SABERTOOTH 990FX R3.0

Motherboard

E11421
First Edition
June 2016

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Contents

Chapter 3: BIOS Setup

Chapter 4: Software Support

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:

1. **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.

2. **Chapter 2: Basic Installation**

   This chapter lists the hardware setup procedures that you have to perform when installing system components.

3. **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.

4. **Chapter 4: Software Support**

   This chapter describes the contents of the support DVD that comes with the motherboard package and the software.

5. **Chapter 5: RAID Support**

   This chapter describes the RAID configurations.

6. **Chapter 6: Multiple GPU Support**

   This chapter describes how to install and configure multiple AMD® CrossFireX™ and NVIDIA® SLI® graphics cards.

Where to find more information

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

1. **ASUS website**

   The ASUS website (www.asus.com) provides updated information on ASUS hardware and software products.

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 (+).

SABERTOOTH 990FX R3.0 specifications summary

CPU	AMD® Socket AM3+ for AMD® FX Series CPU up to 8-core Compatible with AMD® Socket AM3 for AMD® Phenom™ II /Athlon™ II / Sempron™ 100 Series Processors AMD 220W CPU Support AMD Cool 'n' Quiet™ Technology
Chipset	AMD® 990FX/SB950
System Bus	Up to 5.2 GT/s; HyperTransport™ 3.1
Memory	4 x DIMM, Max. 32GB, DDR3 1866/1600/1333/1066 MHz, ECC, Non-ECC, un-buffered Memory Dual Channel memory architecture *** Refer to www.asus.com for the Memory QVL (Qualified Vendors Lists) of AM3+/ AM3 CPU.** **** Due to OS limitation, when installing total memory of 4GB capacity or more, Windows® 32-bit operation system may only recognize less than 3GB. Hence, a total installed memory of less than 3GB is recommended.**
Expansion slots	3 x PCI Express 2.0 x16 slots (Dual at x16/x16, triple at x16/x8/x8 mode)* 1 x PCI Express 2.0 x16 slot (Black@x4) 2 x PCI Express 2.0 x1 slot *** When running dual graphics cards, be sure to insert the card in the first and third PCIex16 slot to get the best performance**
Multi-GPU support	Supports NVIDIA® Quad-GPU SLI® Technology Supports AMD® Quad-GPU CrossFireX™ Technology
Storage	**AMD® SB950 Chipset:** - 5 x SATA 6.0 Gb/s ports with RAID 0,1,5 and 10 support - 1 x M.2 Socket 3 with M Key, type 2242/2260/2280/22110 storage devices support (both SATA & PCIE mode)
LAN	Intel® 211 Gigabit LAN controller Turbo LAN TUF LANGuard
Audio	Realtek® ALC1150 8-Channel High Definition Audio CODEC - Audio shielding ensures precision analog/digital separation and greatly reduced multi-lateral interference - Separate layer for left and right track, ensuring both sound deliver equal quality - Top notch audio sensation delivers according to the audio configuration - Audio Amplifier to enhance the highest quality sound for headphone and speakers - Absolute Pitch 192khz/24bit True BD Lossless Sound - BD Audio Layer Content Protection - Supports Jack-Detection, Multi-streaming, and Front Panel Jack-Retasking - Optical S/PDIF out port at back I/O

(continued on the next page)

SABERTOOTH 990FX R3.0 specifications summary

USB	**2 x ASMedia® USB 3.1 controllers - supports ASUS USB 3.1 Boost and 3A power output** - 1 x USB 3.1/3.0/2.0 port @back panel (Type C) - 3 x USB 3.1/3.0/2.0 ports @back panel (teal blue, Type A) **ASMedia® USB 3.0 Hub - supports ASUS USB 3.1 Boost** - 8 x USB 3.0/2.0 ports (4 ports at mid-board, 4 ports at back panel) **AMD® SB950 Chipset** - 8 x USB 2.0/1.1 ports (4 ports at mid-board, 4 ports at back panel)
Exclusive TUF Features	**"Ultimate COOL!" Thermal Solution** - TUF Thermal Radar 2 **"TUF ENGINE!" Digital Power Design** - 8+2 Digital Phase Power Design - ASUS DIGI+ Power Control Utility - TUF Components (Alloy choke, Cap. & MOSFET; certified by military-standard) **"Safe & Stable!" Guardian Angel** - TUF ESD Guards 2 - TUF LANGuard - MemOK!
Other Special Features	- USB 3.1 Boost featuring speedy USB 3.1 transmission - ASUS SafeSlot - Ai Suite 3 - ASUS UEFI BIOS EZ Mode featuring friendly graphics user interface - USB BIOS Flashback with USB BIOS Flashback Wizard for EZ BIOS download scheduling - DRCT header - ASUS Q-Connector - ASUS Q-Shield - ASUS Q-LED (CPU, DRAM, VGA, Boot Device LED) - ASUS Q-Slot - ASUS Q-DIMM - ASUS O.C. Profile - ASUS EZ Flash 2 - Multi-language BIOS

(continued on the next page)

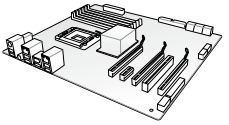
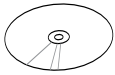
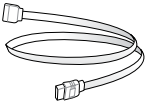
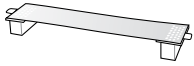
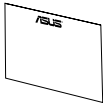
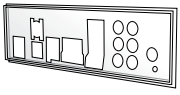
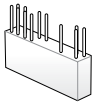
SABERTOOTH 990FX R3.0 specifications summary

Back Panel I/O Ports	1 x Optical S/PDIF Output port 1 x USB 3.1/3.0/2.0 port (Type C) 3 x USB 3.1/3.0/2.0 port (teal blue, Type A) 1 x LAN (RJ45) port 4 x USB 3.0/2.0 ports (blue) 4 x USB 2.0/1.1 ports(one port can be used as USB BIOS Flashback port) 8-channel Audio I/O(5 x Audio jacks)
Internal I/O Connectors	2 x USB 3.0/2.0 connectors support additional 4 USB 3.0/2.0 ports (19-pin) 2 x USB 2.0/1.1 connectors support additional 4 USB 2.0/1.1 ports 5 x SATA 6Gb/s connectors 1 x CPU Fan connector (4-pin) 1 x CPU Opt fan connector (4-pin) 1 x Water Pump header (4-pin) 3 x Chassis Fan connectors (4-pin) 1 x TPM header Front panel audio connector 1 x COM port 1 x S/PDIF Out header 24-pin EATX Power connector 8-pin EATX 12V Power connector System Panel (Q-Connector) 1 x DRCT header 1 x Power on button 1 x MemOK! button 1 x USB BIOS Flashback button 1 x Clear CMOS header
BIOS	64 Mb Flash ROM, UEFI BIOS, PnP, SLP2.1, DMI2.0, WfM2.0, SM BIOS 2.7, ACPI 2.0a, Multi-language BIOS, ASUS EZ Flash 2, ASUS CrashFree BIOS 3, My Favorites, Quick Note, Last Modified log, F12 PrintScreen, F3 Shortcut functions, and ASUS DRAM SPD (Serial Presence Detect) memory information
Manageability	WfM 2.0, DMI 2.0, WOL by PME, WOR by PME, PXE
Support DVD	Drivers Anti-virus software (OEM version) ASUS Update ASUS Utilities
Form Factor	ATX Form Factor, 12”x 9.6” (30.5cm x 24.4cm)

Specifications are subject to change without notice.

