

**MAXIMUS V
FORMULA
Series**



Motherboard

E7295

First Edition

May 2012

Copyright © 2012 ASUSTeK COMPUTER INC. All Rights Reserved.

No part of this manual, including the products and software described in it, may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language in any form or by any means, except documentation kept by the purchaser for backup purposes, without the express written permission of ASUSTeK COMPUTER INC. ("ASUS").

Product warranty or service will not be extended if: (1) the product is repaired, modified or altered, unless such repair, modification or alteration is authorized in writing by ASUS; or (2) the serial number of the product is defaced or missing.

ASUS PROVIDES THIS MANUAL "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OR CONDITIONS OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL ASUS, ITS DIRECTORS, OFFICERS, EMPLOYEES OR AGENTS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES (INCLUDING DAMAGES FOR LOSS OF PROFITS, LOSS OF BUSINESS, LOSS OF USE OR DATA, INTERRUPTION OF BUSINESS AND THE LIKE), EVEN IF ASUS HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES ARISING FROM ANY DEFECT OR ERROR IN THIS MANUAL OR PRODUCT.

SPECIFICATIONS AND INFORMATION CONTAINED IN THIS MANUAL ARE FURNISHED FOR INFORMATIONAL USE ONLY, AND ARE SUBJECT TO CHANGE AT ANY TIME WITHOUT NOTICE, AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY ASUS. ASUS ASSUMES NO RESPONSIBILITY OR LIABILITY FOR ANY ERRORS OR INACCURACIES THAT MAY APPEAR IN THIS MANUAL, INCLUDING THE PRODUCTS AND SOFTWARE DESCRIBED IN IT.

Products and corporate names appearing in this manual may or may not be registered trademarks or copyrights of their respective companies, and are used only for identification or explanation and to the owners' benefit, without intent to infringe.

Offer to Provide Source Code of Certain Software

This product contains copyrighted software that is licensed under the General Public License ("GPL"), under the Lesser General Public License Version ("LGPL") and/or other Free Open Source Software Licenses. Such software in this product is distributed without any warranty to the extent permitted by the applicable law. Copies of these licenses are included in this product.

Where the applicable license entitles you to the source code of such software and/or other additional data, you may obtain it for a period of three years after our last shipment of the product, either

(1) for free by downloading it from <http://support.asus.com/download>

or

(2) for the cost of reproduction and shipment, which is dependent on the preferred carrier and the location where you want to have it shipped to, by sending a request to:

ASUSTeK Computer Inc.

Legal Compliance Dept.

15 Li Te Rd.,

Beitou, Taipei 112

Taiwan

In your request please provide the name, model number and version, as stated in the About Box of the product for which you wish to obtain the corresponding source code and your contact details so that we can coordinate the terms and cost of shipment with you.

The source code will be distributed WITHOUT ANY WARRANTY and licensed under the same license as the corresponding binary/object code.

This offer is valid to anyone in receipt of this information.

ASUSTeK is eager to duly provide complete source code as required under various Free Open Source Software licenses. If however you encounter any problems in obtaining the full corresponding source code we would be much obliged if you give us a notification to the email address gpl@asus.com, stating the product and describing the problem (please DO NOT send large attachments such as source code archives, etc. to this email address).

Contents

Safety information.....	vii
About this guide.....	viii
MAXIMUS V FORMULA Series specifications summary	x
ROG ThunderFX specifications summary	xv
Package contents.....	xvi
Installation tools and components.....	xvii
 Chapter 1: Product introduction	 1-1
1.1 Special features.....	1-1
1.1.1 Product highlights.....	1-1
1.1.2 ROG unique gaming features	1-2
1.1.3 ROG Intelligent Performance & Overclocking features.....	1-2
1.1.4 ASUS special features	1-4
1.1.5 ROG-rich bundled software.....	1-4
1.2 Motherboard overview.....	1-6
1.2.1 Before you proceed.....	1-6
1.2.2 Motherboard layout	1-7
1.2.3 Central Processing Unit (CPU)	1-9
1.2.4 System memory	1-10
1.2.5 Expansion slots.....	1-21
1.2.6 Onboard buttons and switches.....	1-24
1.2.7 Jumpers	1-26
1.2.8 Onboard LEDs	1-27
1.2.9 Internal connectors.....	1-36
1.2.10 Fusion Thermo	1-47
 Chapter 2: Basic Installation	 2-1
2.1 Building your PC system.....	2-1
2.1.1 Motherboard installation.....	2-1
2.1.2 CPU installation.....	2-4
2.1.3 CPU heatsink and fan assembly installation	2-5
2.1.4 DIMM installation.....	2-7
2.1.5 ATX Power connection.....	2-8
2.1.6 SATA device connection.....	2-9
2.1.7 Front I/O Connector	2-10
2.1.8 Expansion Card installation.....	2-11
2.1.9 mPCIe Combo installation.....	2-12

2.2	BIOS update utility	2-19
2.2.1	USB BIOS Flashback	2-19
2.3	Motherboard rear and audio connections	2-20
2.3.1	Rear I/O connection	2-20
2.3.2	Audio I/O connections	2-21
2.4	Starting up for the first time	2-25
2.5	Turning off the computer	2-25
Chapter 3:	BIOS setup	3-1
3.1	Knowing BIOS	3-1
3.2	BIOS setup program	3-2
3.2.1	EZ Mode	3-3
3.2.2	Advanced Mode	3-4
3.3	Extreme Tweaker menu	3-6
3.4	Main menu	3-19
3.5	Advanced menu	3-22
3.5.1	CPU Configuration	3-23
3.5.2	PCH Configuration	3-25
3.5.3	SATA Configuration	3-26
3.5.4	System Agent Configuration	3-27
3.5.5	USB Configuration	3-28
3.5.6	Onboard Devices Configuration	3-30
3.5.7	APM	3-32
3.5.8	Network Stack	3-33
3.6	Monitor menu	3-34
3.7	Boot menu	3-37
3.8	Tools menu	3-39
3.8.1	ASUS EZ Flash 2 Utility	3-39
3.8.2	ASUS O.C. Profile	3-39
3.8.3	ASUS SPD Information	3-40
3.8.4	GO Button File	3-41
3.9	Exit menu	3-42
3.10	Updating BIOS	3-43
3.10.1	ASUS Update	3-43
3.10.2	ASUS EZ Flash 2	3-46
3.10.3	ASUS CrashFree BIOS 3	3-47
3.10.4	ASUS BIOS Updater	3-48

Chapter 4:	Software support	4-1
4.1	Installing an operating system	4-1
4.2	Support DVD information	4-1
4.2.1	Running the support DVD	4-1
4.2.2	Obtaining the software manuals	4-2
4.3	Software information	4-3
4.3.1	AI Suite II	4-3
4.3.2	TurboV EVO	4-4
4.3.3	DIGI+ Power Control	4-7
4.3.4	EPU	4-10
4.3.5	FAN Xpert 2	4-11
4.3.6	USB 3.0 Boost	4-16
4.3.7	Ai Charger+	4-17
4.3.8	USB Charger+	4-18
4.3.9	Probe II	4-20
4.3.10	Sensor Recorder	4-21
4.3.11	ASUS Update	4-23
4.3.12	MyLogo2	4-24
4.3.13	Audio configurations	4-25
4.3.14	ROG Connect	4-28
4.3.15	GameFirst II	4-30
4.3.16	MemTweakIt	4-32
Chapter 5:	RAID support	5-1
5.1	RAID configurations	5-1
5.1.1	RAID definitions	5-1
5.1.2	Installing Serial ATA hard disks	5-2
5.1.3	Setting the RAID item in BIOS	5-2
5.1.4	Intel® Rapid Storage Technology Option ROM utility	5-3
5.2	Creating a RAID driver disk	5-8
5.2.1	Creating a RAID driver disk without entering the OS	5-8
5.2.2	Creating a RAID driver disk in Windows®	5-8
5.2.3	Installing the RAID driver during Windows® OS installation	5-9
5.2.4	Using a USB floppy disk drive	5-10
Chapter 6:	Multiple GPU support	6-1
6.1	AMD® CrossFireX™ technology	6-1
6.1.1	Requirements	6-1
6.1.2	Before you begin	6-1

6.1.3	Installing two CrossFireX™ graphics cards	6-2
6.1.4	Installing three CrossFireX™ graphics cards	6-3
6.1.5	Installing the device drivers	6-4
6.1.6	Enabling the AMD® CrossFireX™ technology	6-4
6.2	NVIDIA® SLI™ technology	6-6
6.2.1	Requirements	6-6
6.2.2	Installing two SLI-ready graphics cards	6-6
6.2.3	Installing the device drivers	6-7
6.2.4	Enabling the NVIDIA® SLI™ technology	6-8
6.3	LucidLogix Virtu MVP	6-10
6.3.1	Installing LucidLogix Virtu MVP	6-10
6.3.2	Setting up your display	6-11
6.3.3	Configuring LucidLogix Virtu MVP	6-12
Chapter 7:	Intel® technologies	7-1
7.1	Intel® 2012 Desktop responsiveness technologies	7-1
7.1.1	Intel® Smart Response Technology	7-3
7.1.2	Intel® Rapid Start Technology	7-4
7.1.3	Intel® Smart Connect Technology	7-10
Chapter 8:	ThunderFX	8-1
8.1	Hardware introduction	8-1
8.1.1	Front panel	8-1
8.1.2	Rear panel	8-3
8.2	Connecting your devices	8-4
8.2.1	Connecting to PC	8-5
8.2.2	Connecting to PlayStation3™	8-6
8.2.3	Connecting to Xbox 360™	8-8
8.2.4	Connecting to iPhone/ iPod/ iPad/ MP3 player	8-10
8.3	Driver Installation	8-11
8.4	ThunderFX Utility Introduction	8-12
Appendices		A-1
Notices		A-1
ASUS contact information		A-5

Safety information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Ensure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, ensure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.

About this guide

This user guide contains the information you need when installing and configuring the motherboard.

How this guide is organized

This guide contains the following parts:

- **Chapter 1: Product introduction**
This chapter describes the features of the motherboard and the new technology it supports. It includes description of the switches, jumpers, and connectors on the motherboard.
- **Chapter 2: Basic Installation**
This chapter lists the hardware setup procedures that you have to perform when installing system components.
- **Chapter 3: BIOS setup**
This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.
- **Chapter 4: Software support**
This chapter describes the contents of the support DVD that comes with the motherboard package and the software.
- **Chapter 5: RAID support**
This chapter describes the RAID configurations.
- **Chapter 6: Multiple GPU technology support**
This chapter describes how to install and configure multiple ATI® CrossFireX™ and NVIDIA® SLI™ graphics cards.
- **Chapter 7: Intel® technologies**
This chapter tells how to install the Intel® 2012 desktop responsiveness technologies.
- **Chapter 8: ThunderFX**
This chapter tells how to set up the ThunderFX with your system.

Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. **ASUS websites**
The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.
2. **Optional documentation**
Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

To ensure that you perform certain tasks properly, take note of the following symbols used throughout this manual.



DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.



CAUTION: Information to prevent damage to the components when trying to complete a task



IMPORTANT: Instructions that you **MUST** follow to complete a task..



NOTE: Tips and additional information to help you complete a task.

Typography

Bold text

Indicates a menu or an item to select.

Italics

Used to emphasize a word or a phrase.

<Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.

Example: <Enter> means that you must press the Enter or Return key.

<Key1> + <Key2> + <Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).

MAXIMUS V FORMULA Series specifications summary

CPU	LGA1155 socket for Intel® 3rd/2nd Generation Core™ i7 Core™ i5 / Core™ i3 / Pentium® / Celeron® Processors Supports 22/32nm CPU Supports Intel® Turbo Boost Technology 2.0 * The Intel® Turbo Boost Technology 2.0 support depends on the CPU types. ** Refer to www.asus.com for Intel CPU support list
Chipset	Intel® Z77 Express Chipset
Memory	4 x DIMM, max. 32GB, DDR3 2800 (O.C.)* / 2600 (O.C.)* / 2400 (O.C.)* / 2200(O.C.) / 2133(O.C.) / 1866(O.C.) / 1600 / 1333 / 1066 MHz, non-ECC, un-buffered memory Dual channel memory architecture Supports Intel® Extreme Memory Profile (XMP) * Hyper DIMM support is subject to the physical characteristics of individual CPUs. Please refer to Memory QVL (Qualified Vendors List) for details.
Expansion slots	3 x PCI Express 3.0*/2.0 x16 slots [red] (support x16, or dual at x8/x8 mode, 3-way CFX at x8/x4/x4** native from CPU) 1 x PCI Express 2.0 x4 slot [black] 3 x PCI Express 2.0 slots 1 x mini-PCI Express 2.0 x1 slot*** on mPCIe Combo™ expansion card * Intel® 3rd generation Core™ processors support PCIe 3.0. ** Intel® 3rd generation Core™ processors supports x8/x4/x4 mode. *** The mini-PCIe slot is pre-installed with a Wi-Fi/Bluetooth module.
VGA	Integrated Graphics Processor - Intel® HD Graphics support Multi-VGA output support: DisplayPort/HDMI port Supports DisplayPort 1.1a with max. resolution of 2560 x 1600 @60Hz Supports HDMI with max. resolution of 1920 x 1200 @60Hz Supports Intel® InTru™ 3D/Quick Sync Video/Clear Video HD Technology/Insider™
Multi-GPU support	Supports NVIDIA® SLI™/AMD CrossFireX™ Technology Supports AMD® 3-WAY CrossFireX™ Technology Supports Lucidlogix Virtu MVP Technology* *LucidLogix Virtu MVP supports Windows® 7 operating system.

(continued on the next page)

MAXIMUS V FORMULA Series specifications summary

Storage	Intel® Z77 Express Chipset with RAID 0, 1, 5, 10 support - 2 x SATA 6.0 Gb/s ports (red) - 2 x SATA 3.0 Gb/s ports (black) - 1 x eSATA 3.0 Gb/s ports - 1 x mSATA 3.0 Gb/s slot on mPCIe Combo™ expansion card - Supports Intel® Smart Response Technology, Intel® Rapid Start Technology and Intel® Smart Connect Technology* ASMedia® SATA 6Gb/s controller* - 4 x SATA 6.0 Gb/s ports [red]** * Supports Intel® Core™ processors on Windows® 7 operating system. ** These SATA ports are for data hard drives only. ATAPI devices are not supported.
LAN	1 x Intel® Gigabit LAN Controller
Wireless Data Network	Wi-Fi 802.11 a/b/g/n supports dual frequency band 2.4/5 GHz on mPCIe Combo™ expansion card
Bluetooth	Bluetooth v4.0/3.0+HS * The module is pre-installed on the mPCIe Combo™
ROG SupremeFX HD Audio	SupremeFX IV, built-in 7.1 Channel High Definition Audio CODEC High fidelity headphone amplifier Texas Instruments (120dB SNR, -117dB THD+N at VCC+=12V, RL=600 Ω, f=1KHz) SupremeFX Shielding™ Technology ELNA Premium Audio Capacitors 1500 uF Audio Power Capacitor Output Signal-to-Noise Ratio (A-Weighted): 110dB Output THD+N at 1KHz: 95dB Supports jack-detection, multi-streaming, front panel jack-retasking Blu-ray audio layer content protection Optical S/PDIF input and output ports at back panel Audio Features: DTS Ultra PC II DTS Connect
USB	Intel® Z77 Express Chipset - 4 x USB 3.0 ports (2 ports at mid-board [red]*, 2 ports at back panel [blue]) - 8 x USB 2.0 ports (4 ports at mid-board, 1 port reserved for ROG Connect [white], 3 ports at back panel) ASMedia® USB 3.0 controller - 2 x USB 3.0 ports at back panel (blue) * UASP standard on the Intel® native USB 3.0 only supports Windows® 8.

(continued on the next page)

MAXIMUS V FORMULA Series specifications summary

ROG Exclusive Features	mPCIe Combo™ (mPCIe/mSATA combo card) ROG Connect - RC Diagram - RC Remote - RC Poster - GPU TweakIt ROG Extreme Engine Digi+ II - 8-phase CPU power - 4-phase iGPU power - 2-phase DRAM power UEFI BIOS features - ROG BIOS Print - GPU.DIMM Post ROG Extreme OC Kit - LN2 Mode - Slow Mode - EZ Plug CPU Level Up GameFirst II Probelt iROG Extreme Tweaker USB BIOS Flashback Loadline Calibration ROG O.C. Profile
Special Features	ASUS EPU Engine ASUS Wi-Fi GO! ASUS Exclusive Features - AI Suite II - TurboV EVO - USB 3.0 Boost - Fan Xpert2 - AI Charger+ - USB Charger+ - Disk Unlocker ASUS EZ DIY - ASUS CrashFree BIOS 3 - ASUS EZ Flash 2 - ASUS C.P.R. (CPU Parameter Recall) ASUS Q-Design - ASUS Q-Code - ASUS Q-Shield - ASUS Q-Connector - ASUS Q-LED (CPU, DRAM, VGA, Boot Device LED) - ASUS Q-Slot - ASUS Q-DIMM

(continued on the next page)

MAXIMUS V FORMULA Series specifications summary

Back I/O Ports	1 x Clear CMOS button 1 x ROG Connect On/Off button 4 x USB 2.0 (1 port for ROG Connect) 1 x eSATA 3.0 Gb/s connector 4 x USB 3.0 ports [blue] 1 x Optical S/PDIF IN 1 x Optical S/PDIF OUT 1 x HDMI port 1 x DisplayPort 1 x LAN (RJ45) port 5 x audio jacks
Internal Connectors	1 x USB 3.0 connector (supports additional 2 USB 3.0 ports) 2 x USB 2.0 connectors (support additional 4 USB 2.0 ports) 6 x SATA 6.0 Gb/s connectors 2 x SATA 3.0 Gb/s connectors 2 x CPU fan connectors 3 x Chassis fan connectors 3 x Optional fan connectors 3 x Thermal sensor connectors 1 x 24-pin EATX power connector 1 x 8-pin EATX 12V power connector 1 x 4-pin EATX 12V power connector 8 x Probelt measurement points 1 x EZ Plug connector 1 x LN2 Mode header 1 x Slow mode switch 1 s START (Power-on) button 1 x RESET button 1 x GO button 1 x S/PDIF OUT header 1 x Front panel audio connector (AAFP) 1 x System panel connector 1 x mPCIe Combo™ header
Manageability	WfM2.0, DMI2.0, WOL by PME, PXE

(continued on the next page)

MAXIMUS V FORMULA Series specifications summary

BIOS Features	64Mb UEFI AMI BIOS, PnP, DMI2.0, WfM2.0, SM BIOS 2.5, ACPI2.0a Multi-language BIOS
Software	Drivers Kaspersky® Anti-Virus DAEMON Tools Pro Standard GameFirst II ROG CPU-Z Mem TweakIt ASUS AI Suite II ASUS WebStorage ASUS Utilities
Form Factor	extended ATX Form Factor, 12" x 10.1" (30.5cm x 25.7cm)



Specifications are subject to change without notice.

ROG ThunderFX specifications summary

Audio Performance	Output Signal-to-Noise Ratio (A-Weighted): 114dB Digital-to-analog converter: 120dB SNR, 107dB THD+N (Max. 192kHz/24-bit) C-Media 6631 audio processor (Max. 192kHz/ 24-bit) Built-in high fidelity headphone amplifier Up to 300-ohms headphone ratio support
Special Features	Multi-platform Support: PC, Xbox 360, PS3 Independent master / voice / game volume control (PS3, Xbox 360) Built-in ENC (Environmental Noise Cancellation) Technology GameEQ: 3 preset EQ profiles with graphical audio effect tuning hints Xear™ Surround headphone Xear™ SingFX FlexBass™, Smart Volume Normalize™ DS3D GX 1.0, OpenAL
I/O Ports	2 x RCA audio input 1 x USB 2.0 connector 1 x 3.5mm headphone jack 1 x 3.5mm microphone jack 1 x 2.5mm microphone jack for Xbox 360 voice input
Dimensions	191mm x 137.5mm x 37mm (L x W x H)



Specifications are subject to change without notice.

Package contents

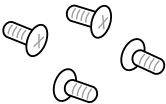
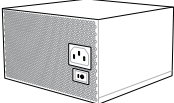
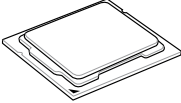
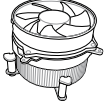
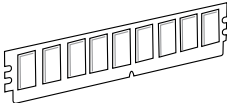
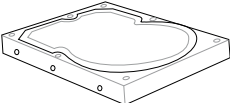
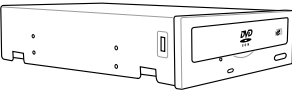
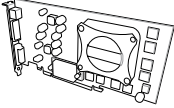
Check your motherboard package for the following items.

Motherboard	ROG MAXIMUS V FORMULA
USB external sound card	ROG ThunderFX*
Cables	1 x ROG Connect cable 2 x 2-in-1 SATA 6.0 Gb/s signal cables 1 x 2-in-1 SATA 3.0 Gb/s signal cables 1 x 2-in-1 RF cables 1 x SLI bridge 1 x Xbox 360 voice input cable (2.5mm)** 1 x Dual-head USB cable** 1 x ThunderFX Xbox 360 AV +3.5mm-to-RCA cable**
Accessories	I/O Shield 1 x mPCIe Combo card with dual band Wi-Fi / Bluetooth module 2 x dual band Wi-Fi Ring Moving Antenna 1 x 12-in-1 ROG cable label 1 x 2-in-1 ASUS Q-Connector kit 1 x Diablo III mousepad** 1 x ROG logo sticker**
Application DVD	ROG motherboard support DVD
Documentation	User guide



- If any of the above items is damaged or missing, contact your retailer.
- *ThunderFX is only available in selected models.
- ** These items are bundled with ThunderFX.

Installation tools and components

	
1 bag of screws	Phillips (cross) screwdriver
	
PC chassis	Power supply unit
	
Intel LGA 1155 CPU	Intel LGA 1155 compatible CPU Fan
	
DIMM	SATA hard disk drive
	
SATA optical disc drive (optional)	Graphics card (optional)



The tools and components in the table above are not included in the motherboard package.

This image shows a full page of blank, lined paper. It features approximately 20 horizontal blue or grey lines spaced evenly apart, typical of notebook paper. The lines extend across the entire width of the page, leaving small margins at the top and bottom. There are no vertical lines, text, or other markings on the page.

Product introduction

1

1.1 Special features

1.1.1 Product highlights

Republic of Gamers

The Republic of Gamers offers you the best of the best. We offer the best hardware engineering, the fastest performance, the most innovative ideas, and we welcome the best gamers to join in. In the Republic of Gamers, mercy rules are only for the weak, and bragging rights means everything. We believe in making statements and we excel in competitions. If your character matches our trait, then join the elite Republic of Gamers and make your presence felt.

LGA1155 socket for Intel® 2nd/3rd Generation Core™ i7 / Core™ i5 / Core™ i3, Pentium®, and Celeron® Processors

This motherboard supports Intel 2nd/3rd generation Core™ i7/i5/i3, Pentium, and Celeron processors in the LGA1155 package. It provides great graphics and system performance with its GPU, dual-channel DDR3 memory slots, and PCI Express 2.0/3.0 expansion slots.

Intel® Z77 Express Chipset

Intel® Z77 Express Chipset is a single-chipset that supports the 1155 socket Intel® 2nd/3rd generation Core™ i7/i5/ i3, Pentium®, and Celeron® processors. It utilizes the serial point-to-point links, which increases bandwidth and enhances the system's performance. It natively supports four USB 3.0 ports for up to ten times faster transfer rate than USB 2.0, and enables the iGPU function for Intel® integrated graphics performance.

PCI Express® 3.0

PCI Express® 3.0 (PCIe 3.0) is the PCI Express bus standard that provides twice the performance and speed of PCIe 2.0. It provides an optimal graphics performance, unprecedented data speed, and seamless transition with its complete backward compatibility to PCIe 1.0/2.0 devices.

* Intel® 3rd generation Core™ processors support PCIe 3.0.

SLI/CrossFire On-Demand

This motherboard features a unique PCIe 3.0 bridge chip to support multi-GPU SLI/CrossFireX graphics cards for an unrivaled gaming performance. With the Intel Z77 platform to optimize the PCIe allocation of multiple GPUs, it supports up to 2-WAY GPU SLI or 3-WAY GPU CrossFireX configuration.

LucidLogix® Virtu™ MVP

LucidLogix® Virtu™ MVP, with HyperFormance™ Technology, is designed for Intel® processor graphics chip on Windows® 7 and perfectly combines the performance of a discrete graphics card with fast computing iGPU (Integrated Graphics Processing Unit). The newly-designed Virtual VSync eliminates tearing artifacts allowing you to enjoy a smoother gaming experience.

LucidLogix® Virtu™ MVP can also dynamically assign tasks to the best available graphics resource based on power, performance, and system load. With Intel® Quick Sync Video 2.0 technology, it provides 3x faster video conversion of NVIDIA and AMD graphics cards while retaining the graphics cards' high-end 3D rendering and gaming performance. When the discrete graphics cards are not in use, it drastically reduces the power usage, making the system more environmentally friendly.

* LucidLogix® Virtu™ MVP supports Windows® 7 operating system.

** Intel® Quick Sync Video feature is supported by 2nd/3rd generation Intel® Core™ processor family.

1.1.2 ROG unique gaming features

SupremeFX IV

The SupremeFX IV™ onboard audio solution is a set of audio capacitors that produce a crisp, warm sound. With the bundled 300-ohm built-in headphone amplifier, SupremeFX IV™ provides you with better gaming audio experience. Combined with the existing SupremeFX innovation such as the Red Line physical PCB separation, and EMI shield, SupremeFX sets an unrivaled audio standard for PC gamers.

GameFirst II

ASUS GameFirst II, with cFOS Traffic Shaping technology, provides a powerful and user-friendly network control to easily frag your gaming system. Featuring the EZ Mode for beginners' setup and Advanced Mode for professionals' tweaking, your frags comes first.

ThunderFX

ThunderFX is an audio device that produces a premium gaming audio and easily connects to your favorite PC headphones on any PC, laptop or console. Its Environmental Noise Cancellation (ENC) technology reduces the gaming background noise and GameEQ provides a 3-preset gaming audio genre and four audio effect hints for a quick and easy tuning. Its 300-ohm amplified headphone and premium Nichicon FG Series capacitors provide a pure and powerful audio. ThunderFX is a supreme sound accessory fit for your console and network gaming entertainment.

1.1.3 ROG Intelligent Performance & Overclocking features

mPCIe Combo + Dual band Wi-Fi / Bluetooth 4.0

The mPCIe Combo is a two-sided mini-card that allows you to install an extra mSATA SSD and a Wi-Fi module into the motherboard. This device comes with one mSATA port that supports Intel® Smart Response Technology hybrid storage acceleration, and a dual-band 2.4/5 GHz Wi-Fi 802.11 a/b/g/n and Bluetooth v4.0 functions.

Fusion Thermo

ROG Fusion Thermo is a VRM cooler made from a combination of 100% copper water cooling channel with electro-plated nickel barbs, and anodized aluminum finned air-cooler. With both water-cooling and air-cooling features, Fusion Thermo delivers the ultimate add-on to achieve the best O.C. advantage.

ROG Connect

ROG Connect allows you to monitor the status of your desktop PC and tweak its parameters in real-time via a notebook. ROG Connect links your main system to a notebook through a USB cable, allowing you to view real-time POST code and hardware status readouts on your notebook, as well as make on-the-fly parameter adjustments at a purely hardware level.

Extreme Engine Digi+ II

The Extreme Engine Digi+ II is equipped with the finest Japan-made 10K Black Metallic capacitors, and its digital VRM design allows you to achieve ultimate performance with adjustable CPU and memory power management frequencies.

USB BIOS FlashBack

USB BIOS Flashback offers a hassle-free updating solution for your ultimate convenience. Simply install a USB storage device containing the BIOS file, press the BIOS Flashback button for three seconds, and the UEFI BIOS is automatically updated even without entering the existing the BIOS or operating system. It also allows you to regularly check for UEFI BIOS updates, and download the latest BIOS automatically.

iROG

The iROG is a special IC that fully maximizes ROG's unique functions, providing you with full control of your motherboard at any stage. It greatly increases your overclocking enjoyment, and offers you with advanced system control and management features purely at a hardware level.

CPU Level Up

With ROG's CPU Level Up, overclocking has never been so easy, or cost-free. Simply select the processor that you want to overclock to, and the motherboard will do the rest.

GPU.DIMM Post

GPU.DIMM Post enables you to catch potential problems even before you enter the OS, saving you valuable time in detecting component failure under extreme conditions. With GPU.DIMM Post, quickly and easily check your graphic cards, memory modules' statuses in the BIOS, and overclocking settings.

BIOS Print

ROG offers a whole new UEFI BIOS feature to handle the demands of an overclocking experience. The motherboard features ROG BIOS Print that allows you to easily share your BIOS settings to others with the press of a button.

Probelts

This motherboard consists of seven Probelts measurement points that helps you detect your system's current voltage. With the use of a multimeter device, these points can help measure your system's ground, platform controller hub, CPU phase locked loop, input/output, memory, iGPU, and GPU voltages.

Extreme Tweaker

Extreme Tweaker is the one stop shop to fine-tune your system to optimal performance. With Extreme Tweaker, you can adjust the system settings such as frequency, over-voltage, memory timing, and more.

Loadline Calibration

Maintaining ample voltage support for the CPU is critical during overclocking. The Loadline Calibration ensures stable and optimal CPU voltage under heavy loading. It helps overclockers enjoy the motherboard's ultimate OC capabilities and benchmark scores.

1.1.4 ASUS special features

Intel Gigabit LAN

The LAN solution from Intel has been long known to have a better throughput, lower CPU utilization as well as better stability. With the Intel Gigabit LAN solutions onboard, the ultimate network experience can therefore be delivered to its users like never before.

USB 3.0 Boost

ASUS USB 3.0 Boost technology supports UASP (USB Attached SCSI Protocol), the latest USB 3.0 standard. With USB 3.0 Boost technology, a USB device's transmission speed is significantly increased up to 170%, adding to an already impressive fast USB 3.0 transfer speed. It automatically accelerates data speeds for compatible USB 3.0 peripherals without the need for any user interaction.

1.1.5 ROG-rich bundled software

Kaspersky® Anti-Virus

Kaspersky® Anti-Virus Personal offers premium antivirus protection for individual users and home offices. It is based on advanced antivirus technologies. The product incorporates the Kaspersky® Anti-Virus engine, which is renowned for malicious program detection rates that are among the industry's highest.

DAEMON Tools Pro Standard

DAEMON Tools Pro offers essential functionality to backup CD, DVD and Blu-ray discs. It converts optical media into virtual discs and emulates devices to work with the virtual copies. DAEMON Tools Pro organizes data, music, video, and photo collections on a PC, notebook, or netbook.

ROG CPU-Z

ROG CPU-Z, authorized by Intel's CPU Identification (CPUID), is a customized ROG utility that allows you to gather information about your system's main components. It gives you the current information and status of your CPU, motherboard, memory, and other main components. Get that ROG look of reporting your system's current information with ROG CPU-Z.

1.2 Motherboard overview

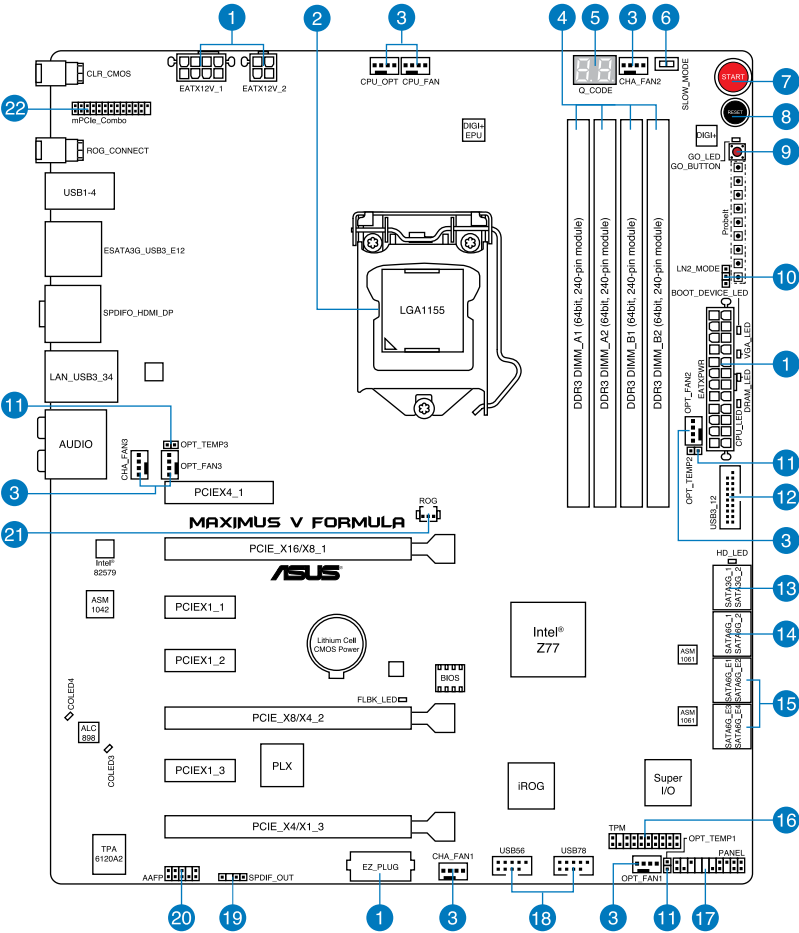
1.2.1 Before you proceed

Take note of the following precautions before you install motherboard components or change any motherboard settings.



-
- Unplug the power cord from the wall socket before touching any component.
 - Before handling components, use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, to avoid damaging them due to static electricity.
 - Hold components by the edges to avoid touching the ICs on them.
 - Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.
 - Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, or components.
-

1.2.2 Motherboard layout



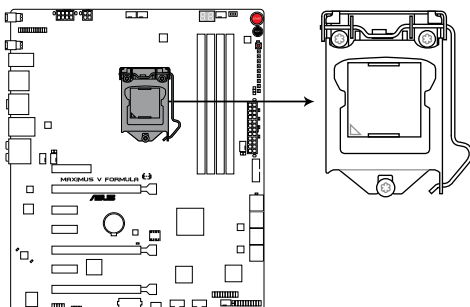
Refer to 1.2.9 Internal connectors and 2.3.1 Rear I/O connection for more information about rear panel connectors and internal connectors.

Layout contents

Connectors/Jumpers/Buttons and switches/Slots	Page
1. Power connectors (24-pin EATXPWR, 8-pin EATX12V, 4-pin EATX12V; 4-pin EZ_PLUG)	1-43
2. LGA1155 CPU Socket	1-9
3. CPU, chassis, and optional fan connectors (4-pin CPU_FAN, 4-pin CPU_OPT, 4-pin OPT_FAN1-3, 4-pin CHA_FAN1-3)	1-41
4. DDR3 DIMM slots	1-10
5. Q_Code LEDs	1-29
6. Slow Mode switch	1-25
7. START (Power-on) button	1-24
8. RESET button	1-24
9. GO button	1-25
10. LN2 Mode header	1-26
11. Thermal sensor cable connectors (2-pin OPT_TEMP1/2/3)	1-45
12. USB 3.0 connectors (20-1 pin USB3_12)	1-39
13. Intel® Z77 Serial ATA 3.0 Gb/s connectors (7-pin SATA3G_1/2 [black])	1-37
14. Intel® Z77 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1/2 [red])	1-36
15. Asmedia® Z77 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_E12/E34 [red])	1-38
16. TPM connector	1-45
17. System panel connector (20-8 pin PANEL)	1-44
18. USB 2.0 connectors (10-1 pin USB56; USB78)	1-40
19. Digital audio connector (4-1 pin SPDIF_OUT)	1-39
20. Front panel audio connector (10-1 pin AAFP)	1-42
21. ROG Logo LED connector (3-pin)	1-46
22. mPCIe combo connector (26-1 pin mPCIe)	2-12

1.2.3 Central Processing Unit (CPU)

The motherboard comes with a surface mount LGA1155 socket designed for the Intel® 3rd/2nd Generation Core™ i7 / Core™ i5 / Core™ i3, Pentium™, and Celeron™ processors.



MAXIMUS V FORMULA CPU LGA1155



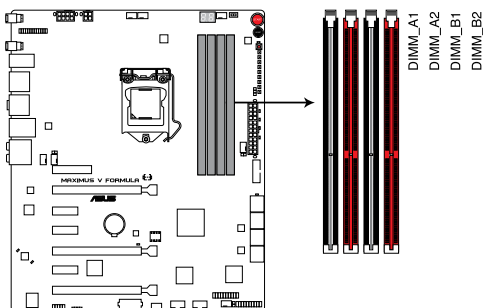
- Ensure that all power cables are unplugged before installing the CPU.
- The LGA1156 CPU is incompatible with the LGA1155 socket. DO NOT install a LGA1156 CPU on the LGA1155 socket.
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS will shoulder the cost of repair only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the LGA1155 socket.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

1.2.4 System memory

The motherboard comes with four Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) slots.

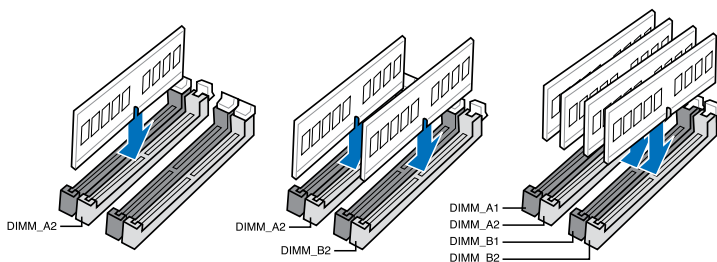


A DDR3 module is notched differently from a DDR or DDR2 module. DO NOT install a DDR or DDR2 memory module to the DDR3 slot.



