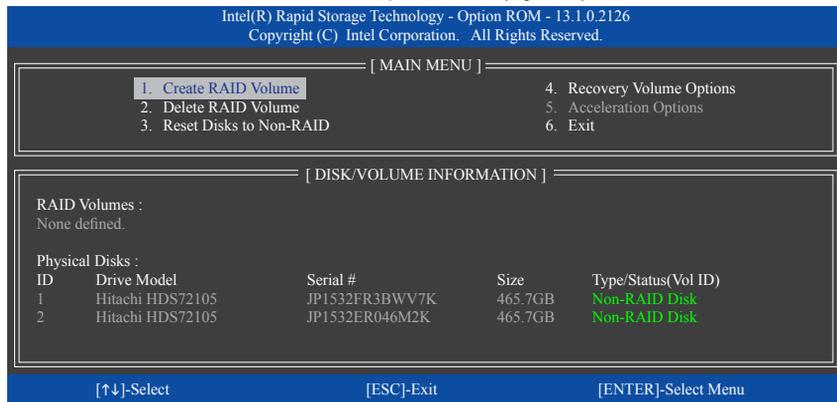


Figure 15

Step 2:

After entering the volume name, select **Recovery** under the **RAID Level** item and press <Enter> (Figure 16).

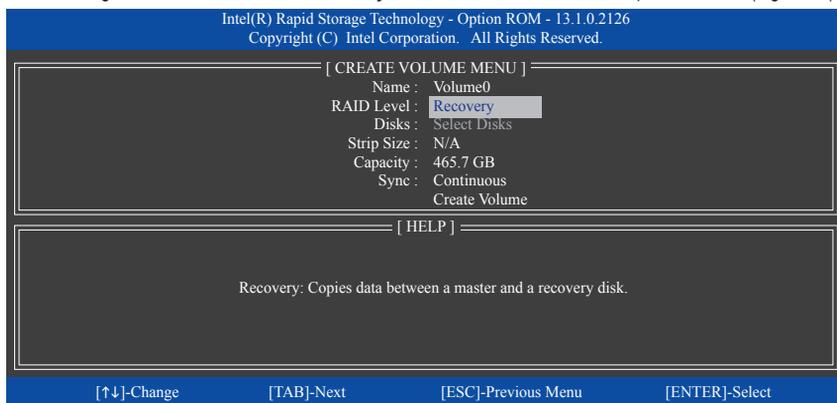


Figure 16

Step 3:

Press <Enter> under the **Select Disks** item. In the **SELECT DISKS** box, press <Tab> on the hard drive you want to use for the master drive and press <Space> on the hard drive you want to use for the recovery drive. (Make sure the recovery drive has equal or larger capacity than the master drive.) Then press <Enter> to confirm (Figure 17).

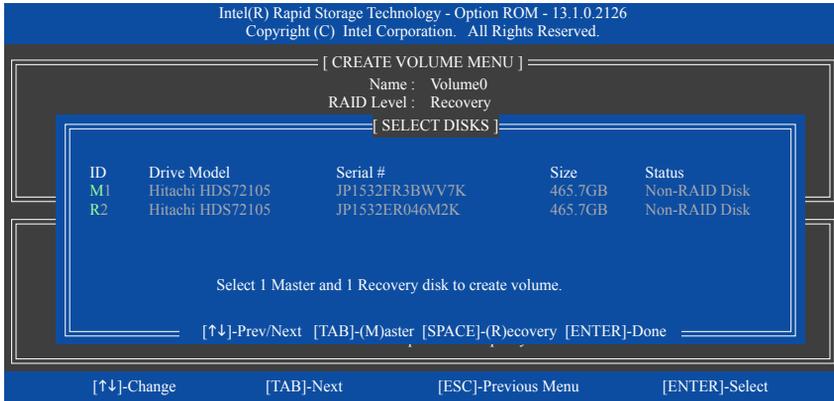


Figure 17

Step 4:

Under **Sync**, select **Continuous** or **On Request** (Figure 18). When set to **Continuous**, changes made to the data on the master drive will be automatically and continuously copied to the recovery drive when both hard drives are installed in the system. **On Request** allows users to update data from the master drive to the recovery drive manually using the Intel® Rapid Storage Technology utility in the operating system. **On Request** also allows users to restore the master drive to a previous state.