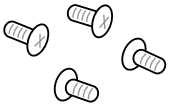
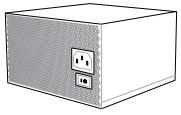
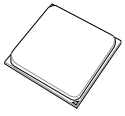
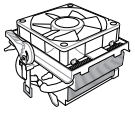
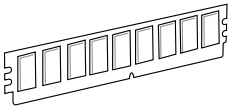
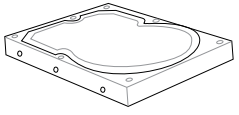
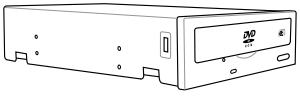
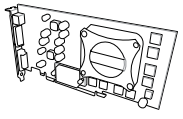
Package contents

Check your motherboard package for the following items.

		
ASUS SABERTOOTH 990FX R3.0 motherboard	**User manual**	**Support DVD**
		
4 x Serial ATA 6.0 Gb/s cables	**1 x ASUS SLI™ bridge connector**	**1 x TUF Certification card**
		
1 x ASUS Q-Shield	**1 x Q-Connector**	**1 x TUF Five-year warranty manual (by region)**

- If any of the above items is damaged or missing, contact your retailer.
- The illustrated items above are for reference only. Actual product specifications may vary with different models.

Installation tools and components

	
1 bag of screws	Philips (cross) screwdriver
	
PC chassis	Power supply unit
	
AMD AM3+ CPU	AMD AM3+ compatible CPU Fan
	
DDR3 DIMM	SATA hard disk drive
	
SATA optical disc drive (optional)	Graphics card

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

Product Introduction

1

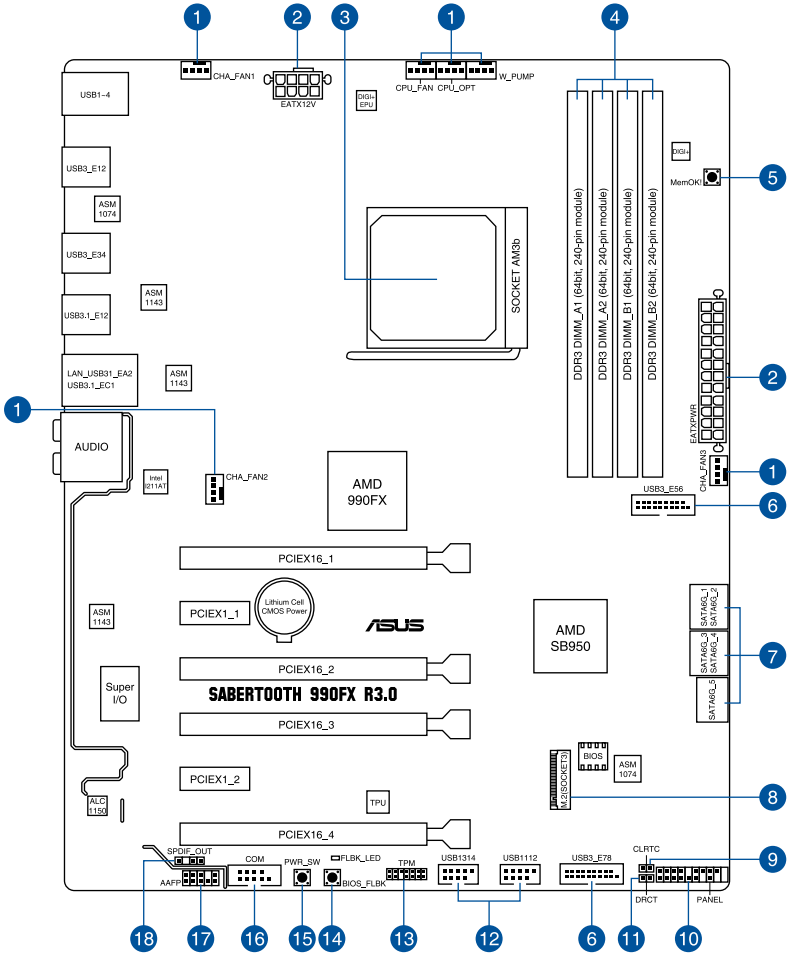
1.1 Motherboard overview

1.1.1 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.

1.1.2 Motherboard layout



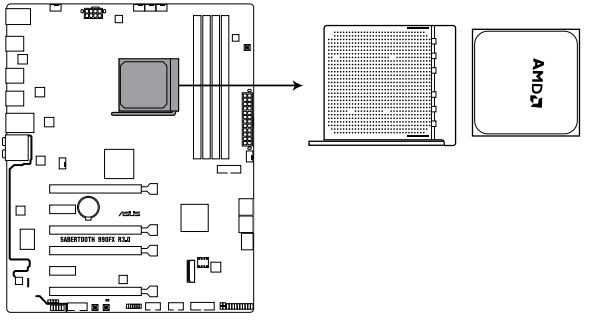
Refer to **1.1.9 Internal connectors** and **2.3.1 Rear I/O connection** for more information about rear panel connectors and internal connectors.

Layout contents

Connectors/Jumpers/Buttons and switches/Slots	Page
1. CPU and chassis fan connectors (4-pin CPU_FAN, 4-pin CPU_OPT, 4-pin CHA_FAN1-3, 4-pin W_PUMP)	1-17
2. ATX power connectors (24-pin EATXPWR, 8-pin EATX12V)	1-19
3. AM3+ CPU socket	1-4
4. DDR3 DIMM slots	1-5
5. MemOK! button	1-10
6. USB 3.0 connector (20-1 pin USB3_E56, USB3_E78)	1-14
7. AMD® Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1-5)	1-13
8. M.2 socket 3	1-16
9. Clear RTC RAM (2-pin CLRTC)	1-11
10. System panel connector (20-8 pin PANEL)	1-20
11. Direct Connector (2-pin DRCT)	1-21
12. USB 2.0 connectors (10-1 pin USB1314, USB1112)	1-15
13. TPM connector (14-1 pin TPM)	1-21
14. USB BIOS Flashback button	2-21
15. Power-on button	1-9
16. Serial port connector (10-1 pin COM1)	1-16
17. Front panel audio connector (10-1 pin AAFP)	1-18
18. Digital audio connector (4-1 pin SPDIF_OUT)	1-14

1.1.3 Central Processing Unit (CPU)

The motherboard comes with an AM3+ socket designed for AMD® FX Series CPU up to 8-core, also compatible with AMD® socket AM3 for AMD® Phenom™ II / Athlon™ II / Sempron™ 100 Series Processors.



SABERTOOTH 990FX R3.0 CPU AM3+

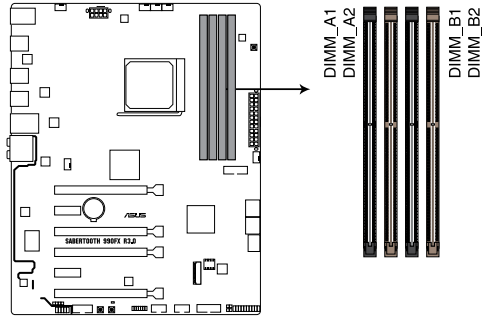
Ensure that all power cables are unplugged before installing the CPU.

The AM3+ socket has a different pinout design. Ensure that you use a CPU designed for the AM3+/AM3 socket. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

1.1.4 System memory

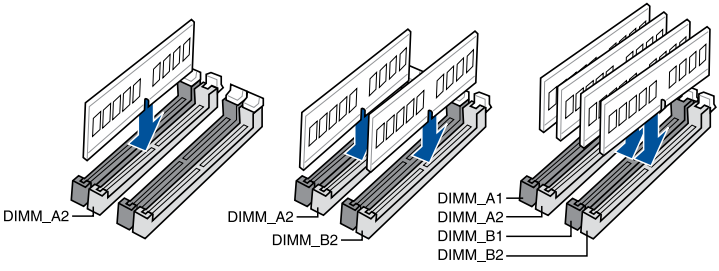
The motherboard comes with four Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) slots.

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.