MAXIMUS V FORMULA 240-pin DDR3 DIMM sockets

Recommended memory configurations



Memory configurations

You may install 1GB, 2GB, 4GB and 8GB unbuffered and non-ECC DDR3 DIMMs into the DIMM sockets.



- Memory module with memory frequency higher than 2133 MHz and its corresponding timing or the loaded XMP profile is not the JEDEC memory standard. The stability and compatibility of these memory modules depend on the CPU's capabilities and other installed devices.
- You may install varying memory sizes in Channel A and Channel B. The system maps the total size of the lower-sized channel for the dual-channel configuration. Any excess memory from the higher-sized channel is then mapped for single-channel operation.
- Due to Intel® 2nd generation processors' behavior, DDR3 2200 (and higher), and DDR3 2000/1800 MHz memory modules will run at the default frequency rates of DDR3 2133/1866/1600 MHz.
- According to Intel CPU spec, DIMM voltage below 1.65V is recommended to protect the CPU.
- Always install DIMMs with the same CAS latency. For optimal compatibility, we recommend that you install memory modules of the same version or date code (D/C) from the same vendor. Check with the retailer to get the correct memory modules.
- Due to the memory address limitation on 32-bit Windows OS, when you install 4GB or more memory on the motherboard, the actual usable memory for the OS can be about 3GB or less. For effective use of memory, we recommend that you do any of the following:
 - a) Use a maximum of 3GB system memory if you are using a 32-bit Windows OS.
 - b) Install a 64-bit Windows OS when you want to install 4GB or more on the motherboard.
 - c) For more details, refer to the Microsoft® support site at <http://support.microsoft.com/kb/929605/en-us>.
- This motherboard does not support DIMMs made up of 512Mb (64MB) chips or less (Memory chip capacity counts in Megabit, 8 Megabit/Mb = 1 Megabyte/MB).



- The default memory operation frequency is dependent on its Serial Presence Detect (SPD), which is the standard way of accessing information from a memory module. Under the default state, some memory modules for overclocking may operate at a lower frequency than the vendor-marked value. To operate at the vendor-marked or at a higher frequency, refer to section **3.3 Extreme Tweaker menu** for manual memory frequency adjustment.
- For system stability, use a more efficient memory cooling system to support a full memory load (4 DIMMs) or overclocking condition.

MAXIMUS V FORMULA Series Motherboard Qualified Vendors Lists (QVL)

DDR3 2400 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
CORSAIR	CMGTX8(XMP)	8GB (4x2GB)	SS	-	-	10-12-10-30	1.65	•	•	
CORSAIR	CMGTX3(XMP)	2GB	DS	-	-	9-11-9-27	1.65	•	•	
G.SKILL	F3-19200CL11Q-16GBZHD (XMP)	16GB (4x4GB)	DS	-	-	11-11-11-31	1.65	•	•	•
G.SKILL	F3-19200CL11Q-16GBZHD (XMP)	16GB (4x4GB)	DS	-	-	11-11-11-31	1.65		•	•
G.SKILL	F3-19200CL9Q-16GBZMD (XMP)	16GB (4x4GB)	DS	-	-	9-11-11-31	1.65	•	•	•
G.SKILL	F3-19200CL10Q-32GBZHD (XMP)	32GB (4x8GB)	DS	-	-	10-12-12-31	1.65	•	•	•
G.SKILL	F3-19200CL9D-4GBPIS (XMP)	4G (2x2GB)	DS	-	-	9-11-9-28	1.65	•	•	
GEIL	GOC316GB2400C10QC (XMP)	16GB (4x4GB)	DS	-	-	10-11-11-30	1.65	•	•	•
GEIL	GOC316GB2400C11QC (XMP)	16GB (4x4GB)	DS	-	-	11-11-11-30	1.65	•	•	•
Kingston	KHX2400C11D3K4/8GX (XMP)	8GB (4x2GB)	SS	-	-	11-13-11-30	1.65	•	•	•
Transcend	TX2400KLU-4GK (381850) (XMP)	2GB	DS	-	-	-	1.65	•	•	•
Transcend	TX2400KLU-4GK(374243) (XMP)	2GB	DS	-	-	-	1.65	•	•	•
Patriot	PVV34G2400C9K(XMP)	4GB (2x2GB)	DS	-	-	9-11-9-27	1.66	•		

DDR3 2200 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
G.SKILL	F3-17600CL7D-4GBFLS(XMP)	4G (2x2G)	DS	-	-	7-10-10-28	1.65	•	•	
GEIL	GET34GB2200C9DC(XMP)	4GB (2x2GB)	DS	-	-	9-10-9-28	1.65	•	•	•
GEIL	GET38GB2200C9ADC(XMP)	8GB (2x4GB)	DS	-	-	9-11-9-28	1.65	•	•	•
KINGMAX	FLKE85F-B8KJAA-FEIS(XMP)	4GB (2x2GB)	DS	Kingmax	N/A	-	-	•		

DDR3 2133 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
A-DATA	AX3U2133C2G9B(XMP)	2GB	SS	-	-	9-11-9-27	1.55~1.75	•		
A-DATA	AX3U2133GC2G9B(XMP)	2GB	SS	-	-	9-9-9-24	1.55-1.75	•	•	
A-DATA	AX3U2133GC4G9B(XMP)	16GB (4x4GB)	DS	-	-	9-11-9-27	1.65	•	•	•
Apacer	78.BAGE4.AFD0C(XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	-	•	•	•
CORSAIR	CMT4GX3M2A2133C9(XMP)	4GB (2x2GB)	DS	-	-	9-10-9-24	1.65	•	•	
CORSAIR	CMT4GX3M2B2133C9 (Ver7.1)(XMP)	4GB (2x2GB)	DS	-	-	9-9-9-24	1.5	•	•	•
CORSAIR	CMT4GX3M2B2133C9(XMP)	4GB (2x2GB)	DS	-	-	9-10-9-27	1.5	•	•	•
G.SKILL	F3-17000CL9Q- 16GBXLD(XMP)	16GB (4x4GB)	DS	-	-	9-11-9-28	1.65	•	•	•
G.SKILL	F3-17000CL9Q-16GBZH(XMP)	16GB (4x4GB)	DS	-	-	9-11-10-28	1.65	•	•	•
G.SKILL	F3-17066CL9Q- 16GBTDD(XMP)	16GB (4x4GB)	DS	-	-	9-9-9-24	1.65	•	•	
G.SKILL	F3-17000CL11Q2- 64GBZLD(XMP)	64GB (8x8GB)	DS	-	-	11-11-11-30	1.5	•	•	•
G.SKILL	F3-17066CL9D-8GBPID(XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	1.65	•	•	
KINGSTON	KHX2133C11D3K4/16GX(XMP)	16GB (4x4GB)	DS	-	-	11-12-11-30	1.65	•	•	•
OCZ	OCZ3XTEP2133C9LV4GK	2GB	DS	-	-	7-7-7-20	1.65	•	•	
Patriot	PVV34G2133C9K(XMP)	4GB (2x2GB)	DS	-	-	9-11-9-27	1.66	•	•	

DDR3 2000 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
A-DATA	AX3U2000GB2G9B (XMP)	2GB	DS	-	-	9-11-9-27	1.55~1.75	•	•	•
A-DATA	AX3U2000GC4G9B (XMP)	4GB	DS	-	-	9-11-9-27	1.55~1.75	•	•	•
Apacer	78.AAGD5.9KD(XMP)	6GB(3x2GB)	DS	-	-	9-9-9-27	-	•	•	•
CORSAIR	CMZ4GX3M2A2000C10 (Ver 5.12) (XMP)	4GB (2x2GB)	SS	-	-	10-10- 10-27	1.5	•	•	
CORSAIR	CMT6GX3M3A2000C8 (XMP)	6GB (3x2GB)	DS	-	-	8-9-8-24	1.65	•	•	•
G.SKILL	F3-16000CL9D-4GBRH (XMP)	4GB(2x2GB)	DS	-	-	9-9-9-24	1.65	•	•	
G.SKILL	F3-16000CL9D-4GBTD (XMP)	4GB(2x2GB)	DS	-	-	9-9-9-24	1.65	•	•	
GEIL	GUP34GB2000C9DC (XMP)	4GB (2x2GB)	DS	-	-	9-9-9-28	1.65	•	•	•
Transcend	TX2000KLN-8GK(388375) (XMP)	4GB	DS	-	-	-	1.6	•	•	
AEXEA	AXA3ES2G2000LG28V (XMP)	2GB	DS	-	-	-	1.65	•	•	•
AEXEA	AXA3ES4GK2000LG28V (XMP)	4GB (2x2GB)	DS	-	-	-	1.65	•	•	
Asint	SLA302G08-ML2HB (XMP)	4GB	DS	Hynix	H5TQ2G83 BFRH9C	9-9-9-27	-	•	•	•
Gingle	FA3URSS673A801A	2GB	DS	-	-	9-9-9-24	-	•	•	
Patriot	PX7312G2000ELK(XMP)	12GB (3x4GB)	DS	-	-	9-11-9-27	1.65	•	•	•
Patriot	PV736G2000ELK(XMP)	6GB (3x2GB)	DS	-	-	7-7-7-20	1.65	•	•	
Silicon Power	SP002GBLYU200S02 (XMP)	2GB	DS	-	-	-	-	•	•	•
Team	TXD32048M2000C9 (XMP)	2GB	DS	Team	T3D1288RT- 20	9-9-9-24	1.5	•	•	•
Team	TXD32048M2000C9-L (XMP)	2GB	DS	Team	T3D1288LT- 20	9-9-9-24	1.5	•	•	•
Team	TXD32048M2000C9-L (XMP)	2GB	DS	Team	T3D1288RT- 20	9-9-9-24	1.6	•	•	•

DDR3 1866 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
A-DATA	AX3U1866GC2G9B(XMP)	2GB	SS	-	-	9-11-9-27	1.55~1.75	•	•	
A-DATA	AX3U1866GC4G9B(XMP)	4GB	DS	-	-	9-11-9-27	1.55~1.75	•	•	•
CORSAIR	CMT32GX3M4X1866C9 (Ver3.23)(XMP)	32GB (4x8GB)	DS	-	-	9-10-9-27	1.5	•	•	
CORSAIR	CMZ32GX3M4X1866C10 (Ver3.23)(XMP)	32GB (4x8GB)	DS	-	-	10-11-10-27	1.5	•	•	•
CORSAIR	CMZ8GX3M2A1866C9 (XMP)	8GB (2x4GB)	DS	-	-	9-10-9-27	1.5	•	•	•
Crucial	BLE4G3D1869DE1XT0.16FMD(XMP)	4GB	DS	-	-	9-9-9-27	1.5	•	•	•
G.SKILL	F3-14900CL9Q-16GBXL (XMP)	16GB (4x4GB)	DS	-	-	9-10-9-28	1.5	•	•	•
G.SKILL	F3-14900CL9Q-16GBZL (XMP)	16GB (4x4GB)	DS	-	-	9-10-9-28	1.5	•	•	•
G.SKILL	F3-14900CL10Q2-64GB ZLD(XMP)	64GB (8x8GB)	DS	-	-	10-11-10-30	1.5	•	•	•
G.SKILL	F3-14900CL9D-8GBSR (XMP)	8GB (2x4GB)	DS	-	-	9-10-9-28	1.5	•	•	•
G.SKILL	F3-14900CL9Q-8GBFLD (XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	1.6	•	•	•
Patriot	PXD34G1866ELK(XMP)	4GB (2x2GB)	SS	-	-	9-9-9-24	1.65	•	•	•
Patriot	PXD38G1866ELK(XMP)	8GB (2x4GB)	DS	-	-	9-11-9-27	1.65	•	•	•
Patriot	PXD38G1866ELK(XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	1.65	•	•	•
Team	TXD34096M1866HC9K-L(XMP)	4GB	DS	Hynix	H5TC2G3BFRH9A	9-11-9-27	1.65	•	•	•

DDR3 1800 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
G.SKILL	F3-14400CL9D-4G BRL(XMP)	4GB (2x2GB)	DS	-	-	9-9-9-24	1.6	•	•	•

DDR3 1600 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
A-DATA	AM2U16BC2P1	2GB	SS	A-DATA	3CCD-1509A	-	-	*	*	*
A-DATA	AM2U16BC4P2	4GB	DS	A-DATA	3CCD-1509A	-	-	*	*	*
A-DATA	AX3U1600GC4G9 (XMP)	4GB	DS	-	-	-	1.55~1.75	*	*	*
A-DATA	AX3U1600PC4G8 (XMP)	4GB	DS	-	-	8-8-8-24	1.55~1.75	*	*	*
CORSAIR	CMZ8GX3M4X1600C9 (Ver2.12)(XMP)	8GB (4x2GB)	SS	-	-	9-9-9-24	1.5	*	*	*
CORSAIR	HX3X12G1600C9 (XMP)	12GB (6x2GB)	DS	-	-	9-9-9-24	1.6	*	*	*
CORSAIR	CML16GX3M4X1600C8 (Ver 2.12)(XMP)	16GB (4x4GB)	DS	-	-	Heat-Sink Package	1.5	*		
CORSAIR	CMZ16GX3M4A1600C9 (XMP)	16GB (4x4GB)	DS	-	-	9-9-9-24	1.5	*	*	*
CORSAIR	CMZ32GX3M4X1600C10 (Ver2.2)(XMP)	32GB (4x8GB)	DS	-	-	10-10- 10-27	1.5	*	*	*
CORSAIR	CMG4GX3M2A1600C6	4GB (2x2GB)	DS	-	-	6-6-6-18	1.65	*	*	*
CORSAIR	CMP6GX3M3A1600C8 (XMP)	6GB (3x2GB)	DS	-	-	8-8-8-24	1.65	*	*	*
CORSAIR	CMP6GX3M3A1600C8 (XMP)	6GB (3x2GB)	DS	-	-	8-8-8-24	1.65	*	*	*
CORSAIR	CMX6GX3M3C1600C7 (XMP)	6GB (3x2GB)	DS	-	-	7-8-7-20	1.65	*	*	*
CORSAIR	CMZ8GX3M2A1600C8 (XMP)	8GB (2x4GB)	DS	-	-	8-8-8-24	1.5	*	*	*
CORSAIR	CMZ8GX3M2A1600C9 (XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	1.5	*	*	*
Crucial	BL12864BN1608.8FF (XMP)	2GB(2x1GB)	SS	-	-	8-8-8-24	1.65	*	*	*
Crucial	BLT4G3D1608DT1TX0. 16FM(XMP)	4GB	DS	-	-	8-8-8-24	1.5	*	*	*
G.SKILL	F3-12800CL7Q-16GBXH (XMP)	16GB (4x4GB)	DS	-	-	7-8-7-24	1.6	*	*	*
G.SKILL	F3-12800CL9Q-16GBXL (XMP)	16GB (4x4GB)	DS	-	-	9-9-9-24	1.5	*	*	
G.Skill	F3-12800CL9Q-16GBZL (XMP)	16GB (4x4GB)	DS	-	-	9-9-9-24	1.5	*	*	*
G.SKILL	F3-12800CL7D-8GBRH (XMP)	8GB (2x4GB)	DS	-	-	7-8-7-24	1.6	*	*	*
G.SKILL	F3-12800CL9D-8GBRL (XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	1.5	*	*	*

(continued on the next page)

DDR3 1600 MHZ Capability

Vendors	Part No.	Size	SS/DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
G.SKILL	F3-12800CL9D-8GBSR 2(XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	1.25	*	*	
G.SKILL	F3-12800CL8D-8GBECO (XMP)	8GB (2x4B)	DS	-	-	8-8-8-24	1.35	*	*	*
GEIL	GET316GB1600C9QC (XMP)	16GB (4x4GB)	DS	-	-	9-9-9-28	1.6		*	*
GEIL	GUP34GB1600C7DC (XMP)	4GB (2x2GB)	DS	-	-	7-7-7-24	1.6	*	*	
KINGMAX	FLGE85F-C8KL9A (XMP)	2GB	SS	KINGMAX	N/A	9-9-9-28	-	*	*	*
KINGMAX	FLGF65F-C8KL9A(XMP)	4GB	DS	KINGMAX	N/A	9-9-9-28	-	*	*	*
KINGSTON	KHX1600C9D3K3/12GX (XMP)	12GB (3x4GB)	DS	-	-	9	1.65	*	*	
KINGSTON	KHX1600C9D3T1BK3/12GX (XMP)	12GB (3x4GB)	DS	-	-	9	1.65	*	*	*
KINGSTON	KHX1600C9D3K3/12GX(XMP)	12GB(3x 4GB)	DS	-	-	-	1.65	*	*	*
KINGSTON	KHX1600C9D3K6/24GX(XMP)	24GB (6x4GB)	DS	-	-	9	1.65	*	*	*
Kingston	KHX1600C9D3K8/32GX(XMP)	32GB (8x4GB)	DS	-	-	9-9-9-27	1.65	*	*	*
KINGSTON	KHX1600C9D3K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	-	1.65	*	*	*
KINGSTON	KHX1600C9D3LK2/4GX(XMP)	4GB (2x2GB)	DS	-	-	-	1.35	*	*	*
KINGSTON	KHX1600C9D3X2K2/4GX(XMP)	4GB (2x2GB)	DS	-	-	9	1.65	*	*	*
KINGSTON	KHX1600C9D3K3/6GX(XMP)	6GB (3x2GB)	DS	-	-	9	1.65	*	*	*
KINGSTON	KHX1600C9D3K3/6GX(XMP)	6GB (3x2GB)	DS	-	-	9	1.65	*	*	*
KINGSTON	KHX1600C9D3T1K3/6GX(XMP)	6GB (3x2GB)	DS	-	-	9	1.65	*	*	*
KINGSTON	KHX1600C9D3P1K2/8G	8GB (2x4GB)	DS	-	-	9	1.5	*	*	*
OCZ	OCZ3BE1600C8LV4GK	4GB(2x2GB)	DS	-	-	8-8-8	1.65	*	*	
Transcend	TS256MLK64V6N	2GB	SS	Transcend	K4B2G 0846C	-	-	*	*	*
Transcend	TS512MLK64V6N	4GB	DS	Transcend	K4B2G 0846C	-	-	*	*	*
Transcend	JM1600KLN-8GK	8GB (2x4GB)	DS	Transcend	TK483 PCW3	-	-	*	*	*
Asint	SLZ3128M8-EJ1D(XMP)	2GB	DS	Asint	3128M 8-GJ1D	-	-	*	*	*
Asint	SLA302G08-EGG1C(XMP)	4GB	DS	Asint	302G0 8-GG1C	9-9-9-27	-	*	*	*

(continued on the next page)

DDR3 1600 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
Asint	SLA302G08-EGG1C (XMP)	4GB	DS	Asint	302G08-GG1C	9-9-9-27	-	•	•	•
Asint	SLA302G08-EGJ1C (XMP)	4GB	DS	Asint	302G08-GJ1C	9-9-9-27	-	•	•	•
ATP	AQ12M64B8BKK0S	4GB	DS	SAMSUNG	K4B2G08460	-	NO	•	•	•
EK Memory	EKM324L28BP8-I16 (XMP)	4GB(2x2GB)	DS	-	-	9	-	•	•	
EK Memory	EKM324L28BP8-I16 (XMP)	4GB(2x2GB)	DS	-	-	9	-	•	•	•
Elixir	M2X2F64CB88G7N-DG(XMP)	2GB	SS	Elixir	N2CB2G80GN-DG	9-9-9-28	-	•	•	•
Elixir	M2X4G64CB8HG5N-DG(XMP)	4GB	DS	Elixir	N2CB2G80GN-DG	9-9-9-28	-	•	•	•
GoodRam	GR1600D364L9/2G	2GB	DS	GoodRam	GF1008K C-JN	-	-	•	•	•
KINGTIGER	KTG2G1600PG3 (XMP)	2GB	DS	-	-	-	-	•	•	•
Mushkin	996805(XMP)	4GB (2x2GB)	DS	-	-	6-8-6-24	1.65	•	•	•
Mushkin	998805(XMP)	6GB (3x2GB)	DS	-	-	6-8-6-24	1.65	•	•	•
Patriot	AE32G1609U1-U	2GB	SS	AMD	23EY4587MB6H	-	1.5	•	•	•
Patriot	PX7312G1600LLK (XMP)	12GB (3x4GB)	DS	-	-	8-9-8-24	1.65	•	•	•
Patriot	PGS34G1600LLKA2	4GB (2x2GB)	DS	-	-	8-8-8-24	1.7	•	•	•
Patriot	PGS34G1600LLKA	4GB(2x2GB)	DS	-	-	7-7-7-20	1.7	•	•	•
Patriot	AE34G1609U2-U	4GB	DS	AMD	23EY4587MB6H	-	1.5	•	•	•
Patriot	PGD38G1600ELK (XMP)	8GB (2x4GB)	DS	-	-	9-9-9-24	1.65	•	•	•
Patriot	PVV38G1600LLK(XMP)	8GB (2x4GB)	DS	-	-	8-9-8-24	1.65	•	•	•
SanMax	SMD-4G68HP-16KZ	4GB	DS	Hynix	H5TQ2G83BFRPBC	-	1.5	•	•	•
SanMax	SMD-4G68NG-16KK	4GB	DS	ELPIDA	J2108BDB G-GN-F	-	-	•	•	•
Silicon Power	SP002GBLTU160V02 (XMP)	2GB	SS	S-POWER	20YT5NG	9-11-11-28	1.5	•	•	•
Silicon Power	SP004GBLTU160V02 (XMP)	4GB	DS	S-POWER	20YT5NG	9-9-9-24	1.5	•	•	•
Team	TXD31024M1600C8-D (XMP)	1GB	SS	Team	T3D1288R T-16	8-8-8-24	1.65	•	•	•

(continued on the next page)

DDR3 1600 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)		
								1	2	4
Team	TXD32048M1600C7-L (XMP)	2GB	DS	Team	T3D1288L T-16	7-7-7- 24	1.65	•	•	
Team	TXD32048M1600HC 8-D(XMP)	2GB	DS	Team	T3D1288R T-16	8-8-8- 24	1.65	•	•	•
Team	TED34096M1600HC 11	4GB	DS	Team	T3D2568E T-16	-	-	•	•	•
Team	TXD34096M1600HC 9-D (XMP)	4GB	DS	Hynix	H5TC2G8 3BFRH9A	9-9-9- 24	1.5	•	•	•

DDR 1333 MHz capability

Vendors	Part No.	Size	SS/ DS	Chip Brand	Chip NO.	Timing	Voltage	DIMM socket support (Optional)	
								2	4
A-DATA	AM2U139C2P1	2GB	SS	A-DATA	3CCD-15 09A	-	-	•	•
A-DATA	AM2U139C4P2	4GB	DS	A-DATA	3CCD-15 09A	-	-		•
G.SKILL	F3-10666CL8D- 4GBHK(XMP)	4GB (2x2GB)	DS	-	-	8-8-8- 21	1.5		•
G.SKILL	F3-10666CL7D- 8GBRH(XMP)	8GB (2x4GB)	DS	-	-	7-7-7- 21	1.5	•	•
KINGMAX	FLFD45F-B8KL9	1GB	SS	KINGMAX	KFB8FNL XF-BNF-15A	-	-	•	•
KINGSTON	KVR1333D3N9/ 2G	2GB	DS	Elpida	J1108BDB G-DJ-F	-	1.5	•	•
MICRON	MT16JTF1G64A Z-1G4D1	8GB	DS	MICRON	D9PCP	-	-	•	•
SAMSUNG	M378B5773DH0- CH9	2GB	SS	SAMSUNG	K4B2G08 460	-	-	•	•
SAMSUNG	M378B5273DH0- CH9	4GB	DS	SAMSUNG	K4B2G08 460	-	-	•	
Elixir	M2F2G64CB88G 7N-CG	2GB	SS	Elixir	N2CB2G8 0GN-CG	-	-	•	
Elixir	M2F4G64CB8HD 5N-CG	4GB	DS	Elixir	M2CB2G8 BDN-CG	-	-	•	•



Side(s): SS - Single-sided DS - Double-sided DIMM support:

- (1) Supports one (1) module inserted into any slot as Single-channel memory configuration. We suggest that you install the module into A2 slot.
 - (2) Supports two (2) modules inserted into either the red slots or the black slots as one pair of Dual-channel memory configuration. We suggest that you install the modules into slots A2 and B2 for better compatibility.
 - (4) Supports four (4) modules inserted into both the red and black slots as two pairs of Dual-channel memory configuration.
-

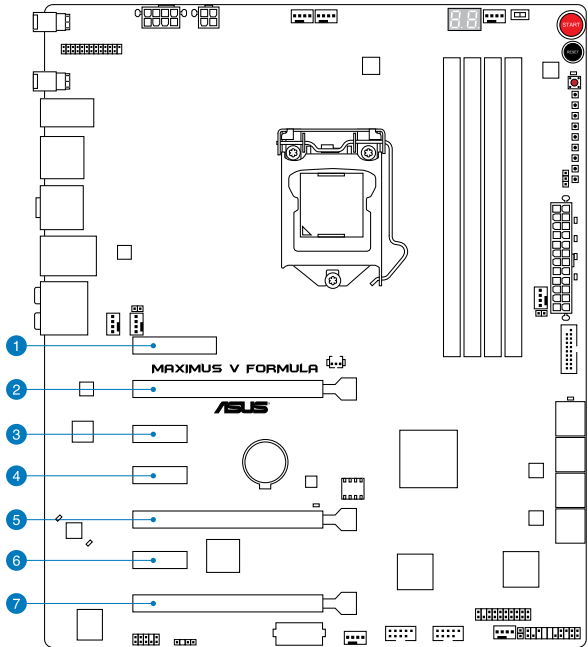


- ASUS exclusively provides hyper DIMM support function.
 - Hyper DIMM support is subject to the physical characteristics of individual CPUs. Load the X.M.P. or D.O.C.P. settings in the BIOS for the hyper DIMM support.
 - Visit the ASUS website for the latest QVL.
-

1.2.5 Expansion slots



Unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.



Slot No.	Slot Description
----------	------------------

1	PCIe 2.0 x4_1 slot
2	PCIe 3.0/2.0 x16/x8_1 slot
3	PCIe 2.0 x1_1 slot
4	PCIe 2.0 x1_2 slot
5	PCIe 3.0/2.0 x8/x4_2 slot
6	PCIe 2.0 x1_3 slot
7	PCIe 2.0 x4/x1_3 slot

VGA Configuration	PCIe Express 3.0 operating mode		
	PCIe_x16/x8_1	PCIe_x8/x4_2	PCIe_x4/x1_3
Configuration 1	x 16 at Max. GEN3 (single VGA recommended)	Empty	x1 at Max. GEN2 (Normal applications recommended)
Configuration 2	x8 at Max. GEN3 (SLI/CFX recommended)	x8 at Max. GEN3 (SLI/CFX recommended)	x1 at Max. GEN2 (Normal applications recommended)
Configuration 3	x8 at Max. GEN3 (3-WAY CFX recommended)	x4 at Max. GEN3 (3-WAY CFX recommended)	x4 at Max. GEN3 (3-WAY CFX recommended)



- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode.
- Connect a chassis fan to the motherboard connector labeled CHA_FAN1-4 when using multiple graphics cards for better thermal environment.
- Intel® 3rd generation Core™ processors support PCIe 3.0 speed rate.



- Intel® 3rd generation Ivy Bridge Core™ processors support x8/x4/x4 mode.
- PCIe_x16/x8_1 slot switches to x8 mode when PCIe_x8/x4_2 slot is occupied.
- PCIe_x8/x4_2 slot switches to x4 mode when PCIe_x4/x1_4 slot is loaded with x8 or x16 expansion cards.

IRQ assignments for this motherboard

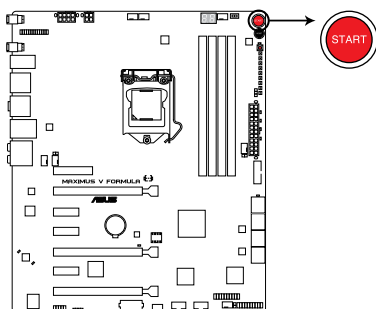
	A	B	C	D	E	F	G	H
PCIe_x16/x8_1	shared	–	–	–	–	–	–	–
PCIe_x8/x4_2	–	shared	–	–	–	–	–	–
PCIe_x4/x1_3		–	shared	–	–	–	–	–
PCIe_x4_1	shared	–	–	–	–	–	–	–
I.G.F.X.	shared	–	–	–	–	–	–	–
Intel LAN Controller	–	shared	–	–	–	–	–	–
SATA #0	–	shared	–	–	–	–	–	–
SATA #1	–	shared	–	–	–	–	–	–
High Definition Audio	–	–	–	–	–	–	shared	–
EHCI# 0 (USB 2.0)	–		–	–	–	–	–	shared
EHCI# 1 (USB 2.0)	–	–	–	–	shared	–	–	–
XHCI (USB 3.0)	shared	–	–	–	–	–	–	–
Asmedia USB 3.0 Controller	shared	–	–	–	–	–	–	–
ASM1061 Storage Controller #0	shared	–	–	–	–	–	–	–
ASM1061 Storage Controller #1	shared	–	–	–	–	–	–	–

1.2.6 Onboard buttons and switches

Onboard switches and buttons allow you to fine-tune performance when working on a bare or open-case system. This is ideal for overclockers and gamers who continually change settings to enhance system performance.

1. Power-on button

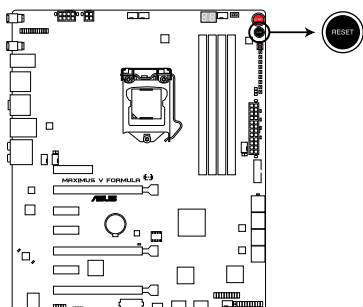
The motherboard comes with a power-on button that allows you to power up or wake up the system. The button also lights up when the system is plugged to a power source indicating that you should shut down the system and unplug the power cable before removing or installing any motherboard component.



MAXIMUS V FORMULA Power on button

2. Reset button

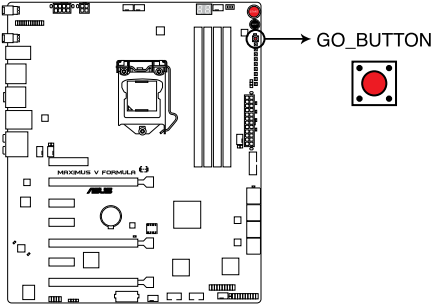
Press the reset button to reboot the system.



MAXIMUS V FORMULA Reset button

3. GO button

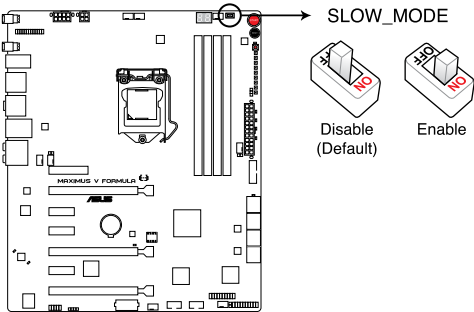
Press the GO button before POST to enable MemOK! or press it to quickly load the preset profile (GO_Button file) for temporary overclocking when in OS.



MAXIMUS V FORMULA GO_BUTTON

4. Slow Mode switch

Slow Mode switch allows your system to provide better overclocking margins when using the -10°C cooling system. When enabled, the Slow Mode switch prevents the system from crashing, slows down the CPU, and the system's tuner will make the adjustments.



MAXIMUS V FORMULA Slow Mode Switch

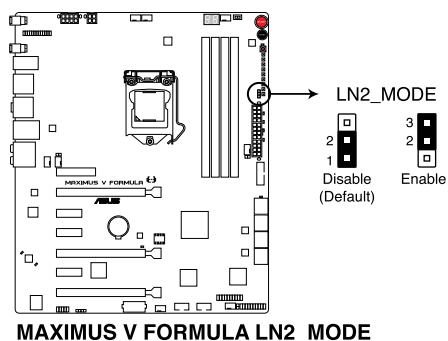


Ensure to set the LN2 Mode jumper to [Enable] before using the Slow Mode Switch.

1.2.7 Jumpers

1. LN2 Mode Jumper (3-pin LN2)

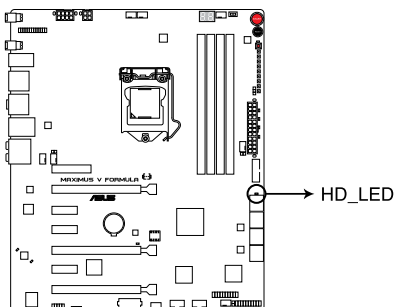
When enabled, the LN2 Mode jumper allows your system to eliminate the cold bugs in the processor during POST. It allows the processor to run at an extremely low temperature and helps the system boot fast.



1.2.8 Onboard LEDs

1. Hard Disk LED

The hard disk LED is designed to indicate the hard disk activity. It blinks when data is being written into or read from the hard disk drive. The LED does not light up when there is no hard disk drive connected to the motherboard or when the hard disk drive does not function.

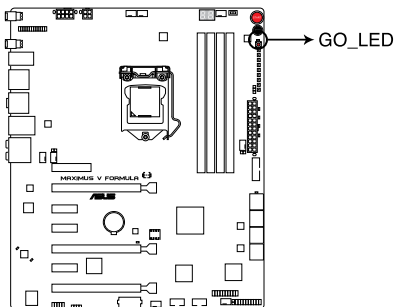


MAXIMUS V FORMULA Hard Disk LED

2. GO LED

Blinking: Indicates that MemOK! is enabled before POST.

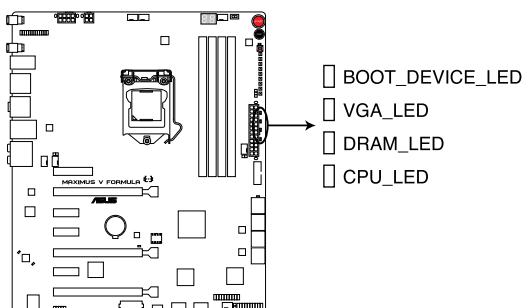
Lighting: Indicates that the system loads the preset profile (GO_Button file) for temporary overclocking when in OS.



MAXIMUS V FORMULA GO_LED

3. Q LED

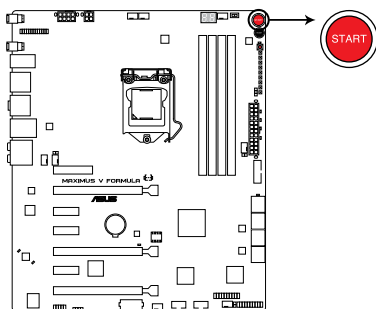
Q LEDs check key components (CPU, DRAM, VGA card, and booting devices) in sequence during motherboard booting process. If an error is found, the corresponding LED will continue lighting until the problem is solved. This user-friendly design provides an intuitive way to locate the root problem within seconds.



**MAXIMUS V FORMULA CPU/ DRAM/
VGA/ BOOT DEVICE LED**

4. Power LED

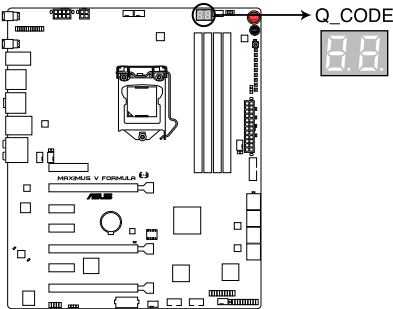
The motherboard comes with a power-on button that lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard power-on button.



MAXIMUS V FORMULA Power on button

4. **Q-Code LEDs**

The Q-Code LED design provides you with a 2-digit error code that displays the system status. Refer to the Q-Code table on the next page for details.



