G1.Sniper 5

User's Manual

Rev. 1003

12ME-G1SINP5-1003R

Declaration of Conformity

We, Manufacturer/Importer,

Address:

G.B.T. Technology Trading GMbH

Bullenkoppel 16, 22047 Hamburg, Germany

Declare that the product

Product Type: **Motherboard**

Product Name: **G1.Sniper 5**

conforms with the essential requirements of the following directives:

☒ **2004/108/IEC EMC Directive:**

☒	Conduction & Radiated Emissions:	EN55022:2006+A1:2007
☒	Immunity:	EN55024:1998+A1:2001+A2:2003
☒	Power-line harmonics:	EN61000-3-2:2006
☒	Power-line flicker:	EN61000-3-3:2008

☒ **2006/95/IEC LVD Directive**

| ☒ | Safety: | EN60950-1:2006+A11:2009 |

☒ **2011/65/EU RoHS Directive**

| ☒ | 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**

(EC conformity marking)

(Stamp)

Date: Apr. 12, 2013   Signature: *Timmy Huang*   Name: Timmy Huang

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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: G1.Sniper 5

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 inference received, including that may cause undesired operation.

Representative Person's Name: ERIC LU

Signature: *Eric Lu*

Date: Apr. 12, 2013

Copyright

Disclaimer

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.
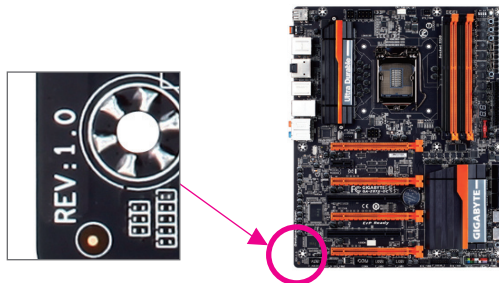
Example:

Table of Contents

Box Contents

- ☑ G1.Sniper 5 motherboard
- ☑ Motherboard driver disk
- ☑ User's Manual
- ☑ Quick Installation Guide
- ☑ Six SATA cables
- ☑ I/O Shield
- ☑ One 2-Way CrossFire bridge connector
- ☑ One 2-Way SLI bridge connector
- ☑ One 3-Way SLI bridge connector
- ☑ One 4-Way SLI bridge connector
- ☑ 3.5" Front Panel with 2 USB 3.0/2.0 ports
- ☑ One GC-WB300D (including one antenna, one USB 2.0 cable, driver disk, and user's manual)
- ☑ One IC extractor
- ☑ Two operational amplifier chips (one onboard, one provided in the product package)

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

Optional Items

- ☐ 2-port USB 2.0 bracket (Part No. 12CR1-1UB030-6*R)
- ☐ eSATA bracket (Part No. 12CF1-3SATPW-4*R)
- ☐ 3.5" Front Panel with 2 USB 3.0/2.0 ports (Part No. 12CR1-FPX582-2*R)
- ☐ HDMI-to-DVI adapter (Part No. 12CT2-HDMI01-1*R)

G1.Sniper 5 Motherboard Layout
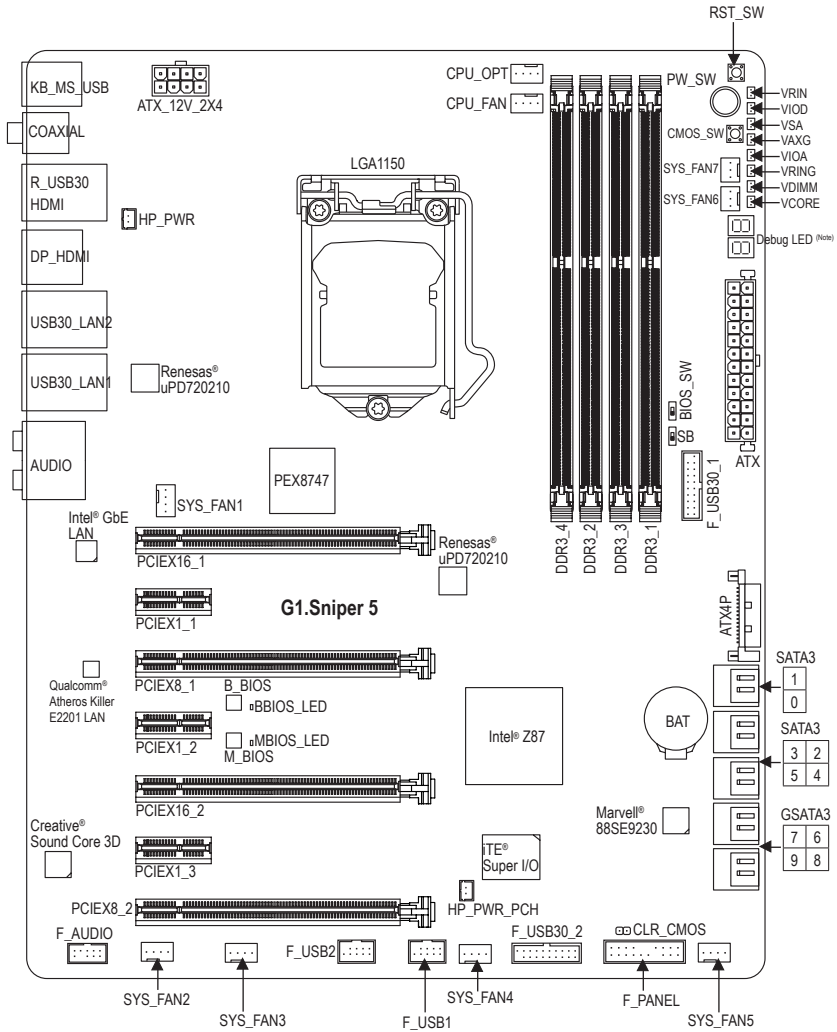
(Note)   For debug code information, please refer to Chapter 6.

G1.Sniper 5 Motherboard Block Diagram

2 PCI Express x8   2 PCI Express x8

CPU CLK+/- (100 MHz)

DDR3 1600/1333 MHz

LGA1150 CPU

Dual Channel Memory

1 PCI Express x16   1 PCI Express x16

HDMI

HDMI

DisplayPort

x16   x16

Switch   x16   x16   Switch

DMI 2.0   FDI

PCIe CLK
(100 MHz)

PEX8747

6 SATA 6Gb/s

PCI Express Bus

3 PCI Express x1   4 SATA 6Gb/s

4 USB 3.0/2.0

PCIe CLK
(100 MHz)

Renesas®
uPD720210 Hub

Marvell®
88SE9230

4 USB 3.0/2.0

x1 x1 x1   x2

Renesas®
uPD720210 Hub

Intel® Z87

PCI Express Bus

6 USB 2.0/1.1

LAN1   LAN2

2 USB 3.0/2.0

RJ45   RJ45

PCIe CLK
(100 MHz)

Qualcomm® Atheros Killer
E2201 LAN

Intel® GbE LAN phy

Dual BIOS

x1   x1

iTE®
Super I/O

PCI Express Bus

LPC Bus

PS/2 KB/Mouse

Creative®
Sound Core
3D

Surround Speaker Out
Center/Subwoofer Speaker Out

Headphone/Speaker Out
Line Out
MIC/Line In

S/PDIF Out

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	◆	Support for Intel® Core™ i7 processors/Intel® Core™ i5 processors/ Intel® Core™ i3 processors/Intel® Pentium® processors/Intel® Celeron® processors in the LGA1150 package (Go to GIGABYTE's website for the latest CPU support list.)
	◆	L3 cache varies with CPU
Chipset	◆	Intel® Z87 Express Chipset
Memory	◆	4 x 1.5V DDR3 DIMM sockets supporting up to 32 GB of system memory 　　* Due to a Windows 32-bit operating system limitation, when more than 4 GB of physical memory is installed, the actual memory size displayed will be less than the size of the physical memory installed.
	◆	Dual channel memory architecture
	◆	Support for DDR3 1600/1333 MHz memory modules
	◆	Support for non-ECC memory modules
	◆	Support for Extreme Memory Profile (XMP) memory modules (Go to GIGABYTE's website for the latest supported memory speeds and memory modules.)
Onboard Graphics	◆	Integrated Graphics Processor: - 2 x HDMI ports, supporting a maximum resolution of 4096x2160 　　* Support for HDMI 1.4a version. - 1 x DisplayPort, supporting a maximum resolution of 3840x2160 　　* Support for DisplayPort 1.2 version. - Maximum shared memory of 1 GB
Audio	◆	Creative® Sound Core 3D chip
	◆	Support for Sound Blaster Recon3Di
	◆	High Definition Audio
	◆	2/5.1-channel
	◆	Support for S/PDIF Out
LAN	◆	1 x Qualcomm® Atheros Killer E2201 chip (10/100/1000 Mbit) (LAN1)
	◆	1 x Intel® GbE LAN phy (10/100/1000 Mbit) (LAN2) 　　* Teaming is not supported.
Wireless Communication module	◆ ◆	Wi-Fi 802.11 a/b/g/n, supporting 2.4/5 GHz Dual-Band Bluetooth 4.0, 3.0+HS, 2.1+EDR
Expansion Slots	◆	2 x PCI Express x16 slots, running at x16 (PCIEX16_1, PCIEX16_2) 　　* For optimum performance, if only one PCI Express graphics card is to be installed, be sure to install it in the PCIEX16_1 slot; if you are installing two PCI Express graphics cards, it is recommended that you install them in the PCIEX16_1 and PCIEX16_2 slots.
	◆	2 x PCI Express x16 slots, running at x8 (PCIEX8_1, PCIEX8_2) 　　* The PCIEX8_1 slot shares bandwidth with the PCIEX16_1 slot and the PCIEX8_2 slot with PCIEX16_2. The PCIEX16_1/PCIEX16_2 slot will operate at up to x8 mode when the PCIEX8_1/PCIEX8_2 is populated. (The PCIEX16 and PCIEX8 slots conform to PCI Express 3.0 standard.)
	◆	3 x PCI Express x1 slots (All PCI Express x1 slots conform to PCI Express 2.0 standard.)

Multi-Graphics Technology	◆	Support for 4-Way/3-Way/2-Way AMD CrossFire™/NVIDIA® SLI™ technology
Storage Interface	◆	Chipset: - 6 x SATA 6Gb/s connectors (SATA3 0~5) supporting up to 6 SATA 6Gb/s devices - Support for RAID 0, RAID 1, RAID 5, and RAID 10
	◆	Marvell® 88SE9230 chip: - 4 x SATA 6Gb/s connectors (GSATA3 6~9) supporting up to 4 SATA 6Gb/s devices - Support for RAID 0, RAID 1, and RAID 10
USB	◆	Chipset: - Up to 2 USB 3.0/2.0 ports (available through the internal USB header) - Up to 6 USB 2.0/1.1 ports (2 ports on the back panel, 4 ports available through the internal USB headers)
	◆	Chipset + 2 Renesas® uPD720210 USB 3.0 Hubs: - Up to 8 USB 3.0/2.0 ports (6 ports on the back panel, 2 ports available through the internal USB header)
Internal Connectors	◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆	1 x 24-pin ATX main power connector 1 x 8-pin ATX 12V power connector 1 x PCIe power connector 10 x SATA 6Gb/s connectors 1 x CPU fan header 7 x system fan headers 1 x water cooling fan header (CPU_OPT) 1 x front panel header 1 x front panel audio header 2 x USB 3.0/2.0 headers 2 x USB 2.0/1.1 headers 1 x Clear CMOS jumper 1 x heatsink LED power connector 1 x heatsink fan connector 1 x power button 1 x reset button 1 x Clear CMOS button 2 x BIOS switches Voltage measurement points
Back Panel Connectors	◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆ ◆	1 x PS/2 keyboard/mouse port 2 x HDMI ports 1 x DisplayPort 1 x coaxial S/PDIF Out connector 1 x optical S/PDIF Out connector 6 x USB 3.0/2.0 ports 2 x USB 2.0/1.1 ports 2 x RJ-45 ports 5 x audio jacks (Center/Subwoofer Speaker Out, Rear Speaker Out, Line In/Mic In, Line Out, Headphone/Speaker Out)

I/O Controller	◆	iTE® I/O Controller Chip
Hardware Monitor	◆	System voltage detection
	◆	CPU/System/PCH temperature detection
	◆	CPU/CPU OPT/System fan speed detection
	◆	CPU/System overheating warning
	◆	CPU/CPU OPT/System fan fail warning
	◆	CPU/CPU OPT/System fan speed control
		* Whether the fan speed control function is supported will depend on the cooler you install.
BIOS	◆	2 x 128 Mbit flash
	◆	Use of licensed AMI EFI BIOS
	◆	Support for DualBIOS™
	◆	PnP 1.0a, DMI 2.0, SM BIOS 2.6, ACPI 2.0a
Unique Features	◆	Support for Q-Flash
	◆	Support for Xpress Install
	◆	Support for APP Center
		* Available applications in APP Center may differ by motherboard model. Supported functions of each application may also differ depending on motherboard specifications.
		- @BIOS
		- EasyTune
		- EZ Setup
		- ON/OFF Charge2
		- USB Blocker
Bundled Software	◆	Norton® Internet Security (OEM version)
	◆	Intel® Rapid Start Technology
	◆	Intel® Smart Connect Technology
	◆	Intel® Smart Response Technology
Operating System	◆	Support for Windows 8/7
Form Factor	◆	E-ATX Form Factor; 30.5cm x 26.4cm

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

* Please visit GIGABYTE's website 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.

LGA1150 CPU Socket

Alignment Key   Alignment Key

Pin One Corner of the CPU Socket

LGA1150 CPU

Notch   Notch

Triangle Pin One Marking on the CPU
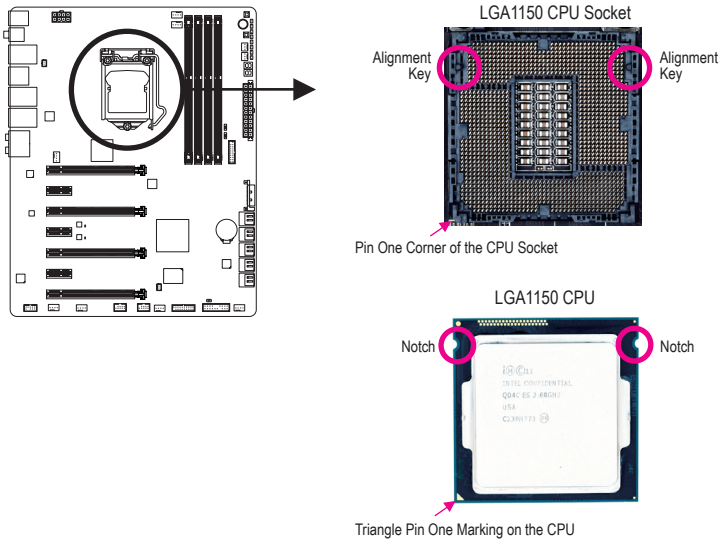
B.   Follow the steps below to correctly install the CPU into the motherboard CPU socket.

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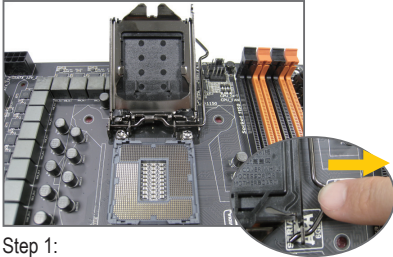
Step 1:
Gently press the CPU socket lever handle down and away from the socket with your finger. Then completely lift the CPU socket lever and the metal load plate/plastic cover will be lifted as well.

Step 2:
Hold the CPU with your thumb and index fingers. Align the CPU pin one marking (triangle) with the pin one corner of the CPU socket (or you may align the CPU notches with the socket alignment keys) and gently insert the CPU into position.
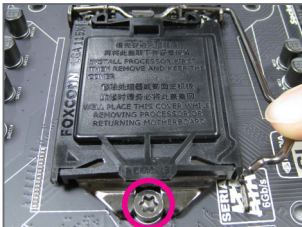
Step 3:
Once the CPU is properly inserted, carefully replace the load plate. When replacing the load plate, make sure the front end of the load plate is under the shoulder screw. Then press the CPU socket lever. The protective plastic cover may pop off from the load plate during the process of engaging the lever. Remove the cover. (Save the cover properly and always replace it when the CPU is not installed.)

Step 4:
Finally, secure the lever under its retention tab to complete the installation of the CPU.
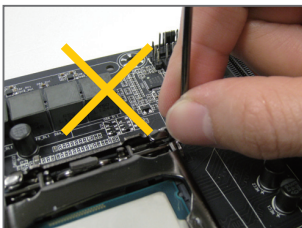
NOTE:
Hold the CPU socket lever by the handle, not the lever base portion.

1-3-2   Installing the CPU Cooler
Follow the steps below to correctly install the CPU cooler on the motherboard.