SABERTOOTH 990FX R3.0 240-pin DDR3 DIMM socket

Recommended memory configurations



Memory configurations

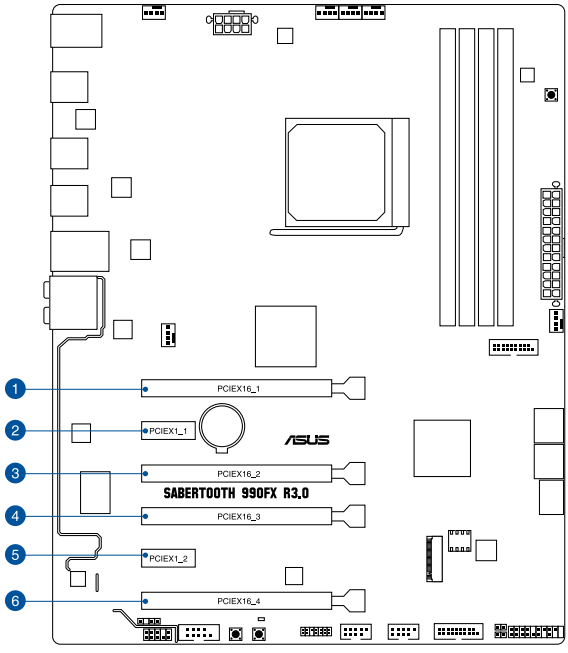
You may install 1 GB, 2 GB, 4 GB and 8 GB unbuffered and non-ECC DDR3 DIMMs into the DIMM sockets.

- 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 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 4 GB or more on the motherboard.
  c) For more details, refer to the Microsoft® support site at http://support.microsoft.com/kb/929605/en-us.
- The design of the DIMM fan may vary. Ensure that the DIMM fan fits to the motherboard

- Always install the DIMMS with the same CAS Latency. For an optimum compatibility, we recommend that you install memory modules of the same version or data code (D/C) from the same vendor. Check with the vendor to get the correct memory modules.
- 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.

1.1.5 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 x16_1 slot (single at x16, dual at x16/x16, triple at x16/x8/x8 mode)
2	PCIe 2.0 x1_1 slot
3	PCIe 2.0 x16_2 slot
4	PCIe 2.0 x16_3 slot
5	PCIe 2.0 x1_2 slot
6	PCIe 2.0 x16_4 slot

VGA configuration	PCI Express operating mode			
	PCIe 2.0_ x16_1	PCIe 2.0_ x16_2	PCIe 2.0x16_3	PCIe 2.0x16_4
Single VGA/ PCIe card	x16 (Recommend for single VGA)	x4	x16	x1
Dual VGA/PCIe card	x16	x4	x16	x1
3-way SLI	x16	x4	x8	x8

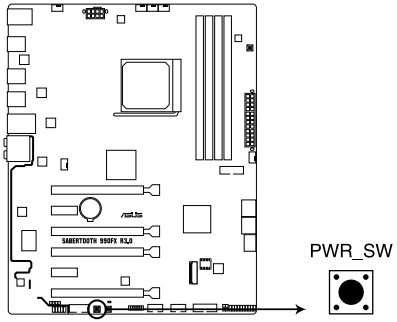
- In single VGA card mode, use the PCIe 2.0 x16_1 slot for a PCI Express x16 graphics card to get better performance.
- In CrossFireX™ or SLI™ mode, use the PCIe 2.0 x16_1 and PCIe 2.0 x16_3 slots for PCI Express x16 graphics cards to get better performance.
- In 3-way SLI mode, use the PCIe 2.0 x16_1/PCIe 2.0 x16_3/PCIe 2.0 x16_4 slots for PCI Express x16 graphic cards to get better performance.
- We recommend that you provide sufficient power when running CrossFireX™ or SLI™ mode.
- Connect a chassis fan to the motherboard connector labeled CHA_FAN1/2/3 when using multiple graphics cards for better thermal environment.

1.1.6 Onboard buttons

Onboard 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

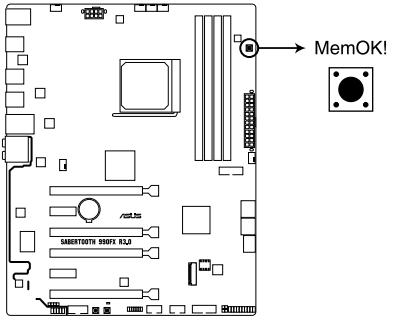
The motherboard comes with a power-on button that allows you to power up or wake up the system.



SABERTOOTH 990FX R3.0 Power on button

2. MemOK! button

Installing DIMMs that are not compatible with the motherboard may cause system boot failure, and the DRAM_LED near the MemOK! switch lights continuously. Press and hold the MemOK! button until the DRAM_LED starts blinking to begin automatic memory compatibility tuning for successful boot.



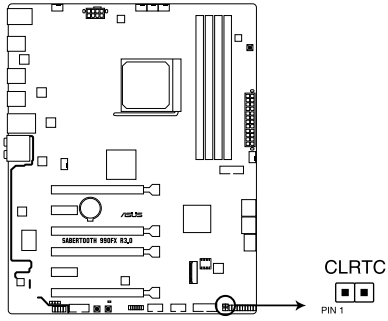
SABERTOOTH 990FX R3.0 MemOK! button

- The MemOK! switch does not function under Windows™ OS environment.
- During the tuning process, the system loads and tests failsafe memory settings. It takes about 30 seconds for the system to test one set of failsafe settings. If the test fails, the system reboots and test the next set of failsafe settings.
- Due to memory tuning requirement, the system automatically reboots when each timing set is tested. Replace the DIMMs with ones recommended in the Memory QVL (Qualified Vendors Lists) on the ASUS website at www.asus.com.
- If you turn off the computer and replace DIMMs during the tuning process, the system continues memory tuning after turning on the computer. To stop memory tuning, turn off the computer and unplug the power cord for about 5–10 seconds.
- If your system fails to boot up due to BIOS overclocking, press the MemOK! switch to boot and load the BIOS default settings. A message will appear during POST reminding you that the BIOS has been restored to its default settings.
- We recommend that you download and update to the latest BIOS version from the ASUS website at www.asus.com after using the MemOK! function.

1.1.7 Jumpers

1. Clear RTC RAM (2-pin CLRTC)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.



SABERTOOTH 990FX R3.0 CLRTC

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Short-circuit pin 1-2 with a metal object or jumper cap for about 5-10 seconds.
3. Plug the power cord and turn ON the computer.
4. Hold down the **<Del>** key during the boot process and enter BIOS setup to re-enter data.

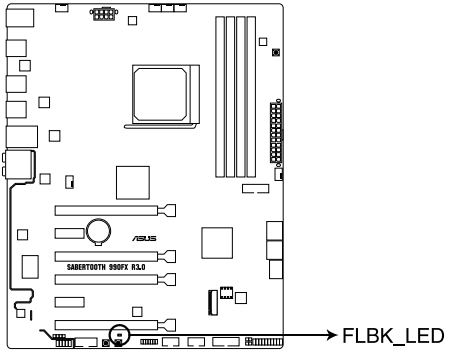
Except when clearing the RTC RAM, never short-circuit the CLRTC jumper. Shorting the CLRTC jumper will cause system boot failure!

- If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After clearing the CMOS, reinstall the battery.
- You do not need to clear the RTC when the system hangs due to overclocking. For system failure due to overclocking, use the CPU Parameter Recall (C.P.R.) feature. Shut down and reboot the system, then the BIOS automatically resets parameter settings to default values.
- Due to chipset behavior, AC power off is required to enable C.P.R. function. You must turn off and on the power supply or unplug and plug the power cord before rebooting the system.

1.1.8 Onboard LEDs

1. USB BIOS Flashback LED (FLBK_LED)

The BIOS Flashback LED flashes when you press the BIOS Flashback button for BIOS update.