MAXIMUS V FORMULA Q_Code LED

Q-Code table

Code	Description
00	Not used
01	Power on. Reset type detection (soft/hard).
02	AP initialization before microcode loading
03	System Agent initialization before microcode loading
04	PCH initialization before microcode loading
06	Microcode loading
07	AP initialization after microcode loading
08	System Agent initialization after microcode loading
09	PCH initialization after microcode loading
0B	Cache initialization
0C – 0D	Reserved for future AMI SEC error codes
0E	Microcode not found
0F	Microcode not loaded
10	PEI Core is started

(continued on the next page)

Q-Code table

Code	Description
11 – 14	Pre-memory CPU initialization is started
15 – 18	Pre-memory System Agent initialization is started
19 – 1C	Pre-memory PCH initialization is started
2B – 2F	Memory initialization
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32 – 36	CPU post-memory initialization
37 – 3A	Post-Memory System Agent initialization is started
3B – 3E	Post-Memory PCH initialization is started
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
54	Unspecified memory initialization error
55	Memory not installed
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
00	Not used
01	Power on. Reset type detection (soft/hard).
02	AP initialization before microcode loading
03	System Agent initialization before microcode loading
04	PCH initialization before microcode loading
06	Microcode loading
07	AP initialization after microcode loading
08	System Agent initialization after microcode loading
09	PCH initialization after microcode loading
0B	Cache initialization
0C – 0D	Reserved for future AMI SEC error codes
0E	Microcode not found

(continued on the next page)

Code	Description
0F	Microcode not loaded
10	PEI Core is started
11 – 14	Pre-memory CPU initialization is started
15 – 18	Pre-memory System Agent initialization is started
19 – 1C	Pre-memory PCH initialization is started
2B – 2F	Memory initialization
30	Reserved for ASL (see ASL Status Codes section below)
31	Memory Installed
32 – 36	CPU post-memory initialization
37 – 3A	Post-Memory System Agent initialization is started
3B – 3E	Post-Memory PCH initialization is started
4F	DXE IPL is started
50 – 53	Memory initialization error. Invalid memory type or incompatible memory speed
54	Unspecified memory initialization error
55	Memory not installed
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 not available
5C – 5F	Reserved for future AML error codes
E0	S3 Resume is started (S3 Resume PPI is called by the DXE IPL)
E1	S3 Boot Script execution
E2	Video repost
E3	OS S3 wake vector call
E4 – E7	Reserved for future AML progress codes
E8	S3 Resume Failed
E9	S3 Resume PPI not Found

(continued on the next page)

Code	Description
EA	S3 Resume Boot Script Error
EB	S3 OS Wake Error
EC – EF	Reserved for future AML error codes
F0	Recovery condition triggered by firmware (Auto recovery)
F1	Recovery condition triggered by user (Forced recovery)
F2	Recovery process started
F3	Recovery firmware image is found
F4	Recovery firmware image is loaded
F5 – F7	Reserved for future AML progress codes
F8	Recovery PPI is not available
F9	Recovery capsule is not found
FA	Invalid recovery capsule
FB – FF	Reserved for future AML error codes
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
69	System Agent DXE initialization is started
6A	System Agent DXE SMM initialization is started
6B – 6F	System Agent DXE initialization (System Agent module specific)
70	PCH DXE initialization is started
71	PCH DXE SMM initialization is started
72	PCH devices initialization
73 – 77	PCH DXE Initialization (PCH module specific)
78	ACPI module initialization
79	CSM initialization
7A – 7F	Reserved for future AML DXE codes
90	Boot Device Selection (BDS) phase is started
91	Driver connecting is started

(continued on the next page)

Code	Description
92	PCI Bus initialization is started
93	PCI Bus Hot Plug Controller Initialization
94	PCI Bus Enumeration
95	PCI Bus Request Resources
96	PCI Bus Assign Resources
97	Console Output devices connect
98	Console input devices connect
99	Super IO Initialization
9A	USB initialization is started
9B	USB Reset
9C	USB Detect
9D	USB Enable
9E – 9F	Reserved for future AMI codes
A0	IDE initialization is started
A1	IDE Reset
A2	IDE Detect
A3	IDE Enable
A4	SCSI initialization is started
A5	SCSI Reset
A6	SCSI Detect
A7	SCSI Enable
A8	Setup Verifying Password
A9	Start of Setup
AA	Reserved for ASL (see ASL Status Codes section below)
AB	Setup Input Wait
AC	Reserved for ASL (see ASL Status Codes section below)
AD	Ready To Boot event
AE	Legacy Boot event
AF	Exit Boot Services event
B0	Runtime Set Virtual Address MAP Begin

(continued on the next page)

Code	Description
B1	Runtime Set Virtual Address MAP End
B2	Legacy Option ROM Initialization
B3	System Reset
B4	USB hot plug
B5	PCI bus hot plug
B6	Clean-up of NVRAM
B7	Configuration Reset (reset of NVRAM settings)
B8– BF	Reserved for future AML codes
D0	CPU initialization error
D1	System Agent initialization error
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
D6	No Console Output Devices are found
D7	No Console Input Devices are found
D8	Invalid password
D9	Error loading Boot Option (LoadImage returned error)
DA	Boot Option is failed (StartImage returned error)
DB	Flash update is failed
DC	Reset protocol is not available

ACPI/ASL Checkpoints

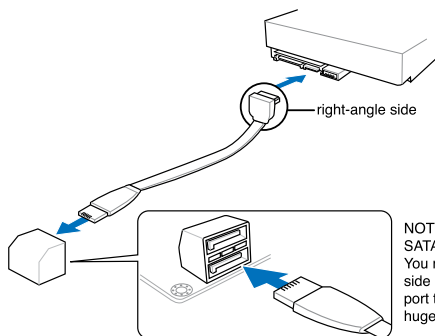
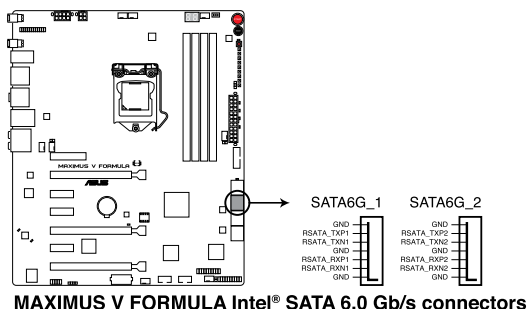
Code	Description
0x01	System is entering S1 sleep state
0x02	System is entering S2 sleep state
0x03	System is entering S3 sleep state
0x04	System is entering S4 sleep state
0x05	System is entering S5 sleep state
0x10	System is waking up from the S1 sleep state
0x20	System is waking up from the S2 sleep state
0x30	System is waking up from the S3 sleep state
0x40	System is waking up from the S4 sleep state
0xAC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
0xAA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

1.2.9 Internal connectors

1. Intel® Z77 Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1/2 [red])

These connectors connect to Serial ATA 6.0 Gb/s hard disk drives via Serial ATA 6.0 Gb/s signal cables.

If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® Z77 chipset.



NOTE: Connect the right-angle side of SATA signal cable to SATA device. You may also connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.

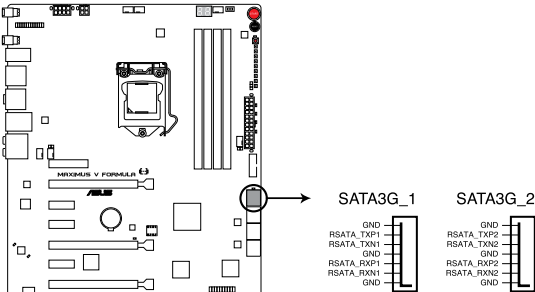


- These connectors are set to **[AHCI Mode]** by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to **[RAID Mode]**. Refer to section **3.5.3 SATA Configuration** for details.
- Before creating a RAID set, refer to section **5.1 RAID configurations** or the manual bundled in the motherboard support DVD.
- When using NCQ, set the SATA Mode in the BIOS to **[AHCI Mode]**. Refer to section **3.5.3 SATA Configuration** for details.
- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

2. **Intel® Z77 Serial ATA 3.0 Gb/s connectors (7-pin SATA3G_34/5 [black])**

These connectors connect to Serial ATA 3.0 Gb/s hard disk drives and optical disc drives via Serial ATA 3.0 Gb/s signal cables.

If you installed Serial ATA hard disk drives, you can create a RAID 0, 1, 5, and 10 configuration with the Intel® Rapid Storage Technology through the onboard Intel® Z77 chipset.



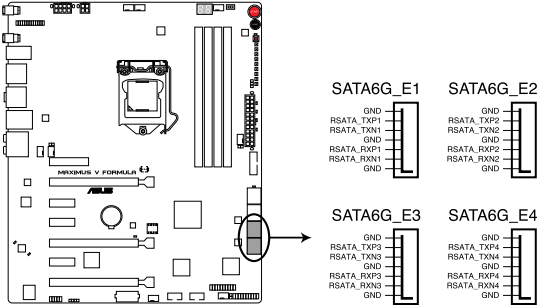
MAXIMUS V FORMULA Intel® SATA 3.0 Gb/s connectors



- These connectors are set to **[AHCI Mode]** by default. If you intend to create a Serial ATA RAID set using these connectors, set the SATA Mode item in the BIOS to **[RAID Mode]**. Refer to section **3.5.3 SATA Configuration** for details.
- Before creating a RAID set, refer to section **5.1 RAID configurations** or the manual bundled in the motherboard support DVD.
- When using NCQ, set the SATA Mode in the BIOS to **[AHCI Mode]**. Refer to section **3.5.3 SATA Configuration** for details.
- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.

3. **Asmedia® Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_E12/E34 [red])**

These connectors connect to Serial ATA 6.0 Gb/s hard disk drives via Serial ATA 6.0 Gb/s signal cables.



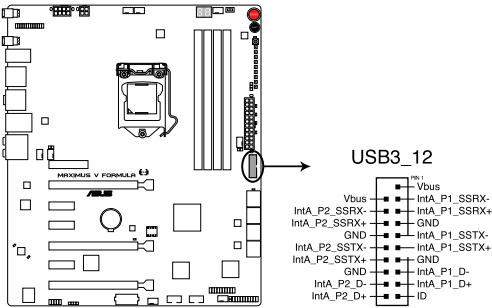
MAXIMUS V FORMULA Asmedia SATA 6.0 Gb/s connectors



You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives.

4. **USB 3.0 connector (20-1 pin USB3_12)**

This connector is for the additional USB 3.0 ports, and complies with the USB 3.0 specification that supports up to 480 MBps connection speed. If the USB 3.0 front panel cable is available from your system chassis, with this USB 3.0 connector, you can have a front panel USB 3.0 solution.



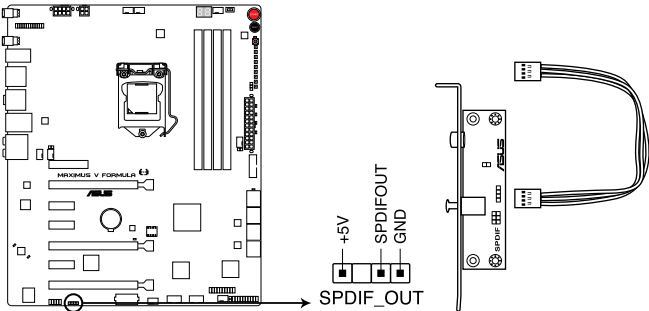
MAXIMUS V FORMULA USB3.0 connector



Due to Intel® limitations, USB3_12 connector ports run at USB 3.0 speed rate under Windows® 7 or later versions.

5. **Digital audio connector (4-1 pin SPDIF_OUT)**

This connector is for an additional Sony/Philips Digital Interface (S/PDIF) port. Connect the S/PDIF Out module cable to this connector, then install the module to a slot opening at the back of the system chassis.



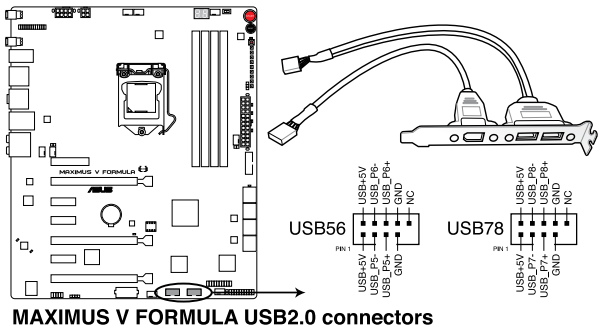
MAXIMUS V FORMULA Digital audio connector



The S/PDIF module is purchased separately.

6. **USB 2.0 connectors (10-1 pin USB56; USB78)**

These connectors are for USB 2.0 ports. Connect the USB module cable to any of these connectors, then install the module to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 48 MBps connection speed.



Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!



You can connect the front panel USB cable to the ASUS Q-Connector (USB, blue) first, and then install the Q-Connector (USB) to the USB connector onboard if your chassis supports front panel USB ports.

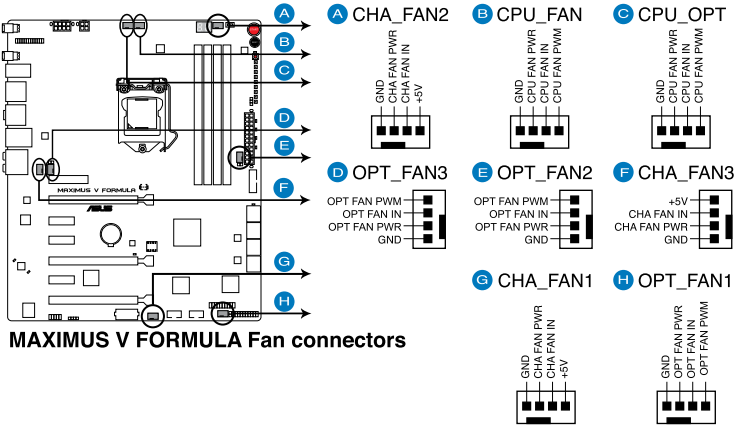


The USB 2.0 module is purchased separately.

7. CPU, chassis, and optional fan connectors

(4-pin CPU_FAN; 4-pin CPU_OPT; 4-pin CHA_FAN1-3; OPT_FAN1-3)

Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.



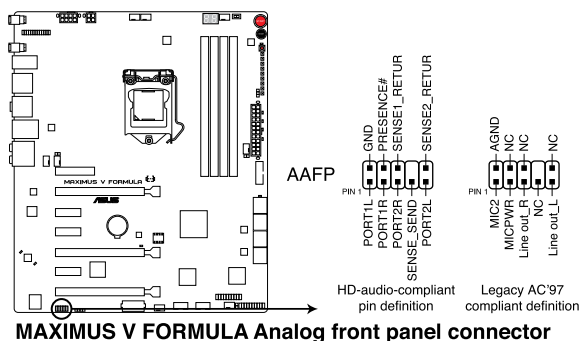
DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components. These are not jumpers! Do not place jumper caps on the fan connectors!



- The CPU_FAN connector supports the CPU fan of maximum 1A (12 W) fan power.
- If you install two VGA cards, we recommend that you plug the rear chassis fan cable to the motherboard connector labeled CHA_FAN1, CHA_FAN2, CHA_FAN3 for better thermal environment.

8. Front panel audio connector (10-1 pin AAFP)

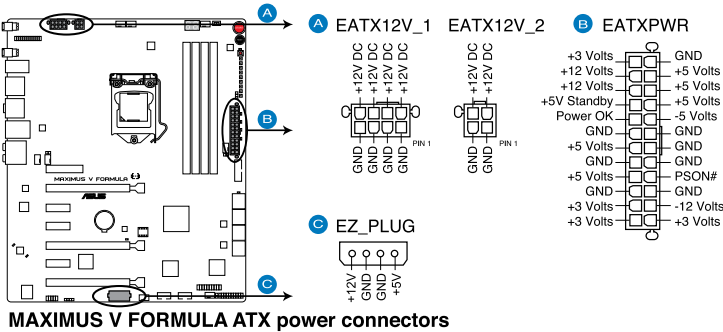
This connector is for a chassis-mounted front panel audio I/O module that supports either HD Audio or legacy AC'97 audio standard. Connect one end of the front panel audio I/O module cable to this connector.



- We recommend that you connect a high-definition front panel audio module to this connector to avail of the motherboard's high-definition audio capability.
- If you want to connect a high-definition or an AC'97 front panel audio module to this connector, set the Front Panel Type item in the BIOS setup to **[HD]** or **[AC97]**.

9. ATX power connectors (24-pin EATXPWR; 8-pin EATX12V; 4-pin EZ PLUG)

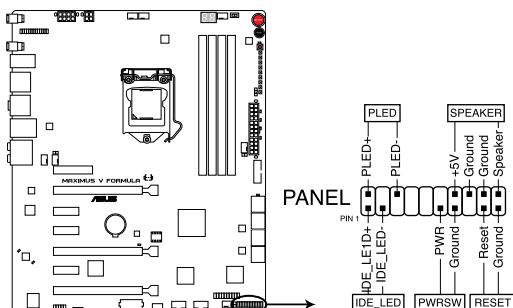
These connectors are for ATX power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Find the proper orientation and push down firmly until the connectors completely fit.



- For a fully configured system, we recommend that you use a power supply unit (PSU) that complies with ATX 12 V Specification 2.0 (or later version) and provides a minimum power of 350 W.
- Do not forget to connect the 4-pin/8-pin EATX12 V power plug. Otherwise, the system will not boot.
- We recommend that you use a PSU with a higher power output when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- If you want to use two or more high-end PCI Express x16 cards, use a PSU with 1000W power or above to ensure the system stability.
- If you are uncertain about the minimum power supply requirement for your system, refer to the Recommended Power Supply Wattage Calculator at <http://support.asus.com/PowerSupplyCalculator/PSCalculator.aspx?SLanguage=en-us> for details.

10. System panel connector (20-8 pin PANEL)

This connector supports several chassis-mounted functions.



MAXIMUS V FORMULA System panel connector

- **System power LED (2-pin PLED)**

This 2-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

- **Hard disk drive activity LED (2-pin IDE_LED)**

This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.

- **System warning speaker (4-pin SPEAKER)**

This 4-pin connector is for the chassis-mounted system warning speaker. The speaker allows you to hear system beeps and warnings.

- **ATX power button/soft-off button (2-pin PWRSW)**

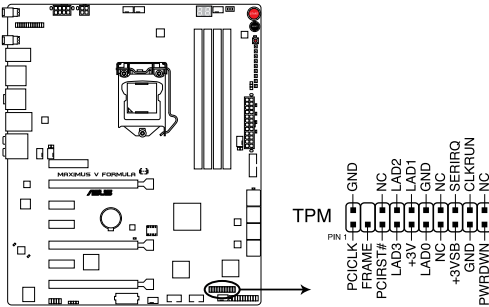
This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

- **Reset button (2-pin RESET)**

This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

11. TPM connector (20-pin TPM)

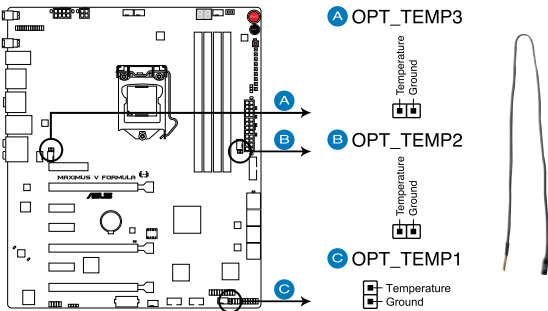
This connector supports a Trusted Platform Module (TPM) system, which securely store keys, digital certificates, passwords and data. A TPM system also helps enhance network security, protect digital identities, and ensures platform integrity.



MAXIMUS V FORMULA TPM connector

12. Thermal sensor cable connectors (2-pin OPT_TEMP1/2/3)

These connectors are for temperature monitoring. Connect the thermal sensor cables to these connectors and place the other ends to the devices which you want to monitor the temperature. The optional fan 1/2/3 can work with the temperature sensors for a better cooling effect.



MAXIMUS V FORMULA
Thermal sensor cable connectors



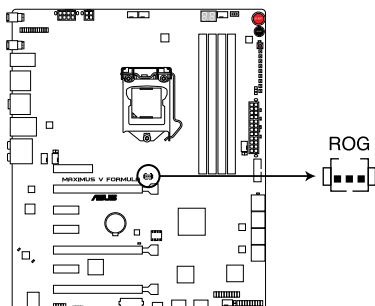
You must enable the **OPT FAN 1/2/3 overheat protection** in BIOS if you connect the thermal sensor cables to these connectors.



The thermal sensor cables are purchased separately.

13. ROG Logo LED connector (3-pin ROG)

This connector is for the box (labeled Republic of Gamers) on the heatpipe assembly. Connect the box's cable, and it lights up when you turn on the system.



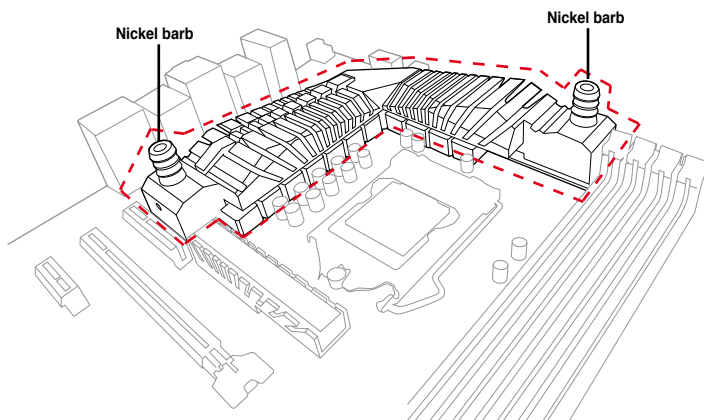
MAXIMUS V FORMULA ROG Logo LED connector

1.2.10 Fusion Thermo

Fusion Thermo is an exclusive ROG heatsink that provides air-cooling and water cooling elements, generating cooler ventilation for your motherboard.

Fusion Thermo contains 100% copper water channel with electro-plated nickel barbs for cooling purpose. It also has an integrated heatpipe wrapped in air-cooling fins that absorbs heat and helps dissipate it throughout the system.

With Fusion Thermo, you have a hybrid air and water cooling system for an optimal cooling performance.



- The Fusion Thermo's nickel barbs' outer diameter measure 3/8 inch (10mm). We recommend that you install a 3/8 inch ID tubing, and lock both ends with the bundled clamps that came with the water cooling kit.
- We recommend that you route the water cooling kit from the CPU water block to the Fusion Thermo zone.
- We recommend that you separate the VGA water cooling system and the CPU/VRM water cooling system for an optimal cooling result.
- Ensure to keep the chassis ventilation airflow in one direction.
- Refer to the technical documentation of your water cooling kit for assembly instructions.

Basic Installation

2

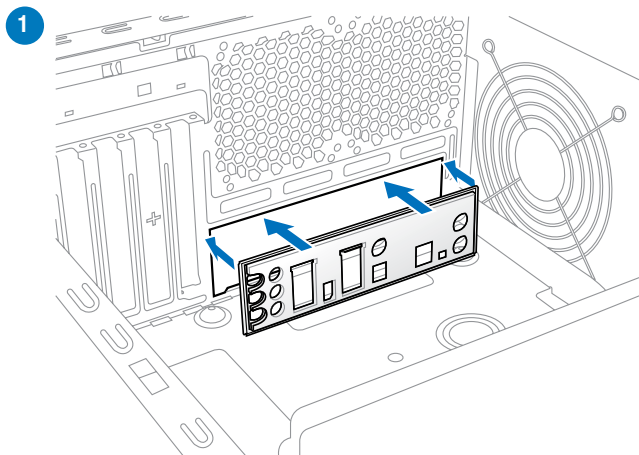
2.1 Building your PC system

2.1.1 Motherboard installation



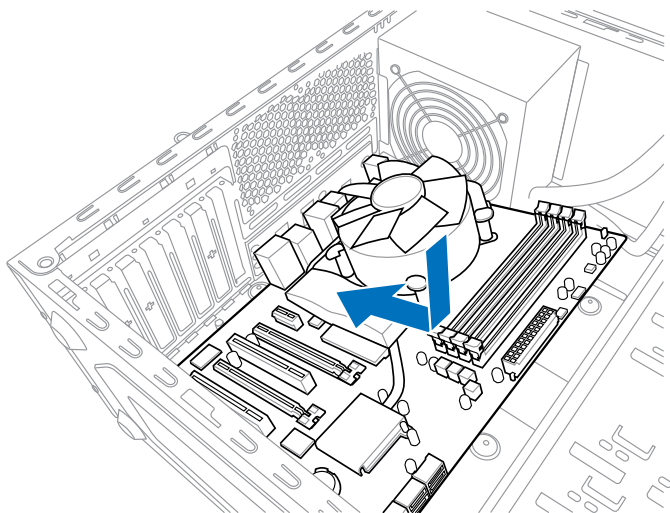
The diagrams in this section are for reference only. The motherboard layout may vary with models, but the installation steps are the same for all models.

1. Install the ASUS Q-Shield to the chassis rear I/O panel.

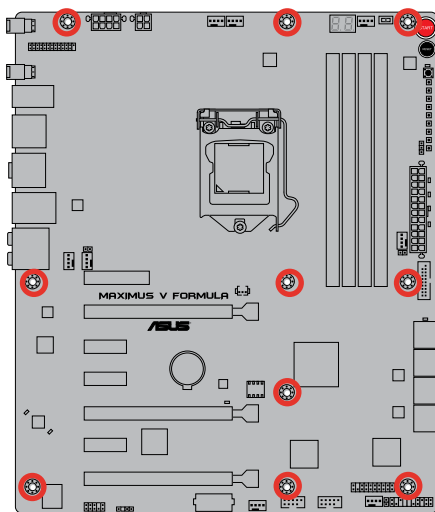
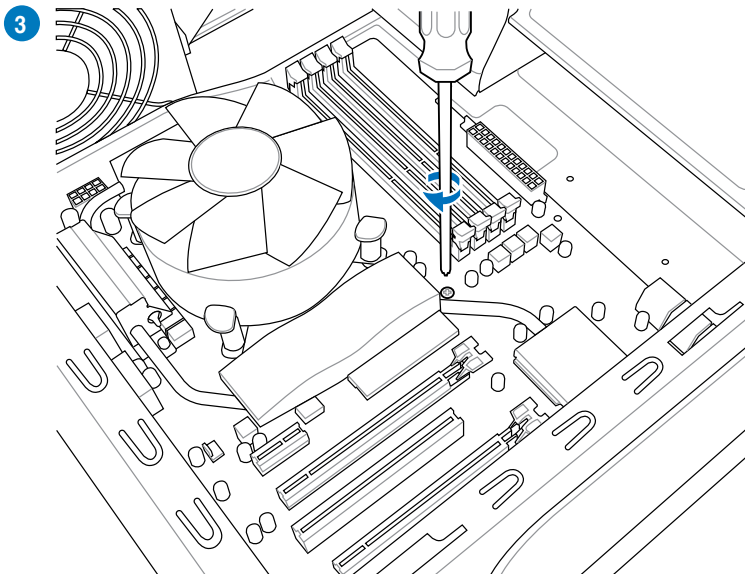


2. Place the motherboard into the chassis, ensuring that its rear I/O ports are aligned to the chassis' rear I/O panel.

2



3. Place ten screws into the holes indicated by circles to secure the motherboard to the chassis.

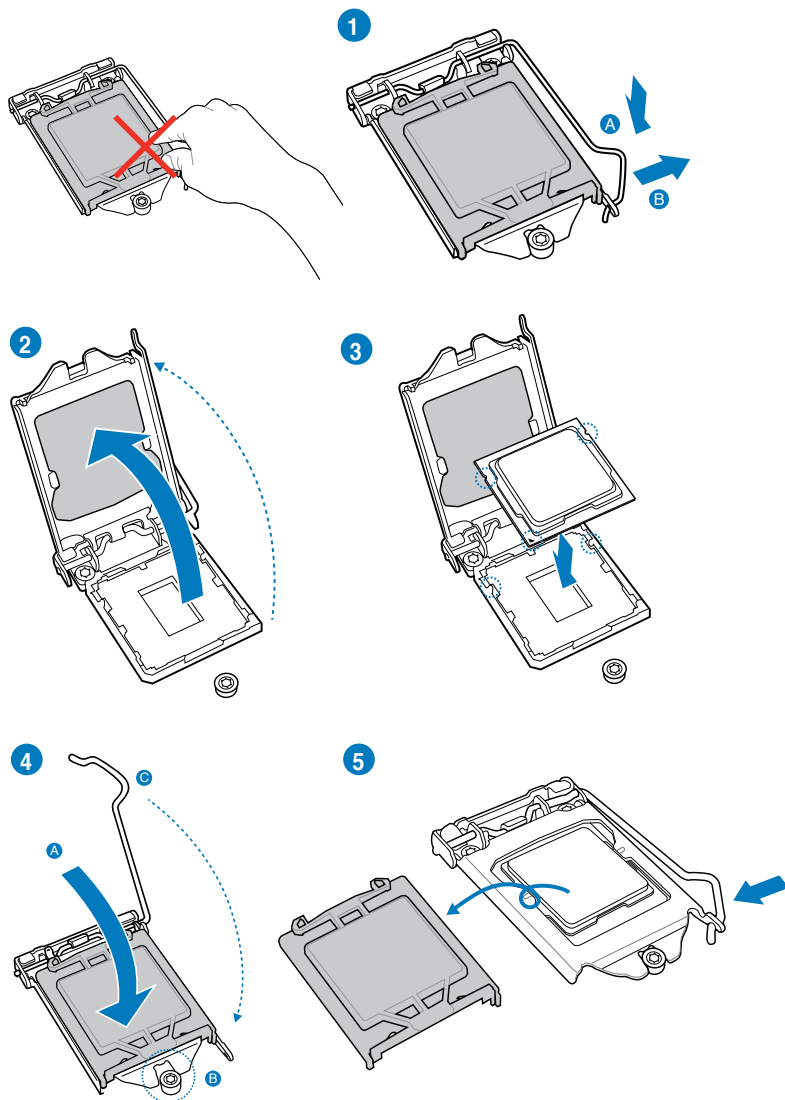


DO NOT overtighten the screws! Doing so can damage the motherboard.

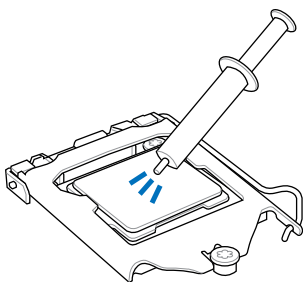
2.1.2 CPU installation



The LGA1156 CPU is not compatible with the LGA1155 socket. DO NOT install a LGA1156 CPU on the LGA1155 socket.

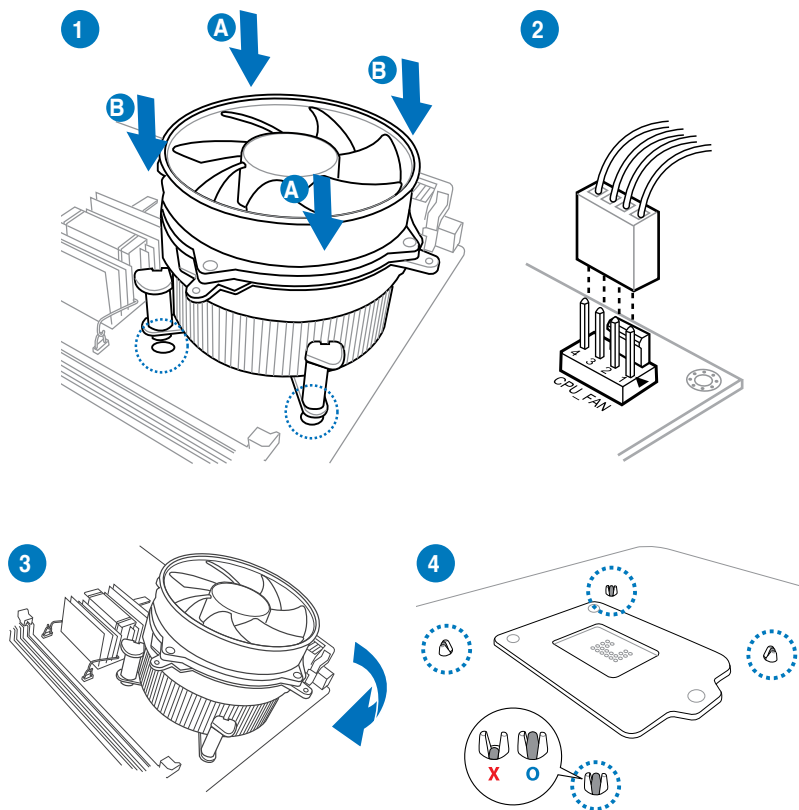


2.1.3 CPU heatsink and fan assembly installation

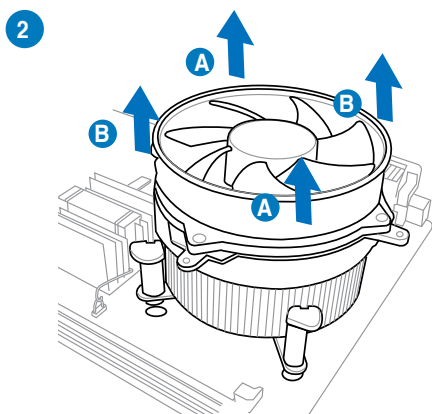
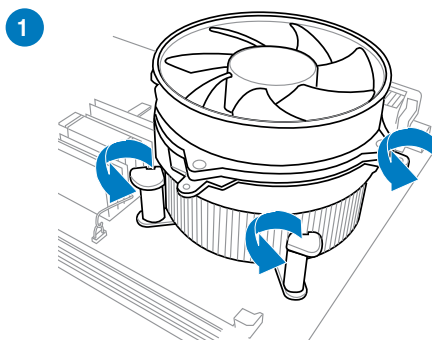


Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

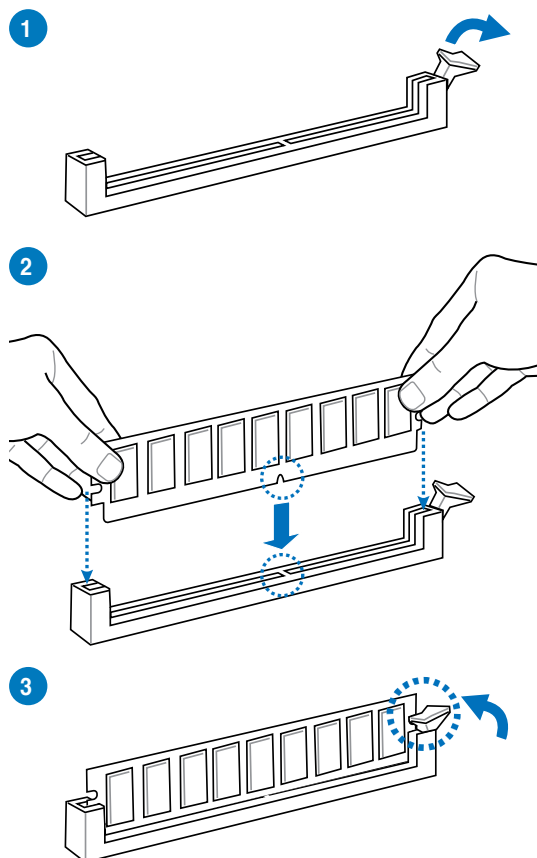
To install the CPU heatsink and fan assembly



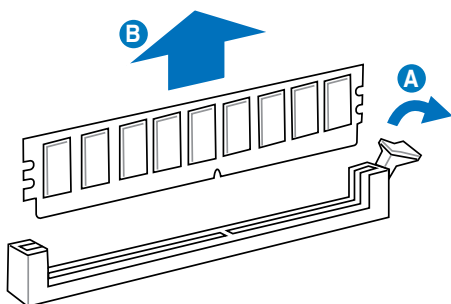
To uninstall the CPU heatsink and fan assembly



2.1.4 DIMM installation

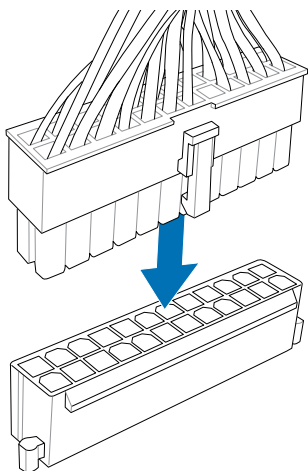


To remove a DIMM

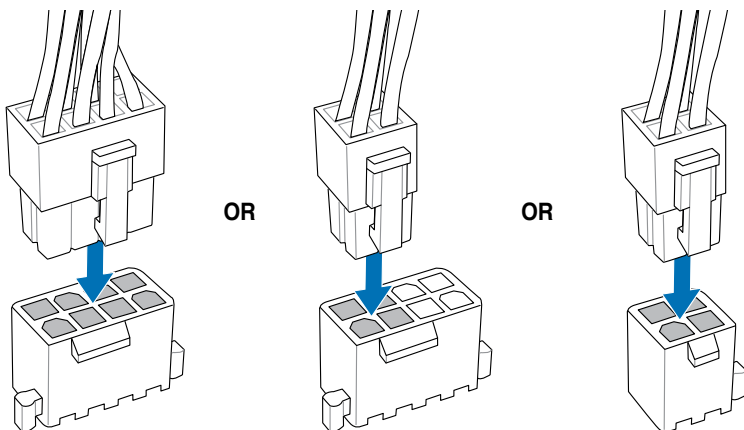


2.1.5 ATX Power connection

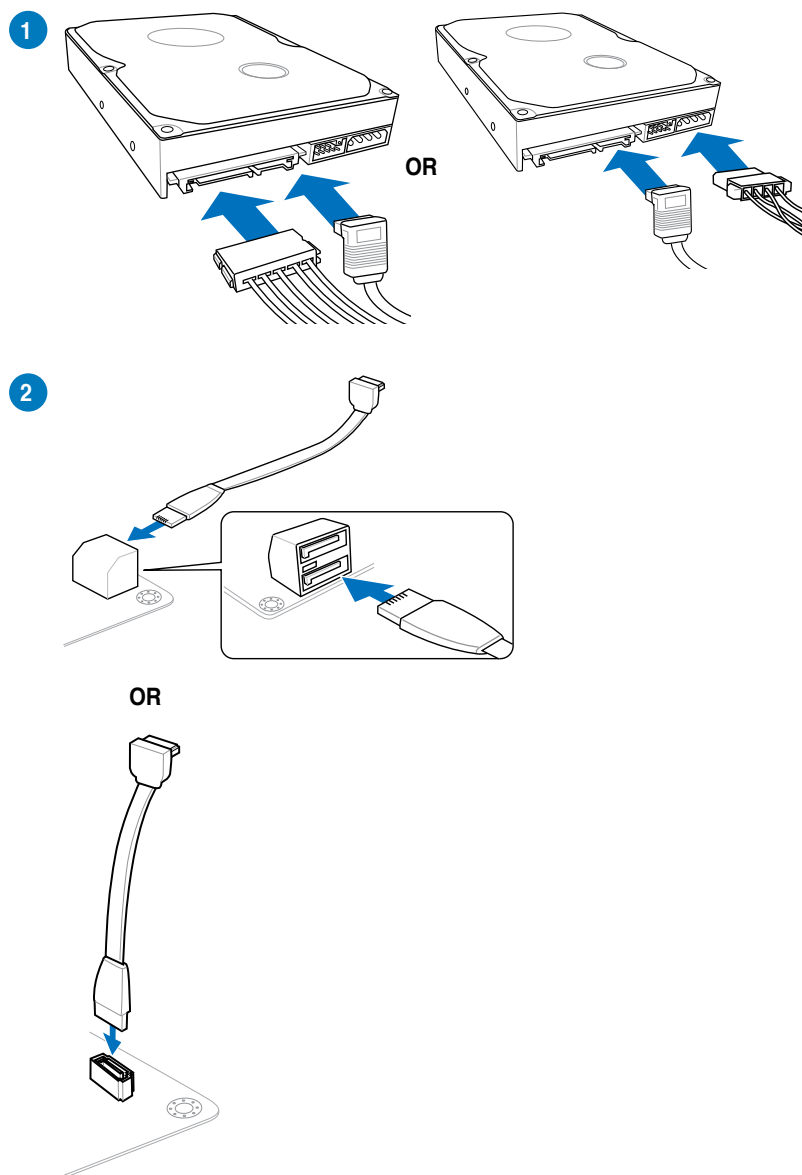
1



2

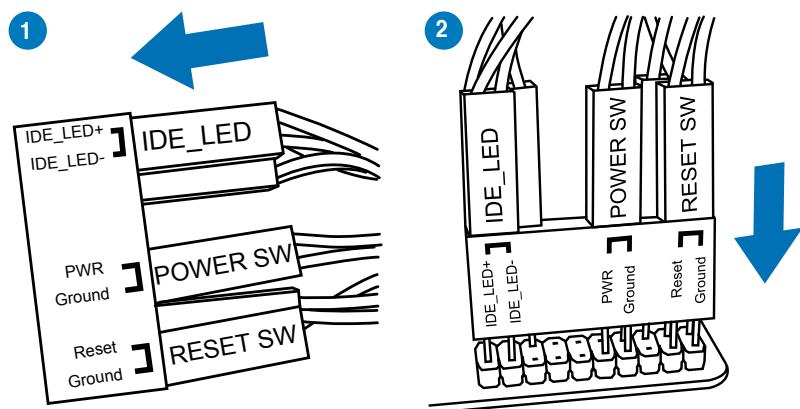


2.1.6 SATA device connection

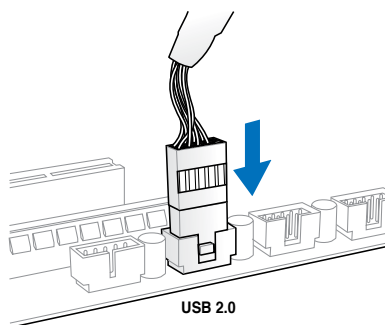


2.1.7 Front I/O Connector

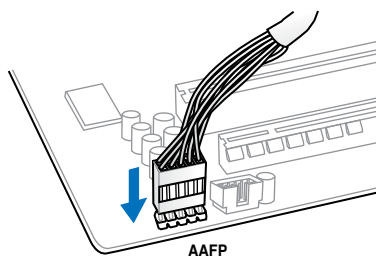
To install ASUS Q-Connector



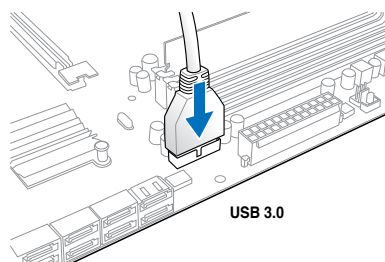
To install USB 2.0 connector



To install front panel audio connector

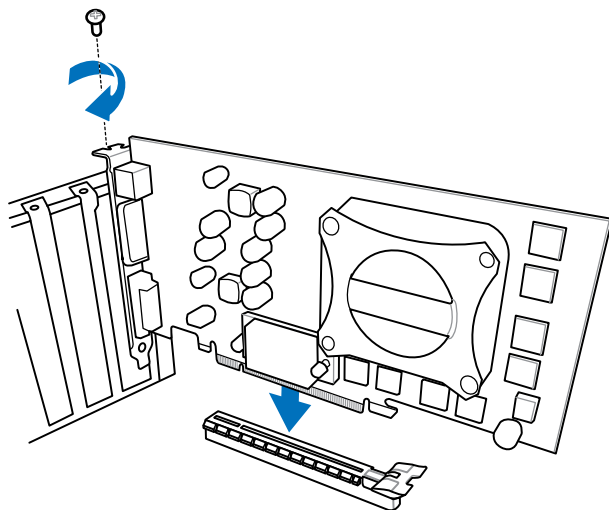


To install USB 3.0 connector

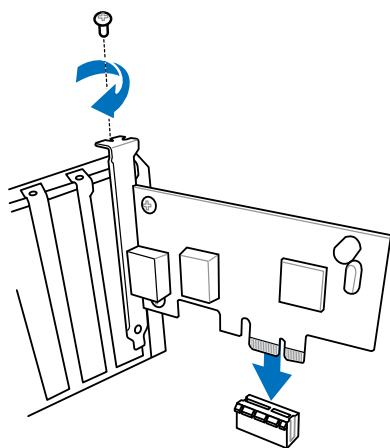


2.1.8 Expansion Card installation

To install PCIe x16 cards



To install PCIe x1 cards



2.1.9 mPCIe Combo installation

The mPCIe Combo is a mini card that allows you to add an mPCIe module and an mSATA module into your motherboard.