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

Direction of the Arrow Sign on the Male Push Pin

Male Push Pin

The Top of Female Push Pin
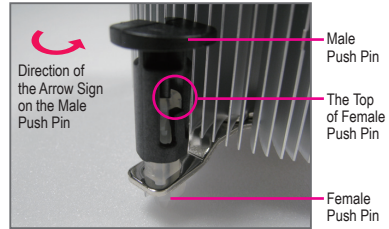
Female Push Pin

Step 2:
Before installing the cooler, note the direction of the arrow sign ↺ on the male push pin. (Turning the push pin along the direction of arrow is to remove the cooler, on the contrary, is to install.)
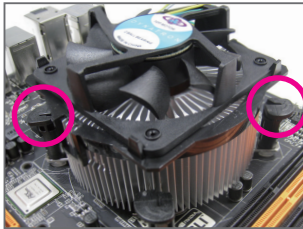
Step 3:
Place the cooler atop the CPU, aligning the four push pins through the pin holes on the motherboard. Push down on the push pins diagonally.
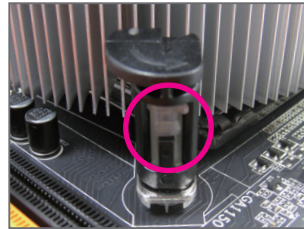
Step 4:
You should hear a "click" when pushing down each push pin. Check that the Male and Female push pins are joined closely.
(Refer to your CPU cooler installation manual for instructions on installing the cooler.)
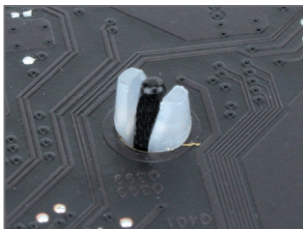
Step 5:
After the installation, check the back of the motherboard. If the push pin is inserted as the picture above shows, the installation is complete.
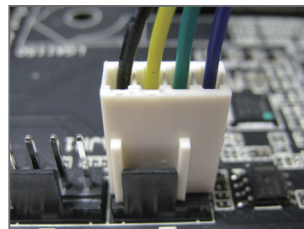
Step 6:
Finally, attach the power connector of the CPU cooler to the CPU fan header (CPU_FAN) on the motherboard.

•   For the waterblocks at each end of the heatsink, we recommend tubes with inner diameter of 9.525 mm and outer diameter of 12.7 mm. After connecting the tubes, make sure that the tubes are attached to the waterblocks securely and tightly with clamps, and there is no leak.
•   Use extreme care when removing the CPU cooler because the thermal grease/tape between the CPU cooler and CPU may adhere to the CPU. Inadequately removing the CPU cooler may damage the CPU.

1-4　Installing the Memory

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

1-4-1　Dual Channel Memory Configuration

This motherboard provides four DDR3 memory sockets and supports Dual Channel Technology. After the memory is installed, the BIOS will automatically detect the specifications and capacity of the memory. Enabling Dual Channel memory mode will double the original memory bandwidth.

The four DDR3 memory sockets are divided into two channels and each channel has two memory sockets as following:
▶Channel A: DDR3_2, DDR3_4
▶Channel B: DDR3_1, DDR3_3
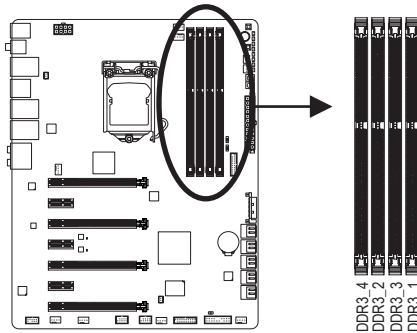
▶ Dual Channel Memory Configurations Table

	DDR3_4	DDR3_2	DDR3_3	DDR3_1
Two Modules	- -	DS/SS	- -	DS/SS
	DS/SS	- -	DS/SS	- -
Four Modules	DS/SS	DS/SS	DS/SS	DS/SS

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

Due to CPU limitations, read the following guidelines before installing the memory in Dual Channel mode.
1. Dual Channel mode cannot be enabled if only one DDR3 memory module is installed.
2. When enabling Dual Channel mode with two or four memory modules, it is recommended that memory of the same capacity, brand, speed, and chips be used. For optimum performance, when enabling Dual Channel mode with two memory modules, we recommend that you install them in the DDR3_1 and DDR3_2 sockets.

1-4-2 Installing a Memory

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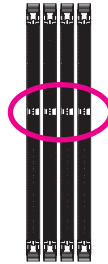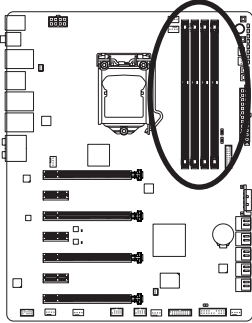
Notch

DDR3 DIMM

A DDR3 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.
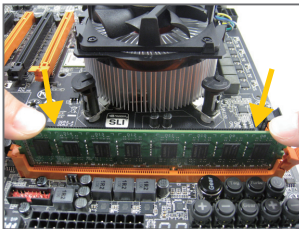
Step 1:
Note the orientation of the memory module. Spread the retaining clip at the right end of the memory socket. Place the memory module on the socket. As indicated in the picture on the left, place your fingers on the top edge of the memory, push down on the memory and insert it vertically into the memory socket.
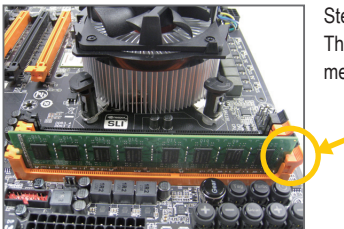
Step 2:
The clips at the right end of the socket will snap into place when the memory module is securely inserted.

1-5   Installing an Expansion Card

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

PCI Express x16 Slot

PCI Express x1 Slot
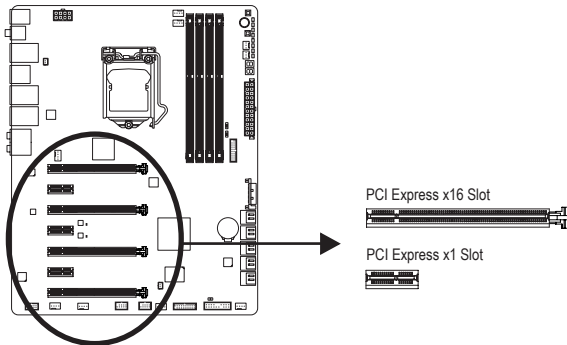
Follow the steps below to correctly install your expansion card in the expansion slot.
1. Locate an expansion slot that supports your card. Remove the metal slot cover from the chassis back panel.
2. Align the card with the slot, and press down on the card until it is fully seated in the slot.
3. Make sure the metal contacts on the card are completely inserted into the slot.
4. Secure the card's metal bracket to the chassis back panel with a screw.
5. After installing all expansion cards, replace the chassis cover(s).
6. Turn on your computer. If necessary, go to BIOS Setup to make any required BIOS changes for your expansion card(s).
7. Install the driver provided with the expansion card in your operating system.

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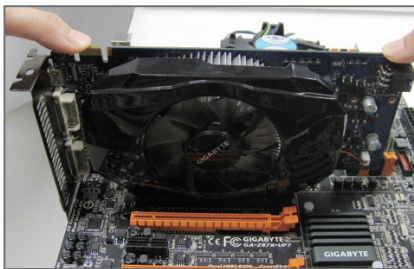
- Installing a Graphics Card:
  Gently push down on the top edge of the card until it is fully inserted into the PCI Express slot. Make sure the card is securely seated in the slot and does not rock.
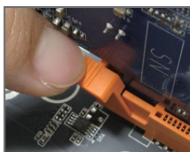
- Removing the Card:
  Gently push back on the lever on the slot and then lift the card straight out from the slot.

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

A. System Requirements
- Windows 8 or Windows 7 operating system
- A CrossFire/SLI-supported motherboard with two/three/four PCI Express x16 slots and correct driver
- Two/three/four 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 (and above) 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 (and above) series. For the latest GPU support information, please refer to the AMD/NVIDIA® official website.)
- CrossFire [(Note 1)]/SLI bridge connectors
- A power supply with sufficient power is recommended [(Note 2)] (Refer to the manual of your graphics cards for the power requirement)

B. Connecting the Graphics Cards
Step 1:
Observe the steps in "1-5 Installing an Expansion Card" and install CrossFire/SLI graphics cards on the PCI Express x16 slots. (To set up a 2-Way configuration, we recommend installing the graphics cards on the PCIEX16_1 and PCIEX16_2 slots.)
Step 2:
Insert the CrossFire [(Note 1)]/SLI bridge connectors in the CrossFire/SLI gold edge connectors on top of the cards.
Step 3:
Plug the display cable into the graphics card on the PCIEX16 slot.

C. Configuring the Graphics Card Driver
C-1. To Enable CrossFire Function
After installing the graphics card driver in the operating system, go to the **AMD VISION Engine Control Center**. Browse to **Performance\ AMD CrossFireX™ Configurations** and ensure the **Enable AMD CrossFireX™** check box is selected. Select the GPU combination you want to use (Available combination options are dependent on the number of graphics cards.) and click **Apply**.
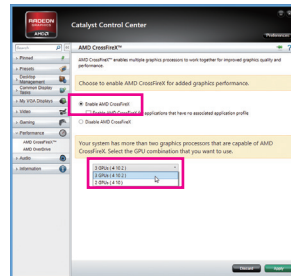
C-2. To Enable SLI Function
After installing the graphics card driver in the operating system, go to the **NVIDIA Control Panel**. Browse to the **Configure SLI, Surround, Physx** screen and ensure **Maximize 3D performance** is enabled.
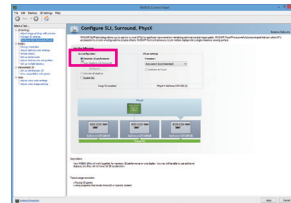
(Note 1)　The bridge connectors may be needed or not depending on your graphics cards.
(Note 2)　When two or more graphics cards are installed, we recommend that you connect the SATA power cable from the power supply to the ATX4P connector to ensure system stability. For 4-way CrossFire/ SLI, you must the ATX4P connector.

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

1-7 Back Panel Connectors
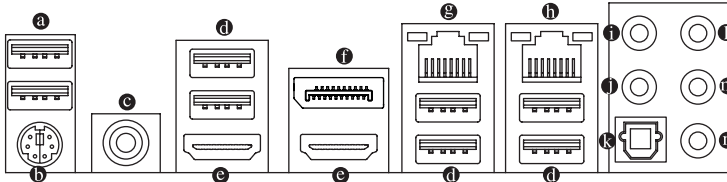
ⓐ USB 2.0/1.1 Port

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.

ⓑ PS/2 Keyboard/Mouse Port

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

ⓒ Coaxial S/PDIF Out Connector

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

ⓓ 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.

ⓔ HDMI Port

The HDMI port is HDCP compliant and supports Dolby True HD and DTS HD Master Audio formats. It also supports up to 192KHz/24bit 8-channel LPCM audio output. You can use this port to connect your HDMI-supported monitor. The maximum supported resolution is 4096x2160, but the actual resolutions supported are dependent on the monitor being used.

After installing the HDMI device, make sure to set the default sound playback device to HDMI. (The item name may differ depending on your operating system. The screenshot below is from Windows 8.)
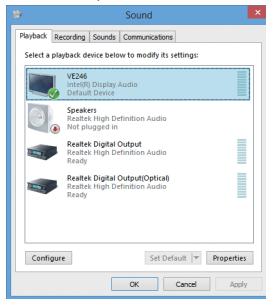
In Windows 8, select All apps>Control Panel>Hardware and Sound>Sound>Playback, set Intel(R) Display Audio to the default playback device.

ⓕ DisplayPort

DisplayPort delivers high quality digital imaging and audio, supporting bi-directional audio transmission. DisplayPort can support both DPCP and HDCP content protection mechanisms. You can use this port to connect your DisplayPort-supported monitor. Note: The DisplayPort Technology can support a maximum resolution of 3840x2160 but the actual resolutions supported depend on the monitor being used.

- 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.

After installing the DisplayPort device, make sure the default device for sound playback is the DisplayPort device. (The item name may differ from operating system. Refer to the HDMI settings information on the previous page for the configuration dialog box.)

Triple Display Configurations for the Onboard Graphics:
Triple-display configurations are supported after you install motherboard drivers in OS. Only dual-display configurations are supported during the BIOS Setup or POST process.

RJ-45 LAN Port (LAN2)
The Gigabit Ethernet LAN port provides Internet connection at up to 1 Gbps data rate. The following describes the states of the LAN port LEDs.

Connection/Speed LED   Activity LED

LAN Port
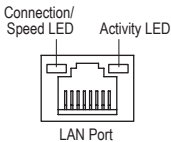
Connection/Speed LED:

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

Activity LED:

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

RJ-45 LAN Port (LAN1)
The Gigabit Ethernet LAN port provides Internet connection at up to 1 Gbps data rate. The following describes the states of the LAN port LEDs.

Connection/Speed LED   Activity LED

LAN Port
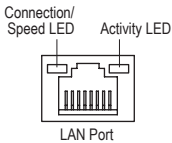
Connection/Speed LED:

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

Activity LED:

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

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

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

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.

Center/Subwoofer Speaker Out Jack
Use this audio jack to connect center/subwoofer speakers in a 5.1-channel audio configuration.

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

Headphone/Speaker Out Jack
This audio output jack supports audio amplifying function. For better sound quality, it is recommended that you connect your headphone/speaker to this jack.

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

1-8   Onboard Buttons, Switches and LEDs

BIOS Switch and BIOS LED Indicators

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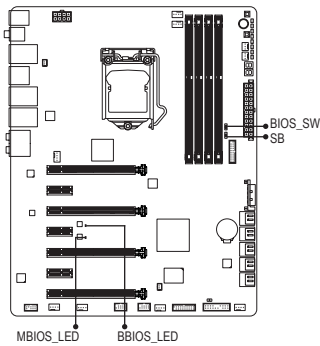
BIOS Switch:

BIOS_SW

1: Main BIOS (Boot from the main BIOS)

2: Backup BIOS (Boot from the backup BIOS)

SB

1: Dual BIOS

2: Single BIOS

BIOS LED Indicators:

MBIOS_LED (The main BIOS is active)

BBIOS_LED (The backup BIOS is active)

Quick Buttons

This motherboard has 3 quick buttons: power button, reset button and clear CMOS button. The power button and reset button allow users to quickly turn on/off or reset the computer in an open-case environment when they want to change hardware components or conduct hardware testing. Use the clear CMOS button to clear the BIOS configuration and reset the CMOS values to factory defaults when needed.
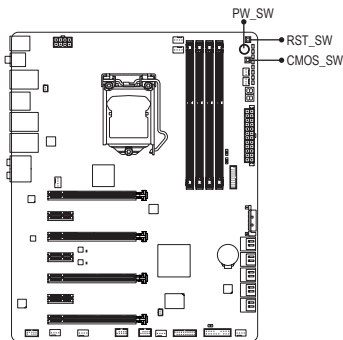
PW_SW: Power button
RST_SW: Reset button
CMOS_SW: Clear CMOS Button

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

Voltage Measurement Points

Users can use a multimeter to measure component voltages, including VRIN, VIOD, VSA, VAXG, VIOA, VRING, VDIMM, and VCORE. You can employ following way to measure component voltages.
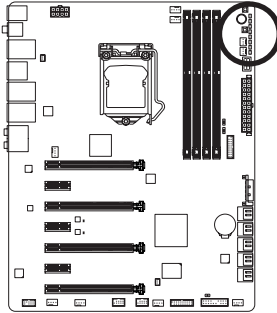
Pin 1 —■ VRIN
Pin 1 —■ VIOD
Pin 1 —■ VSA
Pin 1 —■ VAXG
Pin 1 —■ VIOA
Pin 1 —■ VRING
Pin 1 —■ VDIMM
Pin 1 —■ VCORE

Pin No.	Definition
1	Power
2	GND
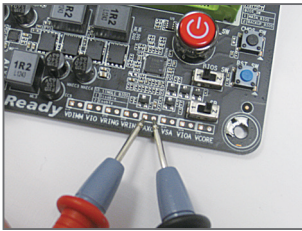
Steps:
Connect the red lead of the multimeter to the pin 1 (Power) of a voltage measurement point and the black lead to the pin 2 (ground).

1-9　Changing the Operational Amplifier
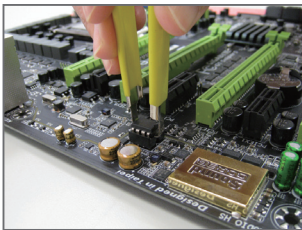
Step 1:
Use the included IC extractor to carefully grip the IC's sides and extract it from the socket.
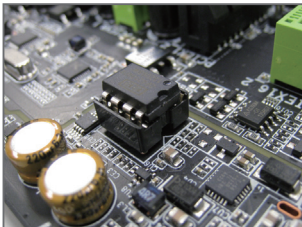
Step 2:
Align the notch on the OP chip with the notch on the socket and gently press the chip into the socket until seated.

1-10   Internal Connectors
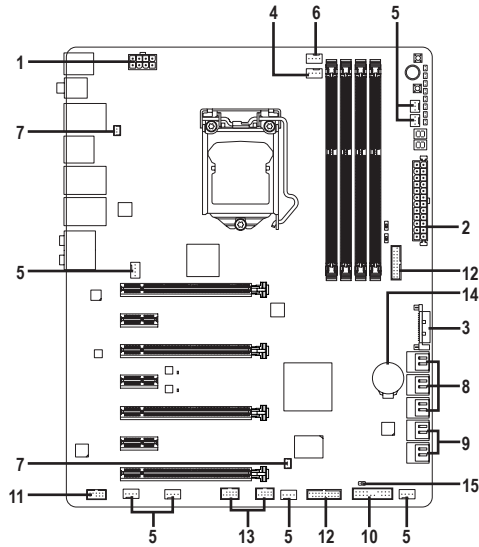
1)	ATX_12V_2X4	9)	GSATA3 6/7/8/9
2)	ATX	10)	F_PANEL
3)	ATX4P	11)	F_AUDIO
4)	CPU_FAN	12)	F_USB30_1/F_USB30_2
5)	SYS_FAN1/2/3/4/5/6/7	13)	F_USB1/F_USB2
6)	CPU_OPT	14)	BAT
7)	HP_PWR_PCH/HP_PWR	15)	CLR_CMOS
8)	SATA3 0/1/2/3/4/5		

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

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

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

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

To meet expansion requirements, it is recommended that a power supply that can withstand high power consumption be used (500W or greater). If a power supply is used that does not provide the required power, the result can lead to an unstable or unbootable system.
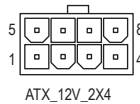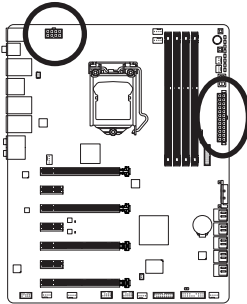
ATX_12V_2X4:

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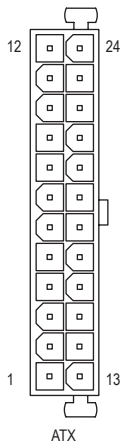
ATX:

Pin No.	Definition	Pin No.	Definition
1	3.3V	13	3.3V
2	3.3V	14	-12V
3	GND	15	GND
4	+5V	16	PS_ON (soft On/Off)
5	GND	17	GND
6	+5V	18	GND
7	GND	19	GND
8	Power Good	20	-5V
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 SATA power cable from the power supply to the ATX4P connector to ensure system stability.
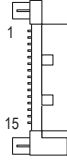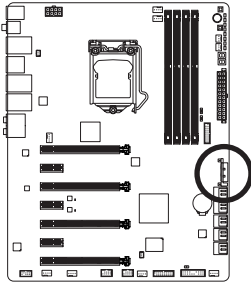
Pin No.	Definition
1	NC
2	NC
3	NC
4	GND
5	GND
6	GND
7	VCC
8	VCC
9	VCC
10	GND
11	GND
12	GND
13	+12V
14	+12V
15	+12V

4/5) CPU_FAN/SYS_FAN1/SYS_FAN2/SYS_FAN3/SYS_FAN4/SYS_FAN5/SYS_FAN6/SYS_FAN7 (Fan Headers)

The motherboard has a 4-pin CPU fan header (CPU_FAN), five 4-pin (SYS_FAN1/2/3/4/5) and the 3-pin (SYS_FAN6/7) system fan headers. Most fan headers possess a foolproof insertion design. When connecting a fan cable, be sure to connect it in the correct orientation (the black connector wire is the ground wire). The motherboard supports CPU fan speed control, which requires the use of a CPU fan with fan speed control design. For optimum heat dissipation, it is recommended that a system fan be installed inside the chassis.