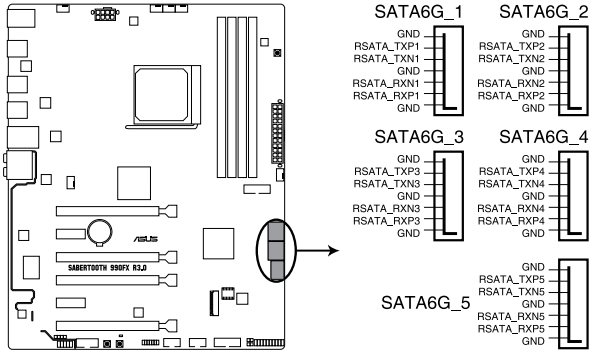
SABERTOOTH 990FX R3.0 FLBK_LED

1.1.9 Internal connectors

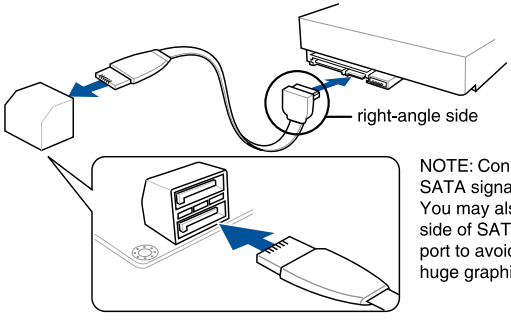
1. AMD® Serial ATA 6.0 Gb/s connectors (7-pin SATA6G_1-5)

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 through the onboard AMD® SB950 chipset.



SABERTOOTH 990FX R3.0 AMD SATA 6 Gb/s connectors

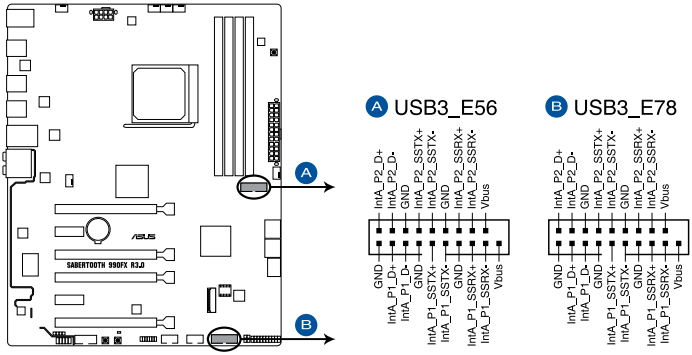


NOTE: Connect the right-angle side of SATA signal cable to SATA device. You may also connect the right-angle side of SATA cable to the onboard SATA port to avoid mechanical conflict with huge graphics cards.

- 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 **3.6.4 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 creating a RAID set, set the SATA6G_5 connectors to **[IDE Mode]** to ensure that the system recognizes your ODD device.
- When using NCQ, set the SATA Mode in the BIOS to **[AHCI Mode]**. Refer to section **3.6.4 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. USB 3.0 connector (20-1 pin USB3_E56, USB3_E78)

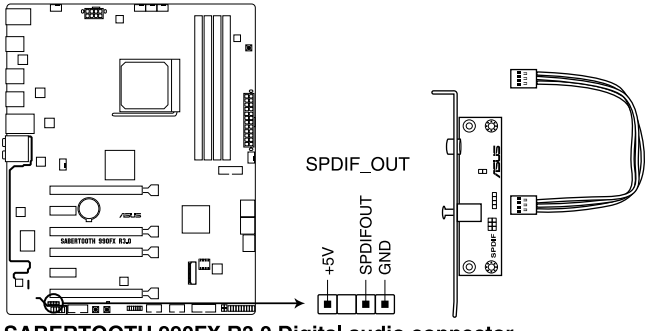
This connector is for the additional USB 3.0 ports, and complies with the USB 3.0 specification that supports up to 480 MBps connection speed. If the USB 3.0 front panel cable is available from your system chassis, with this USB 3.0 connector, you can have a front panel USB 3.0 solution.



SABERTOOTH 990FX R3.0 USB3.0 connectors

3. 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.

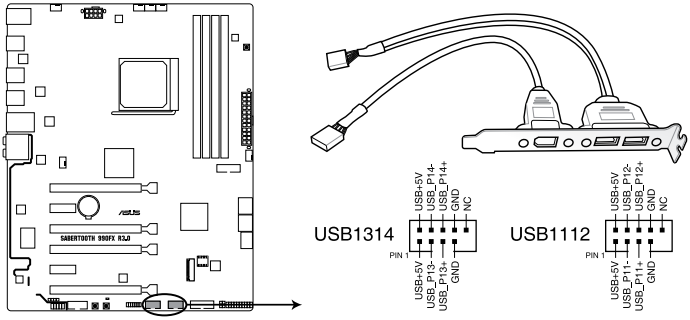


SABERTOOTH 990FX R3.0 Digital audio connector

The S/PDIF module is purchased separately.

4. USB 2.0 connectors (10-1 pin USB1314, USB1112)

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.



SABERTOOTH 990FX R3.0 USB2.0 connectors

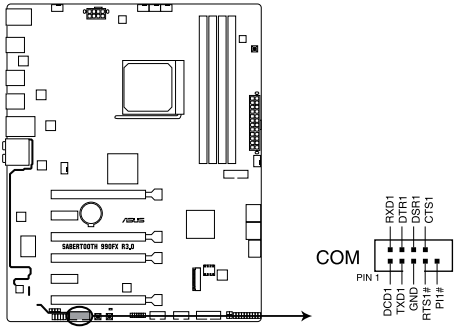
Never connect a 1394 cable to the USB connectors. Doing so will damage the motherboard!

You can connect the front panel USB cable to the ASUS Q-Connector 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.

5. Serial port connector (10-1 pin COM1)

This connector is for a serial (COM) port. Connect the serial port module cable to this connector, then install the module to a slot opening at the back of the system chassis.

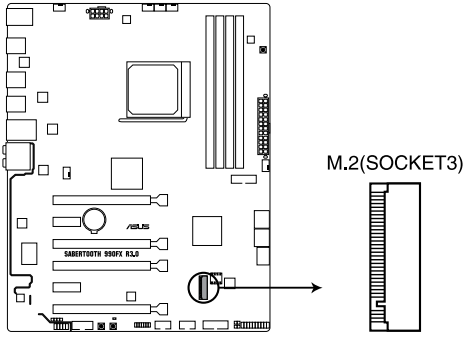


SABERTOOTH 990FX R3.0 Serial port connector

The COM module is purchased separately.

6. M.2 socket 3

This socket allows you to install an M.2 (NGFF) SSD module.



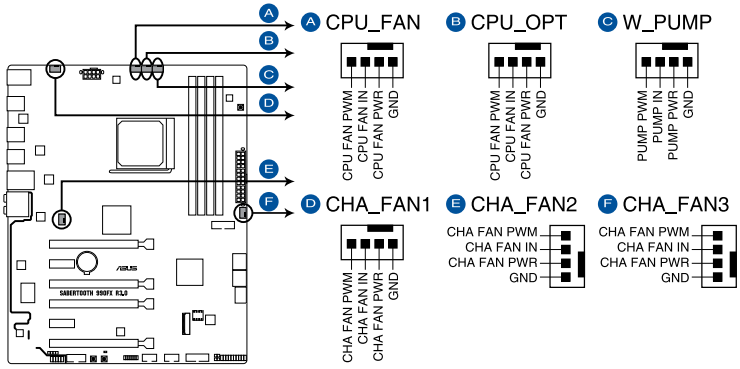
SABERTOOTH 990FX R3.0 M.2(SOCKET3)

This socket supports PCIe 2.0 x4 M Key design and type 2242/2260/2280/22110 PCIe storage devices.

The M.2 (NGFF) SSD module is purchased separately.