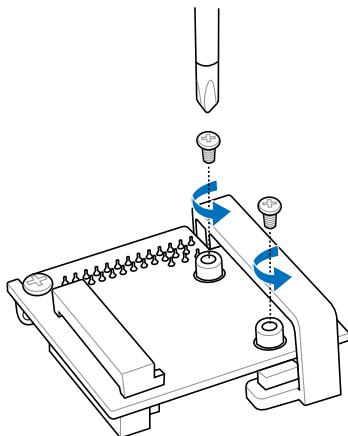


- The mPCIe Combo supports half-sized mPCIe modules (26.8mm x 30mm) only.
- The mPCIe Combo supports full-sized and half-sized mSATA modules. The suggested sizes are from 50.8mm x 30mm to 26.8mm x 30mm.
- The mPCIe and mSATA modules are purchased separately.
- The Wi-Fi module is already installed to the mPCIe Combo card, and will only be available in certain motherboard models.

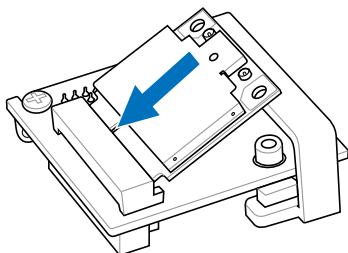
Installing the mPCIe Wi-Fi module

To install the mPCIe Wi-Fi module:

1. Remove both screws from the side of the MINI_PCIE slot.



2. Insert the mPCIe Wi-Fi module.

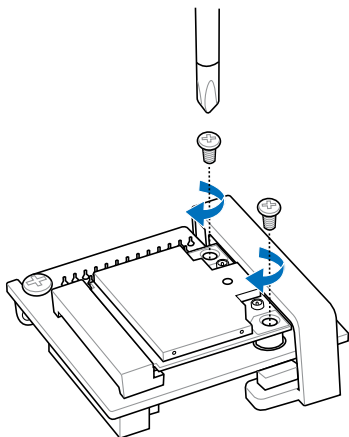


The mPCIe Wi-Fi module fits in one orientation only.

3. Press down the Wi-Fi module, and secure it in place by using the screws removed earlier.

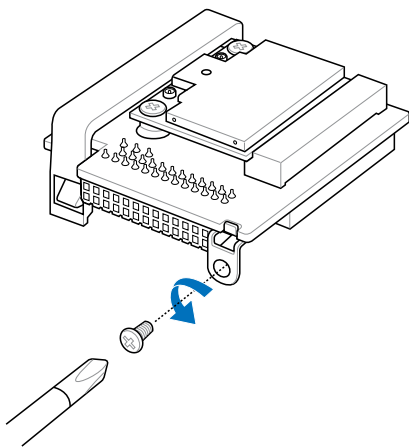


DO NOT overtighten the screws to prevent damage to the mPCIe Wi-Fi module or mPCIe Combo.

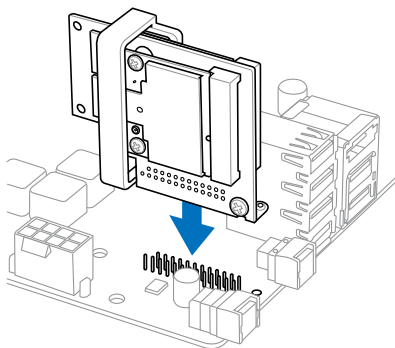


Be sure to install the Bluetooth driver before installing the Wi-Fi GO! software.

4. Remove the screw beside the 26-pin connector.

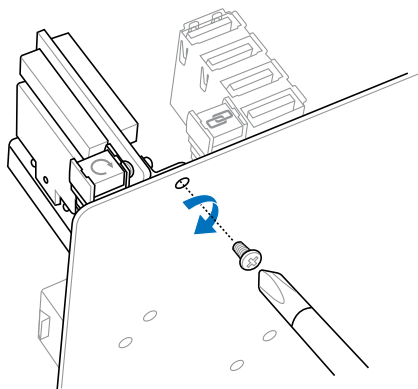


5. Locate the mPCIe_Combo connector on the motherboard. Align and insert the mPCIe Combo on the connector.



- The mPCIe Combo fits in one orientation only.
- Insert the mPCIe Combo with caution to prevent damage to the module, or the mPCIe_Combo connector pins, or the motherboard.

6. Secure the mPCIe Combo in place with the screws removed in step 4.



7. Remove the bolt from the Wi-Fi antenna connector. Leave the washer on the connector.
8. Insert the connector into the I/O shield's Wi-Fi port hole.

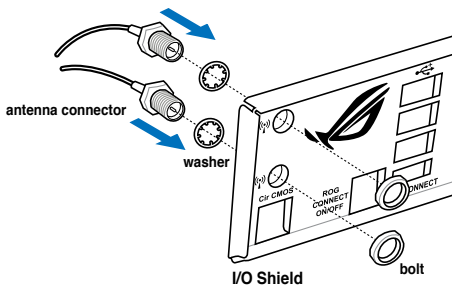


Ensure that the washer is placed between the connector and the back of the I/O shield.

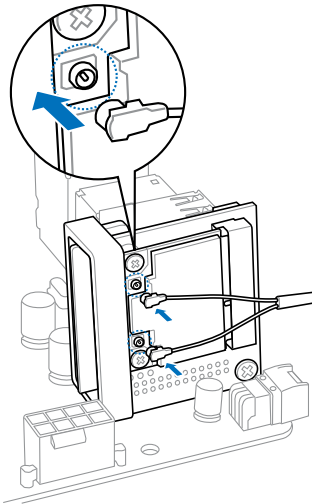


The Wi-Fi antenna and its cables are purchased separately.

9. Re-attach the bolt on the connector.



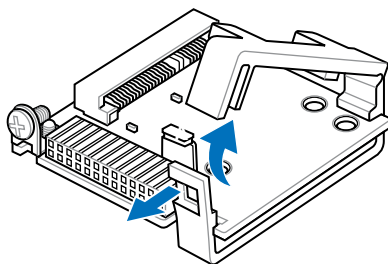
10. Connect the opposite end of the Wi-Fi antenna connector to the pins located on the mPCIe Wi-Fi card.



Installing the mSATA module

To install the mSATA module:

1. Unlock the mSATA clip.

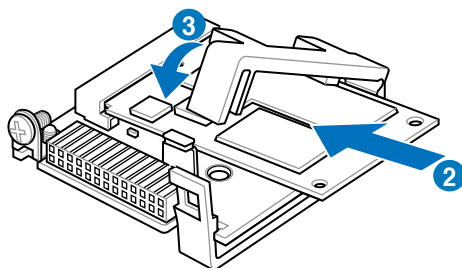


2. Insert the mSATA card into the MSATA slot.

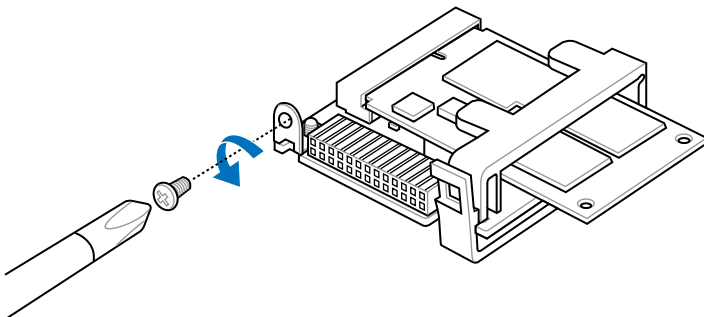


The mSATA card fits in one orientation only.

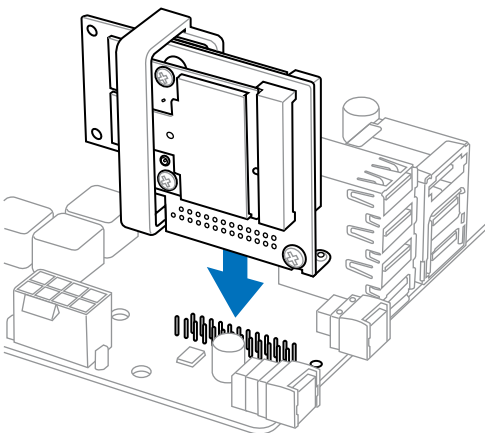
3. Lock the mSATA clip.



4. Remove the screw near the 26-pin connector.

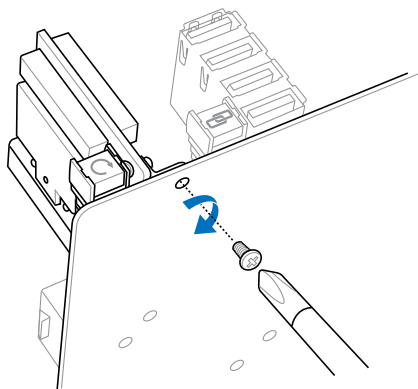


5. Locate the mPCIe_Combo connector on the motherboard. Align and insert the mPCIe Combo on the connector.



- The mPCIe Combo fits in one orientation only.
- Insert the mPCIe with caution to prevent damage to the module, or the mPCIe_Combo connector pins, or the motherboard.

6. Secure the mPCIe Combo in place with the screw removed in step 4.



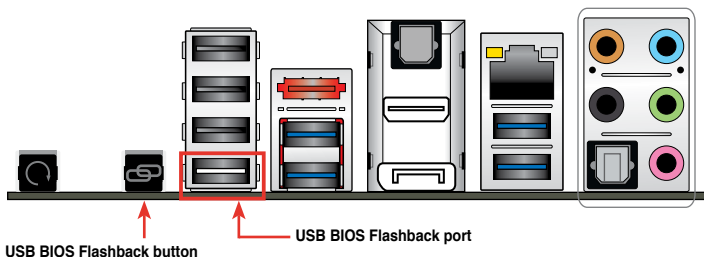
2.2 BIOS update utility

2.2.1 USB BIOS Flashback

USB BIOS Flashback allows you to easily update the BIOS without entering the existing BIOS or operating system. Simply insert a USB storage device to the USB port, press the USB BIOS Flashback button for three seconds, and the BIOS is updated automatically.

To use USB BIOS Flashback:

1. Download the latest BIOS file from the ASUS website
2. Extract and rename the BIOS image file to **M5F.CAP**.
3. Copy **M5F.CAP** to the root directory of the USB flash disk drive.
4. Turn off the system and insert the USB storage device to the ROG Connect port.
5. Press the ROG Connect button and release when a flashing light appears, which indicates that the BIOS Flashback function is enabled.
6. Wait until the light goes out, indicating that the BIOS updating process is completed.



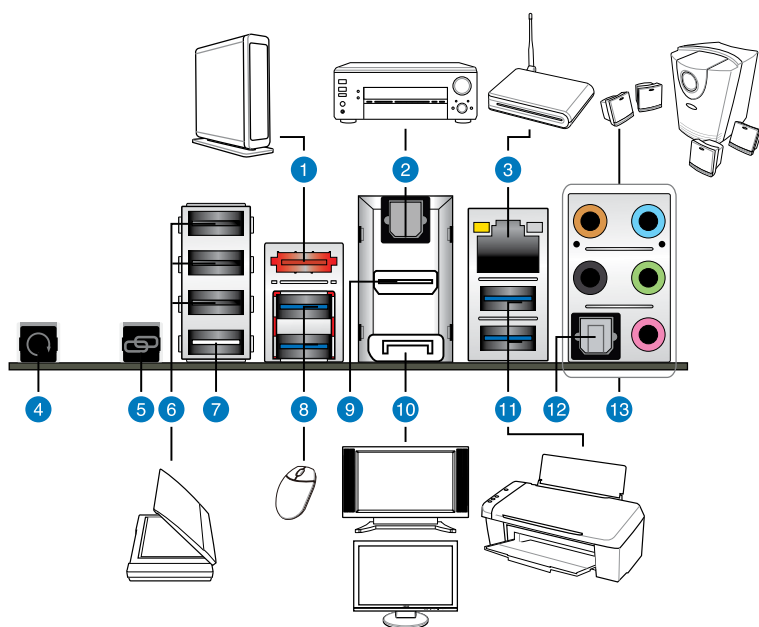
For more BIOS update utilities in BIOS setup, refer to the section **Updating BIOS** in Chapter 3.



- Do not unplug portable disk, power system, or press the CLR_CMOS button while BIOS update is ongoing, otherwise update will be interrupted. In case of interruption, please follow the steps again.
- Updating BIOS may have risks. If the BIOS program is damaged during the process and results to the system's failure to boot up, please contact your local ASUS Service Center.

2.3 Motherboard rear and audio connections

2.3.1 Rear I/O connection



Rear panel connectors

1. External SATA ports
2. Optical S/PDIF OUT port
3. LAN (RJ-45) port*
4. Clear CMOS button
5. ROG Connect button
6. USB 2.0 ports
7. USB 2.0 port, also ROG Connect port
8. ASMedia USB 3.0 ports, support ASUS USB 3.0 Boost UASP Mode
9. HDMI port
10. DisplayPort
11. Intel USB 3.0 ports, support ASUS USB 3.0 Boost Turbo Mode.
12. Optical S/PDIF IN port
13. Audio I/O ports**

* and **: Refer to the tables on the next page for LAN port LEDs, and audio port definitions.



- Due to USB 3.0 controller limitation, USB 3.0 devices can only be used under Windows® OS environment and after the USB 3.0 driver installation.
- USB 3.0 devices can only be used as data storage only.
- We strongly recommend that you connect USB 3.0 devices to USB 3.0 ports for faster and better performance for your USB 3.0 devices.
- Due to XCHI controller structure, we recommend to manually install your USB 3.0 driver twice when installing the operating system from the USB 3.0 optical drive.

* LAN ports LED indications

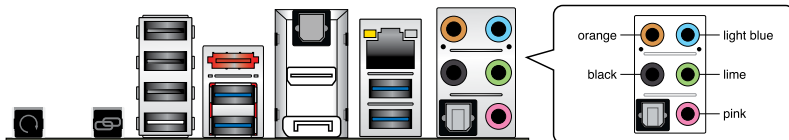
Activity Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
ORANGE	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection

** Audio 2, 4, 6 or 8-channel configuration

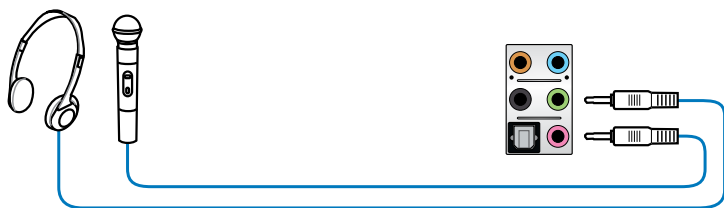
Port	Headset 2-channel	4-channel	6-channel	8-channel
Light Blue	Line In	Line In	Line In	Line In
Lime	Line Out	Front Speaker Out	Front Speaker Out	Front Speaker Out
Pink	Mic In	Mic In	Mic In	Mic In
Orange	—	—	Center/Subwoofer	Center/Subwoofer
Black	—	Rear Speaker Out	Rear Speaker Out	Rear Speaker Out

2.3.2 Audio I/O connections

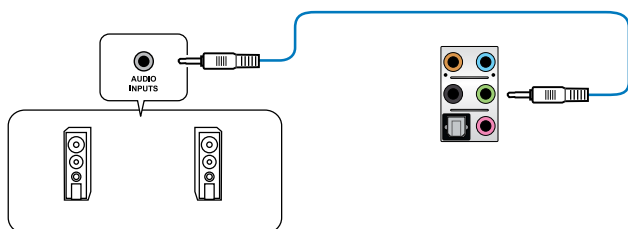
Audio I/O ports



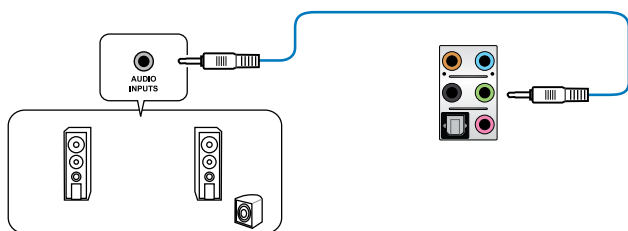
Connect to Headphone and Mic



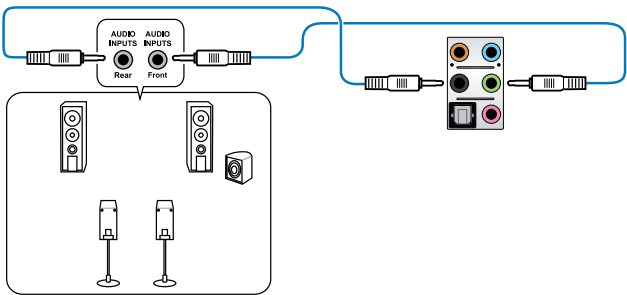
Connect to Stereo Speakers



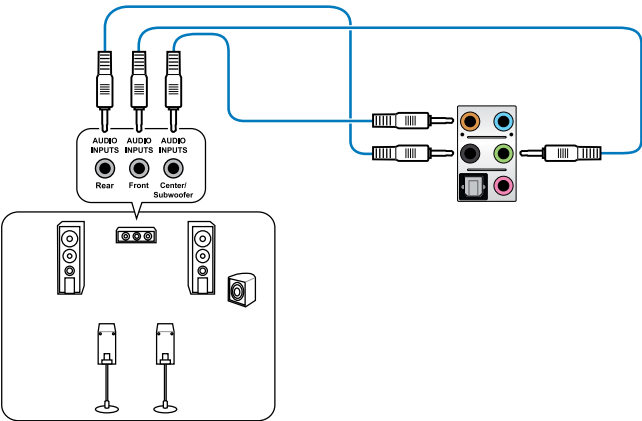
Connect to 2.1 channel Speakers



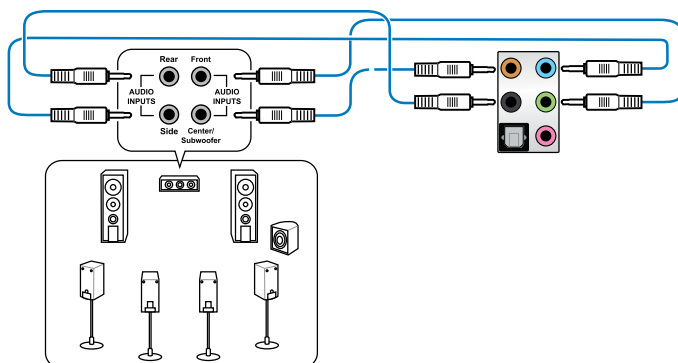
Connect to 4.1 channel Speakers



Connect to 5.1 channel Speakers



Connect to 7.1 channel Speakers



When the DTS UltraPC II function is enabled, ensure to connect the rear speaker to the gray port.

2.4 Starting up for the first time

1. After making all the connections, replace the system case cover.
2. Ensure that all switches are off.
3. Connect the power cord to the power connector at the back of the system chassis.
4. Connect the power cord to a power outlet that is equipped with a surge protector.
5. Turn on the devices in the following order:
 - a. Monitor
 - b. External SCSI devices (starting with the last device on the chain)
 - c. System power
6. After applying power, the system power LED on the system front panel case lights up. For systems with ATX power supplies, the system LED lights up when you press the ATX power button. If your monitor complies with the "green" standards or if it has a "power standby" feature, the monitor LED may light up or change from orange to green after the system LED turns on.

The system then runs the power-on self tests (POST). While the tests are running, the BIOS beeps (refer to the BIOS beep codes table) or additional messages appear on the screen. If you do not see anything within 30 seconds from the time you turned on the power, the system may have failed a power-on test. Check the jumper settings and connections or call your retailer for assistance.

BIOS Beep	Description
One short beep	VGA detected Quick boot set to disabled No keyboard detected
One continuous beep followed by two short beeps then a pause (repeated)	No memory detected
One continuous beep followed by three short beeps	No VGA detected
One continuous beep followed by four short beeps	Hardware component failure

7. At power on, hold down the <Delete> key to enter the BIOS Setup. Follow the instructions in Chapter 3.

2.5 Turning off the computer

While the system is ON, press the power button for less than four seconds to put the system on sleep mode or soft-off mode, depending on the BIOS setting. Press the power switch for more than four seconds to let the system enter the soft-off mode regardless of the BIOS setting.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

BIOS setup

3

3.1 Knowing BIOS



The new ASUS UEFI BIOS is a Unified Extensible Interface that complies with UEFI architecture, offering a user-friendly interface that goes beyond the traditional keyboard-only BIOS controls to enable a more flexible and convenient mouse input. You can easily navigate the new UEFI BIOS with the same smoothness as your operating system. The term “BIOS” in this user manual refers to “UEFI BIOS” unless otherwise specified.

BIOS (Basic Input and Output System) stores system hardware settings such as storage device configuration, overclocking settings, advanced power management, and boot device configuration that are needed for system startup in the motherboard CMOS. In normal circumstances, the default BIOS settings apply to most conditions to ensure optimal performance. **DO NOT change the default BIOS settings** except in the following circumstances:

- An error message appears on the screen during the system bootup and requests you to run the BIOS Setup.
- You have installed a new system component that requires further BIOS settings or update.



Inappropriate BIOS settings may result to instability or boot failure. **We strongly recommend that you change the BIOS settings only with the help of a trained service personnel.**



When downloading or updating the BIOS file, rename it as **MVF.CAP** for this motherboard.

3.2 BIOS setup program

Use the BIOS Setup to update the BIOS or configure its parameters. The BIOS screen include navigation keys and brief onscreen help to guide you in using the BIOS Setup program.

Entering BIOS at startup

To enter BIOS Setup at startup:

- Press <Delete> during the Power-On Self Test (POST). If you do not press <Delete>, POST continues with its routines.

Entering BIOS Setup after POST

To enter BIOS Setup after POST:

- Press <Ctrl>+<Alt>+<Delete> simultaneously.
- Press the reset button on the system chassis.
- Press the power button to turn the system off then back on. Do this option only if you failed to enter BIOS Setup using the first two options.



-
- The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
 - Ensure that a USB mouse is connected to your motherboard if you want to use the mouse to control the BIOS setup program.
 - If the system becomes unstable after changing any BIOS setting, load the default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu or press hotkey <F5>. See section 3.9 Exit Menu for details.
 - If the system fails to boot after changing any BIOS setting, try to clear the CMOS and reset the motherboard to the default value. See section 1.2.6 Onboard buttons and switches for information on how to erase the RTC RAM via the Clear CMOS button.
 - The BIOS setup program does not support the bluetooth devices.
-

BIOS menu screen

The BIOS Setup program can be used under two modes: **EZ Mode** and **Advanced Mode**. You can change modes from the **Exit** menu or from the **Exit/Advanced Mode** screen.

3.2.1 EZ Mode

By default, the EZ Mode screen appears when you enter the BIOS setup program. The EZ Mode provides you an overview of the basic system information, and allows you to select the display language, system performance mode and boot device priority. To access the Advanced Mode, click **Exit/Advanced Mode**, then select **Advanced Mode** or press <F7> hot key for the advanced BIOS settings.



The default screen for entering the BIOS setup program can be changed. Refer to the **Setup Mode** item in section 3.7 **Boot menu** for details.

The screenshot shows the ASUS EZ Mode BIOS interface. Annotations include:

- Displays the CPU/motherboard temperature, CPU/5V/3.3V/12V voltage output, CPU/chassis/ power fan speed**: Points to the temperature and voltage monitoring section.
- Selects the display language of the BIOS setup program**: Points to the language dropdown menu.
- Click to display all fan speeds if available**: Points to the fan speed control icon.
- Exits the BIOS setup program without saving the changes, saves the changes and resets the system, or enters the Advanced Mode**: Points to the Exit/Advanced Mode button.
- Displays the system properties of the selected mode on the right hand side**: Points to the System Performance section.
- Selects the Advanced Mode functions**: Points to the Advanced Mode (F7) button.
- Displays the Advanced mode menus**: Points to the Performance, Quiet, and Energy Saving modes.
- Power Saving mode**: Points to the Quiet mode.
- Normal mode**: Points to the Performance mode.
- Loads optimized default settings**: Points to the Default (F5) button.
- ASUS Optimal mode**: Points to the Energy Saving mode.
- Selects the boot device priority**: Points to the Boot Priority section.



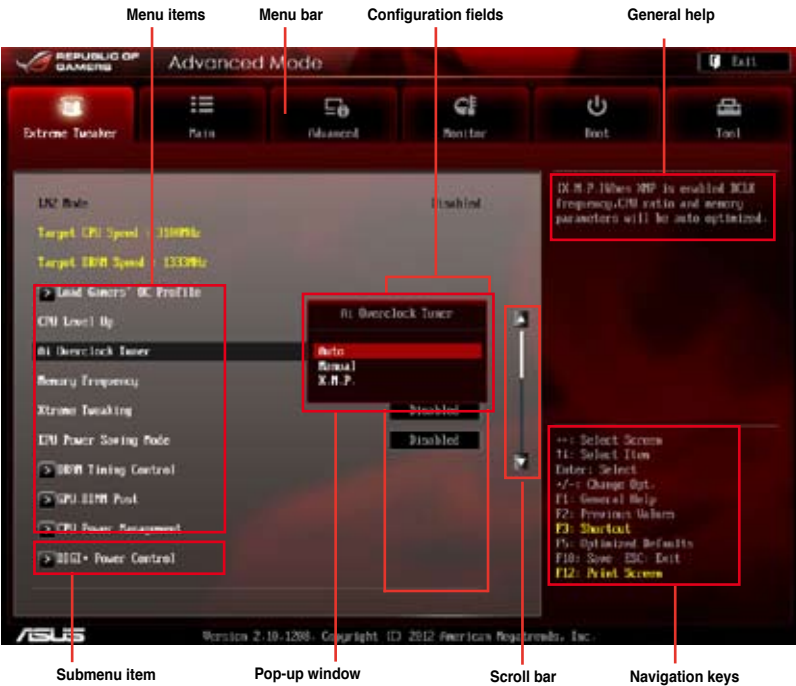
- The boot device options vary depending on the devices you installed to the system.
- The **Boot Menu(F8)** button is available only when the boot device is installed to the system.

3.2.2 Advanced Mode

The Advanced Mode provides advanced options for experienced end-users to configure the BIOS settings. The figure below shows an example of the Advanced Mode. Refer to the following sections for the detailed configurations.



To access the Advanced Mode, click **Exit**, then select **Advanced Mode** or press **F7** hotkey.



Menu bar

The menu bar on top of the screen has the following main items:

Main	For changing the basic system configuration
Extreme Tweaker	For changing the overclocking settings
Advanced	For changing the advanced system settings
Monitor	For displaying the system temperature, power status, and changing the fan settings.
Boot	For changing the system boot configuration
Tool	For configuring options for special functions
Exit	For selecting the exit options and loading default settings

Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting **Main** shows the Main menu items.

The other items (Ai Tweaker, Advanced, Monitor, Boot, Tool, and Exit) on the menu bar have their respective menu items.

Back button

This button appears when entering a submenu. Press <Esc> or use the USB mouse to click this button to return to the previous menu screen.

Submenu items

A greater than sign (>) before each item on any menu screen means that the item has a submenu. To display the submenu, select the item and press <Enter>.

Pop-up window

Select a menu item and press <Enter> to display a pop-up window with the configuration options for that item.

Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> / <Page Down> keys to display the other items on the screen.

Navigation keys

At the bottom right corner of the menu screen are the navigation keys for the BIOS setup program. Use the navigation keys to select items in the menu and change the settings.

General help

At the top right corner of the menu screen is a brief description of the selected item. Use <F12> key to capture the BIOS screen and save it to the removable storage device.

Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

A configurable field is highlighted when selected. To change the value of a field, select it and press <Enter> to display a list of options.

3.3 Extreme Tweaker menu

The Extreme Tweaker menu items allow you to configure overclocking-related items.



Be cautious when changing the settings of the Ai Tweaker menu items. Incorrect field values can cause the system to malfunction.



The configuration options for this section vary depending on the CPU and DIMM model you installed on the motherboard.

Scroll down to display other BIOS items.



Load Gamers' OC Profile

Press <Enter> and select Yes to load the Gamers' OC profile to suit extreme overclocking.

CPU Level Up [Disabled]

Allows you to select a CPU level, and the related parameters will be automatically adjusted according to the selected CPU level.

Configuration options: [Disabled] [Auto] [X.XXXG]

Ai Overclock Tuner [Auto]

Allows you to select the CPU overclocking options to achieve the desired CPU internal frequency. Select any of these preset overclocking configuration options:

- [Auto] Loads the optimal settings for the system.
- [Manual] Allows you to individually set overclocking parameters.
- [X.M.P.] If you install memory modules supporting the eXtreme Memory Profile (X.M.P.) Technology, choose this item to set the profiles supported by your memory modules for optimizing the system performance.



The [X.M.P.] configuration option appears only when you install memory modules supporting the eXtreme Memory Profile(X.M.P.) Technology.

eXtreme Memory Profile

This item appears only when you set the Ai Overclocking Tuner item to [X.M.P.] and allows you to select the X.M.P. mode supported by your memory module.

Configuration options: [Profile #1] [Profile #2]

BCLK/PEG Frequency [XXX]

This item appears only when you set the Ai Overclocking Tuner item to [Manual]. It allows you to adjust the CPU and VGA frequency to enhance the system performance. Use the <+> and <-> keys to adjust the value. You can also key in the desired value using the numeric keypad. The values range from 80.0MHz to 300.0MHz.

Memory Frequency [Auto]

Allows you to set the memory operating frequency.

Configuration options: [Auto] [DDR3-800MHz] [DDR3-1066MHz] [DDR3-1333MHz] [DDR3-1600MHz] [DDR3-1866MHz] [DDR3-2133MHz] [DDR3-2400MHz]



Selecting a very high memory frequency may cause the system to become unstable! If this happens, revert to the default setting.

Xtreme Tweaking [Disabled]

This item may help improve some benchmarks performance.

Configuration options: [Disabled] [Enabled]

EPU Power Saving Mode [Disabled]

Allows you to enable or disable the EPU power saving function.

Configuration options: [Disabled] [Enabled]

EPU Setting [Auto]

This item only appears when you set the EPU Power Saving Mode to [Enabled]. It allows you to set the EPU setting to power saving modes.

Configuration options: [Auto] [Light Power Saving Mode] [Medium Power Saving Mode] [Max Power Saving Mode]

DRAM Timing Control

The sub-items in this menu allow you to set the DRAM timing control features. Use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.



Changing the values in this menu may cause the system to become unstable! If this happens, revert to the default settings.

Memory Presets

Allows you to configure a memory preset for different memory modules.

Load Elpida Hyper Profile

Allows you to load a timing profile for Elpida Hyper chipset.

Configuration options: [Yes] [No]

Load Tight 2x2GB Elpida BBSE Profile

Allows you to load a tight timing profile for 2x2GB Elpida BBSE chipset.

Configuration options: [Yes] [No]

Load Tight 4x2GB Elpida BBSE Profile

Allows you to load a tight timing profile for 4x2GB Elpida BBSE chipset.

Configuration options: [Yes] [No]

Load Loose Elpida BBSE Profile

Allows you to load a loose timing profile for Elpida BBSE chipset.

Configuration options: [Yes] [No]

Load Tight 2x2GB PSC Profile

Allows you to load a tight timing profile for 2x2GB PSC chipset.

Configuration options: [Yes] [No]

Load Tight 4x2GB PSC Profile

Allows you to load a tight timing profile for 4x2GB PSC chipset.

Configuration options: [Yes] [No]

Load Loose PSC Profile

Allows you to load a loose PSC profile for PSC chipset.

Configuration options: [Yes] [No]

Load Tight Hynix Profile

Allows you to load a tight timing profile for Hynix chipset.

Configuration options: [Yes] [No]

Load Loose Hynix Profile

Allows you to load a loose timing profile for Hynix chipset.

Configuration options: [Yes] [No]

Load Tight 2x4GB Samsung Profile

Allows you to load a tight timing profile for 2x4GB Samsung chipset.

Configuration options: [Yes] [No]

Load Medium 2x4GB Samsung Profile

Allows you to load a medium timing profile for 2x4GB Samsung chipset.

Configuration options: [Yes] [No]

Load Tight 4x4GB Samsung Profile

Allows you to load a tight timing profile for 4x4GB Samsung chipset.

Configuration options: [Yes] [No]

Load RAW MHZ Profile

Allows you to load RAW MHZ profile for maximum clocks.