CPU_FAN:

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

SYS_FAN1:
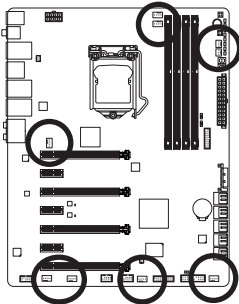
Pin No.	Definition
1	GND
2	+12V /Speed Control
3	Sense
4	VCC

SYS_FAN6/7:

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

SYS_FAN2/3/4/5:

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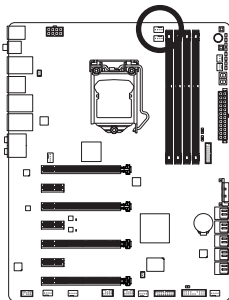
Pin No.	Definition
1	GND
2	+12V /Speed Control
3	Sense
4	VCC

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

7) HP_PWR_PCH/HP_PWR (Chipset Heatsink LED/Fan Header)

The HP_PWR_PCH power connector provides power to the LEDs on the Chipset heatsink. The HP_PWR power connector provides power to the fan on the Chipset heatsink.
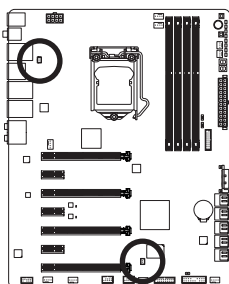
HP_PWR_PCH:

Pin No.	Definition
1	+12V
2	GND

HP_PWR:

Pin No.	Definition
1	+12V /Speed Control
2	GND

8) SATA3 0/1/2/3/4/5 (SATA 6Gb/s Connectors, Controlled by Intel® Z87 Chipset)

The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA device. The Intel® Z87 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
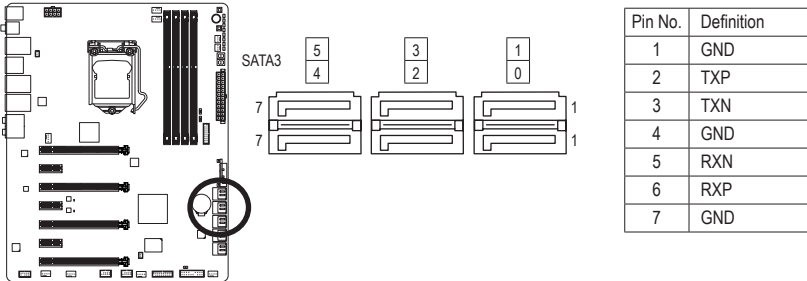
9) GSATA3 6/7/8/9 (SATA 6Gb/s Connectors, Controlled by Marvell® 88SE9230 Chip)

The SATA connectors conform to SATA 6Gb/s standard and are compatible with SATA 3Gb/s and SATA 1.5Gb/s standard. Each SATA connector supports a single SATA device. The Marvell® 88SE9230 chip supports RAID 0, RAID 1, 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
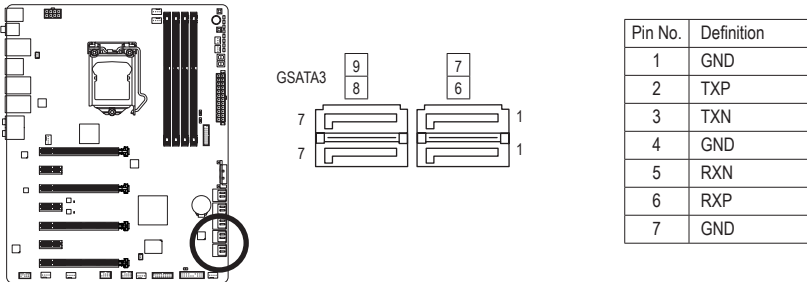
- A RAID 0 or RAID 1 configuration requires at least two hard drives. If more than two hard drives are to be used, the total number of hard drives must be an even number.
- A RAID 5 configuration requires at least three hard drives. (The total number of hard drives does not have to be an even number.)
- A RAID 10 configuration requires four hard drives.

10) 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.
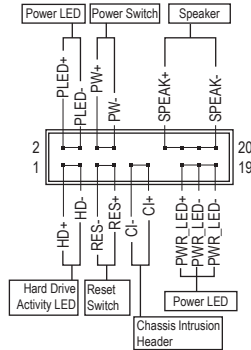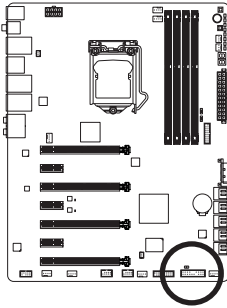
- **PLED/PWR** (Power LED, Yellow/Purple):

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.

11) F_AUDIO (Front Panel Audio Header)

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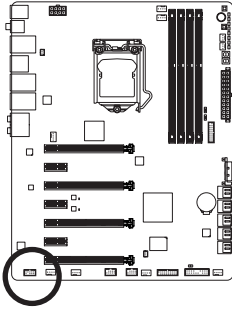
For HD Front Panel Audio:

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

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.

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

The headers conform to USB 3.0/2.0 specification and each header can provide two USB ports. For purchasing the optional 3.5" front panel that provides two USB 3.0/2.0 ports, please contact the local dealer.
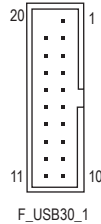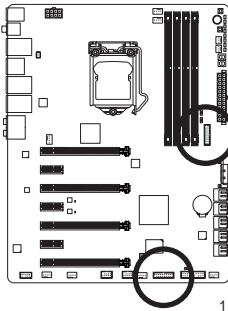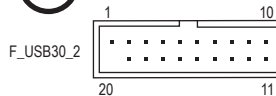
Pin No.	Definition	Pin No.	Definition
1	VBUS	11	D2+
2	SSRX1-	12	D2-
3	SSRX1+	13	GND
4	GND	14	SSTX2+
5	SSTX1-	15	SSTX2-
6	SSTX1+	16	GND
7	GND	17	SSRX2+
8	D1-	18	SSRX2-
9	D1+	19	VBUS
10	NC	20	No Pin

Only the USB ports routed to the F_USB30_1 header can support the ON/OFF Charge2 function.

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

13) 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.
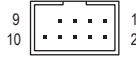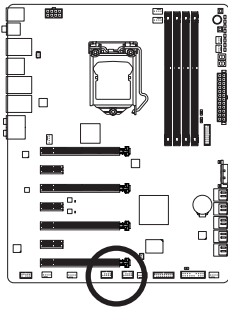
Pin No.	Definition
1	Power (5V)
2	Power (5V)
3	USB DX-
4	USB DY-
5	USB DX+
6	USB DY+
7	GND
8	GND
9	No Pin
10	NC

- • 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.

14) 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.
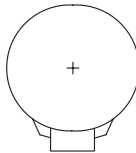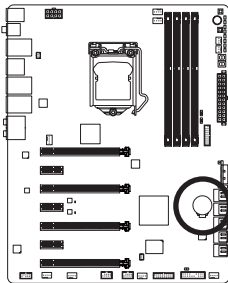
You may clear the CMOS values by removing the battery:
1. Turn off your computer and unplug the power cord.
2. Gently remove the battery from the battery holder and wait for one minute. (Or use a metal object like a screwdriver to touch the positive and negative terminals of the battery holder, making 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.

15) CLR_CMOS (Clear CMOS Jumper)

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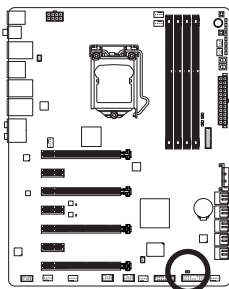
Open: Normal

Short: Clear CMOS Values

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

Chapter 2   BIOS Setup

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

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

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

To upgrade the BIOS, use either the GIGABYTE Q-Flash or @BIOS utility.
• Q-Flash allows the user to quickly and easily upgrade or back up BIOS without entering the operating system.
• @BIOS is a Windows-based utility that searches and downloads the latest version of BIOS from the Internet and updates the BIOS.
For instructions on using the Q-Flash and @BIOS utilities, refer to Chapter 5, "BIOS Update Utilities."

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

2-1 Startup Screen

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

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

Function Keys:

<DEL>: BIOS SETUP\Q-FLASH

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

<F9>: SYSTEM INFORMATION

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

<F12>: BOOT MENU

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

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

<END>: Q-FLASH

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

2-2 The Main Menu

A. Windows Mode (Default)

Differing from traditional UEFI interface, the Windows mode provides a fancy and user-friendly BIOS environment where users can easily point and click through various settings and make adjustments for optimum performance. In Windows Mode, you can use your mouse to move through the option menus for quick configuration or you can click **Classic Setup** under the **Shortcuts** list on the right of the screen or press <F2> to switch to the traditional BIOS Setup screen.
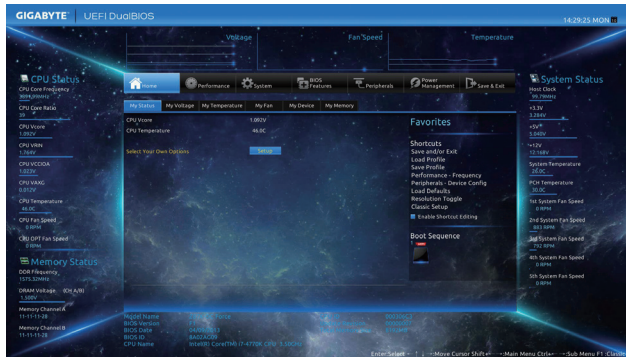
B. Classic Setup

In Classic Setup, 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: F4a)

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
<F2>	Switch to Windows Mode
<F5>	Restore the previous BIOS settings for the current submenus
<F7>	Load the Optimized BIOS default settings for the current submenus
<F8>	Access the Q-Flash utility
<F9>	Display system information
<F10>	Save all the changes and exit the BIOS Setup program
<F12>	Capture the current screen as an image and save it to your USB drive
<Esc>	Main Menu: Exit the BIOS Setup program
	Submenus: Exit current submenu

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**
Use this menu to configure the default language used by the BIOS and system time and date. This menu also displays information on the devices connected to the SATA ports.

■ **BIOS Features**
Use this menu to configure the device boot order, advanced features available on the CPU, and the primary display adapter.

■ **Peripherals**
Use this menu to configure all peripheral devices, such as SATA, USB, integrated audio, and integrated 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.

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

2-3   M.I.T.

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

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

▶ **M.I.T. Current Status**
   This screen provides information on CPU/memory frequencies/parameters.

▶ **Advanced Frequency Settings**

☞ **Performance Boost** (Note)
  Provides you with five different overclocking configurations. Options are: Medium, High, Turbo, Ultra, Extreme. (Default: Auto)

☞ **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 enabled.

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

☞ **Processor Graphics Clock**
  Allows you to set the onboard graphics clock. The adjustable range is from 400 MHz to 4000 MHz. (Default: Auto)

☞ **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.

(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.

- **CPU Frequency**

    Displays the current operating CPU frequency.

▶ **Advanced CPU Core Features**

- **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 (1-Core Active~4-Core Active)** (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)

- **CPU Core Enabled** (Note 1)

  Allows you to determine whether to enable all CPU cores. **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/C6 State Support** (Note 1)

  Allows you to determine whether to let the CPU enter C3/C6 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/C6 state is a more enhanced power-saving state than C1. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

- **CPU Thermal Monitor** (Note 1)

  Enables or disables Intel® CPU 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® SpeedStep 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)

- **Memory Frequency (MHz)**

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

(Note 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 support this feature.

▶ **Advanced Memory Settings**

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

  Performance Enhance
Allows the system to operate at three different performance levels.
    ▶ Normal   Lets the system operate at its basic performance level.
    ▶ Turbo   Lets the system operate at its good performance level. (Default)
    ▶ Extreme   Lets the system operate at its best performance level.

  DRAM Timing Selectable
Quick and **Expert** allows the **Channel Interleaving**, **Rank Interleaving**, and memory timing settings below to be configurable. Options are: Auto (default), Quick, Expert.

  Profile DDR Voltage
When using a non-XMP memory module or **Extreme Memory Profile (X.M.P.)** is set to **Disabled**, this item will display as **1.50V**. When **Extreme Memory Profile (X.M.P.)** is set to **Profile1** or **Profile2**, this item will display the value based on the SPD data on the XMP memory.

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

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

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

▶ **Channel A/B Timing Settings**

This sub-menu provides memory timing settings for each channel of memory. The respective timing setting screens are configurable only when **DRAM Timing Selectable** is set to **Quick** or **Expert**. 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**

▶ **3D Power Control**

- **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 Vcore 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 voltage limit on the CPU VRIN voltage for over-voltage protection. The adjustable range is from 150.0mV to 500.0mV. **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 300.0mV. **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 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 Vcore.

- **DDR CH(A/B) Current Protection**
  Allows you to set the over-current protection level for the memory voltage.
    ▶ Auto   Lets 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**
  Displays the PWM thermal protection threshold for the CPU VRIN area.

- **DDR CH(A/B) PWM Thermal Protection**
  Displays the PWM thermal protection threshold for the Channel A and Channel B memory area.

- **CPU VRIN PWM Switch Rate**
  Displays the CPU VRIN PWM frequency.
- **DDR CH(A/B) PWM Switch Rate**
  Displays the PWM frequency for Channel A and Channel B memory.
- **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)

▶ **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 VCCIOA/DRAM Voltage/+3.3V/+5V/+12V/CPU VAXG**
  Displays the current system voltages.
-   **CPU/System/PCH Temperature**
  Displays current CPU/System/Chipset temperature.
-   **CPU/CPU OPT/System Fan Speed**
  Displays current CPU/CPU_OPT/system fan speeds.
-   **CPU/System Warning Temperature**
  Sets the warning threshold for CPU/system temperature. When CPU/system 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 EasyTune 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 **Slope PWM** item.
  - ▸ Disabled   Allows the fan to run at full speeds.
-   **Slope PWM**
  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 /^{o}C ~ 2.50 PWM value /^{o}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 EasyTune 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 **Slope PWM** item.
  - ▸ Silent   Allows the fan to run at slow speeds.
-   **Slope PWM**
  Allows you to control the water cooling CPU fan speed. This item is configurable only when **CPU OPT Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /^{o}C ~ 2.50 PWM value /^{o}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 EasyTune 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 **Slope PWM** item.
  - ▸ Disabled   Allows the fan to run at full speeds.
-   **Slope PWM**
  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 /^{o}C ~ 2.50 PWM value /^{o}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 EasyTune 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 Slope PWM item.
▶▶ Disabled   Allows the fan to run at full speeds.
☝ **Slope PWM**
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 /ºC ~ 2.50 PWM value /ºC.
☝ **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 EasyTune 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 Slope PWM item.
▶▶ Disabled   Allows the fan to run at full speeds.
☝ **Slope PWM**
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 /ºC ~ 2.50 PWM value /ºC.
☝ **4th/5th System Fan Speed Control (SYS_FAN4 and SYS_FAN5 Connectors)**
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 EasyTune 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 Slope PWM item.
▶▶ Disabled   Allows the fan to run at full speeds.
☝ **Slope PWM**
Allows you to control the fan speed. This item is configurable only when **4th/5th System Fan Speed Control** is set to **Manual**. Options are: 0.75 PWM value /ºC ~ 2.50 PWM value /ºC.

▶ **Miscellaneous Settings**

☞ **PEG Gen3 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. For example, the PCI Express x1 slots can support up to Gen 2 mode only. **Auto** lets the BIOS automatically configure this setting. (Default: Auto)

☞ **Legacy BenchMark Enhancement**
Allows you to determine whether to enhance some legacy benchmark performance. (Default: Disabled)

2-4   System

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

☞ **System Language**
Selects the default language used by the BIOS.

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

☞ **System Time**
Sets the system time. The time format is hour, minute, and second. For example, 1 p.m. is 13:0:0. 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. For example, you can set hard drive as the first priority **(Boot Option #1)** and DVD ROM drive as the second priority **(Boot Option #2)**. The list only displays the device with the highest priority for a specific type. For example, only hard drive defined as the first priority on the **Hard Drive BBS Priorities** submenu will be presented here.