7. CPU and chassis fan connectors (4-pin CPU_FAN, 4-pin CPU_OPT, 4-pin CHA_FAN1-3, 4-pin W_PUMP)

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.



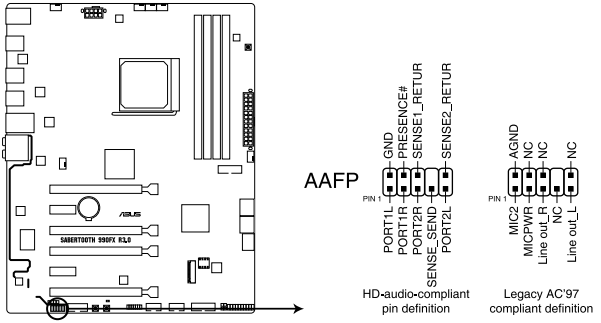
SABERTOOTH 990FX R3.0 Fan connectors

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.
- W_PUMP function support depends on water cooling device. When using a water cooling device, connect the device's fan connector(s) to the motherboard's CPU_FAN connector, and the water pump connector to the W_PUMP connector.
- 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, or 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.

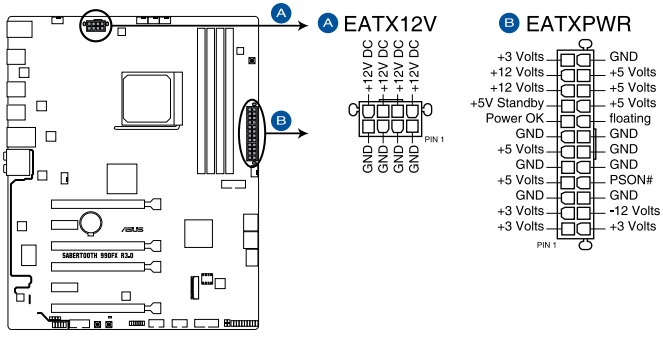


SABERTOOTH 990FX R3.0 Analog front panel connector

- 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)

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.

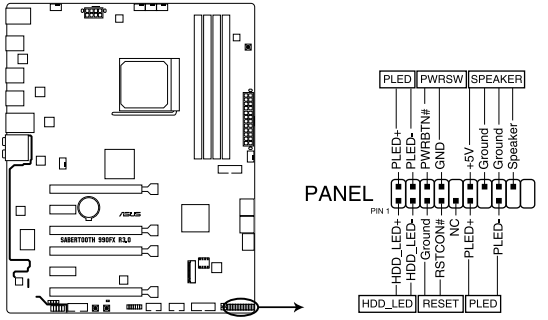


SABERTOOTH 990FX R3.0 ATX power connectors

- 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.

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

This connector supports several chassis-mounted functions.



SABERTOOTH 990FX R3.0 System panel connector

- **System power LED (2-pin or 3-1 pin PLED)**

  The 2-pin or 3-1 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 HDD_LED)**

  This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The HDD 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)**

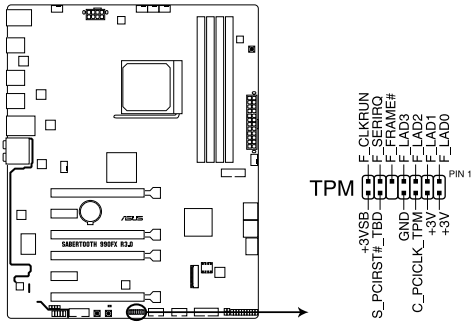
  This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the operating system settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

- **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 (14-1 pin TPM)

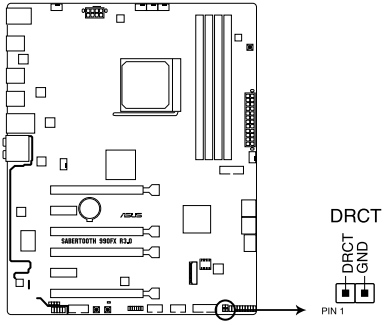
This connector supports a Trusted Platform Module (TPM) system, which securely store keys, digital certificates, passwords and data. A TPM system also helps enhance network security, protect digital identities, and ensures platform integrity.



SABERTOOTH 990FX R3.0 TPM connector

12. Direct Connector (2-pin DRCT)

This connector is for the chassis-mounted button that supports the DirectKey function. Connect the button cable that supports DirectKey, from the chassis to this connector on the motherboard.



SABERTOOTH 990FX R3.0 DRCT connector

Ensure that your chassis comes with the button cable that supports the DirectKey feature. Refer to the technical documentation that came with the chassis for details.

Basic Installation

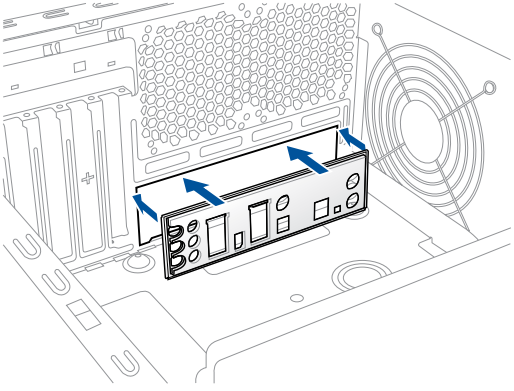
2

2.1 Building your PC system

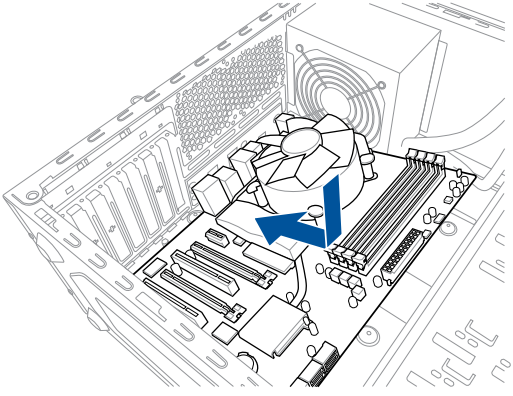
2.1.1 Motherboard installation

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.

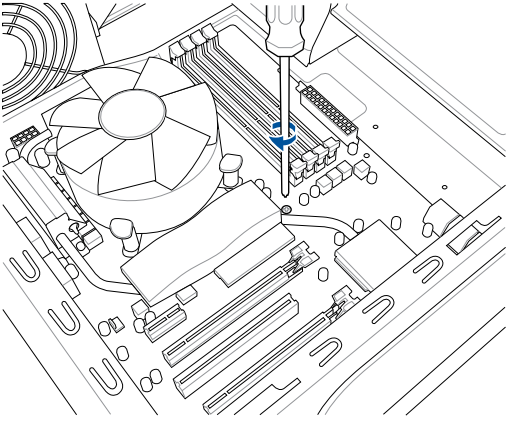
1. Install the ASUS Q-Shield to the chassis rear I/O panel.