Configuration options: [Yes] [No]

Maximus Tweak [Auto]

Configuration options: [Auto] [Mode1] [Mode2]

Primary Timings**DRAM CAS# Latency [Auto]**

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# to CAS# Delay [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# PRE Time [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM RAS# ACT Time [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [255 DRAM Clock]

DRAM COMMAND Mode [Auto]

Configuration options: [Auto] [1 DRAM Clock] [2 DRAM Clock] [3 DRAM Clock]

Latency Boundary

Configuration options: [Auto] [1] - [14]

Secondary Timings

DRAM RAS# to RAS# Delay [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM REF Cycle Time [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [511 DRAM Clock]

DRAM Refresh Interval [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [65535 DRAM Clock]

DRAM WRITE Recovery Time [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [31 DRAM Clock]

DRAM READ to PRE Time [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM FOUR ACT WIN Time [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [63 DRAM Clock]

DRAM WRITE to READ Delay [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM CKE Minimum pulse width [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM CAS# Write Latency [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [15 DRAM Clock]

DRAM RTL (CHA) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [63 DRAM Clock]

DRAM RTL (CHB) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [63 DRAM Clock]

DRAM IO-L (CHA) [Auto]

Configuration options: [Auto] [Delay 1 Clock] – [Delay 15 Clock]

DRAM IO-L (CHB) [Auto]

Configuration options: [Auto] [Delay 1 Clock] – [Delay 15 Clock]

Third Timings

tWRDR (DD) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

tRWDR (DD) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

tRWSR [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

tRR (DD) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

tRR (DR) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

tRRSR [Auto]

Configuration options: [Auto] [4 DRAM Clock] – [7 DRAM Clock]

t_{WW} (DD) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

t_{WW} (DR) [Auto]

Configuration options: [Auto] [1 DRAM Clock] – [8 DRAM Clock]

t_{WSR} [Auto]

Configuration options: [Auto] [4 DRAM Clock] – [7 DRAM Clock]

MISC***MRC Fast Boot [Enabled]***

Configuration options: [Enabled] [Disabled]

DRAM CLK Period [Auto]

Configuration options: [Auto] [1] – [14]

Transmitter Slew (CHA) [Auto]

Configuration options: [Auto] [1] – [7]

Transmitter Slew (CHB) [Auto]

Configuration options: [Auto] [1] – [7]

Receiver Slew (CHA) [Auto]

Configuration options: [Auto] [1] – [7]

Receiver Slew (CHB) [Auto]

Configuration options: [Auto] [1] – [7]

MCH Duty Sense (CHA) [Auto]

Configuration options: [Auto] [1] – [31]

MCH Duty Sense (CHB) [Auto]

Configuration options: [Auto] [1] – [31]

Channel A DIMM Control [Enable Both DIMMS]

Configuration options: [Enable Both DIMMS] [Disable DIMM0] [Disable DIMM1] [Disable Both DIMMS]

Channel B DIMM Control [Enable Both DIMMS]

Configuration options: [Enable Both DIMMS] [Disable DIMM0] [Disable DIMM1] [Disable Both DIMMS]

DRAM Read Additional Swizzle [Auto]

Configuration options: [Auto] [Enabled] [Disabled]

DRAM Write Additional Swizzle [Auto]

Configuration options: [Auto] [Enabled] [Disabled]

GPU.DIMM Post

The sub-items in this menu display the status of the installed VGA cards and memory. The fields show N/A if there are no devices installed on the slots.

CPU Power Management

The sub-items in this menu allow you to set the CPU ratio and features.

CPU Ratio [Auto]

Allows you to manually adjust the maximum non-turbo CPU ratio. Use <+> and <-> keys to adjust the value. The valid value ranges vary according to your CPU model.

Enhanced Intel SpeedStep Technology [Enabled]

Allows you to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).

[Disabled] Disables this function.

[Enabled] The operating system dynamically adjusts the processor voltage and core frequency which may result in decreased average consumption and decreased average heat production.

Turbo Mode [Enabled]

Allows you to enable your core processor's speed to run faster than the marked frequency in a specific condition.

Configuration options: [Disabled] [Enabled]



The following item appear only when you set the Turbo Mode to [Enabled].

Power Limit Control [Auto]

This item appears only when you set the **CPU Ratio** item to [Auto] and the **Turbo Mode** item to [Enabled]. Leave this item at [Auto] for best overclocking or set to [Enabled] to customize settings. Configuration options: [Auto] [Enabled]



The following items appear only when you set the Turbo Mode item to [Enabled] and Power Limit Control item to [Enabled].

Long Duration Power Limit [Auto]

Allows you to limit the turbo ratio's long duration power. Use the <+> and <-> keys to adjust the value.

Long Duration Maintained [Auto]

Allows you to maintain the turbo ratio's long duration power. Use the <+> and <-> keys to adjust the value.

Short Duration Power Limit [Auto]

Allows you to limit the turbo ratio's long duration power. Use the <+> and <-> keys to adjust the value.

Primary Plane Current Limit [Auto]

Maximum instantaneous current allowed at any given time for CPU cores
Use <+> and <-> key to adjust the value at 0.125A increment. .

Secondary Plane Current Limit [Auto]

Maximum instantaneous current allowed at any given time for Internal Graphics cores. Use <+> and <-> key to adjust the value at 0.125A increment.

DIGI+ Power Control

DO NOT remove the thermal module while changing the DIGI+ Power Control related parameters. The thermal conditions should be monitored.



Some of the following items are adjusted by typing the desired values using the numeric keypad and press the <Enter> key. You can also use the <+> and <-> keys to adjust the value. To restore the default setting, type [auto] using the keyboard and press the <Enter> key.

CPU Load-Line Calibration [Auto]

CPU Load-line is defined by Intel VRM spec and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher load-line calibration would get higher voltage and better overclocking performance, but increase the CPU and VRM thermal. This item allows you to adjust the voltage range from the following percentages to boost the system performance: 0% (Regular), 25% (Medium), 50% (High), 75% (Ultra High) and 100% (Extreme).

Configuration options: [Auto] [Regular] [Medium] [High] [Ultra High] [Extreme]



The actual performance boost may vary depending on your CPU specification.

CPU Voltage Frequency [Auto]

This item allows you to configure the CPU voltage's VRM transient response and component thermal conditions. Higher frequency gets a quicker transient response.
Configuration options: [Auto] [Manual]

CPU Power Phase Control [Auto]

Phase number is the number of working VRM phase. Increasing phase number under heavy system loading to get more transient and better thermal performance. Reducing phase number under light system loading to increase VRM efficiency

[Auto]	The default power control phase mode
[Standard]	Proceeds phase control depending on the CPU loading.
[Optimized]	Loads the ASUS optimized phase tuning profile.
[Extreme]	Proceeds the full phase mode.
[Manual Adjustment]	Allows manual adjustment.

CPU Power Duty Control [T.Probe]

[T.Probe] Maintains the VRM thermal balance.

[Extreme] Maintains the VRM current balance.

CPU Current Capability [Auto]

This item provides wider total power range for overclocking. A higher value brings a wider total power range and extends the overclocking frequency range simultaneously. Configuration options: [100%] [110%] [120%] [130%] [140%] [150%] [OCP Disable]

VRM Protection Threshold [Default]

This item allows you to set the VRM protection threshold over temperature protection. Configuration options: [Default] [Higher]

CPU Power Thermal Control [130]

A higher temperature brings a wider CPU power thermal range and extends the overclocking tolerance to enlarge the O.C. potential. Use the <+> and <-> keys to adjust the value. The values range from 130 to 151.



DO NOT remove the thermal module while changing the DIGI+ VRM related parameters. The thermal conditions should be monitored.

DRAM Current Capability [100%]

Setting a higher value brings a wider total power range and extends the overclocking frequency range simultaneously. Configuration options: [100%] [110%] [120%] [130%]

DRAM Voltage Frequency [Auto]

This item allows you to adjust the DRAM switching frequency. Assign a fixed high DRAM frequency to increase O.C range or a lower DRAM frequency for better system stability.

Configuration options: [Auto] [manual]

DRAM Fixed Frequency Mode

This item only appears when you set the DRAM Voltage Frequency to [Manual]. It allows you to assign a fixed high DRAM frequency to increase the overclocking range or set to a low DRAM frequency for a better system stability. The values range from 300KHz to 500KHz.

DRAM Power Phase control [Auto]

- [Auto] Allows you to set the default DRAM power phase control settings.
[Optimized] Allows you to set ASUS optimized phase tuning profile.
[Extreme] Allows you to set the Full phase mode.

DRAM Power Thermal Control [110]

A higher temperature brings a wider DRAM power thermal range, and extends the overclocking tolerance to enlarge the O.C. potential. Use the <+> and <-> keys to adjust the value. The values range from 110 to 131.



DO NOT remove the thermal module. The thermal conditions must be monitored.

VCCIO

The sub-items in this menu allow you to set the VCCIO settings.

VCCIO Switching Freq [Auto]

Allows you to switch the VCCIO frequency
Configuration options: [Auto] [1X] [1.65X]

VCCIO Full Phase Control [Enabled]

Allows you to enable or disable the VCCIO Full Phase Control.
Configuration options: [Auto] [Disabled] [Enabled]

VCCIO Over-Current Protection [Enabled]

Allows you to enable or disable the VCCIO Over-Current Protection.
Configuration options: [Disabled] [Enabled]

Extreme OV [Disabled]

This item is set to [Disabled] by default to protect the CPU from being overheated. Set this item to [Enabled] to choose a higher voltage to overclock, but doing so might decrease CPU life.

Configuration options: [Disabled] [Enabled]

CPU Voltage [Offset Mode]

- [Manual Mode] Allows you to set a fixed CPU voltage.
[Offset Mode] Allows you to set the Offset voltage.

CPU Manual Voltage [Auto]

This item appears only when you set the CPU Voltage item to [Manual Mode] and allows you to set a fixed CPU voltage. The values range from 0.800V to 1.920V with a 0.005V interval. The 2.155V voltage is available only when the Extreme OV item is set to [Enabled].

Offset Mode Sign [+]

This item appears only when you set the CPU Voltage item to [Offset Mode].

[+] To offset the voltage by a positive value.

[-] To offset the voltage by a negative value.

CPU Offset Voltage [Auto]

This item appears only when you set the CPU Voltage item to [Offset Mode] and allows you to set the Offset voltage. The values range from 0.005V to 0.635V with a 0.005V interval.

DRAM Voltage [Auto]

Allows you to set the DRAM voltage. The values range from 1.20V to 1.92V with a 0.005V interval. The 1.92V voltage is available only when the Extreme OV item is set to [Enabled].



According to Intel CPU spec, DIMMs with voltage requirement over 1.65V may damage the CPU permanently. We recommend you install the DIMMs with the voltage requirement below 1.65V.

IMC-DRAM Offset Sign [+]

[+] To offset the DRAM voltage level for LN2 memory by a positive value.

[-] To offset the DRAM voltage level for LN2 memory by a negative value.

IMC-DRAM Offset [Auto]

Allows you to adjust the DRAM voltage level. The values range from 0.00661V to 0.21152V with a 0.00661V interval.

VCCSA Voltage [Auto]

Allows you to set the VCCSA voltage. The values range from 0.80V to 1.70V with a 0.00625V interval.

VCCIO Voltage [Auto]

Allows you to set the VCCIO voltage. The values range from 0.90V to 1.55V with a 0.00625V interval.

CPU PLL Voltage [Auto]

Allows you to set the CPU PLL voltage. The values range from 1.25V to 2.50V with a 0.00625V interval.

Skew Driving Voltage [Auto]

Allows you to set the Skew Driving Voltage. The values range from 0.4V0 to 1.60V with a 0.00625V interval.

2nd VCCIO Voltage [Auto]

Allows you to set the second VCCIO voltage. The values range from 0.40V to 1.70V with a 0.00625V interval.

PCH Voltage [Auto]

Allows you to set the Platform Controller Hub voltage. The values range from 0.8000V to 1.6000V with a 0.00625V interval.



- The values of the CPU Manual Voltage, iGPU Offset Voltage, DRAM Voltage, VCCSA/IO Voltage, CPU PLL Voltage, and PCH Voltage items are labelled in different colors, indicating the risk levels of high voltage settings.
- The system may need better cooling system to work stably under high voltage settings.

VTTDDR Voltage [Auto]

Allows you to set the VTTDDR voltage for DRAM channel. The values range from 0.6250V to 1.1000V with a 0.00625V interval.

DRAM CTRL REF Voltage on CHA/B [Auto]

Allows you to set the DRAM Control Reference Voltage on Channel A/B. The values range from 0.395x to 0.630x with a 0.005x interval. Different ratio might enhance DRAM overclocking ability.

BCLK Skew [Auto]

Reduce to increase BCLK and increase to reduce BCLK.

Configuration options: [Auto] [-12]—[+12]

CPU I/O Skew [Auto]

Adjust this setting may allows you to increase the overclocking capability.

Configuration options: [Auto] [-4]—[+4]

DMI Skew [Auto]

Adjust this setting may allows you to increase the overclocking capability.

Configuration options: [Auto] [-4]—[+4]

PLL Skew [Auto]

Adjust this setting may allows you to increase the overclocking capability.

Configuration options: [Auto] [-12]—[+12]

PCH CLK Driving [Auto]

Adjust this setting may allows you to increase the overclocking capability.

Configuration options: [Auto] [-8]—[+8]

CPU Spread Spectrum [Auto]

[Auto] Automatic configuration.

[Disabled] Enhances the BCLK overclocking ability.

[Enabled] Sets to [Enabled] for EMI control.

BCLK Recovery [Enabled]

Enable this option to recovery default BCLK setting automatically when the system fails on overclocking.

Configuration options: [Disabled] [Enabled]

3.4 Main menu

The Main menu screen appears when you enter the Advanced Mode of the BIOS Setup program. The Main menu provides you an overview of the basic system information, and allows you to set the system date, time, language, and security settings.



Security

The Security menu items allow you to change the system security settings.



- If you have forgotten your BIOS password, erase the CMOS Real Time Clock (RTC) RAM to clear the BIOS password. See section 1.2.6 Onboard buttons and switches for information on how to erase the RTC RAM via the Clear CMOS button.
- The Administrator or User Password items on top of the screen show the default [Not Installed]. After you set a password, these items show [Installed].

Administrator Password

If you have set an administrator password, we recommend that you enter the administrator password for accessing the system. Otherwise, you might be able to see or change only selected fields in the BIOS setup program.

To set an administrator password:

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change an administrator password:

1. Select the **Administrator Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

To clear the administrator password, follow the same steps as in changing an administrator password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **Administrator Password** item on top of the screen shows **Not Installed**.

User Password

If you have set a user password, you must enter the user password for accessing the system. The User Password item on top of the screen shows the default Not Installed. After you set a password, this item shows Installed.

To set a user password:

1. Select the **User Password** item and press <Enter>.
2. From the **Create New Password** box, key in a password, then press <Enter>.
3. Confirm the password when prompted.

To change a user password:

1. Select the **User Password** item and press <Enter>.
2. From the **Enter Current Password** box, key in the current password, then press <Enter>.
3. From the **Create New Password** box, key in a new password, then press <Enter>.
4. Confirm the password when prompted.

To clear the user password, follow the same steps as in changing a user password, but press <Enter> when prompted to create/confirm the password. After you clear the password, the **User Password** item on top of the screen shows **Not Installed**.

3.5 Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.



Be cautious when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



SupremeFX IV Lighting LED [Enabled]

This item allows you to turn on the SupremeFX VI Lighting LED.

Configuration options: [Enabled] [Disabled]

3.5.1 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects.



The items in this menu may vary based on the CPU installed.



Intel Adaptive Thermal Monitor [Enabled]

[Enabled] Enables the overheated CPU to throttle its clock speed to cool down.

[Disabled] Disables the CPU thermal monitor function.

Active Processor Cores [All]

Allows you to choose the number of CPU cores to activate in each processor package.

Configuration options: [All] [1] [2] [3]

Limit CPUID Maximum [Disabled]

[Enabled] Allows legacy operating systems to boot even without support for CPUs with extended CPUID functions.

[Disabled] Disables this function.

Execute Disable Bit [Enabled]

[Enabled] Enables the No-Execution Page Protection Technology.

[Disabled] Forces the XD feature flag to always return to zero (0).

Intel® Virtualization Technology [Disabled]

[Enabled] Allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

[Disabled] Disables this function.

Hardware Prefetcher [Enabled]

[Enabled] Allows a hardware platform to automatically analyze the requirements and prefetch data and codes for the CPU.

[Disabled] Disables this function.

Adjacent Cache Line Prefetch [Enabled]

[Enabled] Allows a hardware platform to perform adjacent cache line prefetching.

[Disabled] Disables this function.

CPU Power Management Configuration

This item allows you to manage and configure the CPU's power.

CPU Ratio [Auto]

Allows you to set the ratio between the CPU Core Clock and the BCLK Frequency. Use <+> and <-> keys to adjust the ratio. The valid value ranges vary according to your CPU model.

Enhanced Intel SpeedStep Technology [Enabled]

Allows you to enable or disable the Enhanced Intel® SpeedStep Technology (EIST).

[Disabled] The CPU runs at its default speed.

[Enabled] The operating system controls the CPU speed.

Turbo Mode [Enabled]

Allows you to set the processor cores to run faster than the marked frequency in a specific condition. Configuration options: [Enabled] [Disabled]

CPU C1E [Auto]

[Enabled] Enables the C1E support function. This function must be enabled to enable or disable the Intel® Turbo Mode Technology.

[Disabled] Disables the function.

CPU C3 Report [Auto]

Allows you to disable or enable the CPU C3 report to OS.

CPU C6 Report [Auto]

Allows you to disable or enable the CPU C6 report to OS.

Package C State Support

Allows you to disable or enable the whole C-State package support.

3.5.2 PCH Configuration



High Precision Timer [Enabled]

Allows you to enable or disable the High Precision Event Timer.

Configuration options: [Enabled] [Disabled]

Intel (R) Rapid Start Technology [Disabled]

Allows you to enable or disable Intel Rapid Start Technology.

Configuration options: [Enabled] [Disabled]



The following items appear only when you set the Intel Rapid Start Technology to [Enabled].

Entry on S3 RTC Wake [Enabled]

The system automatically wakes up and set to Rapid Start Technology S4 mode.

Configuration options: [Enabled] [Disabled]

Entry After [Immediately]

Allows you to set the wake-up time.

Configuration options: [Immediately] [1 minute] [2 minutes] [5 minutes] [10 minutes] [15 minutes] [30 minutes] [1 hour] [2 hours]

Intel (R) Smart Connect Technology [Disabled]

Allow you to enable or disable Intel Smart Connect Technology.

Configuration options: [Enabled] [Disabled]

ISCT Configuration [Disabled]

Allows you to enable or disable ISCT Configuration.

Configuration options: [Enabled] [Disabled]

3.5.3 SATA Configuration

While entering Setup, the BIOS automatically detects the presence of SATA devices. The SATA Port items show **Not Present** if no SATA device is installed to the corresponding SATA port.

Scroll down to display the other BIOS items.



SATA Mode Selection [AHCI]

Allows you to set the SATA configuration.

- [Disabled] Disables the SATA function.
- [IDE] Set to [IDE Mode] when you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices.
- [AHCI] Set to [AHCI Mode] when you want the SATA hard disk drives to use the AHCI (Advanced Host Controller Interface). The AHCI allows the onboard storage driver to enable advanced Serial ATA features that increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.
- [RAID] Set to [RAID Mode] when you want to create a RAID configuration from the SATA hard disk drives.

S.M.A.R.T. Status Check [Enabled]

S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) is a monitor system. When read/write of your hard disk errors occur, this feature allows the hard disk to report warning messages during the POST. Configuration options: [Enabled] [Disabled]

Hot Plug [Disabled]

These items appear only when you set the SATA Mode Selection item to [AHCI] or [RAID], and allow you to enable/disable SATA Hot Plug Support.

Configuration options: [Disabled] [Enabled]

External SATA [Enabled]

Allows you to enable or disable the support of the External SATA.

Configuration options: [Disabled] [Enabled]

3.5.4 System Agent Configuration



Memory Remap Feature [Enabled]

Allows you to enable remapping the memory above 4GB.

[Enabled] Enables the function.

[Disabled] Disables this function.

Graphics Configuration

Allows you to select a primary display from iGPU, and PCIe graphical devices.

Primary Display [Auto]

Allows you to select which of the iGPU/PCIe Graphics device should be the Primary Display. Configuration options: [Auto] [iGPU] [PCIe]

iGPU Memory [64M]

Allows you to select the amount of system memory allocated to DVMT 5.0 used by the iGPU.

Configuration options: [32M] [64M] [96M] [128M] [160M] [192M] [224M] [256M] [288M] [320M] [352M] [384M] [416M] [448M] [480M] [512M] [1024M]

Render Standby [Enabled]

Allows you to enable the Intel Graphics Render Standby support to reduce the iGPU power use when idle.

Configuration options: [Disabled] [Enabled]

iGPU Multi-Monitor [Disabled]

Allows you to enable the iGPU Multi-Monitor. For Lucid Virtu MVP function supports, set this item to [Enabled] to empower both integrated and discrete graphics. iGPU shared system memory size is fixed in 64MB.

Configuration options: [Disabled] [Enabled]

NB PCIe Configuration

Allows you to configure the NB PCI Express settings.

PCIEX16_1 Link Speed [Auto]

Allows you to configure the PCIEX16_1 speed.

Configuration options: [Auto] [Gen1] [Gen2]

PCIEX16_2 Link Speed [Auto]

Allows you to configure PCIEX16_2 speed.

Configuration options: [Auto] [Gen1] [Gen2]

3.5.5 USB Configuration

The items in this menu allow you to change the USB-related features.



The **USB Devices** item shows the auto-detected values. If no USB device is detected, the item shows **None**.

Legacy USB Support [Enabled]

- [Enabled] Enables the support for USB devices on legacy operating systems (OS).
- [Disabled] The USB devices can be used only for the BIOS setup program.
- [Auto] Allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled.

Legacy USB3.0 Support [Enabled]

- [Enabled] Enables the support for USB 3.0 devices on legacy operating systems (OS).
- [Disabled] Disables the function.

Intel xHCI Mode [Smart Auto]

- [Auto] Keeps the last operation of xHCI controller in OS during bootup.
- [Smart Auto] Enables the operation of xHCI controller.
- [Enabled] Enables the function.
- [Disabled] Disables the function.

EHCI Hand-off [Disabled]

- [Enabled] Enables the support for operating systems without an EHCI hand-off feature.
- [Disabled] Disables the function.

3.5.6 Onboard Devices Configuration

Scroll down to view the other BIOS items.



HD Audio Controller [Enabled]

- [Enabled] Enables the High Definition Audio Controller.
- [Disabled] Disables the controller.



The following two items appear only when you set the **Azalia HD Audio** item to [Enabled].

Front Panel Type [HD]

Allows you to set the front panel audio connector (AAPF) mode to legacy AC'97 or high-definition audio depending on the audio standard that the front panel audio module supports.

- [HD] Sets the front panel audio connector (AAPF) mode to high definition audio.
- [AC97] Sets the front panel audio connector (AAPF) mode to legacy AC'97

SPDIF Out Type [SPDIF]

- [SPDIF] Sets to [SPDIF] for SPDIF audio output.
- [HDMI] Sets to [HDMI] for HDMI audio output.

ASM1061 Storage Controller [Enabled]

Allows you to select the ASM1061 storage controller operating mode.

[Disabled] Disables the controller.

[Enabled] Enables the controller.

ASM1061 Storage OPROM [Enabled]

This item appears only when you set the previous item to [Enabled]. It allows you to enable or disable the OptionRom of the ASM1061 storage controller.

Configuration options: [Enabled] [Disabled]

ASM1061 Storage Controller (Front) [Enabled]

Allows you to select the ASM1061 storage controller operating mode.

[Disabled] Disables the controller.

[Enabled] Enables the controller.

ASM1061 Storage OPROM [Enabled]

This item appears only when you set the previous item to [Enabled]. It allows you to enable or disable the OptionRom of the ASM1061 storage controller.

Configuration options: [Enabled] [Disabled]

ASmedia USB 3.0 Controller (USB3_E12) [Enabled]

[Enabled] Enables the USB 3.0 controller.

[Disabled] Disables the controller.

ASmedia USB 3.0 Battery Charging Support [Disabled]

This item only appears when you set the previous item to [Enabled]. It allows you to enable or disable the ASmedia USB 3.0 battery charging support with the BC 1.1 regulation.

[Enabled] Enables the battery charging support.

[Disabled] Disables the battery charging support.

Intel LAN Controller [Enabled]

[Enabled] Enables the GbE controller.

[Disabled] Disables the controller.

Intel PXE OPROM [Disabled]

This item appears only when you set the previous item to [Enabled]. It allows you to enable or disable the PXE OptionRom of the Intel 82579LAN controller.

Configuration options: [Enabled] [Disabled]

3.5.7 APM



ErP Ready [Disabled]

This item allows you to switch off some power at S5 to get the system ready for ErP requirement. When set to [Enabled], all other PME options will be switched off.

Configuration options: [Disabled] [Enabled]

Restore AC Power Loss [Power Off]

[Power On] The system goes into on state after an AC power loss.

[Power Off] The system goes into off state after an AC power loss.

[Last State] The system goes into either off or on state, whatever the system state was before the AC power loss.

Power On By PCIE/PCI [Disabled]

[Disabled] Disables the PCIE/PCI devices to generate a wake-on-LAN feature of the Intel/Realtek LAN device.

[Enabled] Enables the PCIE/PCI devices to generate a wake-on-LAN feature of the Intel/Realtek LAN device.

Power On By RTC [Disabled]

[Disabled] Disables RTC to generate a wake event.

[Enabled] When set to [Enabled], the items **RTC Alarm Date (Days)** and **Hour/Minute/Second** will become user-configurable with set values.

3.5.8 Network Stack



Network Stack [Disable Link]

This item allows you to disable or enable the UEFI network stack.
Configuration options: [Disable Link] [Enable]



The following items appear only when you set the Network Stack to [Enabled].

Ipv4/Ipv6 PXE Support [Enabled]

Allows you to enable or disable the Ipv4/Ipv6 PXE boot option.
Configuration options: [Disabled Link] [Enabled]

3.6 Monitor menu

The Monitor menu displays the system temperature/power status, and allows you to change the fan settings.



Anti Surge Support [Enabled]

This item allows you to enable or disable the Anti Surge function.

Configuration options: [Disabled] [Enabled]

Voltage Monitor

CPU Voltage; 3.3V Voltage; 5V Voltage; 12V Voltage; DRAM Voltage; PCH Voltage; CPU PLL Voltage; VCCIO Voltage; VCCSA Voltage

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Press <Enter> and select [Ignore] if you do not wish to display the detected temperatures.

Temperature Monitor

CPU Temperature; MB Temperature [xxx°C/xxx°F]; OPT1-3 Temperature

The onboard hardware monitor automatically detects and displays the CPU, and motherboard. Press <Enter> and select [Ignore] if you do not wish to display the detected temperatures.

Fan Speed Monitor

CPU FAN Speed; CPU OPT Speed; Chassis FAN1/2/3 Speed [xxxxRPM] or [Ignored] / [N/A]; Opt1/2/3 Fan Speed [xxxxRPM] or [Ignored] / [N/A]

The onboard hardware monitor automatically detects and displays the CPU fan, chassis fan, and optional fan speed in rotations per minute (RPM). If any of the fans is not connected to the motherboard, the field shows [N/A]. These items are not user-configurable. Press <Enter> and select [Ignore] if you do not wish to display the detected temperatures.

Fan Speed Control

CPU Q-Fan Control [Disabled]

Allows you to enable or disable the CPU fan controller.

[Disabled] Disables the CPU Q-fan controller.

[Enabled] Enables the CPU Q-fan controller.



The following three items appear when you enable the CPU Fan Control feature.

CPU Fan Speed Low Limit [600 RPM]

Allows you to set the low speed limit of the CPU fan and the system sends warning message when the fan speed drops below the set value.

Configuration options: [Ignored] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

CPU Fan Profile [Standard]

Allows you to set the appropriate performance level of the CPU fan.

[Standard] Sets to [Standard] to make the chassis fan automatically adjust depending on the CPU temperature.

[Silent] Sets to [Silent] to minimize the fan speed for quiet CPU fan operation.

[Turbo] Set to [Turbo] to achieve maximum CPU fan speed.

[Manual] Sets to [Manual] to display more items for you to manually adjust the CPU upper/lower temperature, and CPU fan upper/lower duty cycle.



The following four items appear only when you set **CPU Fan Profile** to [Manual].

CPU Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 20°C to 75°C.

CPU Fan Max. Duty Cycle(%) [100]

Use the <+> and <-> keys to adjust the maximum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature reaches the upper limit, the CPU fan will operate at the maximum duty cycle.

CPU Lower Temperature [20]

Displays the lower limit of the CPU temperature.

CPU Fan Min. Duty Cycle(%) [20]

Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. The values range from 20% to 100%. When the CPU temperature is under 40°C, the CPU fan will operate at the minimum duty cycle.

Chassis Q-Fan Control 1/3 [Disabled]

[Disabled] Disables the Chassis Q-Fan control feature.

[Enabled] Enables the Chassis Q-Fan control feature.

Chassis Fan Speed Low Limit 1/3 [600 RPM]

This item appears only when you enable the **Chassis Q-Fan Control** feature and allows you to disable or set the chassis fan warning speed.

Configuration options: [Ignore] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Chassis Fan Profile [Standard]

This item appears only when you enable the **Chassis Q-Fan Control** feature and allows you to set the appropriate performance level of the chassis fan.

[Standard] Sets to [Standard] to make the chassis fan automatically adjust depending on the chassis temperature.

[Silent] Sets to [Silent] to minimize the fan speed for quiet chassis fan operation.

[Turbo] Sets to [Turbo] to achieve maximum chassis fan speed.

[Manual] Sets to [Manual] to assign detailed fan speed control parameters.



The following four items appear only when you set Chassis Fan Profile to [Manual].

Chassis Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 40°C to 75°C.

Chassis Fan Max. Duty Cycle(%) [100]

Use the <+> and <-> keys to adjust the maximum chassis fan duty cycle. The values range from 60% to 100%. When the chassis temperature reaches the upper limit, the chassis fan will operate at the maximum duty cycle.

Chassis Lower Temperature [40]

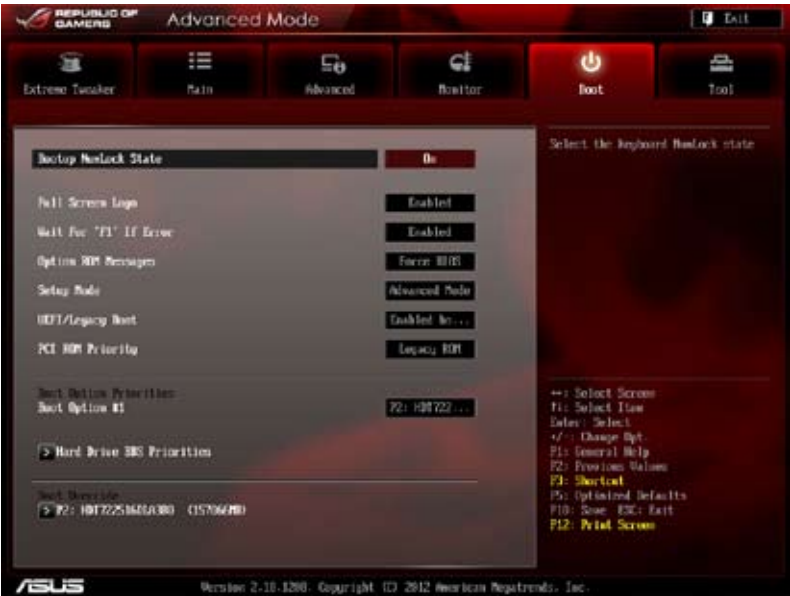
Displays the lower limit of the chassis temperature.

Chassis Fan Min. Duty Cycle(%) [60]

Use the <+> and <-> keys to adjust the minimum chassis fan duty cycle. The values range from 0% to 100%. When the chassis temperature is under 40°C, the chassis fan will operate at the minimum duty cycle.

3.7 Boot menu

The Boot menu items allow you to change the system boot options. Scroll down to display the other BIOS items.



Bootup NumLock State [On]

[On] Sets the power-on state of the NumLock to [On].

[Off] Sets the power-on state of the NumLock to [Off].

Full Screen Logo [Enabled]

[Enabled] Enables the full screen logo display feature.

[Disabled] Disables the full screen logo display feature.



Set this item to [Enabled] to use the ASUS MyLogo 2™ feature.

Post Report [5 sec]

This item appears only when you set Full Screen Logo to [Disabled]. This allows you to select a desired post error waiting time. The values range from 1 to 10 seconds.

Wait For 'F1' If Error [Enabled]

[Disabled] Disables this function.

[Enabled] The system waits for the <F1> key to be pressed when error occurs.

Option ROM Messages [Force BIOS]

- [Force BIOS] The third-party ROM messages will be forced to display during the boot sequence.
- [Keep Current] The third-party ROM messages will be displayed only if the third-party manufacturer had set the add-on device to do so.

Setup Mode [EZ Mode]

- [Advanced Mode] Sets Advanced Mode as the default screen for entering the BIOS setup program.
- [EZ Mode] Sets EZ Mode as the default screen for entering the BIOS setup program.

UEFI/Legacy Boot [Enable both UEFI and Legacy]

- [Enable both UEFI and Legacy] Enables both UEFI and Legacy boot.
- [Disable UEFI] Enables the Legacy boot, and disables the UEFI boot.
- [Disable Legacy] Enables the UEFI boot, and disables the Legacy boot.

PCI ROM Priority [Legacy ROM]

- [Legacy ROM] Launch Legacy ROM
- [EFI Compatible ROM] Launch UEFI Compatible ROM

Boot Option Priorities

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system.



-
- To access Windows OS in Safe Mode, do any of the following:
 - Press <F5> when ASUS Logo appears.
 - Press <F8> after POST.
 - To select the boot device during system startup, press <F8> when ASUS Logo appears.
-

Boot Override

These items displays the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system. Click an item to start booting from the selected device.

3.8 Tools menu

The Tools menu items allow you to configure options for special functions. Select an item then press <Enter> to display the submenu.



3.8.1 ASUS EZ Flash 2 Utility

Allows you to run ASUS EZ Flash 2. When you press <Enter>, a confirmation message appears. Use the left/right arrow key to select between [Yes] or [No], then press <Enter> to confirm your choice.



For more details, refer to section 3.10.2 ASUS EZ Flash 2 utility.

3.8.2 ASUS O.C. Profile

This item allows you to store or load multiple BIOS settings.



The O.C. Profile Configuration items show **Not Installed** if no profile is created.

Allows you to input the label of the setup profiles.

Allows you to save the current BIOS settings to the BIOS Flash, and create a profile. Key in a profile number from one to eight, press <Enter>, and then select **Yes**.

Allows you to load the previous BIOS settings saved in the BIOS Flash. Key in the profile number that saved your BIOS settings, press <Enter>, and then select **Yes**.



- DO NOT shut down or reset the system while updating the BIOS to prevent the system boot failure!
- We recommend that you update the BIOS file only coming from the same memory/CPU configuration and BIOS version.

Allows you to view the DRAM SPD information.



3.8.4 GO Button File

Allows you to set the GO Button files and load the desired GO Button file.



BCLK/PCIE Frequency; CPU Voltage; DRAM Voltage; VCCSA Voltage; VCCIO Voltage; CPU PLL Voltage; PCH Voltage; 2nd VCCIO Voltage; VTTDDR Voltage; iGPU Voltage; CPU Ratio

Allows you to use the <+> and <-> keys to adjust the values for each item. Refer to **3.3 Extreme Tweaker Menu** for details.

Load Default

Allows you to load default settings.

Save Above Settings

Allows you to save the adjusted values for specific items as a GO Button file.

Load from EEPROM setting

Allows you to load from EEPROM setting.

3.9 Exit menu

The Exit menu items allow you to load the optimal default values for the BIOS items, and save or discard your changes to the BIOS items. You can access the EZ Mode from the Exit menu.



Load Optimized Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select **Yes** to load the default values.

Save Changes & Reset

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved. When you select this option or if you press <F10>, a confirmation window appears. Select **Yes** to save changes and exit.

Discard Changes & Exit

This option allows you to exit the Setup program without saving your changes. When you select this option or if you press <Esc>, a confirmation window appears. Select **Yes** to discard changes and exit.

ASUS EZ Mode

This option allows you to enter the EZ Mode screen.

Launch EFI Shell from filesystem device

This option allows you to attempt to launch the EFI Shell application (shellx64.efi) from one of the available filesystem devices.

3.10 Updating BIOS

The ASUS website publishes the latest BIOS versions to provide enhancements on system stability, compatibility, or performance. However, BIOS updating is potentially risky. If there is no problem using the current version of BIOS, DO NOT manually update the BIOS. Inappropriate BIOS updating may result in the system's failure to boot. Carefully follow the instructions of this chapter to update your BIOS if necessary.



Visit the ASUS website (www.asus.com) to download the latest BIOS file for this motherboard.

The following utilities allow you to manage and update the motherboard BIOS setup program.

1. **ASUS Update:** Updates the BIOS in Windows® environment.
2. **ASUS EZ Flash 2:** Updates the BIOS using a USB flash drive.
3. **ASUS CrashFree BIOS 3:** Restores the BIOS using the motherboard support DVD or a USB flash drive when the BIOS file fails or gets corrupted.
4. **ASUS BIOS Updater:** Updates and back ups the BIOS in DOS environment using the motherboard support DVD and a USB flash disk drive.



Save a copy of the original motherboard BIOS file to a USB flash disk in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the ASUS Update or BIOS Updater utilities.

3.10.1 ASUS Update

The ASUS Update is a utility that allows you to manage, save, and update the motherboard BIOS in Windows® environment.



-
- ASUS Update requires an Internet connection either through a network or an Internet Service Provider (ISP).
 - This utility is available in the support DVD that comes with the motherboard package.
-

Launching ASUS Update

To launch ASUS Update, click **Update > ASUS Update** on the AI Suite II main menu bar.



Quit all Windows® applications before you update the BIOS using this utility.