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: Enabled)

- **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)

- **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 item 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 item 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**.

(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.

- **Limit CPUID Maximum** (Note)
  Allows you to determine whether to limit CPUID maximum value. Set this item to **Disabled** for Windows XP operating system; set this item to **Enabled** for legacy operating system such as Windows NT4.0. (Default: Disabled)
- **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)
- **Intel Virtualization Technology** (Note)
  Enables or disables Intel® Virtualization Technology. Virtualization enhanced by Intel® Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With virtualization, one computer system can function as multiple virtual systems. (Default: Enabled)
- **Intel TXT(LT) Support** (Note)
  Enables or disables Intel® Trusted Execution Technology (Intel® TXT). Intel® Trusted Execution Technology provides a hardware-based security foundation. (Default: Disabled)
- **Dynamic Storage Accelerator**
  Enables or disables Intel® Dynamic Storage Accelerator. When enabled, the hard drive I/O performance will be adjusted according to hard drive load. (Default: Disabled)
- **VT-d** (Note)
  Enables or disables Intel® Virtualization Technology for Directed I/O. (Default: Enabled)

- **OS Type**
  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.
  - ▶ Always   Enables UEFI CSM. (Default)
  - ▶ Never   Disables UEFI CSM and supports UEFI BIOS boot process only.

  This item is configurable only when **OS Type** is set to **Windows 8** or **Windows 8 WHQL**.
- **Boot Mode Selection**
  Allows you to select which type of operating system to boot.
  - ▶ UEFI and Legacy   Allows booting from operating systems that support legacy option ROM or UEFI option ROM. (Default)
  - ▶ Legacy Only   Allows booting from operating systems that only support legacy Option ROM.
  - ▶ UEFI Only   Allows booting from operating systems that only support UEFI Option ROM.

  This item is configurable only when **CSM Support** is set to **Always**.
- **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 **Always**.
- **Storage Boot Option Control**
  Allows you to select whether to enable the UEFI or legacy option ROM for the storage device controller.
  - ▶ Disabled   Disables option ROM.
  - ▶ Legacy Only   Enables legacy option ROM only. (Default)
  - ▶ UEFI Only   Enables UEFI option ROM only.
  - ▶ Legacy First   Enables legacy option ROM first.
  - ▶ UEFI First   Enables UEFI option ROM first.

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

- **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 OpROM   Enables legacy option ROM only.
  - ▶ UEFI OpROM   Enables UEFI option ROM only. (Default)
- **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

- **Init Display First**

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

  ▶▶ IGFX   Sets the onboard graphics as the first display. (Default)

  ▶▶ PCIe 1 Slot   Sets the graphics card on the PCIEX16_1 slot as the first display.

  ▶▶ PCIe 2 Slot   Sets the graphics card on the PCIEX8_1 slot as the first display.

  ▶▶ PCIe 3 Slot   Sets the graphics card on the PCIEX16_2 slot as the first display.

  ▶▶ PCIe 4 Slot   Sets the graphics card on the PCIEX8_2 slot as the first display.

- **PCH LAN Controller (Intel® GbE LAN Chip, LAN2)**

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

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

- **XHCI Mode (Intel® Z87 Chipset)**

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

‽ **Internal Graphics**
Enables or disables the onboard graphics function. (Default: Enabled)

‽ **Internal Graphics Memory Size**
Allows you to set the onboard graphics memory size. Options are: 32M~1024M. (Default: 64M)

‽ **DVMT Total Memory Size**
Allows you to allocate the DVMT memory size of the onboard graphics. Options are: 128M, 256M, MAX. (Default: MAX)

‽ **Intel(R) Rapid Start Technology**
Enables or disables Intel® Rapid Start Technology. (Default: Disabled)

‽ **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.

‽ **OnBoard LAN Controller#1 (Qualcomm® Atheros Killer E2201 LAN Chip, LAN1)**
Enables or disables the Qualcomm® Atheros Killer E2201 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**.

▶ **SATA Configuration**

☞ **SATA Controller(s) (Intel® Z87 Chipset)**
Enables or disables the integrated SATA controllers. (Default: Enabled)

☞ **SATA Mode Selection (Intel® Z87 Chipset)**
Enables or disables RAID for the SATA controllers integrated in the Intel® Z87 Chipset 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)

▶ **Serial ATA Port 0/1/2/3/4/5**

☞ **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)

▶ **Intel(R) Smart Connect Technology**

☞ **ISCT Support**
Enables or disables Intel® Smart Connect Technology. (Default: Disabled)

▶ **Marvell® ATA Controller Configuration**

☞ **GSATA Controller (Marvell® 88SE9230 Chip, GSATA3 6/7/8/9 connectors)**
Enables or disables RAID for the SATA controllers integrated in the Marvell® 88SE9230 chip or configures the SATA controllers to AHCI mode. The area below displays the current status of the four SATA ports.
　▶AHCI Mode　　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)
　▶Disabled　　　Disables this function.

▶ **Intel(R) Ethernet Network Connection i217V**
This sub-menu provides information on LAN configuration and related configuration options.

2-7   Power Management

☞ **Resume by Alarm**
Determines whether to power on the system at a desired time. (Default: Disabled)
If enabled, set the date and time as following:
▸ Wake up day: Turn on the system at a specific time on each day or on a specific day in a month.
▸ Wake up hour/minute/second: Set the time at which the system will be powered on automatically.
Note: When using this function, avoid inadequate shutdown from the operating system or removal of the AC power, or the settings may not be effective.

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

☞ **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: 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.

☞ **RC6(Render Standby)**
Allows you to determine whether to let the onboard graphics enter standby mode to decrease power consumption. (Default: Enabled)

☞ **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.

2-8 Save & Exit

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

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

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

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

○ **Save Profiles**
This function allows you to save the current BIOS settings to a profile. You can create up to 8 profiles and save as Setup Profile 1~ Setup Profile 8. Press <Enter> to complete. Or you can select **Select File in HDD/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:
  •   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.
  •   Windows 8/7 setup disk.
  •   Motherboard driver disk.
  •   A USB thumb drivev

3-1   Configuring Intel® Z87 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 there is more than one SATA controller on your motherboard, refer to "Chapter 1," "Hardware Installation," to identify the SATA controller for the SATA port. (For example, on this motherboard, the SATA3 0/1/2/3/4/5 ports are supported by the Intel® Z87 Chipset.) 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 **Peripherals\SATA Configuration**, make sure **SATA Controllers** is enabled. To create RAID, set **SATA Mode Selection** to **RAID** (Figure 1). If you do not want to create RAID, set this item to **IDE** or **AHCI**.
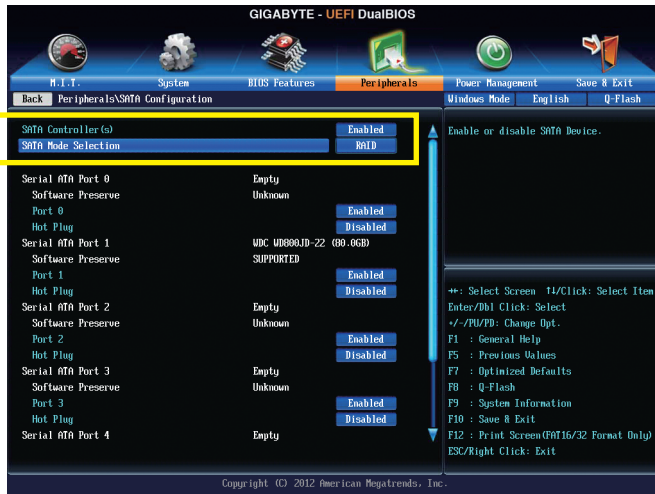
Figure 1

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

This mode supports Windows 8 64-bit installation only.

Step 1:
In BIOS Setup, go to **BIOS Features** and set **OS Type** to **Windows 8** and **CSM Support** to **Never**. (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).

<p align="center">Figure 8</p>

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.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.

RAID Volumes :
None defined.

Physical Devices :
ID      Device Model    Serial #                        Size        Type/Status(Vol ID)
0       ST3120026AS     3JT354CP                        111.7GB     Non-RAID Disk
1       ST3120026AS     3JT329JX                        111.7GB     Non-RAID Disk

Press  <CTRL - I>  to enter Configuration Utility..
```
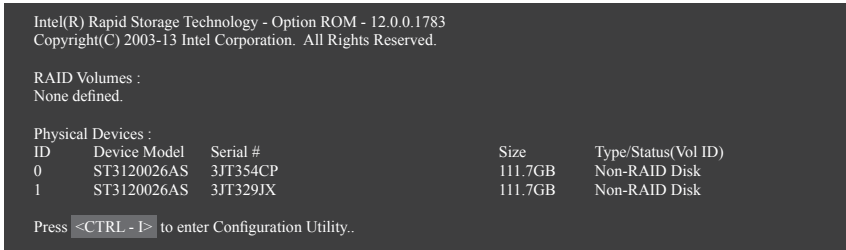
<p align="center">Figure 9</p>

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>.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.
================================= [ MAIN MENU ] =================================
         1.  Create RAID Volume                    4.  Recovery Volume Options
         2.  Delete RAID Volume                    5.  Acceleration Options
         3.  Reset Disks to Non-RAID               6.  Exit

========================= [ DISK/VOLUME INFORMATION ] =========================
RAID Volumes :
None defined.

Physical Deivces :
ID      Device Model            Serial #            Size        Type/Status(Vol ID)
0       ST3120026AS             3JT354CP            111.7GB     Non-RAID Disk
1       ST3120026AS             3JT329JX            111.7GB     Non-RAID Disk


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

<p align="center">Figure 10</p>

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.

```
                   Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
                     Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.
                            ═══[ CREATE VOLUME MENU ]═══
                                   Name :    Volume0
                             RAID Level :   RAID0(Stripe)
                                  Disks :   Select Disks
                             Strip Size :     128KB
                               Capacity :   111.7 GB
                                   Sync :   N/A
                                         Create Volume
                                 ═══[ HELP ]═══



                         RAID0: Stripes data (performance).




        [↑↓]-Change          [TAB]-Next          [ESC]-Previous Menu         [ENTER]-Select
```
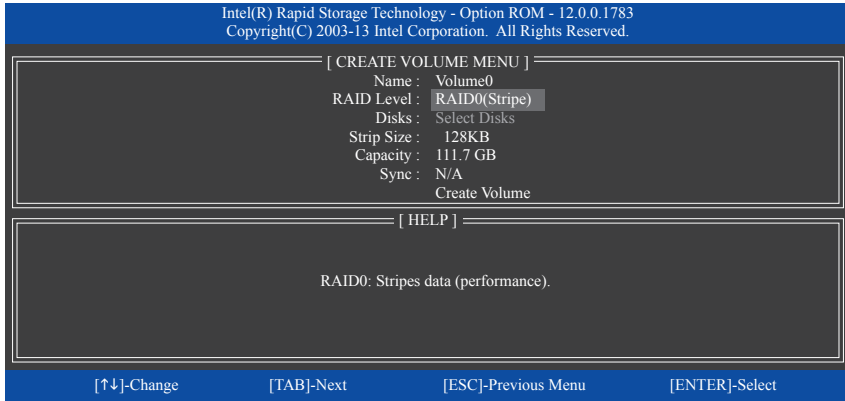
Figure 11

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>.

```
                   Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
                     Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.
                            ═══[ CREATE VOLUME MENU ]═══
                                   Name :    Volume0
                             RAID Level :   RAID0(Stripe)
                                  Disks :   Select Disks
                             Strip Size :    128KB
                               Capacity :   111.7 GB
                                   Sync :   N/A
                                         Create Volume
                                 ═══[ HELP ]═══
                            The following are typical values:
                            RAID0    -   128KB
                            RAID10   -   64KB
                            RAID5    -   64KB



        [↑↓]-Change          [TAB]-Next          [ESC]-Previous Menu         [ENTER]-Select
```

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).

Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.

[CREATE VOLUME MENU]

Name :   Volume0
RAID Level :   RAID0(Stripe)
Disks :   Select Disks
Strip Size :   128 MB
Capacity :   111.7 GB

WARNING : ALL DATA ON SELECTED DISKS WILL BE LOST.

Are you sure you want to create this volume? (Y/N) :

Press ENTER to create the specified volume.

[↑↓]-Change   [TAB]-Next   [ESC]-Previous Menu   [ENTER]-Select

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)

Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.

[MAIN MENU]

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

[DISK/VOLUME INFORMATION]

RAID Volumes :
ID	Name	Level	Strip	Size	Status	Bootable
0	Volume0	RAID0(Stripe)	128KB	223.6GB	Normal	Yes

Physical Devices :
ID	Device Model	Serial #	Size	Type/Status(Vol ID)
0	ST3120026AS	3JT354CP	111.7GB	Member Disk(0)
1	ST3120026AS	3JT329JX	111.7GB	Member Disk(0)

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

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).

```
            Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
               Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.
========================================[ MAIN MENU ]========================================
    1.  Create RAID Volume                        4.  Recovery Volume Options
    2.  Delete RAID Volume                         5.  Acceleration Options
    3.  Reset Disks to Non-RAID                    6.  Exit

==================================[ DISK/VOLUME INFORMATION ]==================================
 RAID Volumes :
 None defined.

 Physical Disks :
 IE      Drive Model              Serial #              Size        Type/Status(Vol ID)
 0       ST3120026AS              3JT354CP              111.7GB     Non-RAID Disk
 1       ST3120026AS              3JT329JX              111.7GB     Non-RAID Disk


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

<center>Figure 15</center>

Step 2:
After entering the volume name, select **Recovery** under the **RAID Level** item and press <Enter> (Figure 16).

```
            Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
               Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.
=====================================[ CREATE VOLUME MENU ]=====================================
                        Name :   Volume0
                  RAID Level :   Recovery
                       Disks :   Select Disks
                  Strip Size :   N/A
                    Capacity :   111.7 GB
                        Sync :   Continuous
                                 Create Volume
==========================================[ HELP ]==========================================



            Recovery: Copies data between a master and a recovery disk.



         [↑↓]-Change          [TAB]-Next          [ESC]-Previous Menu          [ENTER]-Select
```

<center>Figure 16</center>

Configuring SATA Hard Drive(s)   - 70 -

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).

```
              Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
                 Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.
                        ═══════[ CREATE VOLUME MENU ]═══════
                                 Name :   Volume0
                            RAID Level :   Recovery
                              ══════════[ SELECT DISKS ]══════════

           ID      Drive Model                Serial #       Size        Status
           M0      ST3120026AS                3JT354CP       111.7GB     Non-RAID Disk
           R1      ST3120026AS                3JT329JX       111.7GB     Non-RAID Disk




                    Select 1 Master and 1 Recovery disk to create volume.

              ═══[↑↓]-Prev/Next   [TAB]-(M)aster  [SPACE]-(R)ecovery  [ENTER]-Done═══


         [↑↓]-Change            [TAB]-Next              [ESC]-Previous Menu            [ENTER]-Select
```

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.

```
              Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
                 Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.
                        ═══════[ CREATE VOLUME MENU ]═══════
                                 Name :   Volume0
                            RAID Level :   Recovery
                                 Disks :   Select Disks
                            Strip Size :   N/A
                              Capacity :   0.0 GB
                                  Sync :   Continuous
                                          Create Volume
                              ═══════════[ HELP ]═══════════


                                   Select a sync option:
                            On Request: volume is updated manually
                           Continuous: volume is updated automatically



         [↑↓]-Change            [TAB]-Next              [ESC]-Previous Menu            [ENTER]-Select
```

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.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.

════════════════════════[ DELETE VOLUME MENU ]════════════════════════
Name            Level           Drives        Capacity        Status       Bootable
Volume0         RAID0(Stripe)   2             223.6GB         Normal       Yes

          ════════════[ DELETE VOLUME VERIFICATION ]════════════
                    ALL DATA IN THE VOLUME WILL BE LOST!
                    (This does not apply to Recovery volumes)
                    Are you sure you want to delete "Volume0"? (Y/N) :


                    Deleting a volume will reset the disks to non-RAID.
                    WARNING:  ALL DISK DATA WILL BE DELETED.
                    (This does not apply to Recovery volumes)


     [↑↓]-Select                    [ESC]-Exit                    [DEL]-Delete Volume
```

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.

```
Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.

═══════════════════════[ ACCELERATION OPTIONS ]═══════════════════════
Name            Type            Capacity      Mode            Status
DISK PORT 3     Non-RAID Disk   74.5GB        Enhanced        In Sync




═════════════════════════════[ HELP ]═════════════════════════════
              Press 's'  to synchronize data from the cache device to
                          the Accelerated Disk/Volume

                    Press 'r' to remove the Disk/Volume Acceleration
        WARNING:  IT IS RECOMMENDED THAT YOU PERFORM A SYNCHRONIZATION
                          BEFORE REMOVING ACCELERATION

     [↑↓]-Select                                        [ESC]- Previous Menu
```

Figure 20

3-2 Configuring Marvell® 88SE9230 SATA Controller

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. The Marvell® 88SE9230 SATA controller controls the onboard GSATA3 6/7/8/9 connectors. Then connect the power connector from your power supply to the hard drive.

B. Configuring SATA controller and RAID mode in BIOS Setup

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

Step:

Turn on your computer and press <Delete> to enter BIOS Setup during the POST. To create RAID, go to **Peripherals\Marvell ATA Controller Configuration** and make sure **GSATA Controller** is set to **AHCI Mode**. Press <Enter> on **GSATA RAID Configuration** to enter the RAID configuration screen.
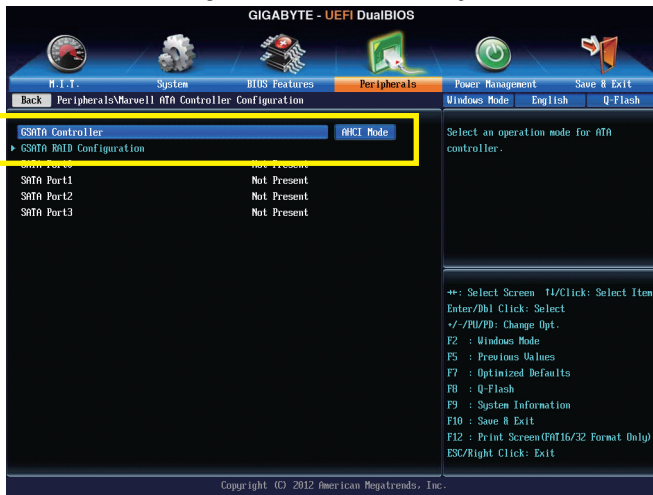
Figure 1

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

C. Configuring a RAID array
Create a RAID Array:

Move the selection bar to **HBA 0: Marvell 0** and press <Enter>.