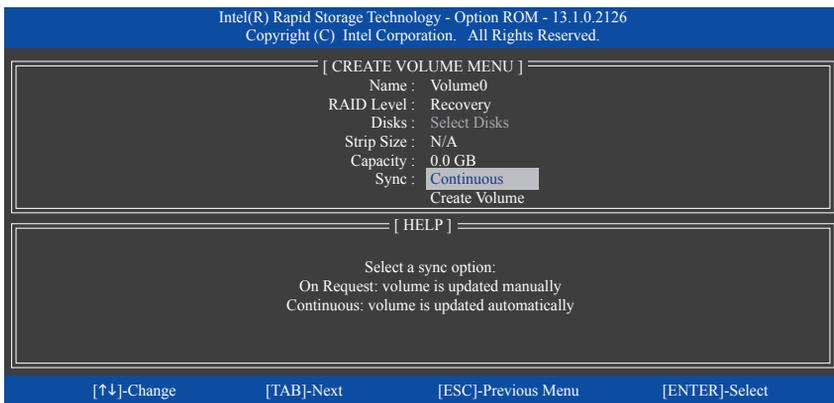


Figure 18

Step 5:

Finally press <Enter> on the **Create Volume** item to begin creating the Recovery Volume and follow the on-screen instructions to complete.

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 19), press <Y> to confirm or <N> to abort.

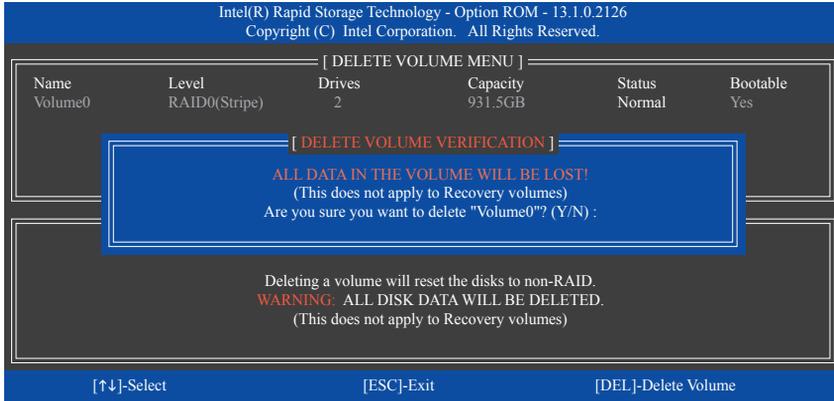


Figure 19

Acceleration Options

This option allows you to view the status of your accelerated drive/volume (Figure 20) created using the Intel® IRST utility. In case you are unable to run the Intel® IRST utility due to an application error or operating system issue, you will need to remove acceleration or manually enable synchronization (Maximized mode only) using this option in the RAID ROM utility.

Steps:

Select **Acceleration Options** in **MAIN MENU** and press <Enter>.

To remove the acceleration, select the accelerated drive/volume, press <R>, and press <Y> to confirm.

To synchronize data from the cache device to the accelerated drive/volume, press <S> and press <Y> to confirm.

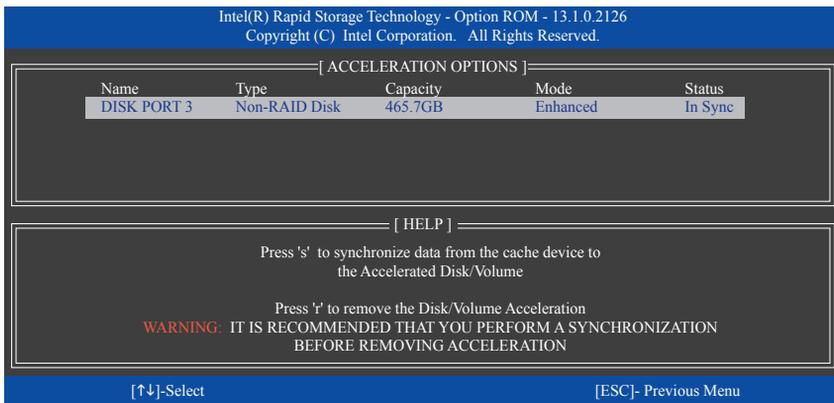


Figure 20

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

With the correct BIOS settings, you are ready to install Windows 8.1/8/7.