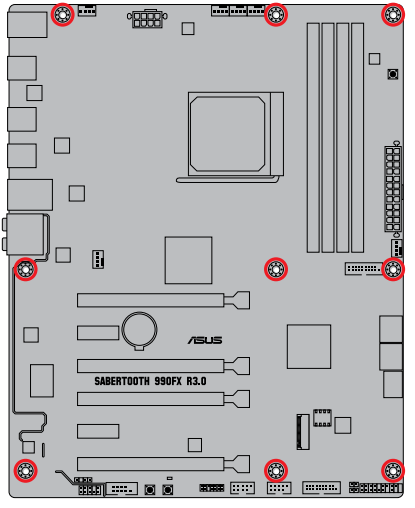


2. Place the motherboard into the chassis, ensuring that its rear I/O ports are aligned to the chassis' rear I/O panel.



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

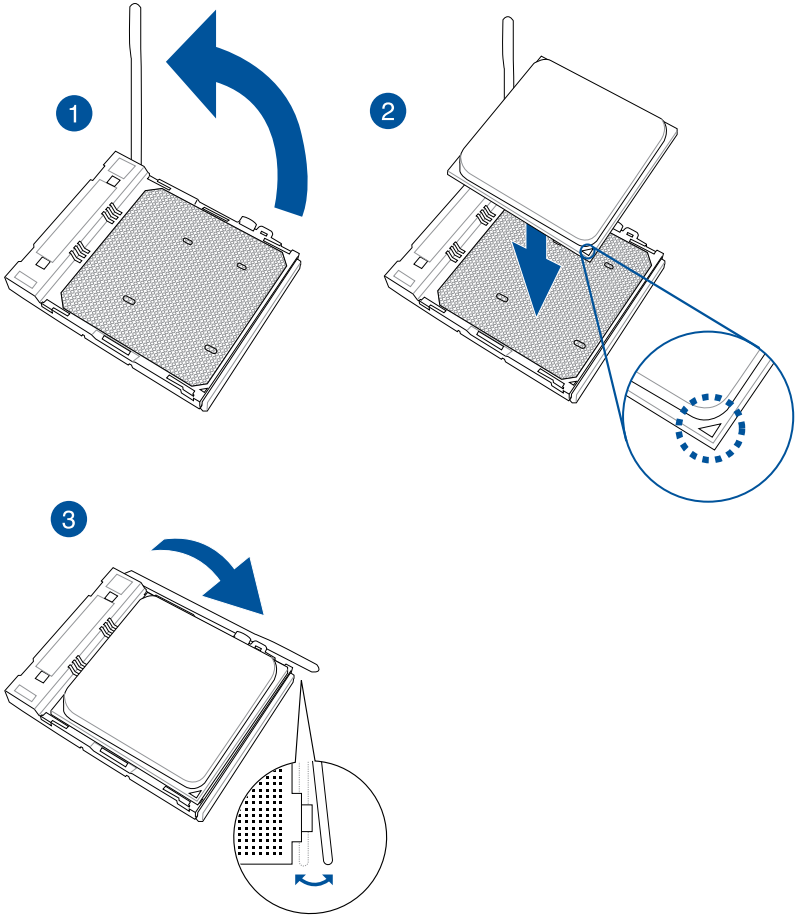




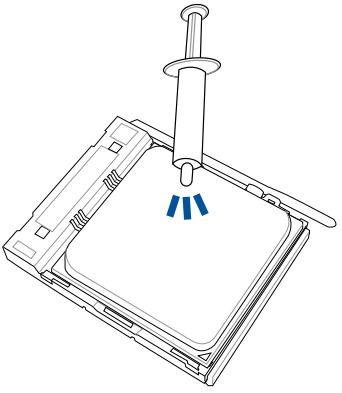
DO NOT overtighten the screws! Doing so can damage the motherboard.

2.1.2 CPU installation

The AMD AM3+ socket is compatible with AMD AM3+ and AM3 processors. Ensure you use a CPU designed for the AM3+ socket. The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!

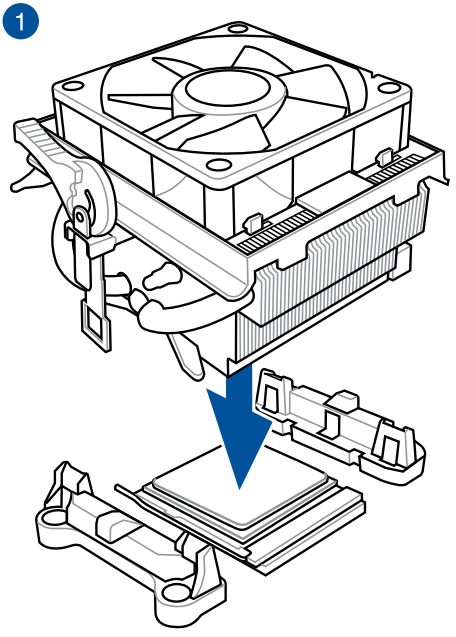


2.1.3 CPU heatsink and fan assembly installation

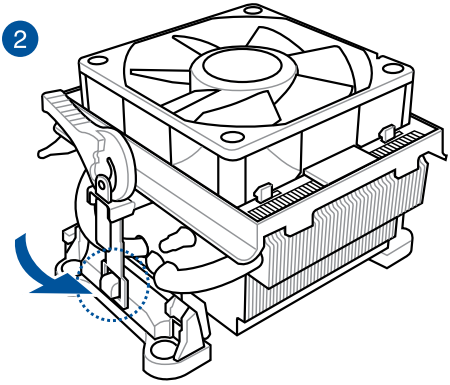


Apply the Thermal Interface Material to the CPU heatsink and CPU before you install the heatsink and fan if necessary.

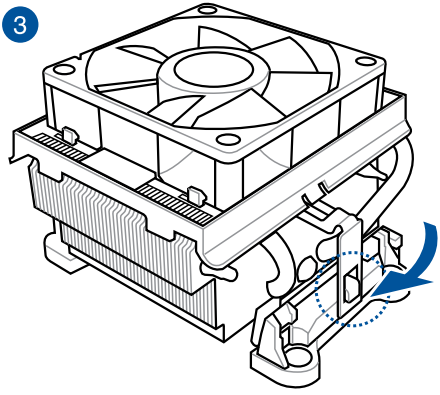
To install the CPU heatsink and fan assembly