```
═══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ═══════════════


┌ Topology ──────────────────────────────┐   ┌ Information ──────────────────────────────
  HBA  0 :   Marvell 0                        Vendor ID           :      1B4B
     ├── Virtual Disks                         Device ID           :      9230
     └── Free Physical Disks                   Revision ID         :      A0
            ├── HDD 0: ST95005620AS            BIOS Version        :      20291.24369.82.6535
            └── HDD 1: ST95005620AS            Firmware Version    :      2.3.0.1046
                                               PCIe Speed rate     :      5.0Gbps x2
                                               Configure SATA as   :      AHCI Mode
                                               Supported Mode      :      RAID 0 RAID 1 RAID10
                                                                   :      Capacity Safe




┌ Help ──────────────────────────────────
  Marvell RAID on chip controller.
  ENTER:  Operation    F10:  Exit/Save    ESC:  Return
```

<p align="center">Figure 2</p>

Under **Free Physical Disks**, use the <Space> key to select the hard drives to be included in the RAID array. The selected hard drive will be marked with an asterisk (*). After selecting the hard drives, press <Enter> to proceed (Figure 3).

```
═══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ═══════════════


┌ Configure -> Select free disks ────────┐   ┌ Information ──────────────────────────────
  HBA  0 :   Marvell 0                        Port ID           :      1
     ├── Virtual Disks                         PD ID             :      1
     └── Free Physical Disks                   Type ID           :      SATA PD
  *       ├── HDD 0: ST95005620AS             Status            :      Unconfigured
  *       └── HDD 1: ST95005620AS             Size              :      465.7GB
                                               Feature Support   :      NCQ 3Gb/s 48Bit
                                               Current Speed     :      3Gb/s
                                               Model             :      ST95005620AS
                                               Serial            :      5YX01W4H
                                               FW version        :      SD22




┌ Help ──────────────────────────────────
  Use space bar to select the free disks to be used in the array.
  ENTER:  Operation    SPACE:  Select    F10:  Exit/Save    ESC:  Return
```

<p align="center">Figure 3</p>

To further configure the RAID array, use the up or down arrow key to move the selection bar to select an item in the right block of the screen and press <Enter> to display options (Figure 4). Set the required items in sequence.

Steps:
1. **RAID Level:** Select a RAID level.
2. **Stripe Size:** Select the stripe block size. Options include 32 KB and 64 KB.
3. **Name:** Enter an array name with 1~10 letters (letters cannot be special characters).

```
═══════════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════

── Configure -> Select free disksCreate Virtual Disk ─────────────────────────────

HBA  0 :  Marvell 0                          RAID Level        :       RAID  0
  ├─ Virtual Disks                           Max Size (MB)     :       931.3GB
  └─ Free Physical Disks                     Stripe Size       :       64KB
  *     ├─ HDD 0: ST95005620AS               Quick Init        :       Yes
  *        HDD 1: ST95005620AS               Name              :       Default
                                             Threshold(%)      :       100
                                             Next




── Help ──────────────────────────────────────────────────────────────────────────

Virtual disk configurations.
ENTER:  Select    F10:  Exit/Save    ESC:  Return
```
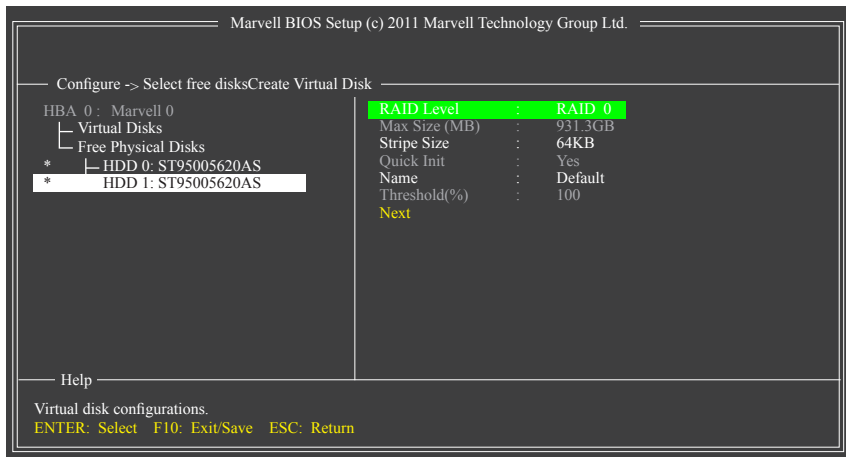
<p align="center">Figure 4</p>

4. **Next:** After completing the settings above, move to **Next** and press <Enter> to begin creating the array. When prompted to confirm whether to create this array, press <Y> to confirm or <N> to cancel (Figure 5).

```
═══════════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════

── Configure -> Select free disksCreate Virtual Disk ─────────────────────────────

HBA  0 :  Marvell 0                          RAID Level        :       RAID  0
  ├─ Virtual Disks                           Max Size (MB)     :       931.3GB
  └─ Free Physical Disks                     Stripe Size       :       64KB
  *     ├─ HDD 0: ST95005620AS               Quick Init        :       Yes
  *        HDD 1: ST95005620AS               Name              :       Default
                                             Threshold(%)      :       100
        ┌── Create Virtual Disk ──────────────────────────────────────┐
        │                                                              │
        │   Do you want to create this virtual disk?                   │
        │             Yes                     No                       │
        └──────────────────────────────────────────────────────────────┘


── Help ──────────────────────────────────────────────────────────────────────────

Virtual disk configurations.
ENTER:  Select    F10:  Exit/Save    ESC:  Return
```

<p align="center">Figure 5</p>

When completed, you can see the new array under **Topology\Virtual Disks** (Figure 6).

```
══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════════


┌─ Topology ──────────────────────────┐    ┌─ Information ──────────────────────────
│ HBA  0 :   Marvell 0                │    Vendor ID          :    1B4B
│   ├─ Virtual Disks                  │    Device ID          :    9230
│   │  └ New_VD                       │    Revision ID        :    A0
│   │     ├─ HDD 0: ST95005620AS      │    BIOS Version       :    20291.24369.82.6535
│   │     └ HDD 1 : ST95005620AS      │    Firmware Version   :    2.3.0.1046
│   └─ Free Physical Disks            │    PCIe Speed rate    :    5.0Gbps x2
│                                     │    Configure SATA as  :    AHCI Mode
│                                     │    Supported Mode     :    RAID 0 RAID 1 RAID10
│                                     │                       :    Capacity Safe
│                                     │
│                                     │
│                                     │
│                                     │
│                                     │
┌─ Help ──────────────────────────────┐
│                                     │
│ Marvell RAID on chip controller.    │
│ ENTER:  Operation    F10:  Exit/Save    ESC:  Return
```

Figure 6

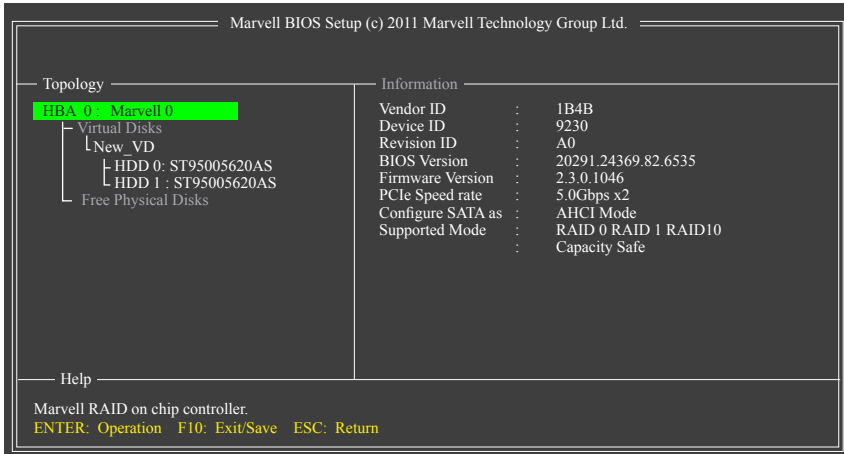5. **Save the Settings and Exit.** After you complete the RAID configuration and before you exit the configuration
   screen, be sure to press <F10> in the main screen. Press <Y> to confirm or <N> to cancel (Figure 7). Now,
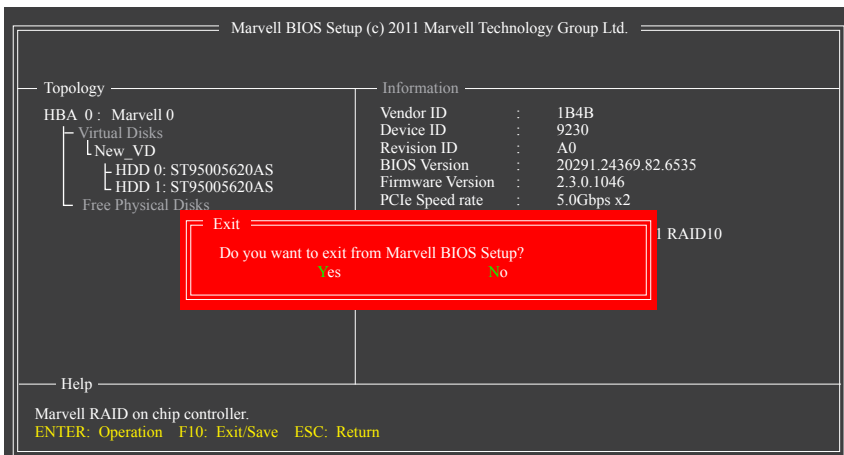   you may proceed to the installation of the SATA driver and operating system.

```
══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════════


┌─ Topology ──────────────────────────┐    ┌─ Information ──────────────────────────
│ HBA  0 :   Marvell 0                │    Vendor ID          :    1B4B
│   ├─ Virtual Disks                  │    Device ID          :    9230
│   │  └ New_VD                       │    Revision ID        :    A0
│   │     ├─ HDD 0: ST95005620AS      │    BIOS Version       :    20291.24369.82.6535
│   │     └ HDD 1: ST95005620AS       │    Firmware Version   :    2.3.0.1046
│   └─ Free Physical Disks            │    PCIe Speed rate    :    5.0Gbps x2
│          ┌─ Exit ────────────────────────────────────┐  1 RAID10
│          │  Do you want to exit from Marvell BIOS Setup? │
│          │         Yes                     No          │
│          └────────────────────────────────────────────┘
│                                     │
│                                     │
┌─ Help ──────────────────────────────┐
│ Marvell RAID on chip controller.    │
│ ENTER:  Operation    F10:  Exit/Save    ESC:  Return
```

Figure 7

Configuring SATA Hard Drive(s)   - 76 -

Delete the RAID Array:

To deleted the existing array, select the array on the main menu (example: VD 0: New_VD) and press <Enter> to display the **Delete** option. Press <Enter>. When prompted, press <Y> to confirm or <N> to cancel (Figure 8).
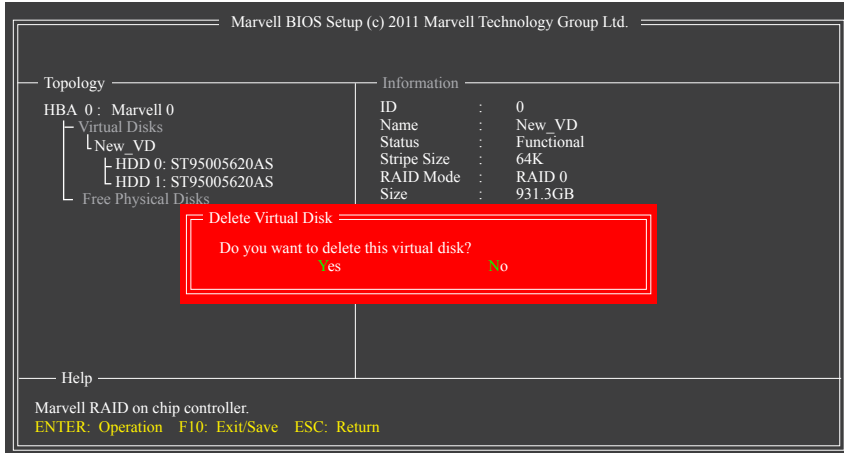
```
                    Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd.

   Topology                                  Information
   HBA  0 :   Marvell 0                      ID            :    0
     ├ Virtual Disks                         Name          :    New_VD
     │ └ New_VD                              Status        :    Functional
     │    ├ HDD 0: ST95005620AS              Stripe Size   :    64K
     │    └ HDD 1: ST95005620AS              RAID Mode     :    RAID 0
     └ Free Physical Disks                   Size          :    931.3GB
                   ┌ Delete Virtual Disk ─────────────────────────────────┐
                   │   Do you want to delete this virtual disk?            │
                   │               Yes                    No               │
                   │                                                       │
                   └───────────────────────────────────────────────────────┘




   Help
   Marvell RAID on chip controller.
   ENTER:  Operation    F10:  Exit/Save    ESC:  Return
```

Figure 8

Use the Marvell® Storage Utility in the Operating System:

With the Marvell® Storage utility, you can set up an array or view the current array status in the operating system. To install the utility, insert the motherboard driver disk, then go to **Application Software\Install Application Software** and select **Marvell Storage Utility** to install. Note: After the installation, you must login the utility with the same account name and password that you use to login the operating system. If you did not set the account password before, click **Login** to enter the Marvell® Storage Utility directly.

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

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

A. Installing Windows 8/7

For the Intel® Z87:

As Windows 7 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. To install Windows 8, 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 8 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
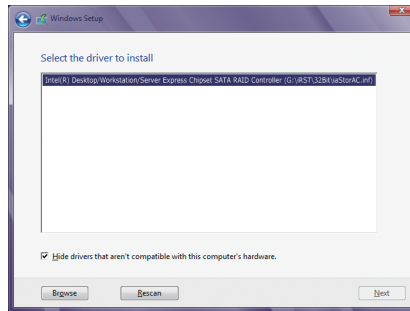

Figure 1

For the Marvell® 88SE9230:

As Windows 8/7 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.

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.)

For the Intel® Z87:

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-I> 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 - 12.0.0.1783
                Copyright(C) 2003-13 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    WDC WD800JD-22LS            WD-WMAM9W736333             111.7GB

RA
No            [↑↓]-Previous/Next          [ENTER]-Select          [ESC]-Exit

Ph
ID
0      ST3120026AS          3JT354CP              111.7GB    Member Disk (0)
1      WDC WD800JD-22LS     WD-WMAM9W736333       111.7GB    Non-RAID Disk


        [↑↓]-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 - 12.0.0.1783
                Copyright(C) 2003-13 Intel Corporation.  All Rights Reserved.

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

                     [ DISK/VOLUME INFORMATION ]
RAID Volumes :
ID      Name          Level              Strip     Size       Status       Bootable
0       Volume0       RAID1(Mirror)      N/A       111.7GB    Rebuild      Yes

Physical Devices :
ID      Devices Model        Serial #              Size       Type/Status(Vol ID)
0       ST3120026AS          3JT354CP              111.7GB    Member Disk (0)
1       WDC WD800JD-22LS     WD-WMAM9W736333       111.7GB    Member Disk (0)
        Volumes with "Rebuild" status will be rebuilt within the operating system.

        [↑↓]-Select                      [ESC]-Exit                      [ENTER]-Select Menu
```
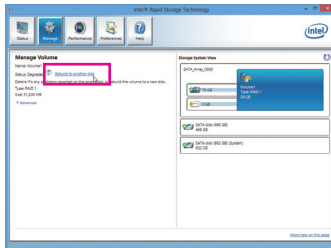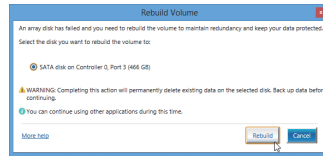
• **Performing the Rebuild in the Operating System**

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.
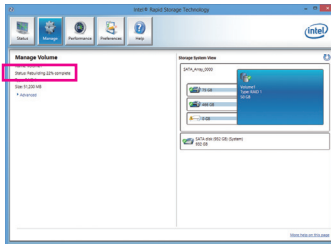

Step 1:
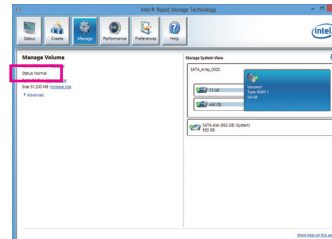Go to the **Manage** menu and click **Rebuild to another disk** in **Manage Volume**.