Updating the BIOS through the Internet

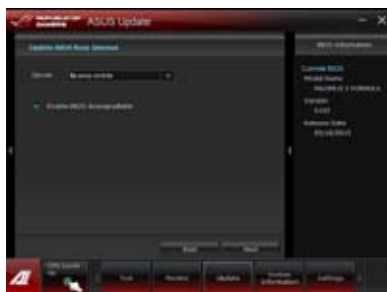
To update the BIOS through the Internet:

1. From the ASUS Update screen, select **Update BIOS from Internet**, and then click Next.



2. Select the ASUS FTP site nearest you to avoid network traffic.

If you want to enable the BIOS downgrade and auto backup functions, tick **Enable BIOS downgrade** and **Automatically backup my current BIOS**.



3. Select the BIOS version that you want to download. Click **Next**.



Updating the BIOS through a BIOS file

To update the BIOS through a BIOS file:

1. From the ASUS Update screen, select **Update BIOS from file**, and then click **Next**.



2. Locate the BIOS file and click **Next**.



3. You can decide whether to change the BIOS boot logo. Click **Yes** if you want to change the boot logo or **No** to continue.
4. Follow the onscreen instructions to complete the update process.



- The screenshots in this section are for reference only. The actual BIOS information vary by models.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.



- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!



Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the Load Optimized Defaults item under the Exit menu. See section **3.9 Exit Menu** for details.

3.10.3 ASUS CrashFree BIOS 3

The ASUS CrashFree BIOS 3 utility is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can restore a corrupted BIOS file using the motherboard support DVD or a USB flash drive that contains the BIOS file.



The BIOS file in the motherboard support DVD may be older than the BIOS file published on the ASUS official website. If you want to use the newer BIOS file, download the file at support.asus.com and save it to a USB flash drive.

Recovering the BIOS

To recover the BIOS:

1. Turn on the system.
2. Insert the motherboard support DVD to the optical drive, or the USB flash drive containing the BIOS file to the USB port.
3. The utility automatically checks the devices for the BIOS file. When found, the utility reads the BIOS file and enters ASUS EZ Flash 2 automatically.
4. The system requires you to enter BIOS Setup to recover the BIOS setting. To ensure system compatibility and stability, we recommend that you press <F5> to load default BIOS values.



DO NOT shut down or reset the system while updating the BIOS! Doing so can cause system boot failure!

3.10.4 ASUS BIOS Updater

The ASUS BIOS Updater allows you to update the BIOS in DOS environment. This utility also allows you to copy the current BIOS file that you can use as a backup when the BIOS fails or gets corrupted during the updating process.



The succeeding utility screens are for reference only. The actual utility screen displays may not be same as shown.

Before updating BIOS

1. Prepare the motherboard support DVD and a USB flash drive in FAT32/16 format and single partition.
2. Download the latest BIOS file and BIOS Updater from the ASUS website at <http://support.asus.com> and save them on the USB flash drive.

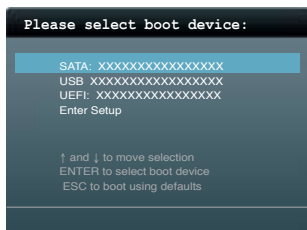


- NTFS is not supported under DOS environment. Do not save the BIOS file and BIOS Updater to a hard disk drive or USB flash drive in NTFS format.
- Do not save the BIOS file to a floppy disk due to low disk capacity.

3. Turn off the computer and disconnect all SATA hard disk drives (optional).

Booting the system in DOS environment

1. Insert the USB flash drive with the latest BIOS file and BIOS Updater to the USB port.
2. Boot your computer. When the ASUS Logo appears, press <F8> to show the BIOS Boot Device Select Menu. Insert the support DVD into the optical drive and select the optical drive as the boot device.



- When the Make Disk menu appears, select the FreeDOS command prompt item by pressing the item number.
- At the FreeDOS prompt, type d: and press <Enter> to switch the disk from Drive C (optical drive) to Drive D (USB flash drive).

```
Welcome to FreeDOS (http://www.freedos.org) !
C:\>d:
D:\>
```

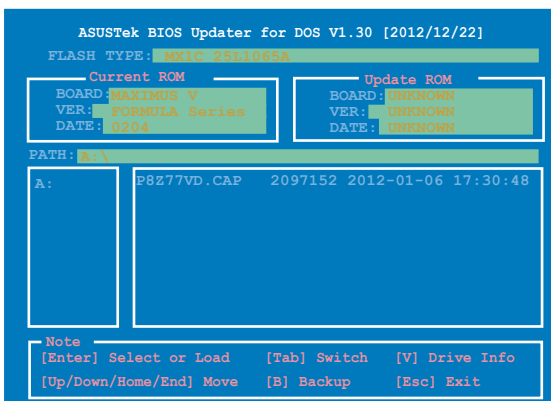
Updating the BIOS file

To update the BIOS file using BIOS Updater:

- At the FreeDOS prompt, type bupdater /pc /g and press <Enter>.

```
D:\>bupdater /pc /g
```

- The BIOS Updater screen appears as below.



- Press <Tab> to switch between screen fields and use the <Up/Down/Home/End> keys to select the BIOS file and press <Enter>. BIOS Updater checks the selected BIOS file and prompts you to confirm BIOS update.



4. Select Yes and press <Enter>. When BIOS update is done, press <ESC> to exit BIOS Updater. Restart your computer.



DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!



- For BIOS Updater version 1.04 or later, the utility automatically exits to the DOS prompt after updating BIOS.
 - Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** BIOS menu. See Chapter 3 of your motherboard user manual for details.
 - Ensure to connect all SATA hard disk drives after updating the BIOS file if you have disconnected them.
-

Software support

4

4.1 Installing an operating system



- This motherboard supports Windows® XP/ 64-bit XP/ 7 / 64-bit 7 operating systems (OS).
- Motherboard settings and hardware options vary. Use the setup procedures presented in this chapter for reference only. Refer to your OS documentation for detailed information.
- Ensure that you install the Windows® XP Service Pack 3 or later versions before installing the drivers for better compatibility and system stability.

4.2 Support DVD information



The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website at www.asus.com for updates.

4.2.1 Running the support DVD

Place the support DVD into the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer. Click each menu tab and select the items you want to install.

The Drivers menu shows the available device drivers if the system detects installed devices. Install the necessary drivers to use the devices.

The Make Disk menu contains items to create the RAID/AHCI driver disk.

The Manual menu contains the list of supplementary user manuals. Click an item to open the folder of the user manual.

The Utilities menu shows the applications and other software that the motherboard supports.

Click an item to install



Click the Contact tab to display the ASUS contact information.

Click an icon to display DVD/motherboard information



If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the DVD.

4.2.2 Obtaining the software manuals

The software manuals are included in the support DVD. Follow the instructions below to get the necessary software manuals.

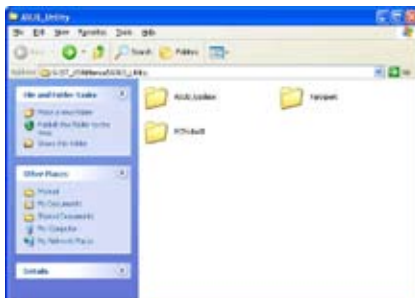


The software manual files are in Portable Document Format (PDF). Install the Adobe® Acrobat® Reader from the Utilities menu before opening the files.

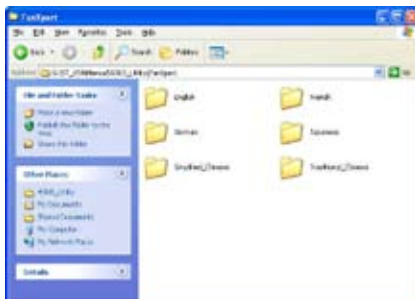
1. Click the **Manual** tab. Click **ASUS Motherboard Utility Guide** from the manual list on the left.



2. The **Manual** folder of the support DVD appears. Double-click the folder of your selected software.



3. Some software manuals are provided in different languages. Double-click the language to show the software manual.



The screenshots in this section are for reference only. The actual software manuals containing in the support DVD vary by models.

4.3 Software information

Most of the applications in the support DVD have wizards that will conveniently guide you through the installation. View the online help or readme file that came with the software application for more information.

4.3.1 AI Suite II

AI Suite II is an all-in-one interface that integrates several ASUS utilities and allows users to launch and operate these utilities simultaneously.

Installing AI Suite II

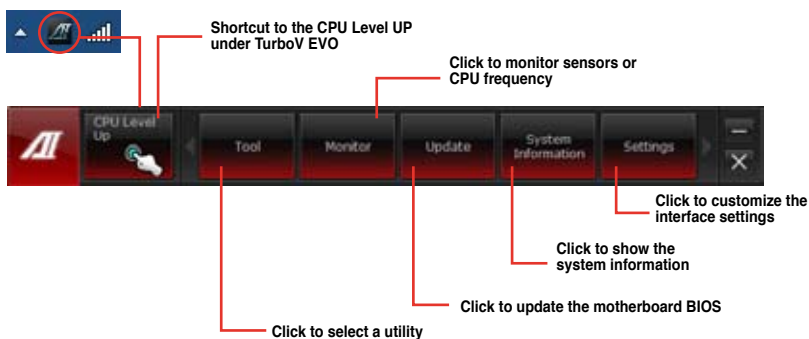
To install AI Suite II on your computer:

1. Place the support DVD to the optical drive. The Drivers installation tab appears if your computer has enabled the Autorun feature.
2. Click **Utilities** tab > **AI Suite II**.
3. Follow the onscreen instructions to complete the installation.

Using AI Suite II

AI Suite II automatically starts when you enter the Windows® operating system (OS). The AI Suite II icon appears in the Windows® notification area. Click the icon to open the AI Suite II main menu bar.

Click each button to select and launch a utility, to monitor the system, to update the motherboard BIOS, to display the system information, and to customize the settings of AI Suite II.



- The applications in the Tool menu vary with models.
- The screenshots of AI Suite II in this user manual are for reference only. The actual screenshots vary with models.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

4.3.2 TurboV EVO

ASUS TurboV EVO allows you to manually adjust the CPU frequency and related voltages such as **CPU Level Up** that offers automatic and easy overclocking and system boost performance.

To launch TurboV EVO, click **Tool > TurboV EVO** on the AI Suite II main menu bar.



Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

TurboV EVO

TurboV EVO allows you to overclock the BCLK frequency, CPU voltage, and DRAM voltage in Windows® environment and in real-time without exiting and rebooting the OS.



Refer to the CPU documentation before adjusting CPU voltage settings. Setting a high voltage may damage the CPU permanently, and setting a low voltage may lead to an unstable system.



For system stability, all changes made in TurboV will not be saved to BIOS settings and will not be kept on the next system boot. Use the Save Profile function to save your customized overclocking settings and manually load the profile after Windows starts.

The screenshot shows the ASUS TurboV EVO application window. It features a 'Manual Mode' tab and a 'CPU Level Up' section. The 'CPU Level Up' section displays 'BCLK Frequency' at 100.0 MHz and 'CPU Voltage' at 1.100 V. Below this, there are 'Advanced Mode' settings for VCCSA Voltage, VCCIO Voltage, CPU PLL Voltage, BCLK Voltage, VTTMEM Voltage, and 2nd VCCIO Voltage, each with a slider and a numerical value. On the right side, there are 'Voltage Adjustment bars' for CPU Frequency (1611.0 MHz) and CPU Voltage (1.100 V). At the bottom, there are buttons for 'Save Profile', 'Load Profile', 'Undo', and 'Apply'. Red lines and boxes highlight specific features: 'Click to select mode' points to the 'Manual Mode' tab; 'Load profile' and 'Target values' point to the 'Load Profile' button; 'Current values' points to the 'CPU Voltage' value; 'Click to view more settings' points to the 'Advanced Mode' section; 'Click to restore all startup settings' points to the 'Load Profile' button; 'Save the current settings as a new profile' points to the 'Save Profile' button; 'Voltage Adjustment bars' points to the 'CPU Voltage' slider; 'Undoes all the changes' points to the 'Undo' button; and 'Applies all the changes immediately' points to the 'Apply' button.

Using Advanced Mode

Click on the **Advanced Mode** tab to adjust the advanced voltage settings.



CPU Level Up

ASUS TurboV EVO provides you with these three CPU Level Up modes for the most flexible CPU auto-tuning options.

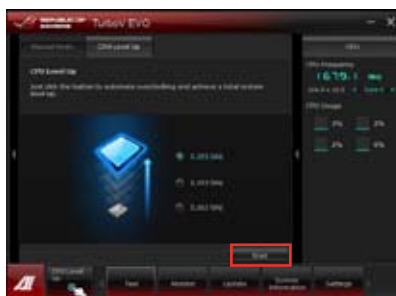


- The overclocking result varies with the CPU model and the system configuration.
- We recommend that you set up a better thermal environment to prevent overheating from damaging the motherboard.
- The CPU Level Up modes depend upon the CPU installed in your system.

Using CPU Level Up

1. Click **CPU Level UP** tab, choose the mode, and click **Start**.
2. Read the warning messages and click **OK** to start the auto-overclocking process.

TurboV automatically overclocks the CPU, saves the BIOS settings, and restarts the system.



3. After re-entering Windows, a message appears indicating successful overclocking. Click **OK** to exit.



4.3.3 DIGI+ Power Control

ASUS DIGI+ Power Control allows you to adjust VRM voltage and frequency modulation to enhance reliability and stability. It also provides the highest power efficiency, generating less heat to prolong the component lifespan and minimize power loss.

To launch DIGI+ Power Control, click **Tool > DIGI+ Power Control** on the AI Suite II main menu bar.

CPU Power



1 CPU Load-line Calibration

It allows you to adjust the voltage settings and control the system temperature. Higher load-line calibration could get higher voltage and good overclocking performance but increases the CPU and VRM thermal conditions.

2 CPU Current Capability

CPU Current Capability provides wider total power range for overclocking. A higher value setting gets higher VRM power consumption delivery

3 CPU Voltage Frequency

Switching frequency affects the VRM transient response and thermal components. Higher frequency gets quicker transient response.

4 CPU Power Phase Control

Increase phase number under heavy system loading to get more transient and better thermal performance. Reduce phase number under light system loading to increase VRM efficiency.

5 VRM Protection Threshold

It allows you to set the VRM protection to your motherboard from overheating accidents.

6 CPU Power Thermal Control

A higher temperature brings a wider CPU power thermal range, and extends the overclocking tolerance to enlarge overclocking potential.

7 CPU Power Duty Control

CPU Power Duty Control adjusts the current of every VRM phase and the thermal conditions of every phase component.

DRAM Power



1 DRAM Current Capability

A higher value brings a wider total power range and extends the overclocking frequency range simultaneously.

2 DRAM Voltage Frequency

Allows you to adjust the DRAM switching frequency for system stability or to increase OC Range.

3 DRAM Power Phase Control

Select Extreme for full phase mode to increase system performance or select Optimized for ASUS optimized phase tuning profile to increase DRAM power efficiency.

4 DRAM Power Thermal Control

A higher temperature brings a wider DRAM power thermal range, and extends the overclocking tolerance to enlarge overclocking potential.



- The actual performance boost may vary depending on your CPU specification.
- Do not remove the thermal module. The thermal conditions must be monitored. •

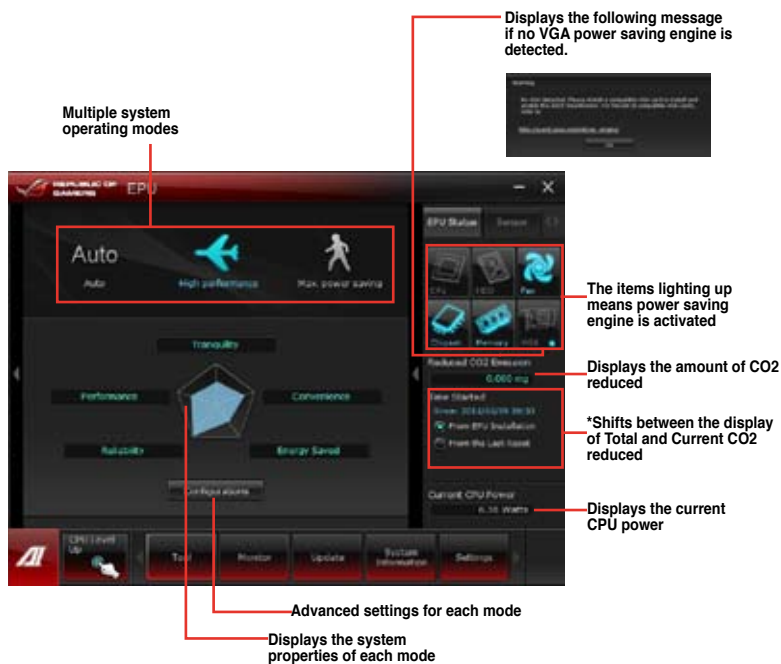
4.3.4 EPU

EPU is an energy-processing utility that provides several power-saving modes. When set to the Auto Mode, the system automatically changes its power-saving mode based on the current system condition.

You can also configure the system settings such as CPU frequency, GPU frequency, vCore Voltage, and Fan Control to customize a power-saving mode.

Launching EPU

To launch EPU, click **Tool > EPU** on the AI Suite II main menu bar.



- Select **From EPU Installation** to show the CO2 that has been reduced since you installed EPU.
- *Select **From the Last Reset** to show the total CO2 that has been reduced since you click the Clear button .
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

4.3.5 FAN Xpert 2

FAN Xpert 2 automatically detects and tweaks all fan speeds, and provides you with optimized fan settings based on the fans' specifications and positions.

Launching FAN Xpert 2

To launch FAN Xpert 2, click **Tool > FAN Xpert 2** from the AI Suite menu bar.

Using FAN Xpert 2 Auto Tuning

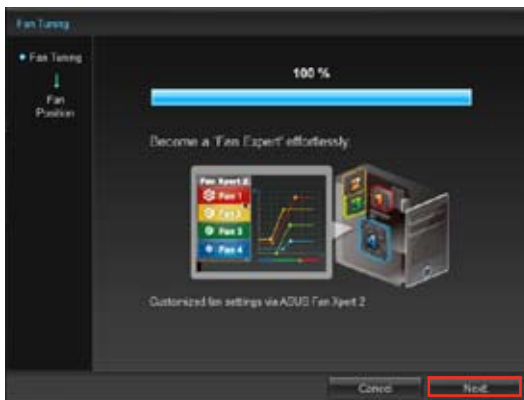
FAN Xpert 2's Fan Auto Tuning feature automatically detects the fans and their locations to provide you with optimized fan settings.

To use Fan Auto Tuning:

1. Click **Fan Auto Tuning** on the FAN Xpert 2 main menu.



2. Wait for the **Fan Auto Tuning Process** to complete, then click **Next**.





Do not remove your fan during the Fan Auto Tuning process.

- From the **Fan Position** screen, check and assign the locations of your fans, then click **OK** to exit the screen.



- Select any of these fan customized settings for each fan.
 - Silent:** Minimized fan speed for silent fan operation.
 - Standard:** Balanced configuration between noise level and fan speed.
 - Turbo:** High fan speed for high cooling capability.
 - Full Speed:** Maximum fan speed.



Select one customized setting

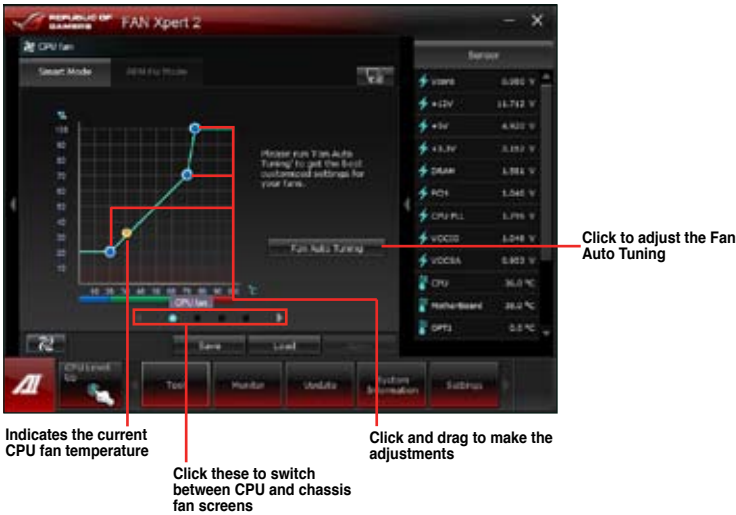
Advanced Mode

FAN Xpert 2's Advanced Mode button  allows you to adjust the reaction speed for fan rotation based on the system's temperature and to configure the fan's rotation per minute.



Smart Mode

The Smart Mode allows you to adjust the reaction speed for fan rotation based on the system's temperature.



RPM Fixed Mode

The RPM Fixed Mode tab allows you to set your fan speed when CPU temperature is below 75 degrees.



Click and drag to make the adjustments

Click to switch between CPU fan window and chassis fan windows 1 to 4



- To protect your CPU, the fan will not automatically turn off even if you set the CPU fan power to 0.
- Only 4-pin CPU fans and 4-pin and 3-pin chassis fans are compatible with FAN Xpert 2.
- FAN Xpert 2 may not be able to detect your fan speed if your fan has an external control kit for rotation speed.
- 2-pin fans are only allowed to run at full speed.

Fan Information

Click the Fan Information button  to see the details of each detected fan. You can click on either the table button  or the graph button  to see the results.



Click to see the results in table format



Click to see the results in graph format

4.3.6 USB 3.0 Boost

ASUS USB 3.0 Boost technology supports UASP (USB Attached SCSI Protocol) and automatically increases a USB 3.0 device's transfer speed up to 170%.

Launching USB 3.0 Boost

To launch USB 3.0 Boost, click **Tool > USB 3.0 Boost** on the AI Suite II main menu bar.

Configuring USB 3.0 Boost

1. Connect a USB 3.0 device to the USB 3.0 port.

USB 3.0 Boost automatically detects the property of the USB 3.0 device and switches to Turbo mode or UASP mode (if UASP is supported by the USB 3.0 device).

2. You can manually switch the USB 3.0 mode back to Normal mode at any time.



- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.
- Due to Intel® chipset limitation, Intel® USB 3.0 ports do not support ASUS 3.0 Boost in Windows XP operating system.
- Use the USB 3.0 devices for high performance. The data transfer speed varies with USB devices.

4.3.7 Ai Charger+

This utility allows you to fast-charge your portable BC 1.1* mobile devices on your computer's USB port three times faster than the standard USB devices**.



- * Check your manufacturer if your USB device is a Battery Charging Specification 1.1 (BC 1.1) compliant or compatible device.
- ** Actual charging speeds may vary depending on the charging rate and specifications of your USB device.
- To ensure normal charging function, disconnect and reconnect your USB device every time you enable or disable Ai Charger+.



4.3.8 USB Charger+

This utility allows you to fast-charge your portable USB devices even if your PC is off, in Sleep Mode, or Hibernate Mode.



When you enable the ErP-ready option in the BIOS, the USB Charger+ will not operate under Sleep Mode, Hibernate Mode and Off mode.

Launching the USB Charger+

To launch this utility, open the AI Suite II, then click **Tool > USB Charger+**.



* The illustration above shows that no device connected to your PC for fast-charging.

USB fast-charging mode settings

Click the dropdown box, and select a proper charge mode when your PC is off, in Sleep Mode, or Hibernate Mode.

- **Disable:** disables the USB fast-charging function.
- **ASUS:** fast-charges your connected ASUS devices.
- **Apple:** fast-charges your connected Apple devices.
- **Kindle:** fast-charges your Kindle devices.
- **Others:** charges other portable USB devices.



- The utility cannot detect the devices connected to your computer if the charging mode is enabled.
- Some USB devices may not support fast-charging with USB Charger+ to protect the voltage settings.

Setting up the charging function

When a portable device is connected to the USB port of the PC, the USB Charger+ automatically detects the kind of your device.

Charging the device

Click  to fast-charge your device.

Indicates that the portable device is in charging mode



Click to fast-charge your connected device.

Click to rescans the connected device.



Clicking the  stops the charging of your connected device, and rescans for other detected devices. Click the  to re-enable the fast-charging.

Disabling the charging function

Click  to stop charging your device.



Click to stop fast-charging the connected device.

4.3.9 Probe II

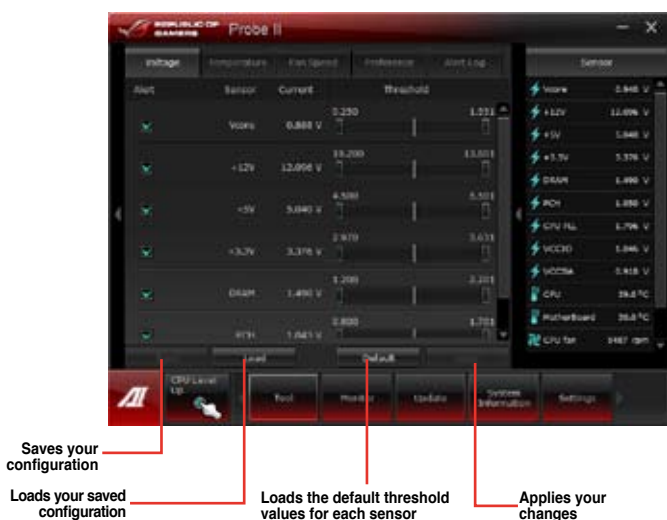
Probe II is a utility that monitors the computer's vital components, and detects and alerts you of any problem with these components. Probe II senses fan rotations, CPU temperature, and system voltages, among others. With this utility, you are assured that your computer is always at a healthy operating condition.

Launching Probe II

To launch Probe II, click **Tool > Probe II** on the AI Suite II main menu bar.

Configuring Probe II

Click the Voltage/Temperature/Fan Speed tabs to activate the sensors or to adjust the sensor threshold values. The Preference tab allows you to customize the time interval of sensor alerts, or change the temperature unit.



Click **Monitor > Sensor** on the AI Suite II main menu bar and the system status will appear on the right panel.

4.3.10 Sensor Recorder

Sensor Recorder monitors the changes in the system voltage, temperature, and fan speed on a timeline. The History Record function allows you to designate specific time spans on record to keep track of the three system statuses for certain purposes.

Launching Sensor Recorder

To launch Sensor Recorder, click **Tool > Sensor Recorder** on the AI Suite II main menu bar.

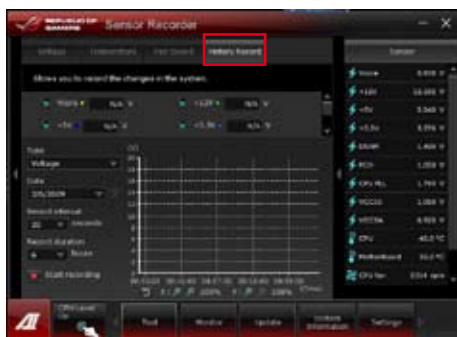
Using Sensor Recorder

Click on Voltage/ Temperature/ Fan Speed tabs for the status you want to monitor. Colored lines will automatically appear on the diagram to indicate the immediate changes in the system status.



Using History Record

1. Click the History Record tab and adjust the settings on the left for Record Interval and Record Duration according to need.
2. Click Start Recording to start measuring and recording each sensor.
3. To stop recording, click Recording again.
4. To track the recorded contents, set Type/ Date/ Select display items to display the history details.



Click on **Monitor > Sensor** on the AI Suite II main menu bar and a highlight of the system statuses will appear on the right panel.

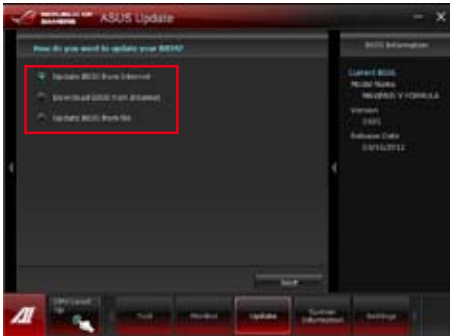
4.3.11 ASUS Update

ASUS Update is a utility that allows you to manage, save, and update the motherboard BIOS in Windows® environment.

Launching ASUS Update

To launch ASUS Update, click **Update > ASUS Update** on the AI Suite II main menu bar.

Using ASUS Update



Select any of these options to update the BIOS:

- **Update BIOS from Internet**

Allows you to download the latest BIOS version from the ASUS website at www.asus.com and follow the onscreen instructions to update the BIOS.

- **Download BIOS from Internet**

Download the latest BIOS version from the ASUS website at www.asus.com and save it for later use.

- **Update BIOS from file**

Use the BIOS file that you had downloaded and saved to update the system BIOS.

4.3.12 MyLogo2

MyLogo2 allows you to customize the boot logo, which is the image that appears on the screen during the Power On Self Tests (POST).

Launching MyLogo2

To launch MyLogo2, click **Update > MyLogo** on the AI Suite II main menu bar.

Using MyLogo



Select the option that you want to use to update your boot logo, click Next and follow the instructions below.

Change the boot logo of a downloaded BIOS file and update (or do not update) this BIOS to the motherboard

1. From the BIOS file field, click Browse to locate the BIOS file.
2. From the Picture File field, click Browse the image for your boot logo, then click Next.



3. Do any of the following:
 - Click Auto Tune to adjust the image size or the image resolution.
 - Click Booting Preview to preview the boot image.
4. Click Next.



5. Click Flash to update the boot logo.
6. When prompted, click Yes to reboot the system. You will see the new boot logo the next time you start up the system.



Ensure to enable the Full Screen Logo in BIOS to use this feature.

4.3.13 Audio configurations

The Realtek® audio CODEC provides 8-channel audio capability to deliver the ultimate audio experience on your computer. The software provides Jack-Sensing function, S/PDIF Out support, and interrupt capability. The CODEC also includes the Realtek® proprietary UAJ® (Universal Audio Jack) technology for all audio ports, eliminating cable connection errors, and giving users plug and play convenience.

Follow the installation wizard to install the Realtek® Audio Driver from the support DVD that came with the motherboard package.

If the Realtek® audio software is correctly installed, you will find the Realtek® HD Audio Manager icon on the taskbar. Double-click on the icon to display the Realtek HD Audio Manager.



A. **Realtek HD Audio Manager with DTS Connect and DTS UltraPC II for Windows® 7**

Configuration option tabs (vary with the audio devices connected)



DTS Connect

DTS Connect allows you to select an audio mode for a digital surround sound media entertainment.



DTS connect only works when you connect 5.1 and 7.1 channel speakers.

DTS UltraPC II

DTS UltraPC II allows you to enhance the audio output for playing movies, music, and games.

Tick to enable the DTS UltraPC feature and customize the settings.



B. Realtek HD Audio Manager for Windows® XP



- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.
- Due to Intel® Z77 platform does not support Windows® Vista™, Realtek HD Audio driver is only supported by Windows® 7™/Windows® XP™.
- To play Blu-Ray disc, make sure to use an HDCP compliant monitor.

4.3.14 ROG Connect

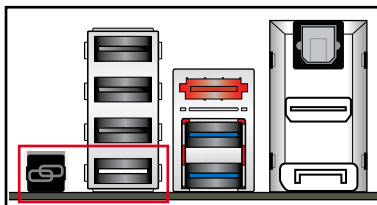
ROG Connect allows you to monitor and adjust the local PC through your remote PC.

Setting up USB connection between your local and remote PC



- Install ROG Connect on the remote PC from the provided Support DVD before using ROG Connect.
- ROG Connect must work with ROG Connect Plus to avail full function. Ensure that you install ROG Connect Plus on your local PC from the provided Support DVD before using ROG Connect.

1. Connect the provided ROG Connect cable to the local PC and the remote PC.
2. Press the ROG Connect Button and it will light up into a stable glow.
3. Double-click the RC TweakIt shortcut on the remote PC to activate the function



Using RC TweakIt

To use the RC TweakIt

1. Use the sliders and buttons to monitor or adjust your local PC.



2. Click Function to display more options.



RC Poster

RC Poster shows the status of the local system during the POST. You can switch the display mode between String and Code.



RC Remote

RC Remote allows you to operate your local system through the ROG Connect cable.



RC Diagram

RC Diagram allows you to monitor and record your local system status.



GPU TweakIt

GPU TweakIt allows you to control and monitor the installed GPU on the local system. Use the sliders to adjust the values and click Apply to save your customized settings.



4.3.15 GameFirst II

GameFirst II, a traffic shaping solution, improves the Internet latency while maintaining a high transfer rate, and reduces delays during data transfers or playing online games. It allows you to set programs' priorities and increase the bandwidth of your currently running games or programs.

GameFirst II attaches itself to Windows network stack to perform packet inspection, which is useful to online gamers and VOIP users.

To launch GameFirst, click **Start > All Programs > ASUS > ROG GameFirst II**.

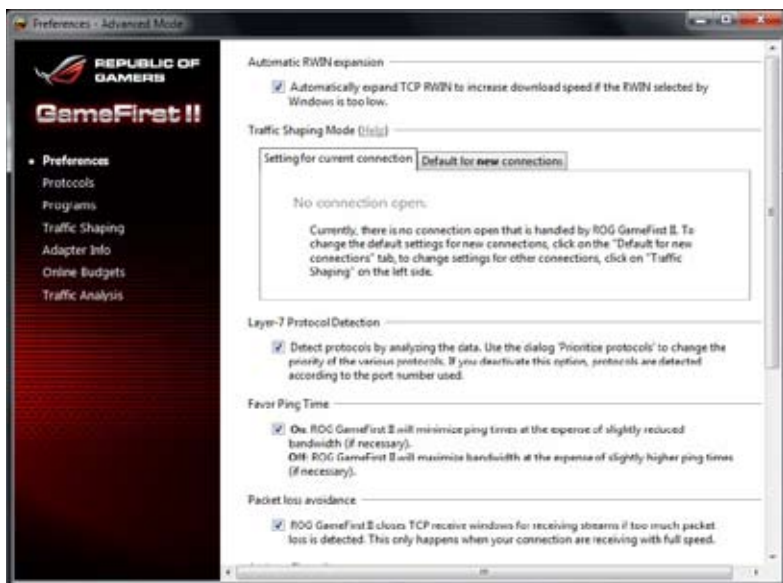
Using EZ Mode





- GameFirst II only works in Windows® operating systems.
- GameFirst II is powered by cFosSpeed software.
- cFosSpeed prioritizes the programs listed in GameFirst II.

Using Advanced Mode



Select any of the following settings to configure the priorities of your programs and network devices.

- **Preferences:** Allows you to control the network's traffic to optimize the program's performance, favor ping time, activate firewall, and avoid packet loss.
- **Protocols:** Allows you to set priority to the program's protocol and enter a transmission limit.
- **Programs:** Allows you to set priority to the programs.
- **Traffic Shaping:** Allows you to set priority to the network adapter and its protocol to reduce delay during data transfer, and speeds up the internet access.
- **Adapter Info:** Allows you to view the information of the adapters in your computer.
- **Online Budgets:** Allows you to set an online budget time to your network adapters.
- **Traffic Analysis:** Allows you to assign protocols and programs in one set.

4.3.16 MemTweakIt

MemTweakIt allows you to adjust the timing of your installed memory. It also allows you to save, validate and post your configuration on the ROG website depending on your DRAM Efficiency Score.

To use MemTweakIt:

1. Double-click  on the desktop.
2. Click the dropdown lists of your selected timings and select a timing value.
3. Click **Apply** to save and apply your configuration. Your **DRAM Efficiency Score** will be shown in **General** section.



A wrong configuration of the DRAM timings may result to an unstable system. Restart your system if needed.

4. Click **About** tab and click **REPUBLIC OF GAMERS** to access ROG official website.



5. Click **OK** to exit MemTweakIt.

Validating and saving your MemTweakIt settings

To validate and save your configuration online:

1. Launch MemTweakIt and click **Validate**.
2. In **Online Mode**, key in your ASUS account ID and password, and click **Submit**.



Your configuration will be displayed in MemTweakIt webpage.

3. Click **OK** to close the **Validation** window.



To validate and save your configuration manually:

1. Launch MemTweakIt and click **Validate**.
2. In **Manual Mode**, click **Save Configuration File**.



3. Key in a file name for your configuration file and click **Save**.
4. Click **validation webpage**.
5. In **MemTweakIt - Validation File Upload** window, key in your ASUS account ID and password.
6. Click **Browse**, locate the saved .cvf file, and click **Open**.
7. Click **Submit**.



Your configuration will be displayed in MemTweakIt webpage.

RAID support

5

5.1 RAID configurations

The motherboard supports the following SATA RAID solutions:

- Intel® Rapid Storage Technology with RAID 0, RAID 1, RAID 10 and RAID 5 support.



- You must install Windows® XP Service Pack 3 or later versions before using Serial ATA hard disk drives. The Serial ATA RAID feature is available only if you are using Windows® XP SP3 or later versions.
- Due to Windows® XP limitation, a RAID array with the total capacity over 2TB cannot be set as a boot disk. A RAID array over 2TB can only be set as a data disk only.
- If you want to install a Windows® operating system to a hard disk drive included in a RAID set, you have to create a RAID driver disk and load the RAID driver during OS installation. Refer to section **5.2 Creating a RAID driver disk** for details.

5.1.1 RAID definitions

RAID 0 (Data striping) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 (Data mirroring) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

5.1.2 Installing Serial ATA hard disks

The motherboard supports Serial ATA hard disk drives. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SATA hard disks for a RAID configuration:

1. Install the SATA hard disks into the drive bays.
2. Connect the SATA signal cables.
3. Connect a SATA power cable to the power connector on each drive.

5.1.3 Setting the RAID item in BIOS

You must enable the RAID function in the BIOS Setup before creating RAID sets using SATA HDDs. To do this:

1. Enter the BIOS Setup during POST.
2. Go to the **Advanced** menu > **SATA Configuration**, and then press <Enter>.
3. Set the SATA Mode item to [RAID Mode].
4. Save your changes, and then exit the BIOS Setup.



Refer to Chapter 3 for details on entering and navigating through the BIOS Setup



Due to chipset limitation, when SATA ports are set to RAID mode, all SATA ports run at RAID mode together.