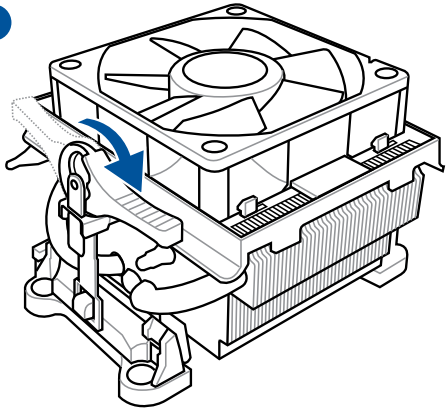
2



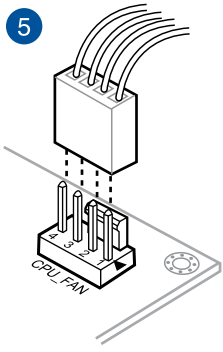
3



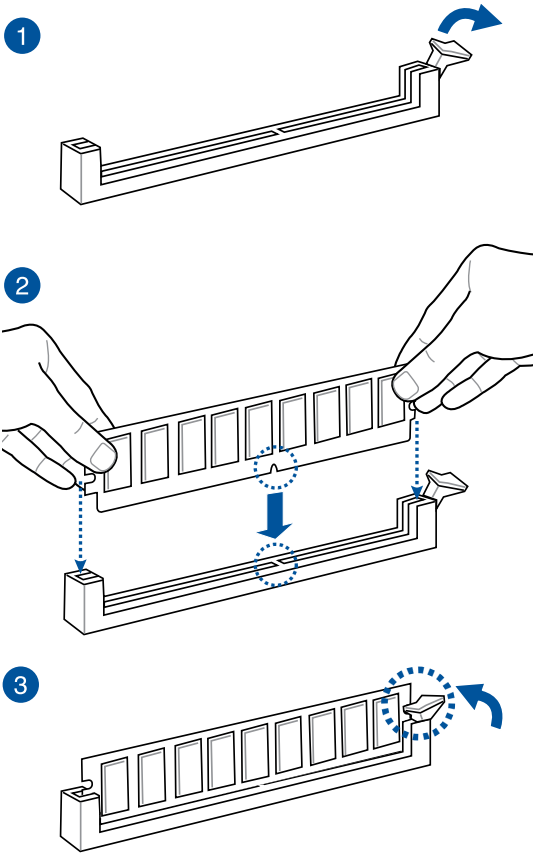
4



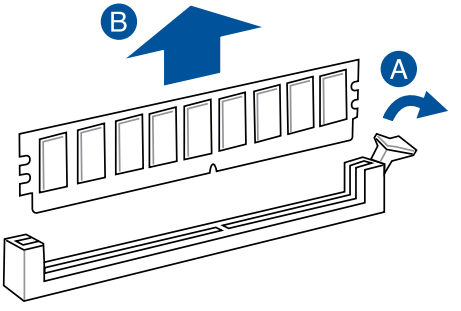
5



2.1.4 DIMM installation

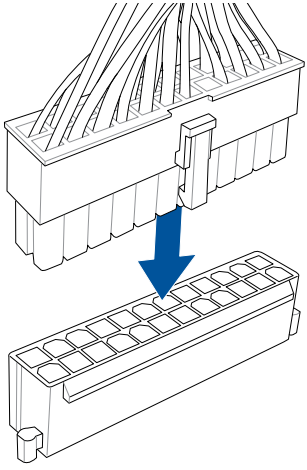


To remove a DIMM

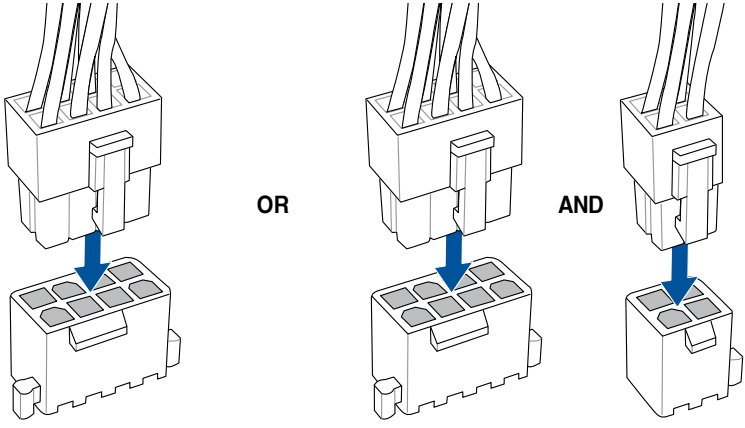


2.1.5 ATX power connection

1

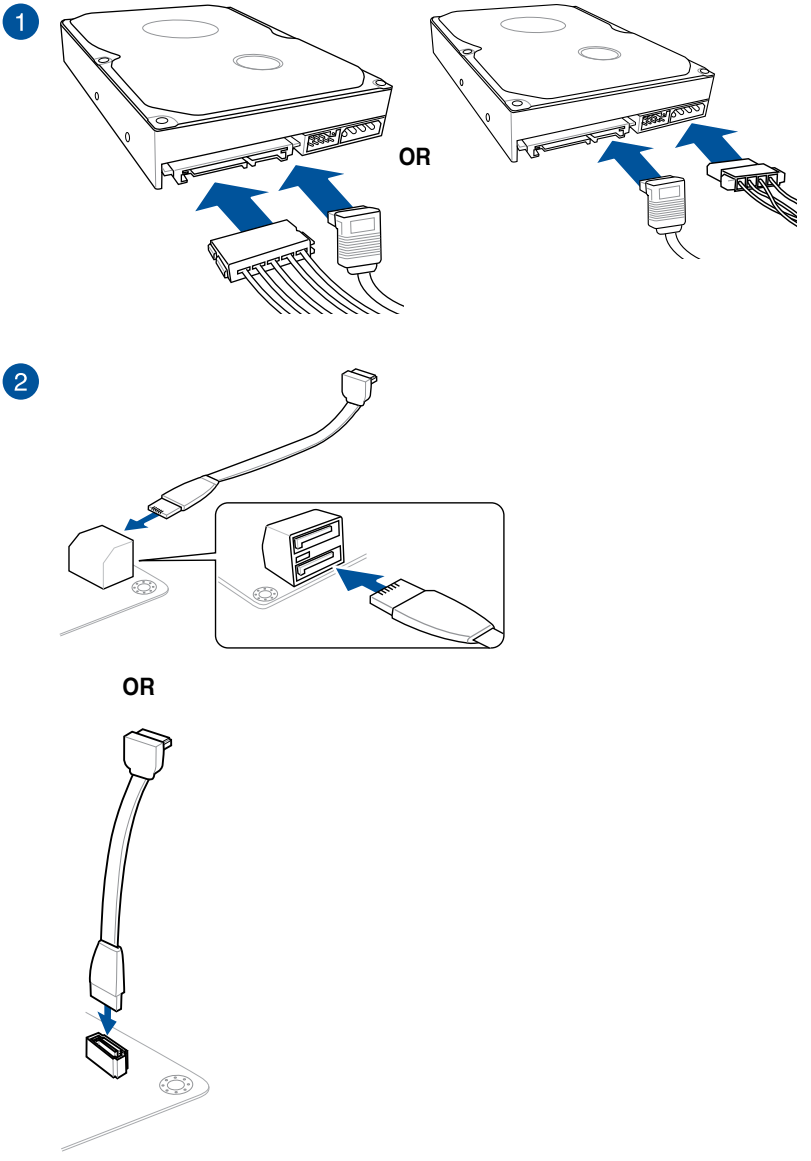


2



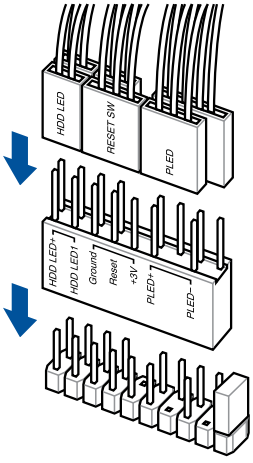
- DO NOT connect the 4-pin power plug only, the motherboard may overheat under heavy usage.
- Ensure to connect the 8-pin power plug, or connect both the 8-pin and 4-pin power plugs.