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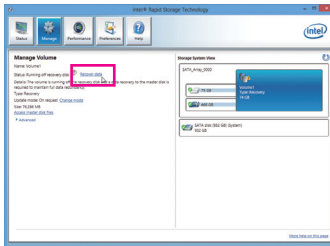

The **Status** item on the left of the screen displays the rebuild progress.
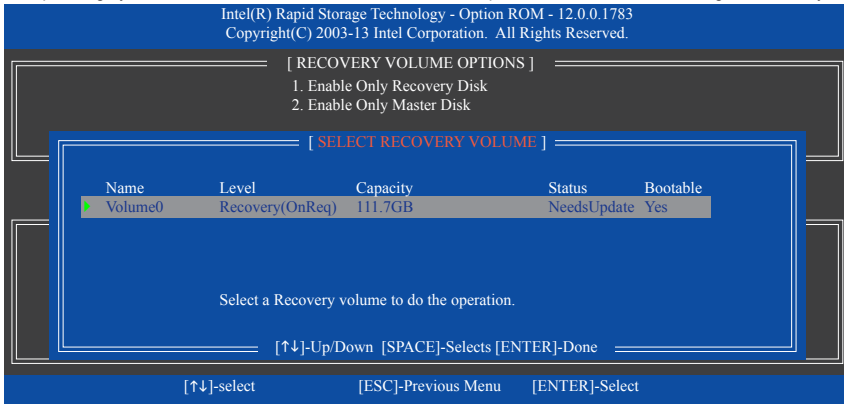

Step 3:
After the RAID 1 volume rebuilding, the **Status** will display as **Normal**.

• **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.

Intel(R) Rapid Storage Technology - Option ROM - 12.0.0.1783
Copyright(C) 2003-13 Intel Corporation. All Rights Reserved.

[RECOVERY VOLUME OPTIONS]
  1. Enable Only Recovery Disk
  2. Enable Only Master Disk

[SELECT RECOVERY VOLUME]

Name	Level	Capacity	Status	Bootable
Volume0	Recovery(OnReq)	111.7GB	NeedsUpdate	Yes

Select a Recovery volume to do the operation.

[↑↓]-Up/Down [SPACE]-Selects [ENTER]-Done

[↑↓]-select   [ESC]-Previous Menu   [ENTER]-Select

Step 2:
Go to the **Manage** menu of the Intel® Rapid Storage Technology utility and click **Recover data** in **Manage Volume**.

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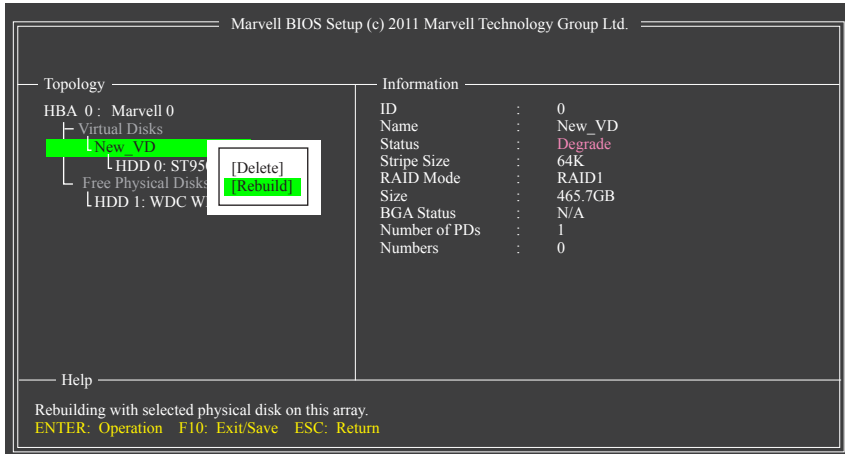

Step 3:
Click **Yes** to begin the data recovery.
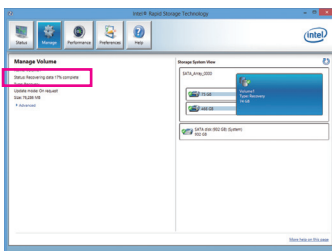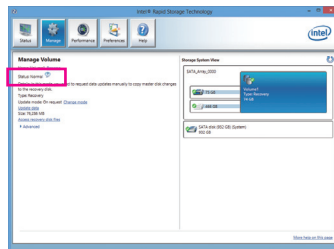
Step 4:
After the recovery volume is completed, the **Status** will display as **Normal**.

For the Marvell® 88SE9230:

Turn off your computer and replace the failed hard drive with a new one. Please note to perform the rebuild, you must enter the **GSATA RAID Configuration** menu in BIOS Setup.
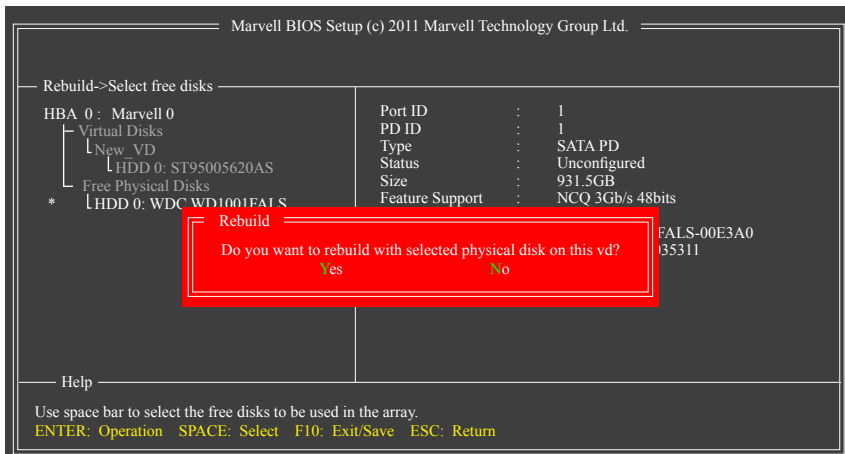
Step 1:

Press <Enter> on **GSATA RAID Configuration** to access the RAID configuration menu. Move the selection bar to the array to be rebuilt (for example, VD 0: New_VD) and press <Enter> and then select **Rebuild**. Press <Enter> again.

```
══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════════


── Topology ──────────────────────           ── Information ──────────────
HBA  0 :  Marvell 0                          ID                :    0
    ├─ Virtual Disks                         Name              :    New_VD
    │   └ New_VD                             Status            :    Degrade
    │       └ HDD 0: ST950   [Delete]        Stripe Size       :    64K
    └ Free Physical Disks   [Rebuild]        RAID Mode         :    RAID1
        └ HDD 1: WDC W                       Size              :    465.7GB
                                             BGA Status        :    N/A
                                             Number of PDs     :    1
                                             Numbers           :    0






  ── Help ──────────────────────────────────────────────────────────────
  Rebuilding with selected physical disk on this array.
  ENTER:  Operation    F10:  Exit/Save    ESC:  Return
```
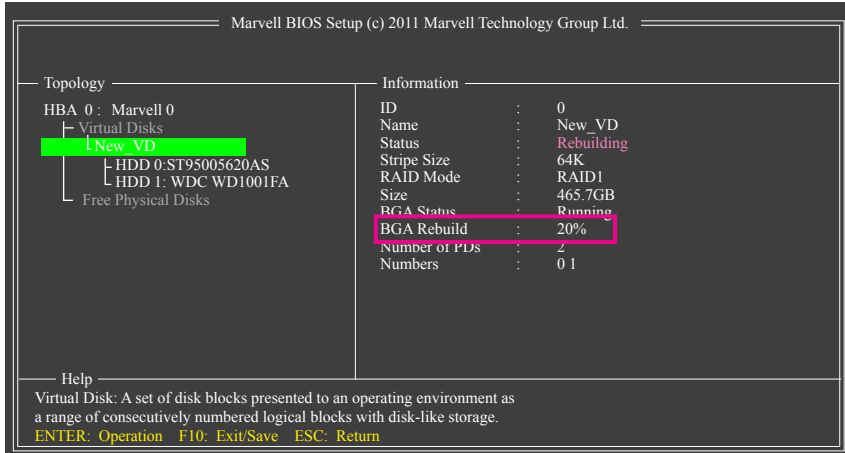
Step 2:

The selection bar will move to the new drive. Press the <Space> key to select it and then press <Enter>. When prompted to confirm, press <Y> to begin the rebuild or <N> to cancel.

```
══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════════


── Rebuild->Select free disks ──────────
HBA  0 :  Marvell 0                          Port ID           :    1
    ├─ Virtual Disks                         PD ID             :    1
    │   └ New_VD                             Type              :    SATA PD
    │       └ HDD 0: ST95005620AS            Status            :    Unconfigured
    └ Free Physical Disks                    Size              :    931.5GB
  *     └ HDD 0: WDC WD1001FALS              Feature Support   :    NCQ 3Gb/s 48bits
        ┌─ Rebuild ──────────────────────────────────────── FALS-00E3A0
        │                                                    35311
        │  Do you want to rebuild with selected physical disk on this vd?
        │         Yes                          No
        └─────────────────────────────────────────────────



  ── Help ──────────────────────────────────────────────────────────────
  Use space bar to select the free disks to be used in the array.
  ENTER:  Operation    SPACE:  Select    F10:  Exit/Save    ESC:  Return
```
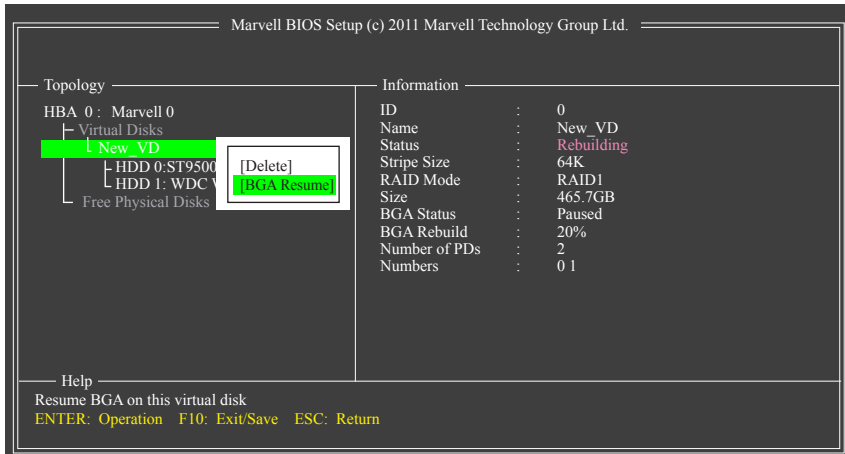
Step 3:

The **BGA Rebuild** item in the **Information** block will display the current rebuild progress. After the rebuild is complete, the **Status** will display as **Functional**. Please note the rebuild will be stopped if you exit the RAID BIOS screen before the rebuild is complete.

```
══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════════


┌ Topology ───────────────────────────────┐  ┌ Information ──────────────────────
  HBA  0 :  Marvell 0                          ID              :     0
    ├ Virtual Disks                            Name            :     New_VD
      └ New_VD                                 Status          :     Rebuilding
          ├ HDD 0:ST95005620AS                 Stripe Size     :     64K
          └ HDD 1: WDC WD1001FA                RAID Mode       :     RAID1
    └ Free Physical Disks                      Size            :     465.7GB
                                               BGA Status      :     Running
                                               BGA Rebuild     :     20%
                                               Number of PDs   :     2
                                               Numbers         :     0 1




  ┌ Help ──────────────────────────────────────────────────────────────
   Virtual Disk: A set of disk blocks presented to an operating environment as
   a range of consecutively numbered logical blocks with disk-like storage.
   ENTER:  Operation    F10:  Exit/Save    ESC:  Return
```

Resume the Stopped Rebuild Process

To resume the stopped rebuild process, enter the **GSATA RAID Configuration** menu in BIOS Setup again. Move the selection bar to the array to be rebuilt (for example, VD 0: New_VD). Press <Enter> on this array and select **BGA Resume**. Press <Enter> again to continue the rebuild process.

```
══════════════ Marvell BIOS Setup (c) 2011 Marvell Technology Group Ltd. ══════════════


┌ Topology ───────────────────────────────┐  ┌ Information ──────────────────────
  HBA  0 :  Marvell 0                          ID              :     0
    ├ Virtual Disks                            Name            :     New_VD
      └ New_VD                                 Status          :     Rebuilding
          ├ HDD 0:ST9500    [Delete]           Stripe Size     :     64K
          └ HDD 1: WDC W  [BGA Resume]         RAID Mode       :     RAID1
    └ Free Physical Disks                      Size            :     465.7GB
                                               BGA Status      :     Paused
                                               BGA Rebuild     :     20%
                                               Number of PDs   :     2
                                               Numbers         :     0 1




  ┌ Help ──────────────────────────────────────────────────────────────
   Resume BGA on this virtual disk
   ENTER:  Operation    F10:  Exit/Save    ESC:  Return
```

Chapter 4   Drivers Installation

- Before installing the drivers, first install the operating system. (The following instructions use Windows 8 as the example operating system.)
- After installing the operating system, insert the motherboard driver disk into your optical drive. Click on the message "Tap to choose what happens with this disc" on the top-right corner of the screen and select "Run **Run**.exe." (Or go to My Computer, double-click the optical drive and execute the **Run**.exe program.)

4-1   Chipset Drivers

"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.
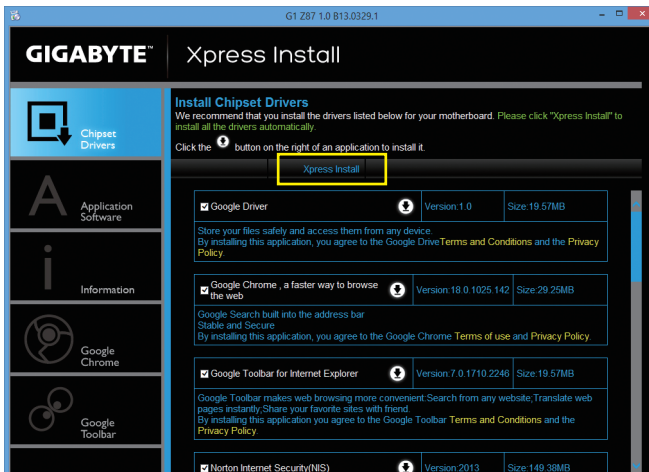
- Please ignore the popup dialog box(es) (e.g. the **Found New Hardware Wizard**) displayed when "Xpress Install" is installing the drivers. Failure to do so may affect the driver installation.
- Some device drivers will restart your system automatically during the driver installation. After the system restart, "Xpress Install" will continue to install other drivers.

4-2   Application Software

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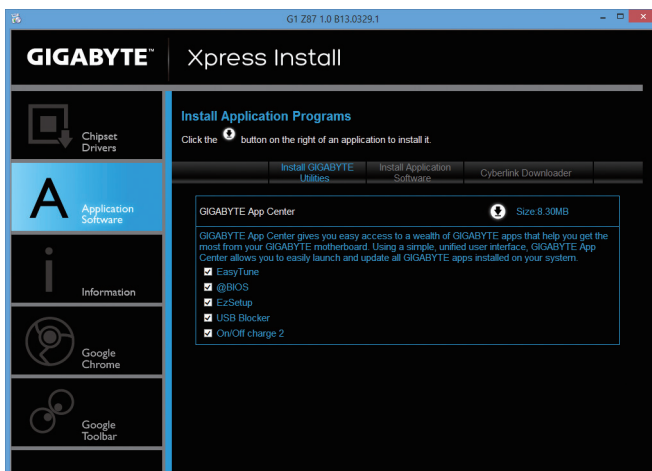
4-3   Information

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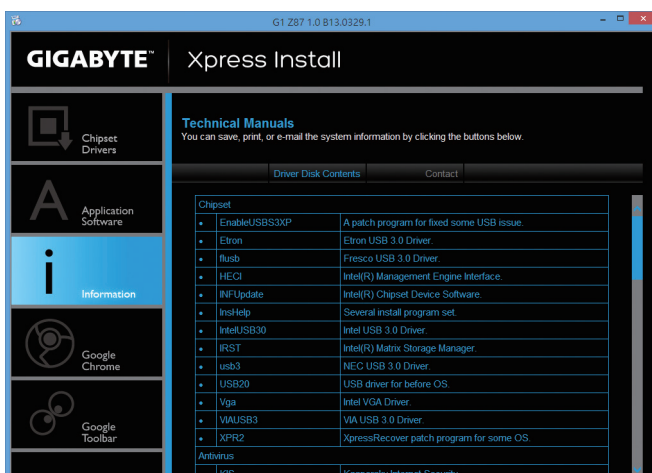
Chapter 5   Unique Features

5-1   BIOS Update Utilities

GIGABYTE motherboards provide two unique BIOS update tools, Q-Flash™ and @BIOS™. GIGABYTE Q-Flash and @BIOS are easy-to-use and allow you to update the BIOS without the need to enter MS-DOS mode. Additionally, this motherboard features the DualBIOS™ design, which enhances protection for the safety and stability of your computer by adding one more physical BIOS chip.

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

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

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

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

A. Before You Begin
1. From GIGABYTE's website, download the latest compressed BIOS update file that matches your motherboard model.
2. Extract the file and save the new BIOS file (e.g. G1SNIPER5.F1) to your USB flash drive or hard drive. Note: The USB flash drive or hard drive must use FAT32/16/12 file system.
3. Restart the system. During the POST, press the <End> key to enter Q-Flash. Note: You can access Q-Flash by either pressing the <End> key during the POST or pressing the <F8> key in BIOS Setup. However, if the BIOS update file is saved to a hard drive in RAID/AHCI mode or a hard drive attached to an independent SATA controller, use the <End> key during the POST to access Q-Flash.

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

B. Updating the BIOS

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

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

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

2. Select **USB Flash Drive**.

```
                     Q-Flash Utility v1.05
  Model Name    :   G1.Sniper 5
  BIOS Version  :   F11
  BIOS Date     :   03/30/2013
  Flash Type/Size  :  Winbond 25X/Q Series       16MB
                 Update BIOS From Drive
                      Select Device
       USB Flash Drive
```
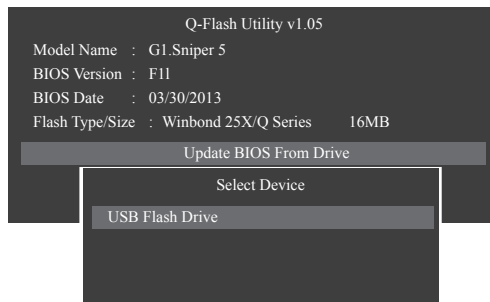
3. Select the BIOS update file.