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 **IRST** folder under **BootDrv** in the driver disk to your USB thumb drive.

Step 2:

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

Step 3:

Insert the USB thumb drive and then browse to the location of the driver. The locations of the drivers are as follows:

Windows 32-bit: \IRST\32Bit

Windows 64-bit: \IRST\64Bit

Step 4:

When a screen as shown in Figure 1 appears, select **Intel(R) Desktop/Workstation/Server Express Chipset SATA RAID Controller** and click **Next** to load the driver and continue the OS installation.

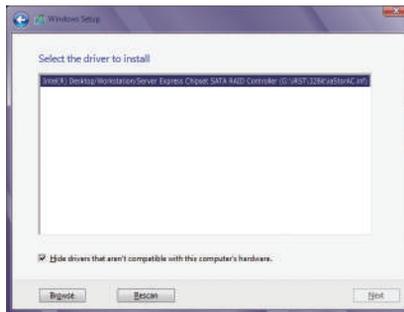


Figure 1

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 - Option ROM - 13.1.0.2126
Copyright (C) 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
1	Hitachi HDS721050CLA	JP1532FR3ABMPK	465.7GB

Physical Devices:

ID	Drive Model	Serial #	Size	Status
0	Hitachi HDS72105	JP1532FR3BWV7K	465.7GB	Member Disk (0)
1	Hitachi HDS72105	JP1532FR3ABMPK	465.7GB	Non-RAID Disk

[↑↓]-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 - Option ROM - 13.1.0.2126
Copyright (C) Intel Corporation. All Rights Reserved.

[MAIN MENU]

1. Create RAID Volume
2. Delete RAID Volume
3. Reset Disks to Non-RAID
4. Recovery Volume Options
5. Acceleration Options
6. Exit

[DISK/VOLUME INFORMATION]

RAID Volumes :

ID	Name	Level	Strip	Size	Status	Bootable
0	Volume0	RAID1(Mirror)	N/A	465.7GB	Rebuild	Yes

Physical Devices :

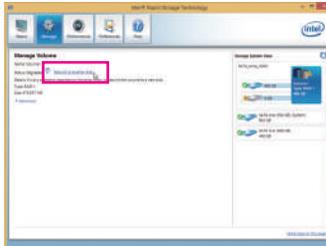
ID	Devices Model	Serial #	Size	Type/Status(Vol ID)
0	Hitachi HDS72105	JP1532FR3BWV7K	465.7GB	Member Disk (0)
1	Hitachi HDS72105	JP1532FR3ABMPK	465.7GB	Member Disk (0)

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 utility from the desktop.



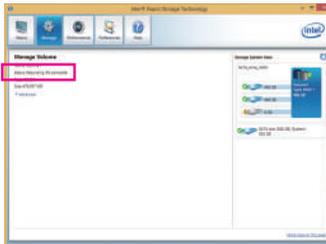
Step 1:

Go to the **Manage** menu and click **Rebuild to another disk in Manage Volume**.