5.1.4 Intel® Rapid Storage Technology Option ROM utility

To enter the Intel® Rapid Storage Technology Option ROM utility:

1. Turn on the system.
2. During POST, press <Ctrl> + <I> to display the utility main menu.

```
Intel(R) Rapid Storage Technology - Option ROM - v10.5.1.1070
Copyright(C) 2003-10 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 Devices:
Port Device Model      Serial #      Size  Type/Status (Vol ID)
0  ST3160812AS        9LS0HJA4      149.0GB Non-RAID Disk
1  ST3160812AS        9LS0F4HL      149.0GB Non-RAID Disk
2  ST3160812AS        3LS0JYL8      149.0GB Non-RAID Disk
3  ST3160812AS        9LS0Bj5H      149.0GB Non-RAID Disk

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

The navigation keys at the bottom of the screen allow you to move through the menus and select the menu options.

- 

The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.
- 

The utility supports maximum four hard disk drives for RAID configuration.

Creating a RAID set

To create a RAID set:

1. From the utility main menu, select **1. Create RAID Volume** and press <Enter>. The following screen appears:

```
Intel(R) Rapid Storage Technology - Option ROM - v10.5.1.1070
Copyright(C) 2003-10 Intel Corporation. All Rights Reserved.

[ CREATE VOLUME MENU ]
Name: Volume
RAID Level:
Disks:
Strip Size:
Capacity:
Sync:
Create volume

[ HELP ]

Enter a unique volume name that has no special characters and is
16 characters or less.

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

2. Enter a name for the RAID set and press <Enter>.
3. When the RAID Level item is selected, press the up/down arrow key to select a RAID level to create, and then press <Enter>.
4. When the Disks item is selected, press <Enter> to select the hard disk drives you want to include in the RAID set. The SELECT DISKS screen appears:

```
[ SELECT DISKS ]

Port Drive Model      Serial #      Size Status
0  ST3160812AS        9LS0H0A4     149.0GB Non-RAID Disk
1  ST3160812AS        9LS0F4HL     149.0GB Non-RAID Disk
2  ST3160812AS        3LS0JYL8     149.0GB Non-RAID Disk
3  ST3160812AS        9LS0BJ5H     149.0GB Non-RAID Disk

Select 2 to 6 disks to use in creating the volume.
[↑↓]-Prev/Next [SPACE]-SelectDisk [ENTER]-Done
```

5. Use the up/down arrow key to select a drive, and then press <Space> to select. A small triangle marks the selected drive. Press <Enter> after completing your selection.
6. Use the up/down arrow key to select the stripe size for the RAID array (for RAID 0, 10 and 5 only), and then press <Enter>. The available stripe size values range from 4KB to 128KB. The following are typical values:
 - RAID 0: 128KB
 - RAID 10: 64KB
 - RAID 5: 64KB



We recommend a lower stripe size for server systems, and a higher stripe size for multimedia computer systems used mainly for audio and video editing.

7. When the **Capacity** item is selected, enter the RAID volume capacity that you want and press <Enter>. The default value indicates the maximum allowed capacity.
8. When the **Create Volume** item is selected, press <Enter>. The following warning message appears:

WARNING: ALL DATA ON SELECTED DISKS WILL BE LOST
Are you sure you want to create this volume? (Y/N):

9. Press <Y> to create the RAID volume and return to the main menu, or <N> to go back to the CREATE VOLUME menu.

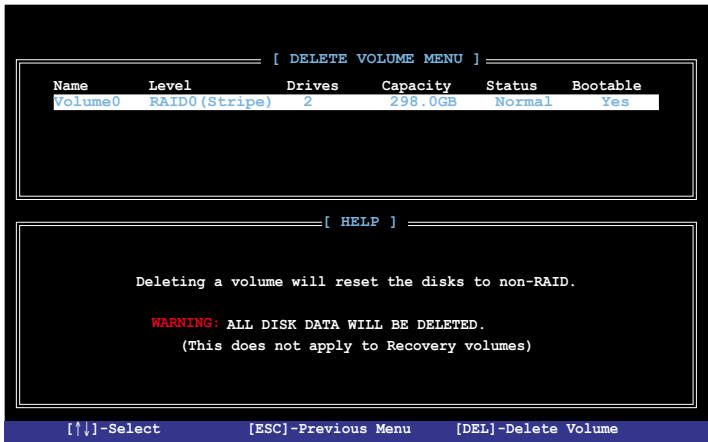
Deleting a RAID set



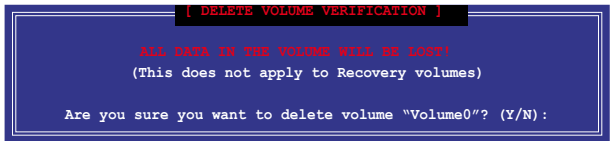
Be cautious when deleting a RAID set. You will lose all data on the hard disk drives when you delete a RAID set.

To delete a RAID set:

1. From the utility main menu, select **2. Delete RAID Volume** and press <Enter>. The following screen appears:



2. Use the up/down arrow key to select the RAID set you want to delete, and then press . The following warning message appears:



3. Press <Y> to delete the RAID set and return to the utility main menu, or press <N> to return to the DELETE VOLUME menu.

Exiting the Intel® Rapid Storage Technology Option ROM utility

To exit the utility:

1. From the utility main menu, select **5. Exit**, and then press <Enter>. The following warning message appears:



5.2 Creating a RAID driver disk

A floppy disk with the RAID driver is required when installing a Windows® operating system on a hard disk drive that is included in a RAID set.



- The motherboard does not provide a floppy drive connector. You have to use a USB floppy disk drive when creating a SATA RAID driver disk.
- Windows® XP may not recognize the USB floppy disk drive due to Windows® XP limitation. To work around this OS limitation, refer to section **5.2.4 Using a USB floppy disk drive**.

5.2.1 Creating a RAID driver disk without entering the OS

To create a RAID driver disk without entering the OS:

1. Boot your computer.
2. Press during POST to enter the BIOS setup utility.
3. Set the optical drive as the primary boot device.
4. Insert the support DVD into the optical drive.
5. Save changes and exit BIOS.
6. When the Make Disk menu appears, press <1> to create a RAID driver disk.
7. Insert a formatted floppy disk into the USB floppy disk drive, then press <Enter>.
8. Follow the succeeding screen instructions to complete the process.

5.2.2 Creating a RAID driver disk in Windows®

To create a RAID driver disk in Windows®:

1. Start Windows®.
2. Plug the USB floppy disk drive and insert a floppy disk.
3. Place the motherboard support DVD into the optical drive.
4. Go to the **Make Disk** menu, and then click **Intel AHCI/RAID Driver Disk** to create a RAID driver disk.
5. Select **USB floppy disk drive** as the destination disk.
6. Follow the succeeding screen instructions to complete the process.



Write-protect the floppy disk to avoid a computer virus infection.

5.2.3 Installing the RAID driver during Windows® OS installation

To install the RAID driver in Windows® XP:

1. During the OS installation, the system prompts you to press the <F6> key to install third-party SCSI or RAID driver.
2. Press <F6>, and then insert the floppy disk with RAID driver into the USB floppy disk drive.
3. When prompted to select the SCSI adapter to install, select the RAID driver for the corresponding OS version.
4. Follow the succeeding screen instructions to complete the installation.

To install the RAID driver for Windows® 7 or later OS:

1. During the OS installation, click **Load Driver** to allow you to select the installation media containing the RAID driver.
2. Insert the USB flash drive with RAID driver into the USB port or the support DVD into the optical drive, and then click **Browse**.
3. Click the name of the device you've inserted, go to **Drivers > RAID**, and then select the RAID driver for the corresponding OS version. Click **OK**.
4. Follow the succeeding screen instructions to complete the installation.



Before loading the RAID driver from a USB flash drive, you have to use another computer to copy the RAID driver from the support DVD to the USB flash drive.

5.2.4 Using a USB floppy disk drive

Due to OS limitation, Windows® XP may not recognize the USB floppy disk drive when you install the RAID driver from a floppy disk during the OS installation.

To solve this issue, add the USB floppy disk drive's Vendor ID (VID) and Product ID (PID) to the floppy disk containing the RAID driver. Refer to the steps below:

1. Using another computer, plug the USB floppy disk drive, and insert the floppy disk containing the RAID driver.

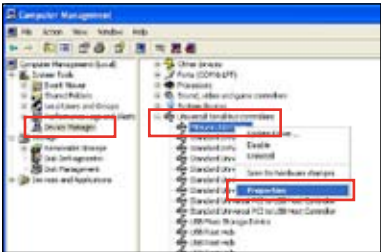
2. Right-click **My Computer** on the Windows® desktop or start menu, and then select **Manage** from the pop-up window.



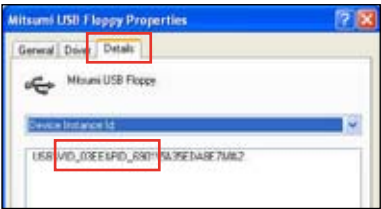
3. Select **Device Manager**. From the **Universal Serial Bus controllers**, right-click **xxxxxx USB Floppy**, and then select **Properties** from the pop-up window.



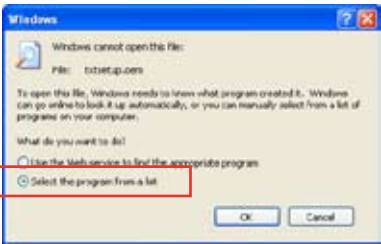
The name of the USB floppy disk drive varies with different vendors.



4. Click **Details** tab. The Vendor ID (VID) and Product ID (PID) are displayed.



5. Browse the contents of the RAID driver disk to locate the file **txtsetup.oem**.
6. Double-click the file. A window appears, allowing you to select the program for opening the oem file.



7. Use Notepad to open the file.



8. Find the `[HardwareIds.scsi.iaAHCI_DesktopWorkstationServer]` and `[HardwareIds.scsi.iaStor_DesktopWorkstationServer]` sections in the `txtsetup.oem` file.

9. Type the following line to the bottom of the two sections:

`id = "USB\VID_XXXX&PID_XXXX", "usbstor"`

```
[HardwareIds.scsi.iaAHCI
DesktopWorkstationServer]
id= "PCI\VEN_8086&DEV_1C02&CC_0106", "iaStor"
id= "USB\VID_03EE&PID_6901", "usbstor"

[HardwareIds.scsi.iaStor
DesktopWorkstationServer]
id= "PCI\VEN_8086&DEV_2822&CC_0104", "iaStor"
id= "USB\VID_03EE&PID_6901", "usbstor"
```



Add the same line to both sections.



The VID and PID vary with different vendors.

10. Save and exit the file.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Multiple GPU support

6

6.1 AMD® CrossFireX™ technology

The motherboard supports the AMD® CrossFireX™ technology that allows you to install multi-graphics processing units (GPU) graphics cards. Follow the installation procedures in this section.

6.1.1 Requirements

- In Dual CrossFireX mode, you should have two identical CrossFireX-ready graphics cards or one CrossFireX-ready dual-GPU graphics card that are AMD® certified.
- Ensure that your graphics card driver supports the AMD CrossFireX technology. Download the latest driver from the AMD website (www.amd.com).
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system. See Chapter 1 for details.



-
- We recommend that you install additional chassis fans for better thermal environment.
 - Visit the AMD Game website (<http://game.amd.com>) for the latest certified graphics card and the supported 3D application list.
-

6.1.2 Before you begin

For AMD CrossFireX to work properly, you have to uninstall all existing graphics card drivers before installing AMD CrossFireX graphics cards to your system.

To uninstall existing graphics card drivers:

1. Close all current applications.
2. For Windows XP, go to **Control Panel > Add/Remove Programs**.
For Windows 7, go to **Control Panel > Programs and Features**.
3. Select your current graphics card driver/s.
4. For Windows XP, select **Add/Remove**.
For Windows 7, select **Uninstall**.
5. Turn off your computer.

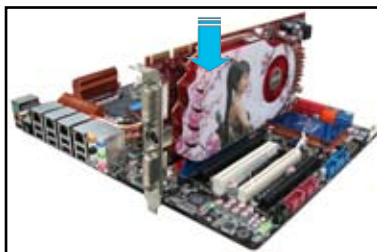
6.1.3 Installing two CrossFireX™ graphics cards



The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

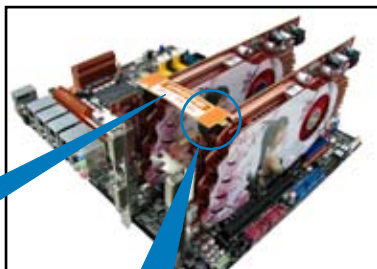
1. Prepare two CrossFireX-ready graphics cards.

2. Insert the two graphics card into the PCIEX16 slots. If your motherboard has more than two PCIEX16 slots, refer to Chapter 1 in this user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.



3. Ensure that the cards are properly seated on the slots.

4. Align and firmly insert the CrossFireX bridge connector to the goldfingers on each graphics card. Ensure that the connector is firmly in place.

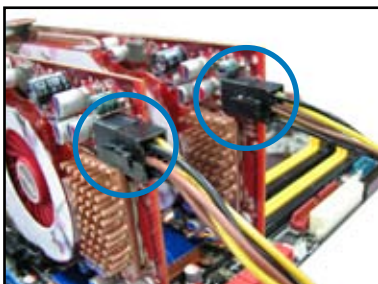


CrossFireX bridge
(bundled with
graphics cards)



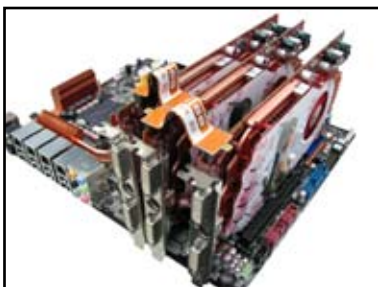
Goldfingers

5. Connect two independent auxiliary power sources from the power supply to the two graphics cards separately.
6. Connect a VGA or a DVI cable to the graphics card.

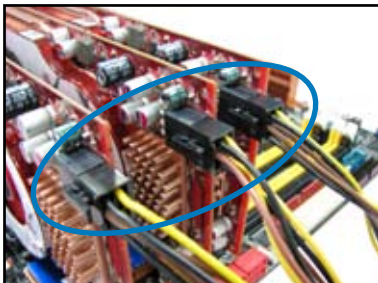


6.1.4 Installing three CrossFireX™ graphics cards

1. Prepare three CrossFireX-ready graphics cards.
2. Insert the three graphics card into the PCIEX16 slots. If your motherboard has more than three PCIEX16 slots, refer to Chapter 1 in this user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.
3. Ensure that the cards are properly seated on the slots.
4. Align and firmly insert the two CrossFireX bridge connectors to the goldfingers on each graphics card. Ensure that the connectors are firmly in place.



5. Connect three independent auxiliary power sources from the power supply to the three graphics cards separately.
6. Connect a VGA or a DVI cable to the graphics card.



6.1.5 Installing the device drivers

Refer to the documentation that came with your graphics card package to install the device drivers.



Ensure that your PCI Express graphics card driver supports the AMD® CrossFire™ technology. Download the latest driver from the AMD website (www.amd.com).

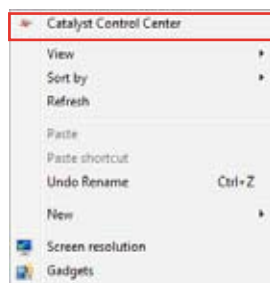
6.1.6 Enabling the AMD® CrossFire™ technology

After installing your graphics cards and the device drivers, enable the CrossFire™ feature through the AMD Catalyst™ Control Center in Windows environment.

Launching the AMD Catalyst Control Center

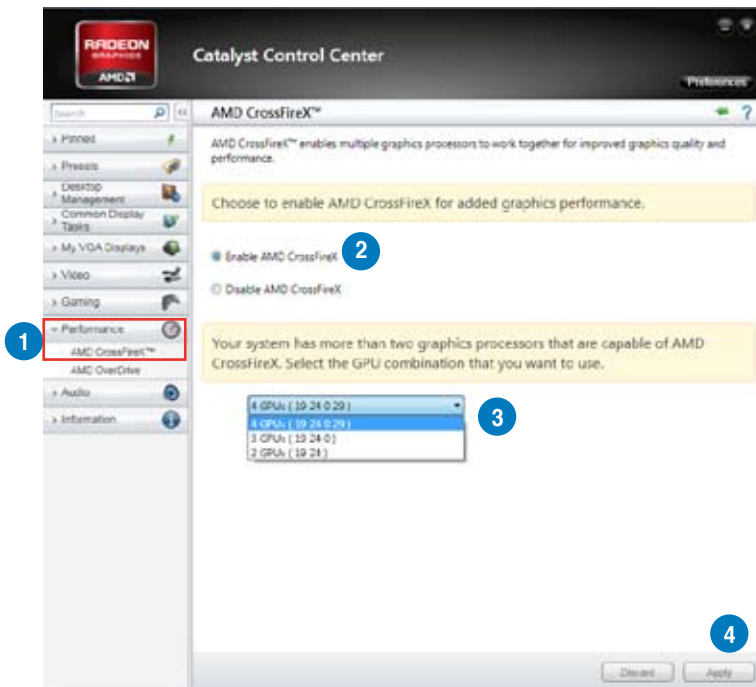
To launch the AMD Catalyst Control Center:

1. Right-click on the Windows® desktop and select **Catalyst Control Center**.
2. Click **Catalyst Control Center** to configure the displays and settings of your AMD graphic cards.



Enabling Dual CrossFireX technology

1. In the Catalyst Control Center window, click **Performance > AMD CrossFireX™**.
2. Select **Enable CrossFireX™**.
3. Select a GPU combination from the drop-down list.
4. Click **Apply** to save and activate the GPU settings made.



6.2 NVIDIA® SLI™ technology

The motherboard supports the NVIDIA® SLI™ (Scalable Link Interface) technology that allows you to install multi-graphics processing units (GPU) graphics cards. Follow the installation procedures in this section.

6.2.1 Requirements

- In SLI mode, you should have two identical SLI-ready graphics cards that are NVIDIA® certified.
- Ensure that your graphics card driver supports the NVIDIA SLI technology. Download the latest driver from the NVIDIA website at www.nvidia.com.
- Ensure that your power supply unit (PSU) can provide at least the minimum power required by your system.



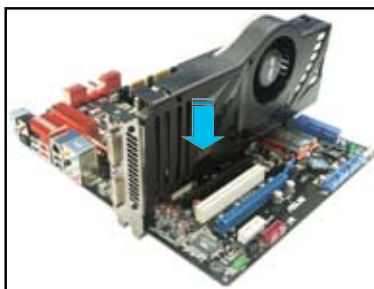
- We recommend that you install additional chassis fans for better thermal environment.
- This motherboard only supports up to 2-WAY SLI graphic cards.
- Visit the NVIDIA zone website (<http://www.nzone.com>) for the latest certified graphics card and supported 3D application list.

6.2.2 Installing two SLI-ready graphics cards

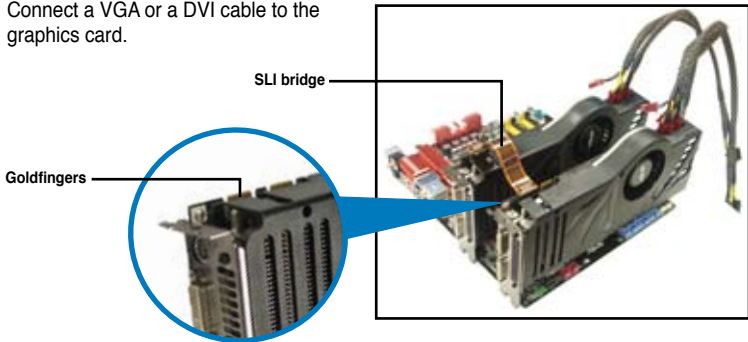


The following pictures are for reference only. The graphics cards and the motherboard layout may vary with models, but the installation steps remain the same.

1. Prepare two SLI-ready graphics cards.
2. Insert the two graphics card into the PCIEX16 slots. If your motherboard has more than two PCIEX16 slots, refer to Chapter 2 in this user manual for the locations of the PCIEX16 slots recommended for multi-graphics card installation.



4. Align and firmly insert the SLI bridge connector to the goldfingers on each graphics card. Ensure that the connector is firmly in place.
5. Connect two independent auxiliary power sources from the power supply to the two graphics cards separately.
6. Connect a VGA or a DVI cable to the graphics card.



6.2.3 Installing the device drivers

Refer to the documentation that came with your graphics card package to install the device drivers.



Ensure that your PCI Express graphics card driver supports the NVIDIA® SLI™ technology. Download the latest driver from the NVIDIA website (www.nvidia.com).

6.2.4 Enabling the NVIDIA® SLI™ technology

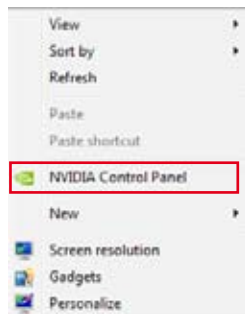
After installing your graphics cards and the device drivers, enable the SLI feature in NVIDIA® Control Panel under the Windows® 7 operating system.

Launching the NVIDIA Control Panel

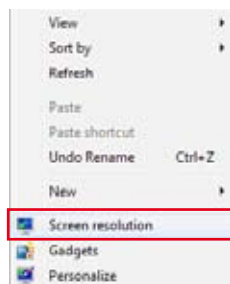
You can launch the NVIDIA Control Panel by the following two methods.

- A. Right click on the empty space of the Windows® desktop and select **NVIDIA Control Panel**.

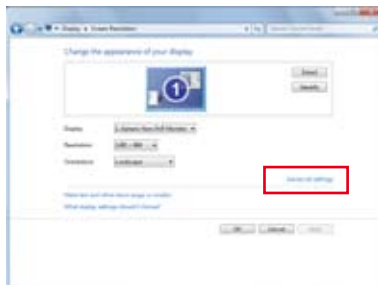
The NVIDIA Control Panel window appears (See Step B3).



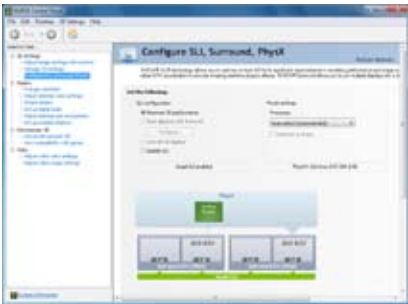
- B1. If you cannot see the NVIDIA Control Panel item in step (A), select **Screen Resolution**.



- B2. From the Screen Resolution window, click **Advanced settings**.

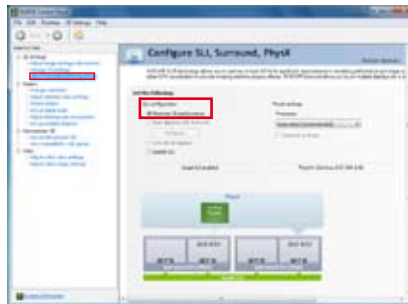


- B3. The NVIDIA Control Panel window appears.



Enabling SLI settings

From the NVIDIA Control Panel window, select **Configure SLI, Surround, PhysX**. In the **Quad-SLI enabled**, click **Maximize 3D Performance SLI** to set the display for viewing SLI rendered content. When done, click **Apply**.



6.3 LucidLogix Virtu MVP

LucidLogix Virtu MVP allows your computer's VGA output and discrete graphic cards to perform better, respond faster and process media files smoother within a low power environment. Its GPU virtualization assigns tasks to the best available graphic source while the newly-designed Virtual Vsync gives you a smoother gaming experience.



-
- LucidLogix Virtu MVP supports Windows 7® operating systems.
 - Intel® Quick Sync Video feature is supported by the 3rd/2nd generation Intel® Core™ processor family.
 - iGPU Multi-Monitor support option must be enabled in BIOS and install both Intel® Graphics Accelerator, and graphics card driver before installing LucidLogix Virtu MVP from ASUS support DVD. Refer to **3.5.4 System Configuration** for details.
 - Hyperformance® and Virtual VSync are enabled when using more than one discrete GPU at the same time.
 - Supports NVIDIA® GF4xx/5xx series and AMD® HD5xxx/6xxx series graphic cards.
 - We do not recommended that you use LucidLogix Virtu MVP under RAID mode.
-

6.3.1 Installing LucidLogix Virtu MVP

To install LucidLogix Virtu MVP:

1. Insert the support DVD in the optical drive. The ASUS Support Wizard appears if your computer has enabled the Autorun feature.
2. Click the **Utilites** tab, then click **LucidLogix Virtu MVP Software**.
3. Follow the succeeding onscreen instructions to complete the installation.



After you successfully installed the LucidLogix Virtu MVP, the LucidLogix Virtu MVP icon appears in the notification area.

6.3.2 Setting up your display

LucidLogix Virtu MVP solution comes with two distinct modes that allows you to enjoy better graphics either from your built-in video output (i-Mode) or from a discrete graphics card (d-Mode).

i-Mode

To use LucidLogix Virtu MVP in i-Mode, the display must be connected to the onboard video output.



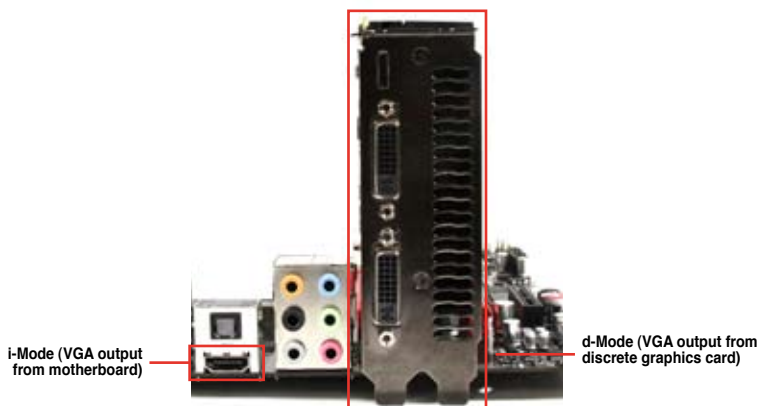
Ensure to set the Primary Display to iGPU in BIOS to activate i-Mode support.

d-Mode

To use LucidLogix Virtu MVP in d-Mode, the display must be connected to the installed graphics card.



-
- Ensure to set the Primary Display to PCIE or PCIE/PCI in BIOS to enable d-Mode support.
 - d-Mode is recommended for an enhanced 3D gaming performance.
-

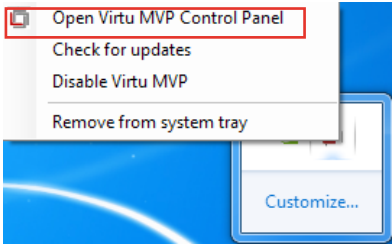


The motherboard's IO ports and discrete graphic card is for reference only and may vary in different models.

6.3.3 Configuring LucidLogix Virtu MVP

Launch the Virtu MVP Control Panel to allow you to configure the main features, adjust the performance settings and select applications for graphical virtualization.

To open the control panel, right-click **LucidLogix Virtu MVP** icon in the notification area and select **Open Virtu MVP Control Panel**.



LucidLogix Virtu MVP is automatically activated when your system is powered on. Select **Remove from system tray** if you want to remove LucidLogix Virtu MVP icon from the notification area.

Main

Allows you to turn ON/OFF the GPU virtualization. Also from the Main tab, you can set to show or hide the In-Game icon.



Click to turn ON/OFF the LucidLogix Virtu MVP

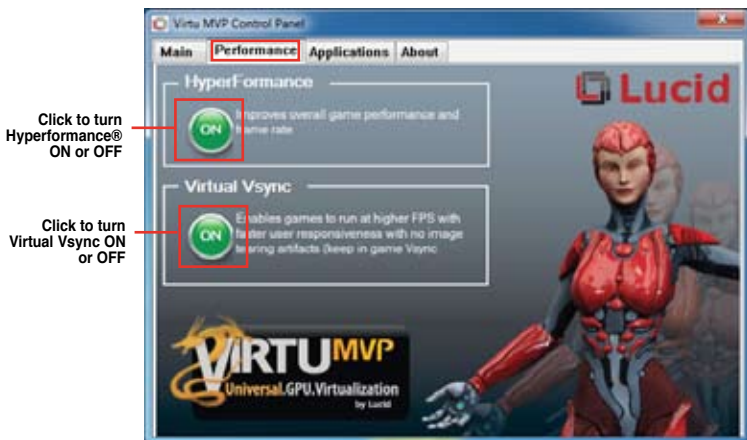
Click to restore to default settings

Tick to show icon in system tray

Select display option for In-Game icon

Performance

Allows you to turn ON/OFF the Hyperformance® or Virtual Vsync function.



Applications

Allows you to select applications for graphic virtualization.



See the descriptions of these columns below:

- D column allows you to run applications with the discrete graphic card. Select **D** to enable 3D graphical performance for that application.
- I column allows to run applications with iGPU. Select **I** for applications with media extensive performance.
- H column allows you to run applications with Hyperperformance®. Tick **H** to enhance graphical performance for that application.



Actual graphical performance varies with the application used and graphics card installed.

Intel® technologies

7

7.1 Intel® 2012 Desktop responsiveness technologies

This section details the overview of the installation and configuration procedures of the Intel® 2012 Desktop responsiveness technologies.

Intel® 2012 Desktop responsiveness technologies feature the three technologies:

- Intel® Smart Response Technology
- Intel® Rapid Start Technology
- Intel® Smart Connect Technology

System Requirements

In order for the system to run smoothly for the Intel® 2012 Desktop responsiveness, your system must meet the following requirements.

CPU: Intel® 3rd/2nd generation Core Processor family

OS: Windows® 7 operating systems

SSD: One dedicated SSD (Solid State Disk) to support Intel® Smart Response and Intel® Rapid Start Technology is necessary.



Refer to the **SSD Capacity Requirements** table for the information of SSD size, partition capacity, and system memory requirements.

HDD: At least one HDD (Hard Disk Drive) for the system OS drive.

DRAM: To enable Intel® Rapid Start Technology, DRAM size smaller than 8GB is required.



Ensure to enable the acceleration of Intel® Smart Response Technology before creating the partition for the Intel® Rapid Start Technology.

SSD Capacity Requirements

SSD Partition Capacity Requirements		System DRAM		
		2GB	4GB	8GB
Intel® storage combinations	Intel® Rapid Start	2GB	4GB	8GB
	Intel® Smart Response	20GB	20GB	20GB
	Intel® Smart Response and Intel® Rapid Start	Separate 20GB and 2GB partition (SSD size > 22GB)	Separate 20GB and 4GB partition (SSD size > 24GB)	Separate 20GB and 8GB partition (SSD size > 28GB)
	Intel® Smart Response, Intel® Rapid Start, and Intel® Smart Connect	Separate 20GB and 2GB partition (SSD size > 22GB)	Separate 20GB and 4GB partition (SSD size > 24GB)	Separate 20GB and 8GB partition (SSD size > 28GB)



- The SSD used for Intel® Rapid Start and Intel® Smart Response is not allowed for creating RAID.
- Due to OS behavior, Intel® Rapid Start Technology does not work efficiently with over 4GB system memory under Windows® 7 32-bit operating system.
- Only Intel® internal SATA ports (gray and blue) support Intel® 2012 Desktop responsiveness technologies.
- The performance of Intel® Smart Response Technology and Intel® Rapid Storage Technology vary with the installed SSD.

7.1.1 Intel® Smart Response Technology

Intel® Smart Response Technology boosts overall system performance. It uses an installed fast SSD (min. 20GB available) as a cache for frequently accessed operations, speeding up hard drive/main memory interaction. It accelerates the hard drive speeds, reduced load and wait time, and maximizes storage use. It also reduces hard drive spin thus reducing unnecessary hard drive spin.



Before applying Intel® Smart Response Technology, setting the SATA Mode BIOS item to [RAID mode] in BIOS setup is necessary. Refer to section **3.5.3 SATA Configuration** for details.

Installing Intel® Smart Response Technology

1. Place the support DVD to the optical drive. If Autorun is enabled in your computer, the DVD automatically displays the installation wizard.
2. Click the **Drivers** tab, then click Intel® Rapid Storage Technology Driver software.
3. Follow the onscreen instructions to complete the installation.

Using the Intel® Smart Response Technology

1. Click **Accelerate** to launch Smart Response Technology settings.



2. Do the following:
 - a. Select the SSD you want to use to accelerate your storage system.
 - b. Select the size allocated for SSD caching.
 - c. Select the hard drive to accelerate.
 - d. Select any of these enhanced modes:

Enhanced mode: WRITE THROUGH, write to SSD and HDD at the same time.

Maximized mode: WRITE BACK, write to SSD and write back to HDD in a later time.



3. Select **Disable Acceleration** to disable this function, and select **Change Mode** to switch acceleration mode to Enhanced/Maximized.



- To enable Intel® Smart Response Technology, you need at least one SSD ($\geq 20\text{GB}$) and an HDD, and only one SSD can be assigned for caching.
- If you want to restore the OS, go to **BIOS Option ROM > Acceleration Options** and remove the **Disks/Volume Acceleration** to disable Intel® Smart Response Technology.
- The maximum caching size on the SSD is 64GB. If it exceeds, the storage capacity left out for caching can still be identified by the system for normal storage.

7.1.2 Intel® Rapid Start Technology

Intel® Rapid Start Technology allows you to quickly resume your computer from sleeping mode. Saving your computer's system memory to the configured SSD provides a faster wake-up response time, but keeps the energy in a low profile.



- Before applying Intel® Rapid Start Technology, go to Advanced Mode > Advanced > PCH Configuration in BIOS item, and enable Intel® Rapid Start Technology.
- Ensure to follow the procedure **Creating a partition** precisely to enable the Intel Rapid Start function. Error message appears if you install the Intel® Rapid Start Utility before creating a partition.

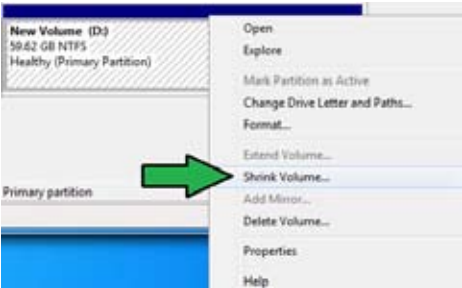
Creating a partition



- Ensure to backup your data before using the Microsoft partition tool. Incorrect partitioning process will result to data loss.
- Adjusting the DRAM to a high frequency will result to unstable system performance.

1. Go to **Start**, right-click **Computer > Manage > Disk Management**.
2. Select the SSD that you want to create the partition.

3. Right click the New Volume that you want to shrink from, and select Shrink Volume.



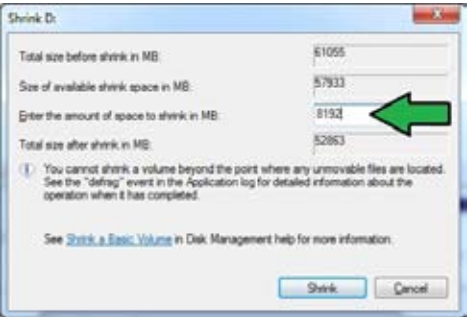
4. If your SSD is not initialized and unformatted:
 - a. Right click the disk that you want to create the partition, and select **Initialize**.
 - b. Right click the unallocated volume, select **New Simple Volume**, and follow the remaining steps.



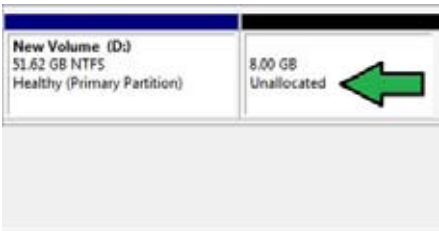
If your SSD is smaller than 64GB, and is set to **Full disk capacity** caching option for Intel® Smart Response, you can not see any volume in the Disk Management. Ensure to set your cache memory value of **18.6GB** in Intel® Smart Response to allow enough capacity for the Intel® Rapid Start partition.

5. Key in the required partition size, and must be equal to the system DRAM memory (1GB = 1024MB). Click Shrink.

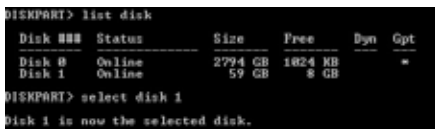
Go to **Start > Control Panel > System and Security > System**, and check the DRAM size information.



The unallocated volume is allocated to the selected disk.



- To launch the disk partitioning tool, click **Start > Programs > Accessories > Command Prompt tool**.
- Type **diskpart** and press <Enter>.
- In the diskpart prompt, type **list disk** after **DISKPART**, and press <Enter>. Select the disk with the unallocated volume by typing **select disk x** (x = disk number), and press <Enter>.



- The value “**x**” refers to a disk number where you created the unallocated partition.
- Refer to step 5 for details about the unallocated disk space in the SSD.

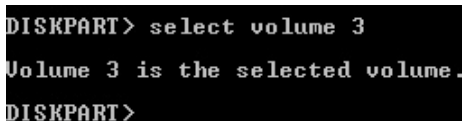
9. Type **create partition primary**, and press <Enter>.



- After creating a primary partition, type **detail disk**, and press <Enter> to view the details of the partitioned disk.

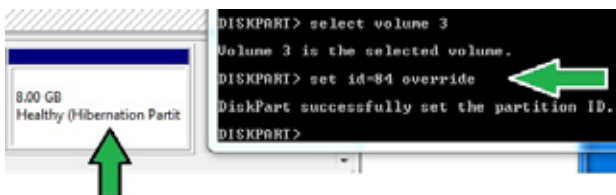


11. Select the RAW volume which has the same size as the shrunk volume, type **select volume x** (x = number), and press Enter to store the Intel® Rapid Start partition.



The value “x” refers to a disk number where you want to create the store partition.