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

Step 2:
The process of the system reading the BIOS file from the USB flash drive is displayed on the screen. When the message "Are you sure to update BIOS?" appears, select **Yes** to begin the BIOS update. The monitor will display the update process.

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

Step 3:
The system will restart after the update process is complete.

Step 4:
During the POST, press <Delete> to enter BIOS Setup. Select **Load Optimized Defaults** on the **Save & Exit** screen and press <Enter> to load BIOS defaults. System will re-detect all peripheral devices after a BIOS update, so we recommend that you reload BIOS defaults.

Select **Yes** to load BIOS defaults

Step 5:
Select **Save & Exit Setup** and press <Enter>. And then select **Yes** to save settings to CMOS and exit BIOS Setup. The procedure is complete after the system restarts.

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

A. Before You Begin

1. In Windows, close all applications and TSR (Terminate and Stay Resident) programs. This helps prevent unexpected failures when performing a BIOS update.
2. If the BIOS is being updated via the Internet, ensure the Internet connection is stable and do NOT interrupt the Internet connection (for example, avoid a power loss or switching off the Internet). Failure to do so may result in a corrupted BIOS or a system that is unable to start.
3. GIGABYTE product warranty does not cover any BIOS damage or system failure resulting from an inadequate BIOS flashing.
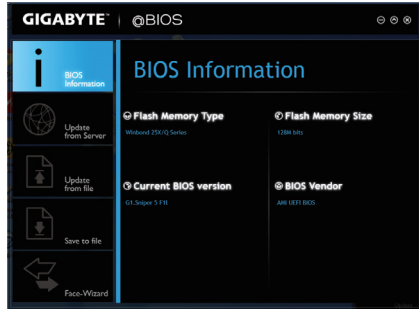
B. Using @BIOS

1. Update the BIOS Using the Internet Update Function:

Click **Update from Server**, select the @BIOS server site closest to your location and then download the BIOS file that matches your motherboard model. Follow the on-screen instructions to complete.

If the BIOS update file for your motherboard is not present on the @BIOS server site, please manually download the BIOS update file from GIGABYTE's website and follow the instructions in "Update the BIOS without Using the Internet Update Function" below.

2. Update the BIOS without Using the Internet Update Function:

Click **Update from file**, then select the location where you save the BIOS update file obtained from the Internet or through other source. Follow the on-screen instructions to complete.

3. Save the Current BIOS File:

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

4. Change the Boot-up Logo:

Click **Upload new image** in Face-Wizard and you will be able to change the boot-up logo with your own picture, creating a personalized boot-up screen. Click **Backup current image** to save the currently used boot-up logo.

Supported image formats include jpg, bmp, and gif.

C. After Updating the BIOS

Restart your system after updating the BIOS.

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

5-2   APP Center

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

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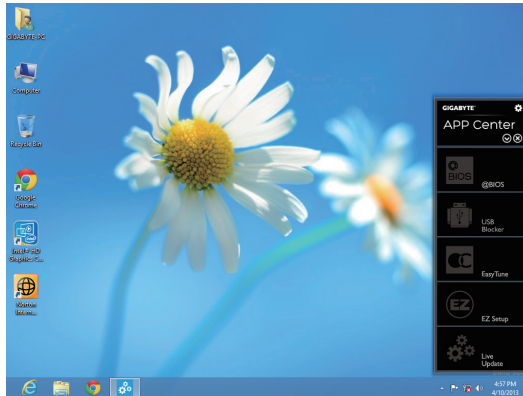
Figure 1

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

Figure 2

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

5-2-1   EasyTune

GIGABYTE's EasyTune is a simple and easy-to-use interface that allows users to fine-tune their system settings or do overclock/overvoltage in Windows environment. The user-friendly EasyTune interface also includes tabbed pages for CPU and memory information, letting users read their system-related information without the need to install additional software.

The EasyTune Interface

Tabs Information

Tab	Function
	The **System Information** tab provides information on the installed CPU and motherboard.
	Smart Quick Boost provides you with different levels of CPU frequency to choose to achieve desired system performance. After making changes, be sure to restart your system for these changes to take effect. The Advanced menu allows you to change specific clock/frequency/votlage settings.
	The **Smart Fan** tab allows you to specify a Smart Fan mode. The Calibrate menu displays the detected linear fan speed for the fans on the motherboard from the fastest to the slowest. The Advanced menu allows you to set temperature thresholds, based on which the fan speed can be changed linearly.
	The **System Alerts** tab allows you to monitor hardware temperature, voltage and fan speed and set temperature/fan speed alarm.
	The **3D Power** tab allows you to change power phase and voltage settings.

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

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

5-2-2   EZ Setup

The GIGABYTE EZ Setup utility includes the following 'EZ' setups applications that will offer greatly simplified install and configuration procedures: Disk Mode Switch, EZ Smart Response, EZ Rapid Start, EZ Smart Connect, and XHD.

Disk Mode Switch

Disk Mode Switch allows you to switch the operating mode for your hard drive even after it's been installed with an operating system. Supported operating modes include IDE, AHCI, and RAID. You can select a disk mode and restart your computer after the selection.

⚠️   •   Native UEFI mode is not supported.
        •   Be sure to reinstall the Intel® Rapid Storage Technology utility after you switch the disk mode.
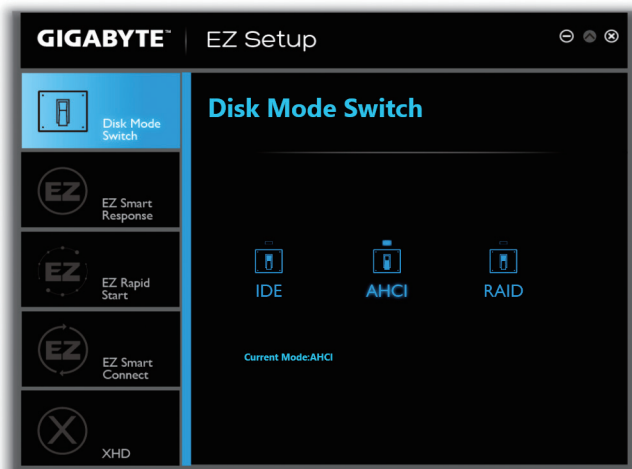
EZ Smart Response

A. System Requirements
1. An Intel® Chipset-based motherboard supporting this feature (Note 1)
2. Intel® Core series processor
3. Intel® SATA controller set to RAID mode
4. Intel® Rapid Storage Technology utility installed (Note 1)
5. A conventional SATA disk and an SSD (Note 2)
6. Windows 7 with SP1/Windows 8 (Note 3)

> ⚠️ If you have installed the operating system before configuring the Smart Response Technology, all original data on the SSD will be lost once you enable RAID mode (Note 4). It is recommended that you back up the hard disk before enabling the Smart Response Technology.

B. Using EZ Smart Response
Select **EZ Smart Response** and click **Create**.
To disable this function, click **Delete**.
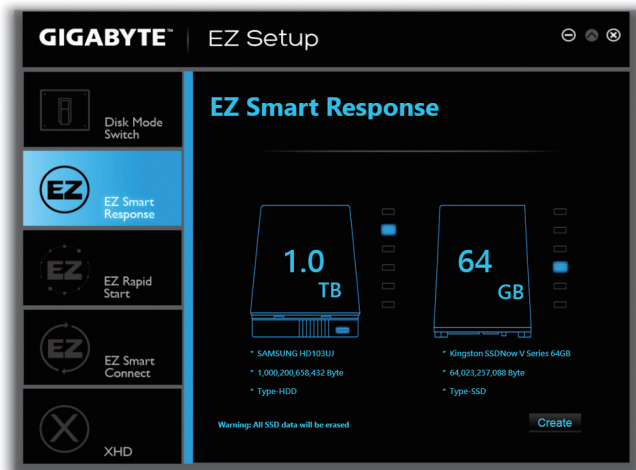
(Note 1)   Before start, make sure you have installed the Intel® Rapid Storage Technology utility (version 11.5 or above).
(Note 2)   The SSD works as a cache of the hard disk. The maximum cache memory size is 64 GB. If you use an SSD larger than 64 GB, the space beyond 64 GB can still be used for storing your data.
(Note 3)   The operating system must be installed to the SATA disk.
(Note 4)   Regardless of the BIOS settings, be it IDE or AHCI mode, the system will be forced into RAID mode.

EZ Rapid Start

A. System Requirements
1. Intel® Rapid Start Technology enabled in BIOS Setup
2. An SSD with size larger than the total system memory
3. Windows 7 with SP1/Windows 8
4. AHCI/RAID mode supported (please note if the SSD has been assigned as a member of a RAID array, it cannot be used to set up and Intel® Rapid Start store partition); IDE mode not supported (Note)

B. Using EZ Rapid Start
Select **EZ Rapid Start** and click **Create**. Then install the Intel® Rapid Start Technology utility and restart your computer to complete.
To disable this function, click **Delete**.
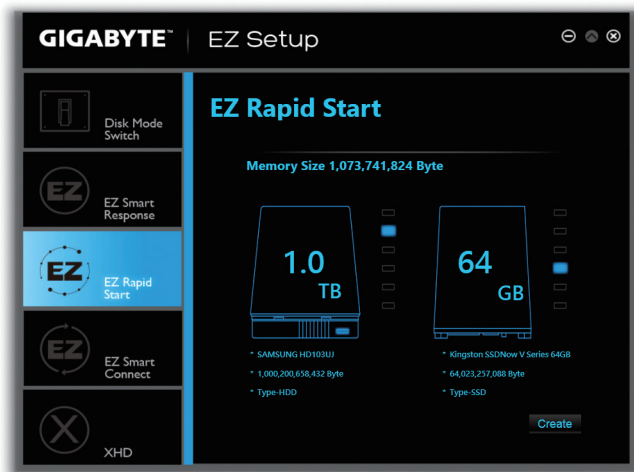
- • The default compressed space is the system memory size plus 2 GB. For example, if the system memory size is 8 GB, the default compressed space is 8 GB plus 2 GB, so the SSD capacity will decrease by 10 GB. If EZ Rapid Start is disabled, the decreased 10 GB will be returned to the SSD.
- • If you want to upgrade your system memory, disable EZ Rapid Start first and re-install it to ensure it can work normally.

(Note)   If the motherboard Chipset supports RAID, EZ Rapid Start will force the Intel® SATA controllers into RAID mode. If not, the Intel® SATA controllers will be forced into AHCI mode.

EZ Smart Connect

A. System Requirements
1. Intel® Smart Connect Technology enabled in BIOS Setup
2. Windows 7 with SP1/Windows 8
3. Intel® Smart Connect Technology utility installed
4. Properly-working network connection
5. Programs added to the White List must be turned on [(Note)]

B. Using EZ Smart Connect
Select **EZ Smart Connect**. Under **File Name**, select the apps to be auto-updated by Smart Connect. Double-click the app to add it to the **Application permission list**. (Double-click [icon] to return to the previous directory.)
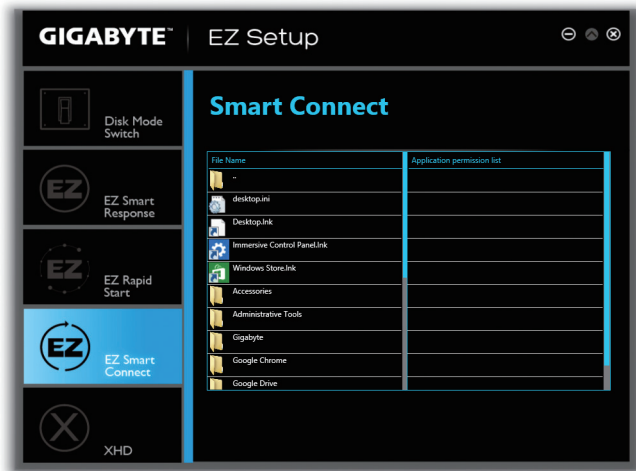
(Note)   This feature works best with programs designed to work automatically with the Internet to obtain their data such as Outlook®, Windows Live™ Mail, and Seesmic®.

XHD

With GIGABYTE XHD (Note 1), users can quickly configure a RAID-ready system for RAID 0 or RAID 1 when a new SATA drive is added. All with a simple click of a button, XHD helps to enhance your hard drive read/write performance without the need for complex and time-consuming configurations. .

A. System Requirements
1. An Intel® Chipset motherboard supporting RAID
2. Intel® SATA controllers set to RAID mode
3. Intel® Rapid Storage Technology utility installed
4. Windows 7 with SP1/Windows 8
5. Intel® SATA controller driver installed

B. Using XHD
Select **XHD** and click **Create RAID 0** or **Create RAID 1** based on your need. (Note 2)
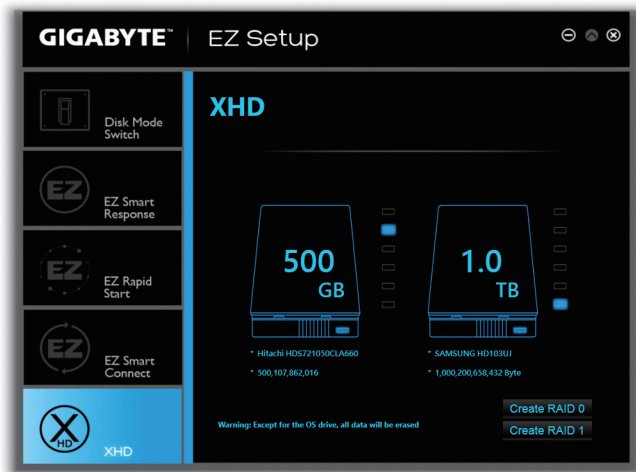
(Note 1)   The XHD utility only supports the SATA connectors controlled by the Intel® Chipset.
(Note 2)   Except for the operating system drive, all data on other hard drive will be deleted. Back up your data
           before using the XHD utility.

5-2-3   ON/OFF Charge2

GIGABYTE ON/OFF Charge2 Technology can automatically detect your mobile device such as smart phone and tablet PC and quickly charge the device through USB interface. It provides the best charging solution while the system is turned on, in sleep/standby mode, or even turned off.

The ON/OFF Charge2 Interface
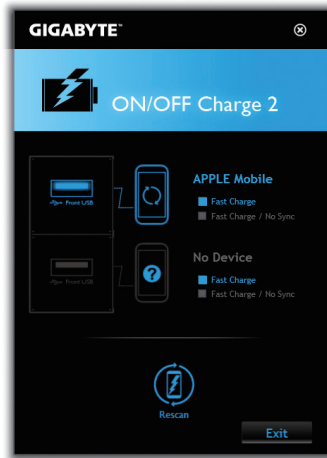
Using ON/OFF Charge2
ON/OFF Charge2 automatically detects your mobile device and displays it on the screen. Available functions may vary by device. If your mobile device does not support data sync, select **Fast Charge/No Sync** to enable a quick charge.

- **Fast Charge:**
  Automatically detects mobile device(s) and enables both quick charge and data sync.
- **Fast Charge/No Sync:**
  Automatically detects mobile device(s) and enables a quick charge but no data sync.
- **Rescan:**
  Rescan the connected mobile device(s).
- **Exit:**
  Turn off ON/OFF Charge2.

5-2-4   USB Blocker

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

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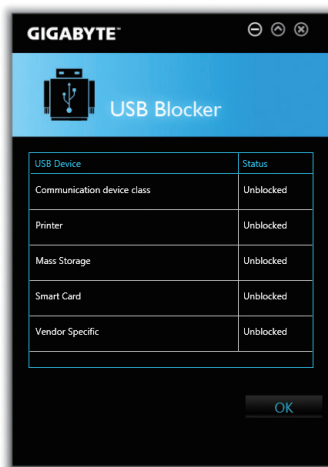
Using USB Blocker
Select the class of USB device that you would like to block or unblocked. Double left-click to change the **Blocked** or **Unblocked** status and click **OK**. Then enter your password and click **OK** to complete.

Chapter 6   Appendix

6-1   Qualcomm® Atheros Killer Network Manager

The Killer Network Manager allows you to view your network connection status and Internet bandwidth and to configure your network settings. It also displays your system information and CPU/memory usage. After installing the LAN driver, you can access the Qualcomm® Atheros Killer Network Manager in All apps>Qualcomm Atheros Killer Network Manager or click on the ![icon] icon in the notification area [(Note 1)].
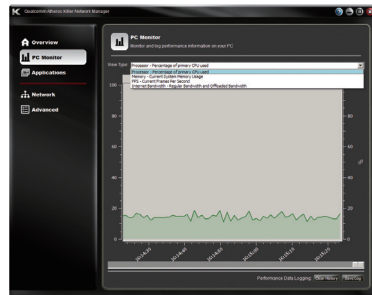
Overview
This page allows you to view your system information and check the current status of your network connection.
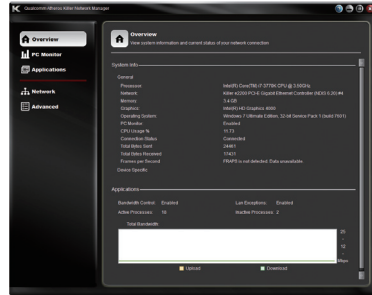
PC Monitor
This page monitors and logs your system performance. You can click **View Type** to select an item to view.