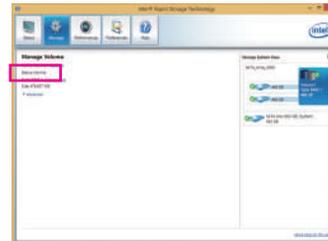


Step 2:

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



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



Step 3:

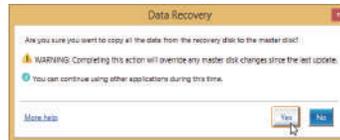
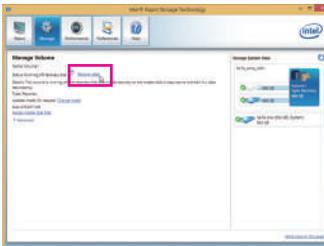
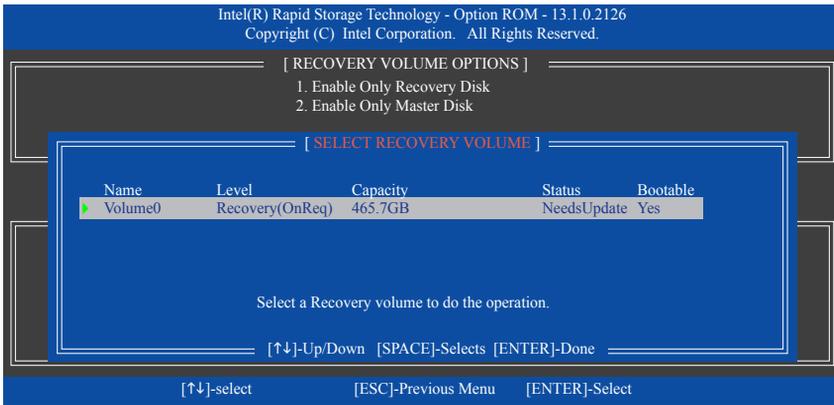
After the RAID 1 volume rebuilding, the **Status** will display as **Normal**.

- **Restoring the Master Drive to a Previous State (for Recovery Volume only)**

When two hard drives are set to Recovery Volume in Update on Request mode, you can restore the master drive data to the last backup state when needed. For example, in case the master drive detects a virus, you can restore the recovery drive data to the master drive.

Step 1:

Select **4. Recovery Volume Options** in the **MAIN MENU** of the Intel® RAID Configuration Utility. On the **RECOVERY VOLUMES OPTIONS** menu, select **Enable Only Recovery Disk** to show the recovery drive in the operating system. Follow the on-screen instructions to complete and exit the RAID Configuration Utility.

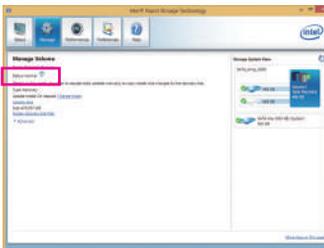
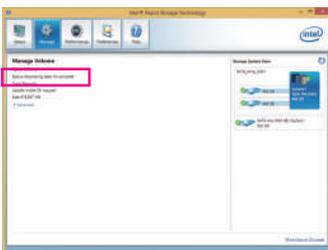


Step 3:

Click **Yes** to begin the data recovery.

Step 2:

Go to the **Manage** menu of the Intel® Rapid Storage Technology utility and click **Recover data** in **Manage Volume**.



Step 4:

After the recovery volume is completed, the **Status** will display as **Normal**.

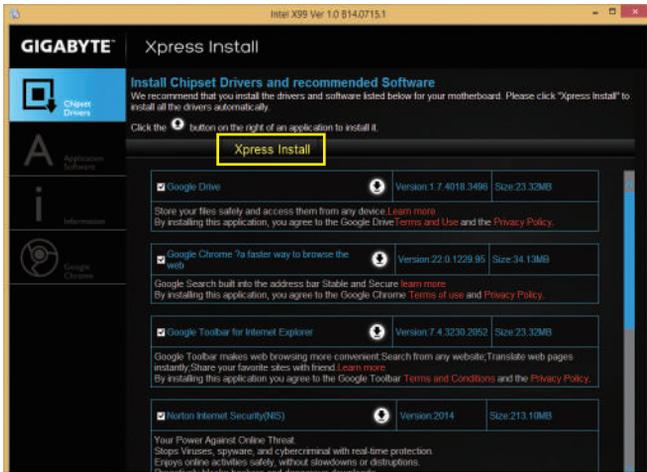
Chapter 4 Appendix

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.)

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



For more software information, please visit GIGABYTE's website.

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- ◆ Consult a dealer or experienced TV/radio technician for help.

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