12. Type **set id=84 override**, press <Enter>, and wait for the “shrinking process” until the Disk Management utility identifies a new partition called **Hibernation Partition**.



The **Hibernation Partition** does not appear when you choose “GPT (GUID Partition Table store type)”. Ensure the “Unallocated” disappears from the volume, and a new partition is identified.

13. Reboot the system after creating the partition.



The partition for Intel® Rapid Start Technology is incomplete if the computer is not rebooted, and this results to function failure of Intel® Rapid Start Technology.

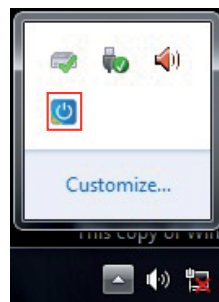
Enabling and disabling the Intel® Rapid Start Technology under the OS



Install the Intel® Rapid Start Technology first from your support DVD in order to launch the Intel® Rapid Start Manager.

After creating the partition, launch the Intel® Rapid Start Manager to enable or disable the Intel® Rapid Start Technology.

1. Click the **Show hidden icons** arrow from the right side of the taskbar, and click **Intel® Rapid Start Technology Manager** icon.



2. Tick **On** in the Status field to enable the function, and click **Save**.

Select and click to enable or disable the function

Click to enable or disable battery saving mode. This function only applies to notebooks.

Click to enable or disable the timer. When enabled, move the scroll bar to the desired time. When the system is idle for more than the time period you set, the system automatically goes into the Intel® Rapid Start mode. Default time is 10 minutes.

Click to save the settings made.

Click to cancel the settings made.

Recovering the partition

This procedure allows you to delete the Intel® Rapid Start Technology from your system, and recover the partition you made for the Intel Rapid® Start Technology installation.

1. Run the **Command Prompt** tool.
2. Type **diskpart** and press <Enter>.
3. At the diskpart prompt, type **list disk** after DISKPART, and press <Enter>.

```
DISKPART> list disk

Disk ###  Status   Size  Free  Dye  Gpt
-----  -
Disk 0    Online   2794 GB  1024 KB
Disk 1    Online    59 GB    0 B
```

4. Select the disk (SSD) where the Intel® Rapid Start Technology is installed for volume recovery, type **select disk x** (x = number), and press <Enter>.

```
DISKPART> select disk 1

Disk 1 is now the selected disk.
DISKPART> _
```



The value "x" refers to a disk number where you want to delete the store partition.

5. Type **list partition**, press Enter, and select the partition where the Intel® Rapid Start Technology is installed by typing **select partition x** (x = number), and press <Enter>.

```
DISKPART> list partition

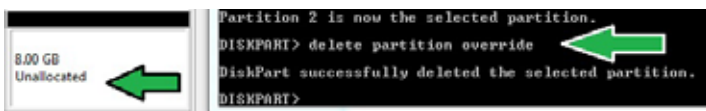
Partition ###  Type              Size      Offset
-----
Partition 1    Primary            51 GB     1024 KB
Partition 2    OEM                8 GB      51 GB

DISKPART> select partition 2
Partition 2 is now the selected partition.
DISKPART>
```

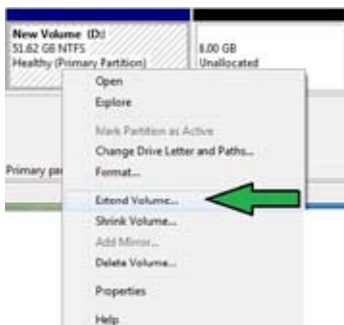


The value “x” refers to a disk number where you want to delete the store partition.

6. Type **delete partition override**, and press <Enter>. The diskpart utility deletes the selected partition.



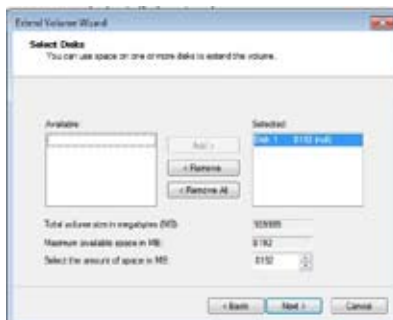
7. In the desktop, click **Start**, right-click **Computer**, and click **Manage**.
8. In the Computer Management window, click **Disk Management**, right click the shrunk new volume, and select **Extend Volume**.



9. As the Extend Volume Wizard appears, click **Next**.



10. Click **Next** after selecting the default selected disk.
11. Extend volume setup is completed. Click **Finish** to recover the Intel® Rapid Start Technology partition.
12. Reboot the system after deleting the partition.
13. Go to **Start > Control Panel > Programs > Programs and Features** to remove the Intel® Rapid Start Manager for the complete deletion of Intel® Rapid Start Technology.



7.1.3 Intel® Smart Connect Technology

The Intel® Smart Connect Technology is a feature that provides the latest content updates and energy efficiency to your computer's platform.

Once installed and activated, the Intel® Smart Connect Technology periodically wakes up the system from sleeping mode, performs user state gathering, and initiates re-entry to sleeping mode to wake-up after a set time interval.



- Intel® Smart Connect Technology supports Windows® Live Mail, Microsoft Outlook, and Seemsc applications.
- It is necessary to enable the items of the PCH Configuration in the BIOS before applying the Intel® Smart Connect Technology. Go to **Advanced Mode > Advanced > PCH Configuration**, and enable the Intel® Smart Connect Technology.

Installing the Intel® Smart Connect Technology

1. Place the support DVD to the optical drive.
2. Go to **Utilities**, and click Intel® Smart Connect Technology.
3. As the setup wizard appears, click **Next** to begin the setup.
4. Tick **I accept the terms in the License Agreement**, and click **Next**.
5. Select all and click **Next** for Custom Setup.
6. Click **Install** to proceed the installation.
7. Click **Yes** to restart your system, and for the newly installed Intel® Smart Connect Technology to take effect.



Using the Intel® Smart Connect Technology



- Before the system goes to sleep mode, ensure to keep your applications on the desktop, and enter the applications, passwords.
- Ensure that the internet is in connection when enabling the Intel® Smart Connect Technology.

1. Click **Start > All Programs > Intel > Intel® Smart Connect Technology**.
2. In the **Basic** tab, click **Enable Updating**. When enabled, the **Advanced** tab is available for advanced function settings.

The **Advanced** tab is activated when updating is enabled

Click to view version information and help topics

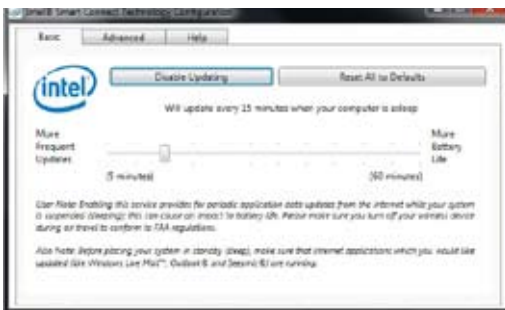
Click to configure the basic settings

Click to enable or disable the function

When the scroll bar is activated, adjust the waking up time period for Internet data update.

When updating is enabled, click to reset all settings to default.

3. To disable the updating function, click **Disable Updating**. Clicking this button automatically disables the configuration in the **Advanced** tab. To reset to defaults, click **Reset All to Defaults**.



4. In the **Advanced** tab, set up the schedule during low power usage time period for power saving. This setting only applies to the assigned time period.



5. In the **Help** tab, click **About** to view the feature's version. Click **Topics** to learn more about the Intel® Smart Connect Technology and its configuration.

ThunderFX

8

8.1 Hardware introduction

8.1.1 Front panel



1 Power LED

Indicates that the ThunderFX is turned on and connected to a PC, PS3, or Xbox 360.



- Before initialization, the LED light does not light up when connecting the ThunderFX to devices for the first time.
- The LED light dims out when the PC/PS3/Xbox 360 devices enter Sleep mode.

2 Device mode knob

Turn the knob to select the audio source from PC, PS3, or Xbox 360.



- Turn the knob to the desired audio source before connecting the USB cable.
- Turn the knob to PS3 or Xbox 360 mode for analog signal output use such as iPhone, iPad, iPod or mp3 player.

3**Volume control knob**

Turn the volume control knob to change the output volume from the external headset and microphone. Press the knob to select **Master**, **Voice**, or **Game** mode and turn it to control the volume.

PS3 and Xbox 360 modes

- **Master:** Simultaneously adjusts the game volume and chat volume of your fellow players.
- **Voice:** Adjusts the chat volume of your fellow players.
- **Game:** Adjusts the game volume.

PC mode

- **Master:** Adjusts the output volume.
- **Voice:** Adjusts the input volume.

4**Mode LED**

Indicates the current mode.

5**3.5mm Headphone output jack**

Connect the headphone to this jack.

6**Microphone input jack**

Connect the external microphone to this jack.

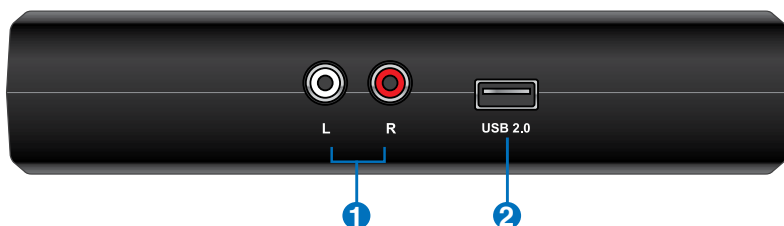
7**2.5mm Xbox 360 voice input jack**

Connect the Xbox 360 controller to this jack.

8**ENC built-in mic and ENC LED**

The built-in microphone reduces environmental noise. You can enable ENC function through the ThunderFX utility. The LED lights up when ENC is enabled.

8.1.2 Rear panel



-
- 1 RCA Audio input**
Connects with PS3 and Xbox 360 RCA output connectors. It also allows you to connect with the bundled ThunderFX Xbox 360 AV +3.5mm to RCA cable for analog input.

-
- 2 USB 2.0 port**
Use the bundled Dual-head USB cable to connect the ThunderFX with your PC, PS3, or Xbox 360 device.



For more details on connecting your devices, refer to section **8.2 Connecting your devices**.

8.2 Connecting your devices



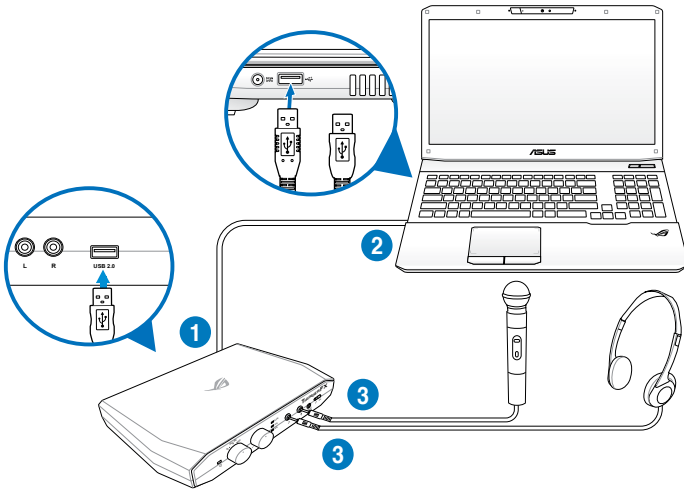
Switch to the desired mode first before connecting the Dual-head USB cable.

Select the correct headphone impedance in the utility before turning on the ThunderFX.

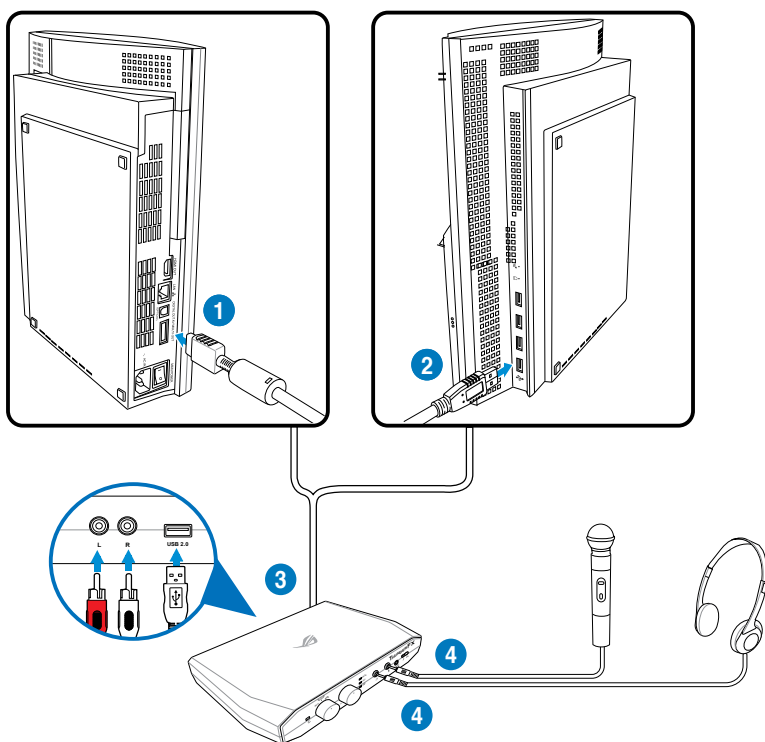
8.2.1 Connecting to PC



- We recommend that you use the main connecting end of the Dual-head USB cable to your PC/consoles. The single-head end must be connected to your ThunderFX.
- For power and signal stability, use both USB connections on the dual-head end for extra power under PC mode.



8.2.2 Connecting to PlayStation3™



Configuring the PlayStation3™

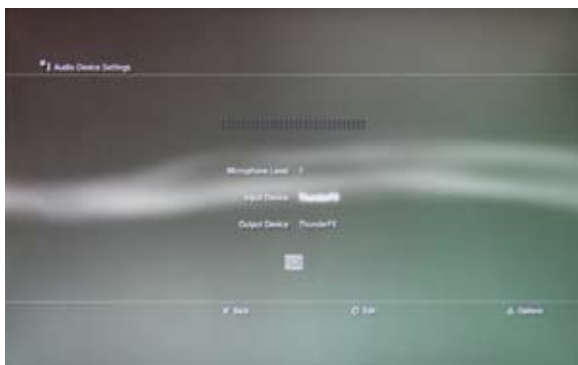
To configure the sound output:

1. Go to **Settings> Sound Settings> Audio Output Settings**.
2. Select **Audio Input Connector/SCART/AV MULTI**.
3. Select **OK** to continue.



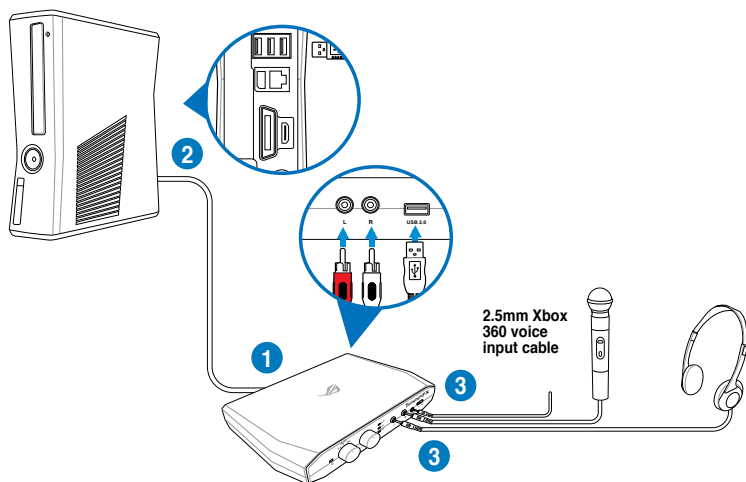
To configure the microphone:

1. Go to **Settings> Accessory Settings> Audio Device Settings**.
2. Go to Input Device and select **ThunderFX**.
3. Go to Output Device and select **ThunderFX**.
4. Select **OK** to continue.



8.2.3 Connecting to Xbox 360™

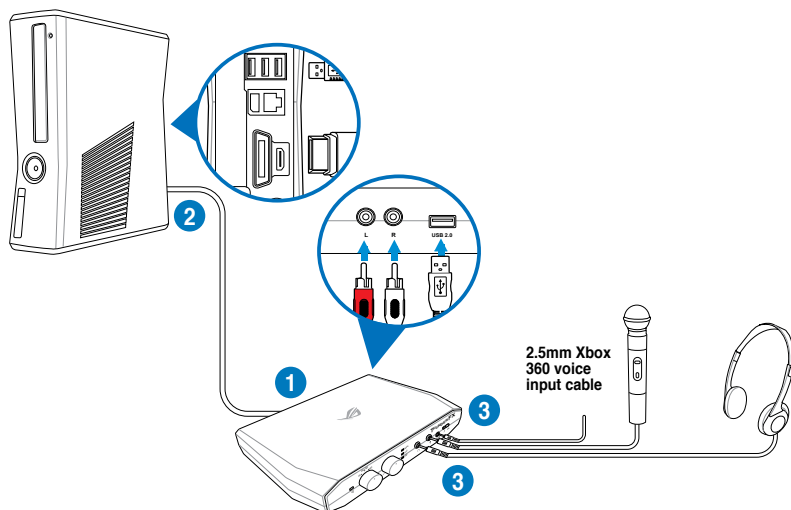
Default Xbox 360™ connection



Xbox 360™ connections with HDMI



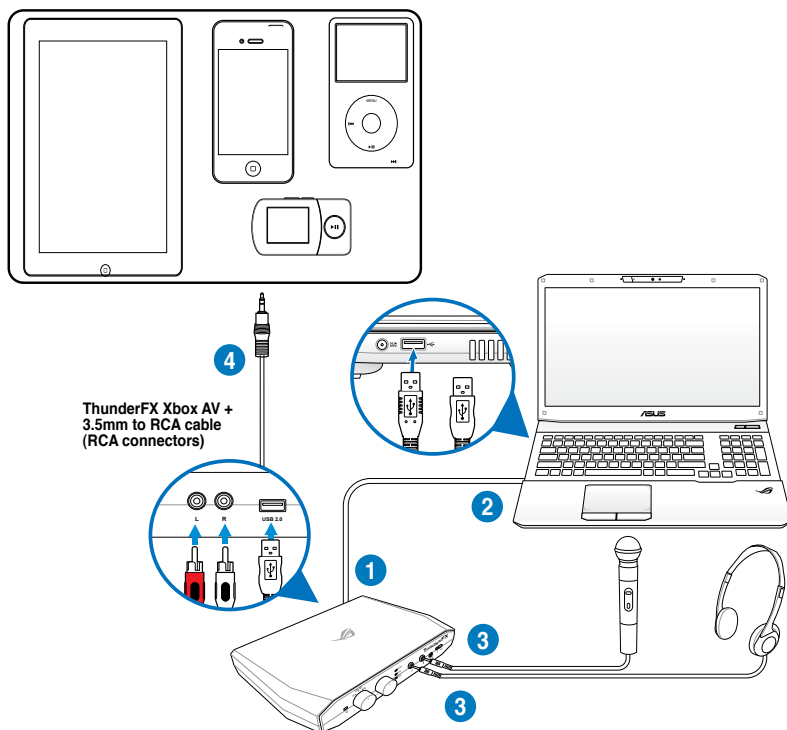
Use the ThunderFX Xbox 360 AV + 3.5mm to RCA cable to connect your Xbox 360 to the ThunderFX.



8.2.4 Connecting to iPhone/ iPod/ iPad/ MP3 player



- Switch to PS3 or Xbox 360 mode before connecting your iPhone/ iPod/ iPad/ MP3 player.
- Connect the ThunderFX to your PC for power supply using the Dual-head USB cable. Ensure there is stand-by power on your PC.
- Use the ThunderFX Xbox AV + 3.5 mm to RCA cable to connect your iPhone/ iPod/ iPad/ MP3 player to the ThunderFX



8.3 Driver Installation

Follow the instructions on the driver installation wizard to set up the ASUS ThunderFX Audio utility, then restart your computer before using the utility.



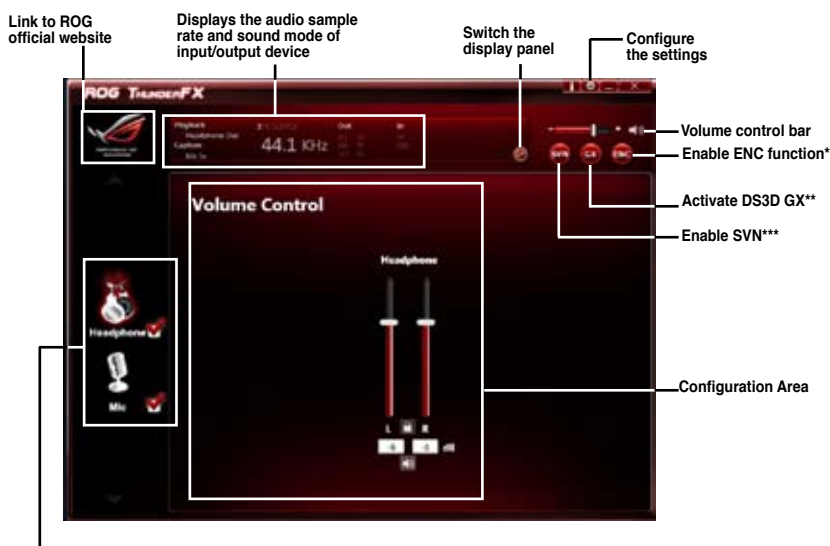
8.4 ThunderFX Utility Introduction

The ASUS ThunderFX Audio utility allows you to adjust the settings for the headphone volume, sound equalizer, surround sound effect, and various micro-audio reception functions. Right-click the Headphone/Mic mode on the left of the Main Control Panel to show the settings options menu.

Double-click the ASUS ThunderFX Audio icon on your desktop to launch the utility.



8.4.1 Main Control Panel



Headphone mode/
Microphone mode

Right-click to show the settings menu. Left-click to display the control screen.

* ENC (Environmental Noise Cancellation)

Enable this function to reduce environmental noise.

** DS3D GX (DirectSound3D Game Extensions)

Enable this function to support EAX and DirectSound3D Extensions.

*** SVN (Smart Volume Normalization)

Enable this function to avoid large volume fluctuations.

8.4.2 Game Profiles

On the Main Control Panel, switch the display panel from Status Panel to the Game Profiles Panel. Click the plus sign (+) to add your customized profiles or the minus sign (-) to delete profiles.



The Game Profiles Panel is a horizontal bar with a dark red background. It contains five icons: a crosshair (FPS Mode), the text 'Hi-Fi', a checkered flag (Racing Mode), a star with a cross (RTS Mode), and a game controller (Manual Mode). On the right side, there is a vertical button with a plus sign (+) and a minus sign (-), and a circular button with a red 'X'.

Labels on the right:

- Add or Delete a profile (pointing to the +/- button)
- Switches the display panel (pointing to the red X button)

	FPS Mode (First Person shooter mode)
	HiFi Mode
	Racing Mode
	RTS Mode (Real-Time Strategy mode)
	Manual Mode (Customized mode)

8.4.3 Equalizer

You can choose default presets or manually configure the equalizer control bars to your preferred acoustic output on your headphone.



The ROG ThunderFX Equalizer interface is a dark-themed window. At the top, it shows 'ThunderFX' and '44.1 KHz'. Below this, there's a section for 'Equalizer' with a checkbox 'Enable Equalizer'. The main area features ten frequency sliders labeled 30, 60, 120, 250, 500, 1K, 2K, 4K, 8K, and 16K. To the right of the sliders, there are four icons: a car (Engine), a person (Human Voice), a foot (Footsteps), and a gun (Gunshots). Below the sliders, there are buttons for 'Presets' (Classic, Rock, Metal, Jazz, Manual) and 'Effects' (SoftBass, Bass, Clarity, Open, SoftBass). A dropdown menu is set to 'Manual'.

Labels on the right:

- Engine
- Human Voice
- Footsteps
- Gunshots

8.4.4 Environmental Noise Cancellation

Environmental Noise Cancellation (ENC) filters environmental noise for clean microphone input.



- Keep the major sound reception microphone and the built-in ENC microphone at a distance of thirty (30) centimeters for the best audio effect.
- ENC only functions under PC mode.

Appendices

Notices

Federal Communications Commission Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference.
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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



The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IC: Canadian Compliance Statement

Complies with the Canadian ICES-003 Class B specifications. This device complies with RSS 210 of Industry Canada. This Class B device meets all the requirements of the Canadian interference-causing equipment regulations.

This device complies with Industry Canada license exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil numérique de la Classe B est conforme à la norme NMB-003 du Canada. Cet appareil numérique de la Classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Cet appareil est conforme aux normes CNR exemptes de licence d'Industrie Canada. Le fonctionnement est soumis aux deux conditions suivantes :

- (1) cet appareil ne doit pas provoquer d'interférences et
- (2) cet appareil doit accepter toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité de l'appareil.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This class B digital apparatus complies with Canadian ICES-003.

VCCI: Japan Compliance Statement

VCCI Class B Statement

情報処理装置等電波障害自主規制について

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に基づくクラスB情報技術装置です。この装置は家庭環境で利用されることを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。

KC: Korea Warning Statement

B급 기기 (가정용 방송통신기자재)

이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

*당해 무선설비는 전파혼신 가능성이 있으므로 인명안전과 관련된 서비스는 할 수 없습니다.

REACH

Complying with the REACH (Registration, Evaluation, Authorisation, and Restriction of Chemicals) regulatory framework, we published the chemical substances in our products at ASUS REACH website at <http://csr.asus.com/english/REACH.htm>.



DO NOT throw the motherboard in municipal waste. This product has been designed to enable proper reuse of parts and recycling. This symbol of the crossed out wheeled bin indicates that the product (electrical and electronic equipment) should not be placed in municipal waste. Check local regulations for disposal of electronic products.



DO NOT throw the mercury-containing button cell battery in municipal waste. This symbol of the crossed out wheeled bin indicates that the battery should not be placed in municipal waste.

ASUS Recycling/Takeback Services

ASUS recycling and takeback programs come from our commitment to the highest standards for protecting our environment. We believe in providing solutions for you to be able to responsibly recycle our products, batteries, other components as well as the packaging materials. Please go to <http://csr.asus.com/english/Takeback.htm> for detailed recycling information in different regions.

RF Equipment Notices

CE: European Community Compliance Statement

The equipment complies with the RF Exposure Requirement 1999/519/EC, Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0–300 GHz). This wireless device complies with the R&TTE Directive.

Wireless Radio Use

This device is restricted to indoor use when operating in the 5.15 to 5.25 GHz frequency band.

Exposure to Radio Frequency Energy

The radiated output power of the Wi-Fi technology is below the FCC radio frequency exposure limits. Nevertheless, it is advised to use the wireless equipment in such a manner that the potential for human contact during normal operation is minimized.

FCC Bluetooth Wireless Compliance

The antenna used with this transmitter must not be colocated or operated in conjunction with any other antenna or transmitter subject to the conditions of the FCC Grant.

Bluetooth Industry Canada Statement

This Class B device meets all requirements of the Canadian interference-causing equipment regulations.

Cet appareil numérique de la Class B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

BSMI: Taiwan Wireless Statement

無線設備的警告聲明

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更射頻、加大功率或變更原設計之特性及功能。低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信指依電信法規定作業之無線通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

於 5.25GHz 至 5.35GHz 區域內操作之
無線設備的警告聲明

工作頻率 5.250 ~ 5.350GHz 該頻段限於室內使用。

Japan RF Equipment Statement

この製品は、周波数帯域5.15～5.35GHzで動作しているときは、屋内においてのみ使用可能です。

KC (RF Equipment)

대한민국 규정 및 준수

방통위고시에 따른 고지사항

해당 무선설비는 운용 중 전파혼신 가능성이 있음.

이 기기는 인명안전과 관련된 서비스에 사용할 수 없습니다.

ASUS contact information

ASUSTeK COMPUTER INC.

Address	15 Li-Te Road, Peitou, Taipei, Taiwan 11259
Telephone	+886-2-2894-3447
Fax	+886-2-2890-7798
E-mail	info@asus.com.tw
Web site	www.asus.com.tw

Technical Support

Telephone	+86-21-38429911
Online support	support.asus.com

ASUS COMPUTER INTERNATIONAL (America)

Address	800 Corporate Way, Fremont, CA 94539, USA
Telephone	+1-812-282-3777
Fax	+1-510-608-4555
Web site	usa.asus.com

Technical Support

Telephone	+1-812-282-2787
Support fax	+1-812-284-0883
Online support	support.asus.com

ASUS COMPUTER GmbH (Germany and Austria)

Address	Harkort Str. 21-23, D-40880 Ratingen, Germany
Fax	+49-2102-959911
Web site	www.asus.de
Online contact	www.asus.de/sales

Technical Support

Telephone	+49-1805-010923*
Support Fax	+49-2102-9599-11
Online support	support.asus.com

* EUR 0.14/minute from a German fixed landline; EUR 0.42/minute from a mobile phone.

DECLARATION OF CONFORMITY

Per FCC Part 2, Section 2.1077(a)



Responsible Party Name: Asus Computer International

Address: 800 Corporate Way, Fremont, CA 94539.

Phone/Fax No: (510)739-3777/(510)608-4555

hereby declares that the product

Product Name : Motherboard

Model Number : MAXIMUS V FORMULA

Conforms to the following specifications:

- ☒ FCC Part 15, Subpart B, Unintentional Radiators
☐ FCC Part 15, Subpart C, Intentional Radiators
☐ FCC Part 15, Subpart E, Intentional Radiators

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

Representative Person's Name : Steve Chang / President
 Signature : 
 Date : May 30, 2012

Ver. 110101

EC Declaration of Conformity



We, the undersigned,

Manufacturer: ASUS/ASUS COMPUTER INC.
 Address, City: No. 150, LITE RD., PERTOU, TAIPEI 112, TAIWAN R.O.C.
 Country: TAIWAN
 Authorized representative in Europe: ASUS COMPUTER GmbH
 Address, City: HARKORT STR. 21-23, 40880 RATINGEN
 Country: GERMANY

declare the following apparatus:

Product name : Motherboard
 Model name : MAXIMUS V FORMULA

conform with the essential requirements of the following directives:

☒ 2004/109/EC-EMC Directive
☒ EN 55022:2008
☒ EN 61000-3-2:2006+A2:2009
☒ EN 61000-3-3:2008
☒ EN 55013:2001+A1:2003+A2:2008
☒ EN 55020:2007

☒ 1999/5/EC-R & TTE Directive

☒ EN 300 328 V1.7.1(2006-10)
☒ EN 300 440-1 V1.4.1(2006-05)
☒ EN 300 440-2 V1.4.1(2006-05)
☒ EN 301 511 V9.0.2(2003-03)
☒ EN 301 908-1 V3.2.1(2007-05)
☒ EN 301 908-2 V3.2.1(2007-05)
☒ EN 301 488-1 V1.4.1(2007-11)
☒ EN 301 488-2 V1.4.1(2007-11)
☒ EN 301 488-3 V1.4.1(2007-11)
☒ EN 301 488-4 V1.4.1(2007-11)
☒ EN 301 488-5 V1.4.1(2007-11)
☒ EN 301 488-6 V1.4.1(2007-11)
☒ EN 301 488-7 V2.1.1(2009-05)
☒ EN 301 488-8 V2.1.1(2009-05)
☒ EN 301 488-9 V1.4.1(2007-11)
☒ EN 302 326-2 V1.3.2(2007-09)
☒ EN 302 326-3 V1.3.2(2007-09)
☒ EN 302 326-4 V1.3.2(2007-09)
☒ EN 302 326-5 V1.3.2(2007-09)
☒ EN 302 326-6 V1.3.2(2007-09)
☒ EN 302 326-7 V1.3.2(2007-09)
☒ EN 302 326-8 V1.3.2(2007-09)
☒ EN 302 326-9 V1.3.2(2007-09)
☒ EN 302 326-10 V1.3.2(2007-09)
☒ EN 302 326-11 V1.3.2(2007-09)
☒ EN 302 326-12 V1.3.2(2007-09)
☒ EN 302 326-13 V1.3.2(2007-09)
☒ EN 302 326-14 V1.3.2(2007-09)
☒ EN 302 326-15 V1.3.2(2007-09)
☒ EN 302 326-16 V1.3.2(2007-09)
☒ EN 302 326-17 V1.3.2(2007-09)
☒ EN 302 326-18 V1.3.2(2007-09)
☒ EN 302 326-19 V1.3.2(2007-09)
☒ EN 302 326-20 V1.3.2(2007-09)
☒ EN 302 326-21 V1.3.2(2007-09)
☒ EN 302 326-22 V1.3.2(2007-09)
☒ EN 302 326-23 V1.3.2(2007-09)
☒ EN 302 326-24 V1.3.2(2007-09)
☒ EN 302 326-25 V1.3.2(2007-09)
☒ EN 302 326-26 V1.3.2(2007-09)
☒ EN 302 326-27 V1.3.2(2007-09)
☒ EN 302 326-28 V1.3.2(2007-09)
☒ EN 302 326-29 V1.3.2(2007-09)
☒ EN 302 326-30 V1.3.2(2007-09)
☒ EN 302 326-31 V1.3.2(2007-09)
☒ EN 302 326-32 V1.3.2(2007-09)
☒ EN 302 326-33 V1.3.2(2007-09)
☒ EN 302 326-34 V1.3.2(2007-09)
☒ EN 302 326-35 V1.3.2(2007-09)
☒ EN 302 326-36 V1.3.2(2007-09)
☒ EN 302 326-37 V1.3.2(2007-09)
☒ EN 302 326-38 V1.3.2(2007-09)
☒ EN 302 326-39 V1.3.2(2007-09)
☒ EN 302 326-40 V1.3.2(2007-09)
☒ EN 302 326-41 V1.3.2(2007-09)
☒ EN 302 326-42 V1.3.2(2007-09)
☒ EN 302 326-43 V1.3.2(2007-09)
☒ EN 302 326-44 V1.3.2(2007-09)
☒ EN 302 326-45 V1.3.2(2007-09)
☒ EN 302 326-46 V1.3.2(2007-09)
☒ EN 302 326-47 V1.3.2(2007-09)
☒ EN 302 326-48 V1.3.2(2007-09)
☒ EN 302 326-49 V1.3.2(2007-09)
☒ EN 302 326-50 V1.3.2(2007-09)
☒ EN 302 326-51 V1.3.2(2007-09)
☒ EN 302 326-52 V1.3.2(2007-09)
☒ EN 302 326-53 V1.3.2(2007-09)
☒ EN 302 326-54 V1.3.2(2007-09)
☒ EN 302 326-55 V1.3.2(2007-09)
☒ EN 302 326-56 V1.3.2(2007-09)
☒ EN 302 326-57 V1.3.2(2007-09)
☒ EN 302 326-58 V1.3.2(2007-09)
☒ EN 302 326-59 V1.3.2(2007-09)
☒ EN 302 326-60 V1.3.2(2007-09)
☒ EN 302 326-61 V1.3.2(2007-09)
☒ EN 302 326-62 V1.3.2(2007-09)
☒ EN 302 326-63 V1.3.2(2007-09)
☒ EN 302 326-64 V1.3.2(2007-09)
☒ EN 302 326-65 V1.3.2(2007-09)
☒ EN 302 326-66 V1.3.2(2007-09)
☒ EN 302 326-67 V1.3.2(2007-09)
☒ EN 302 326-68 V1.3.2(2007-09)
☒ EN 302 326-69 V1.3.2(2007-09)
☒ EN 302 326-70 V1.3.2(2007-09)
☒ EN 302 326-71 V1.3.2(2007-09)
☒ EN 302 326-72 V1.3.2(2007-09)
☒ EN 302 326-73 V1.3.2(2007-09)
☒ EN 302 326-74 V1.3.2(2007-09)
☒ EN 302 326-75 V1.3.2(2007-09)
☒ EN 302 326-76 V1.3.2(2007-09)
☒ EN 302 326-77 V1.3.2(2007-09)
☒ EN 302 326-78 V1.3.2(2007-09)
☒ EN 302 326-79 V1.3.2(2007-09)
☒ EN 302 326-80 V1.3.2(2007-09)
☒ EN 302 326-81 V1.3.2(2007-09)
☒ EN 302 326-82 V1.3.2(2007-09)
☒ EN 302 326-83 V1.3.2(2007-09)
☒ EN 302 326-84 V1.3.2(2007-09)
☒ EN 302 326-85 V1.3.2(2007-09)
☒ EN 302 326-86 V1.3.2(2007-09)
☒ EN 302 326-87 V1.3.2(2007-09)
☒ EN 302 326-88 V1.3.2(2007-09)
☒ EN 302 326-89 V1.3.2(2007-09)
☒ EN 302 326-90 V1.3.2(2007-09)
☒ EN 302 326-91 V1.3.2(2007-09)
☒ EN 302 326-92 V1.3.2(2007-09)
☒ EN 302 326-93 V1.3.2(2007-09)
☒ EN 302 326-94 V1.3.2(2007-09)
☒ EN 302 326-95 V1.3.2(2007-09)
☒ EN 302 326-96 V1.3.2(2007-09)
☒ EN 302 326-97 V1.3.2(2007-09)
☒ EN 302 326-98 V1.3.2(2007-09)
☒ EN 302 326-99 V1.3.2(2007-09)
☒ EN 302 326-100 V1.3.2(2007-09)

☒ 2006/95/EC-LVD Directive

☒ EN 60950-1 /A11:2009
☒ EN 60950-1 /A12:2011
☒ EN 60950-2 /A12:2011

☒ 2009/125/EC-ErP Directive

Regulation (EC) No. 1275/2008
☐ EN 62301:2005
 Regulation (EC) No. 642/2009
☐ EN 62301:2005

Ver. 111121

☒ CE marking


(EC conformity marking)

Position : CEO

Name : Jerry Shen
 Signature : 

 Declaration Date: May 30, 2012
 Year to begin affixing CE marking: 2012