### Configuring How Applications Access the Internet
From the function menu on the left, click the **Applications** tab. On the **Applications** configuration screen [(Note 2)], you can set the priority for an application or online game to use the bandwidth to access the Internet. To change the priority, click an application or game and use the drop-down menu below the application's/game's icon to select a priority level. You can change the upload and download bandwidth for each application as well. Click the application you want and move the cursor to the arrow on the right end of the bar. When the cursor changes to a double-headed arrow, drag it to change the bandwidth.
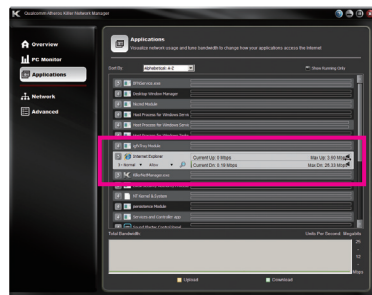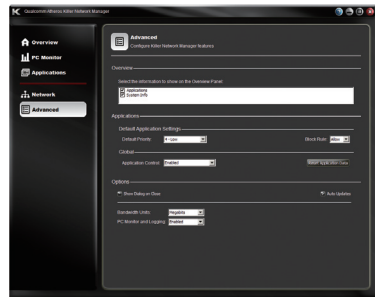
Network

This page allows you to configure your wired network connection and Internet provided speed. You can also configure TCP Protocol settings if needed.

Note: After installing the LAN driver from the motherboard driver disk and restarting your computer, the **Killer Network Manager** screen will automatically appear. The **Bandwidth Test** dialog box will pop up, notifying you that the Killer Network Manager will begin to measure the speed your Internet service provider provides. Click **Start** to begin testing (make sure your computer has been connected to the Internet).
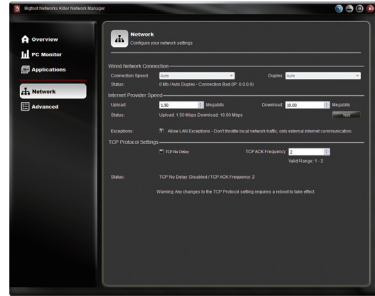
Advanced

This page allows you to configure advanced features, such as select the information to be displayed on the **Overview** page or change application settings.

(Note 1)   For more instructions on using the Killer Network Manager, click the help icon on the top right corner of the screen to open the Help file.

(Note 2)   In case Application Control is disabled, you can go to the Advanced configuration screen to enable it under Global\Application Control.

6-2   Configuring Audio Input and Output

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

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

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

Line In/Mic In
Front Speaker Out
Center/Subwoofer Speaker Out
Rear Speaker Out
Headphone/ Speaker Out
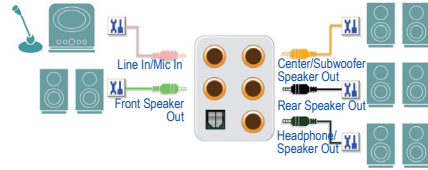
6-2-2   Creative Software Suite

After installing the audio driver, you can find the Creative Software Suite in All apps>Creative.
The Creative Software Suite includes Creative Alchemy and Sound Blaster Recon3Di.
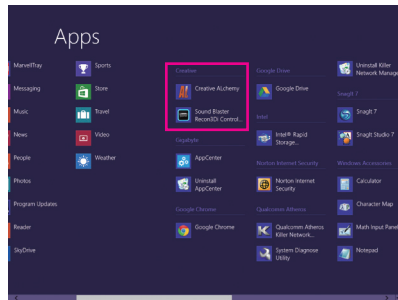
Creative Alchemy
Through the Creative Alchemy, you can enable EAX effects for your games to obtain the most realistic gaming experience.

Steps:
Go to All apps>Creative to launch Creative Alchemy. On the left panel, select the game for which you want to enable the EAX effects and add it to the right panel. You will see the EAX effects are enabled when the game is launched.
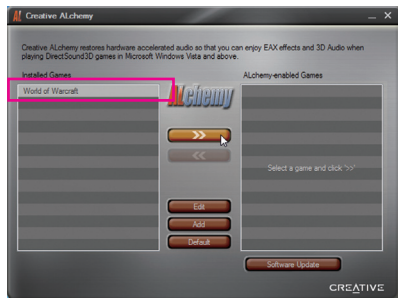
Sound Blaster Recon3Di

To launch the Sound Blaster Recon3Di Control Panel, go to All apps>Creative and select S**ound Blaster Recon3Di** or click the [SB] icon in the notification area.

SBX PRO STUDIO:

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

• Surround:

 Provides immersion control to enhance the natural sense of audio depth and spaciousness by creating virtual surround sound channels.

• Crystalizer:

 Makes the music sound as good as the artist originally intended and adds an enhanced level of realism for movies and games.

• Bass:

 This feature is available only when a stereo speaker or headphone is installed. It fills in the missing low frequency tones and gives the extra impact for a better entertainment experience. The Crossover Frequency feature is available only when a 2-channel stereo speaker system is installed.

• Smart Volume:

 Addresses the problem of abrupt volume level changes during playback and between songs by automatically and continuously measuring volume, and intelligently applying gain and attenuation to compensate for those changes.

• Dialog Plus:

 Enhances the voices in movies for clearer dialog, allowing the listener to hear the dialog over the rest of the soundtrack and over ambient noise in the listening environment.

CRYSTALVOICE:

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

• FX:

 Morphs your voice into different characters and accents.

• Smart Volume:

 Automatically adjusts the loudness of the speaker's voice to maintain a consistent volume level.

• Noise Reduction:

 Eliminates unwanted background noise in your conversations.

• Acoustic Echo Cancellation:

 Eliminates echoes that interfere with your conversation.

SCOUT MODE:

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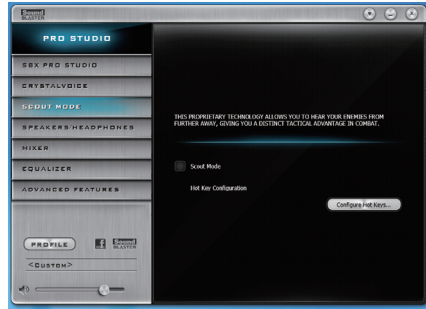
SPEAKERS/HEADPHONES:

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

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

MIXER:

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

EQUALIZER:

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

ADVANCED FEATURES:

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

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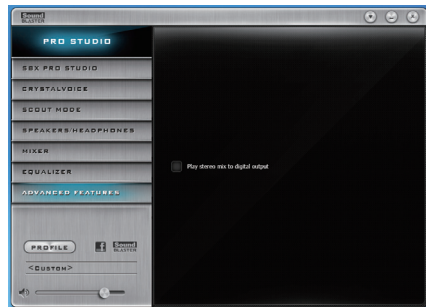
Other Features:

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

(Note)   For more information on Sound Blaster Recon3Di, please visit the CREATIVE® website.

6-2-3 Configuring S/PDIF Out

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

1. Connecting a S/PDIF Out Cable:

Connect a S/PDIF optical cable to an external decoder for transmitting the S/PDIF digital audio signals.
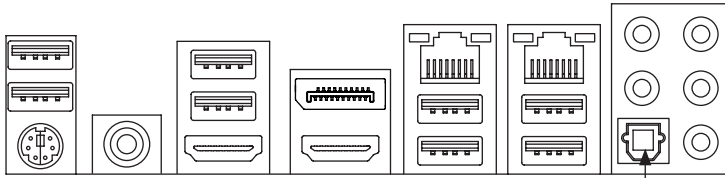
Connects to a S/PDIF optical cable

2. Configuring S/PDIF Out:

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

Step 2:
On the **Playback** tab, right-click on **SPDIF Out**, select **Set as Default Device**, and then open the **Properties** dialog box.
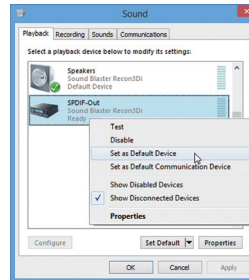
Step 3:
You can go to the **Supported Formats** tab to select the formats to be decoded or the **Advanced** tab to select the sample rate and bit depth.
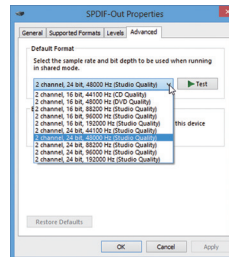
6-2-4   Configuring Audio Recording
You can record the sound from the microphone or Line in device or record the sound from your computer.

1. Configuring your microphone:
Step 1:
Connect your microphone to the Mic in jack (pink) on the back panel or the Mic in jack (pink) on the front panel. Note: The microphone functions on the front panel and back panel cannot be used at the same time.
Open the **Sound Blaster Recon3Di** control panel and go to the **CRYSTALVOICE** page. Make sure your microphone is correctly connected.
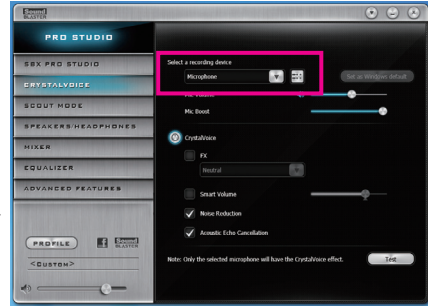
Step 2:
To hear the sound being recorded during the recording process, it is recommended that you set the **Mic volume** at a middle level. Do not mute the recording volume, or you'll not be able to record the sound. To raise the recording and playback volume for the microphone, use the **Mic Boost** slider and set the microphone boost level.

2. Configuring your Line in device:
Step 1:
Open the **Sound Blaster Recon3Di** control panel and go to the **Mixer** page. In the **REC** section, click the **Input Device** icon and select **Rear Line In**. Later you can use the **Line-In** slider to set the volume.
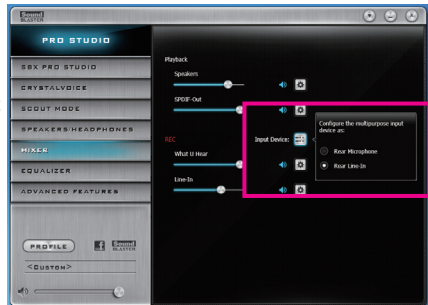
Step 2:
Right-click on the 🔊 icon in the notification area and select **Recording devices**.
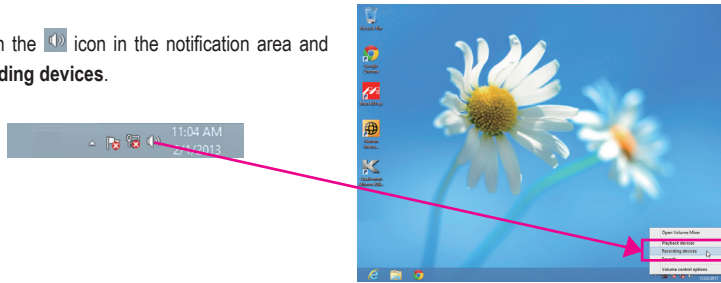
Step 3:
On the **Recording** tab, right-click on **Line-In**, and select **Set as Default Device**.
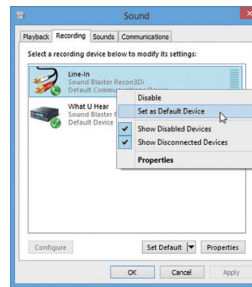
3. Recording the sound from your computer:
Step 1:
While in the operating system, right-click on the 🔊 icon in the notification area and select **Recording devices**.
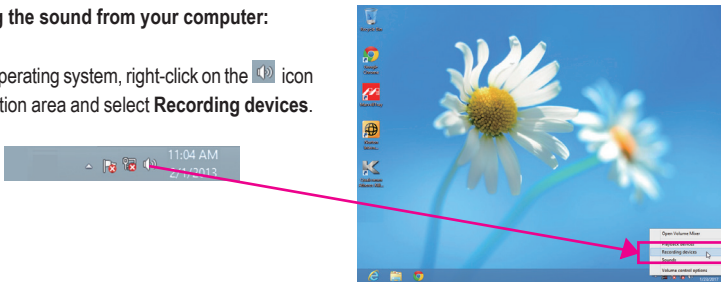
Step 2:
On the **Recording** tab, right-click on **What U Hear** and select **Set as Default Device**.
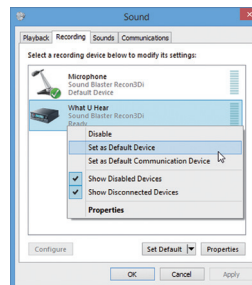
Step 3:
Open the Sound Blaster Recon3Di Control Panel and go to the **Mixer** page. In the **REC** section, you can use the **What U Hear** slider to set the volume.

Step 4:
To open the **Sounder Recorder,** move the mouse cursor to the bottom left corner of the screen, click the Start icon to switch to the **Start** screen (or press the Windows button on the keyboard). Right-click on the screen and click the **All apps** icon on the bottom right corner of the screen to access the **Apps** screen
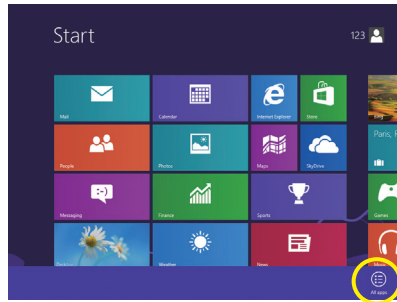
Step 5:
On this screen, click **Sound Recorder** for audio recording.
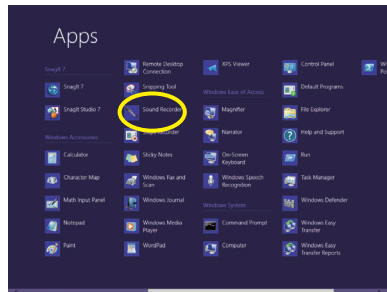
6-2-5 Using the Sound Recorder
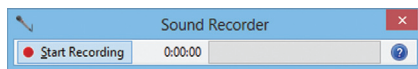
A. Recording Sound
1. Make sure you have connected the sound input device (e.g. microphone) to the computer.
2. To record the audio, click the **Start Recording** button.
3. To stop recording audio, click the **Stop Recording** button.

Be sure to save the recorded audio file upon completion.

B. Playing the Recorded Sound
You can play your recording in a digital media player program that supports your audio file format.

6-3   Troubleshooting

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

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

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

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

6-3-2 Troubleshooting Procedure

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

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

A

When the computer is turned on, is the CPU cooler running? —No→ The power supply, CPU or CPU socket might fail.

Yes ← The problem is verified and solved.

Check if there is display on your monitor. —No→ The graphics card, expansion slot, or monitor might fail.

Yes ← The problem is verified and solved.

Turn off the computer. Plug in the keyboard and mouse and restart the computer.

Check if the keyboard is working properly. —No→ The keyboard or keyboard connector might fail.

Yes ← The problem is verified and solved.

Press <Delete> to enter BIOS Setup. Select "Load Optimized Defaults." Select "Save & Exit Setup" to save changes and exit BIOS Setup.

Turn off the computer and connect the hard drive(s). Check if the system can boot successfully. —No→ The hard drive, connector, or cable might fail.

Yes ← The problem is verified and solved.

Reinstall the operating system. Reinstall other devices one by one (install one device at one time and then boot the system to see if the device works successfully).

END

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

6-4   Debug LED Codes

Regular Boot

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

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

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

S3 Resume

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

Recovery

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

Error

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

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

Regulatory Statements

Regulatory Notices

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

Our Commitment to Preserving the Environment

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

Restriction of Hazardous Substances (RoHS) Directive Statement

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

Waste Electrical & Electronic Equipment (WEEE) Directive Statement

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

WEEE Symbol Statement

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, the device should be taken to the waste collection centers for activation of the treatment, collection, recycling and disposal procedure. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local government office, your household waste disposal service or where you purchased the product for details of environmentally safe recycling.

◆ When your electrical or electronic equipment is no longer useful to you, "take it back" to your local or regional waste collection administration for recycling.

◆ If you need further assistance in recycling, reusing in your "end of life" product, you may contact us at the Customer Care number listed in your product's user's manual and we will be glad to help you with your effort.

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

Contact Us

- **GIGA-BYTE TECHNOLOGY CO., LTD.**
Address: No.6, Bao Chiang Road, Hsin-Tien Dist.,
New Taipei City 231,Taiwan
TEL: +886-2-8912-4000
FAX: +886-2-8912-4005
Tech. and Non-Tech. Support (Sales/Marketing) :
http://ggts.gigabyte.com.tw
WEB address (English): http://www.gigabyte.com
WEB address (Chinese): http://www.gigabyte.tw

- **G.B.T. INC. - U.S.A.**
TEL: +1-626-854-9338
FAX: +1-626-854-9326
Tech. Support: http://ggts.gigabyte.com.tw
Warranty Info: http://rma.gigabyte.us
Web address: http://www.gigabyte.us

- **G.B.T. INC (USA) - Mexico**
Tel: +1-626-854-9338 x 215 (Soporte de habla hispano)
FAX: +1-626-854-9326
Correo: soporte@gigabyte-usa.com
Tech. Support: http://rma.gigabyte.us
Web address: http://latam.giga-byte.com

- **Giga-Byte SINGAPORE PTE. LTD. - Singapore**
WEB address : http://www.gigabyte.sg

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

- **Vietnam**
WEB address : http://www.gigabyte.vn

- **NINGBO G.B.T. TECH. TRADING CO., LTD. - China**
WEB address : http://www.gigabyte.cn
Shanghai
TEL: +86-21-63410999
FAX: +86-21-63410100
Beijing
TEL: +86-10-62102838
FAX: +86-10-62102848
Wuhan
TEL: +86-27-87851061
FAX: +86-27-87851330
GuangZhou
TEL: +86-20-87540700
FAX: +86-20-87544306
Chengdu
TEL: +86-28-85236930
FAX: +86-28-85256822
Xian
TEL: +86-29-85531943
FAX: +86-29-85510930
Shenyang
TEL: +86-24-83992901
FAX: +86-24-83992909

- **GIGABYTE TECHNOLOGY (INDIA) LIMITED - India**
WEB address : http://www.gigabyte.in

- **Saudi Arabia**
WEB address : http://www.gigabyte.com.sa

- **Gigabyte Technology Pty. Ltd. - Australia**
WEB address : http://www.gigabyte.com.au

- **G.B.T. TECHNOLOGY TRADING GMBH - Germany**

WEB address : http://www.gigabyte.de
- **G.B.T. TECH. CO., LTD. - U.K.**

WEB address : http://www.giga-byte.co.uk
- **Giga-Byte Technology B.V. - The Netherlands**

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