2.1.6 SATA device connection

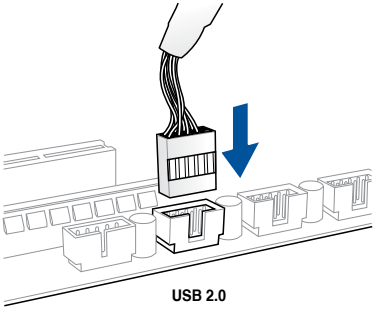


2.1.7 Front I/O connector

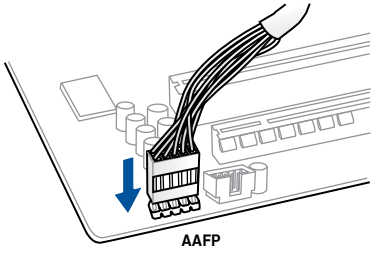
To install ASUS Q-Connector



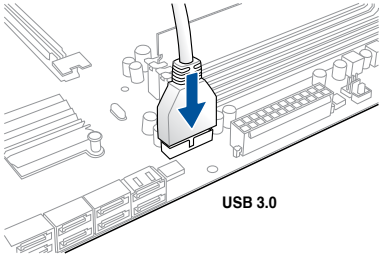
To install USB 2.0 connector



To install front panel audio connector



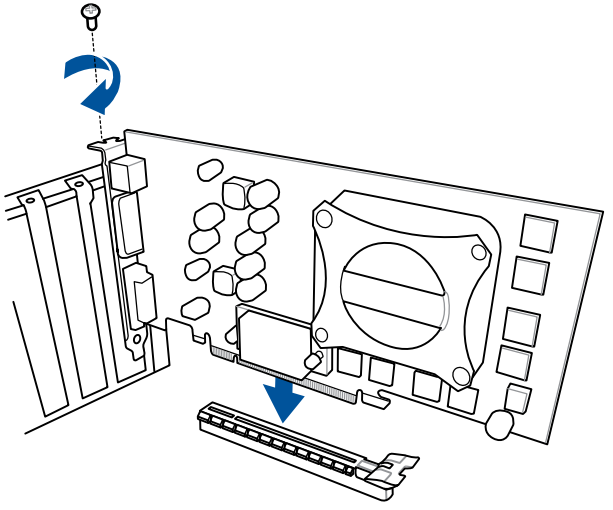
To install USB 3.0 connector



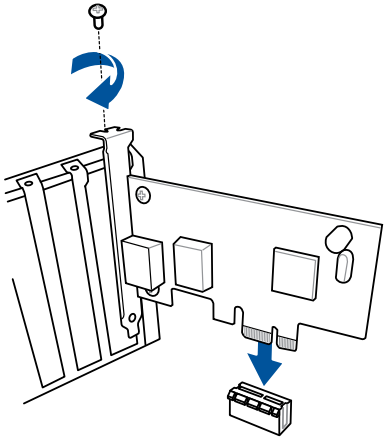
Chapter 2

2.1.8 Expansion card installation

To install PCIe x16 cards



To install PCIe x1 cards



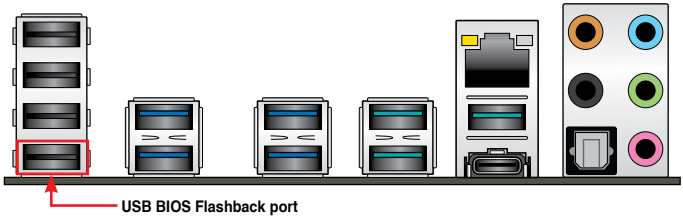
2.2 BIOS update utility

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 (the USB port hole marked in green on the I/O shield) then press the USB BIOS Flashback button for three seconds to automatically update the BIOS.

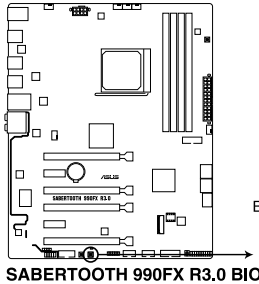
To use USB BIOS Flashback:

1. Place the bundled support DVD to the optical drive and install the USB BIOS Flashback Wizard. Follow the onscreen instructions to complete the installation.
2. Insert the USB storage device to the USB Flashback port.



- We recommend you to use a USB 2.0 storage device to save the latest BIOS version for better compatibility and stability.
- When downloading or updating the BIOS file, rename it as **ST990R30.CAP** for this motherboard.

3. Launch the USB BIOS Flashback Wizard to automatically download the latest BIOS version.
4. Shut down your computer.
5. On your motherboard, press the BIOS Flashback button for three seconds until the Flashback LED blinks three times, indicating that the BIOS Flashback function is enabled.



SABERTOOTH 990FX R3.0 BIOS_FLBK button

Refer to section **1.1.8 Onboard LEDs** for more information of the Flashback LED.

If the system fails to boot after flashing the BIOS, unplug the power core and restart the system.

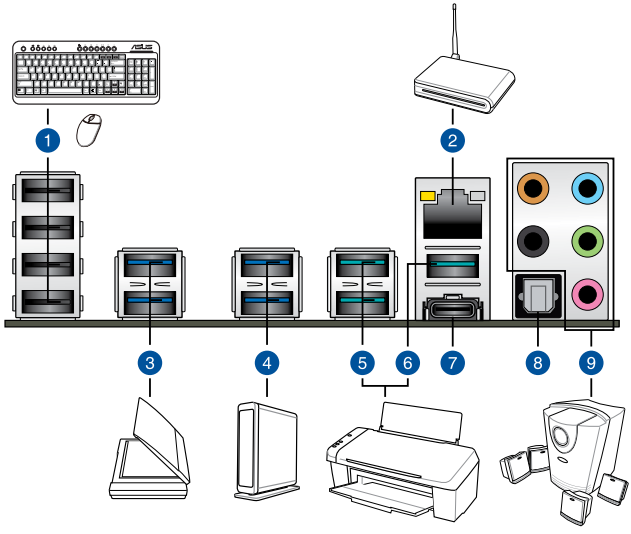
6. Wait until the light goes out, indicating that the BIOS updating process is completed.

For more BIOS update utilities in BIOS setup, refer to the section **3.11 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.
- If the light flashes for five seconds and turns into a solid light, this means that the BIOS Flashback is not operating properly. This may be caused by improper installation of the USB storage device and filename/file format error. If this scenario happens, please restart the system to turn off the light.
- 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



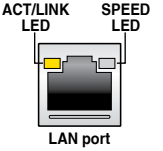
Rear panel connectors			
1.	USB 2.0 ports 1-4	6.	USB 3.1 Type-A port EA2
2.	Intel® LAN port*	7.	USB 3.1 Type-C port EC1
3.	USB 3.0 ports E12	8.	Optical S/PDIF Out port
4.	USB 3.0 ports E34	9.	Audio I/O ports**
5.	USB 3.1 Type-A ports E12		

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

- The plugged USB 3.0 device may run on xHCI mode or EHCI mode, depending on the operating system's setting.
- 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, and USB 3.1 devices to USB 3.1 ports for faster and better performance.
- Due to USB 3.0/USB 3.1 controller limitation, USB 3.0/USB 3.1 devices can only be used under Windows® 7 OS environment and after the USB 3.0/USB 3.1 driver installation.

*** 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
Orange (Blinking)	Data activity	Green	1 Gbps connection
Orange (Blinking then steady)	Ready to wake up from S5 mode		

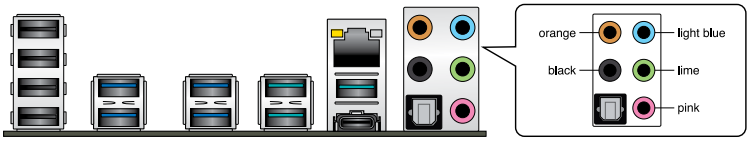


**** Audio 2, 4, 6, or 8-channel configuration**

Port	Headset 2-channel	4-channel	6-channel	8-channel
Light Blue	Line In	Line In	Line In	Line In or side speaker
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

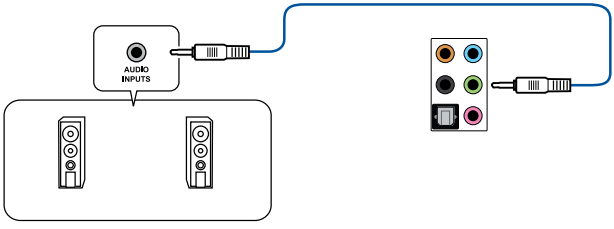
2.3.2 Audio I/O connections

Audio I/O ports

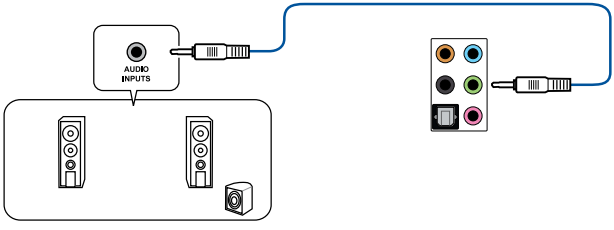


Connect to Headphone and Mic

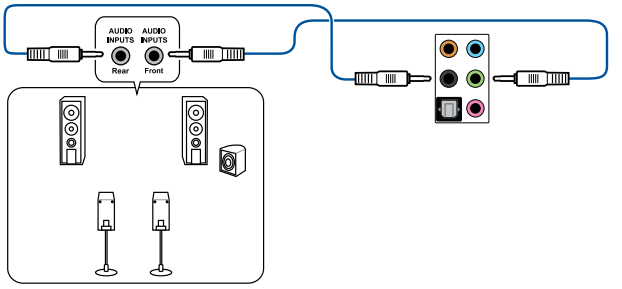
Connect to Stereo Speakers



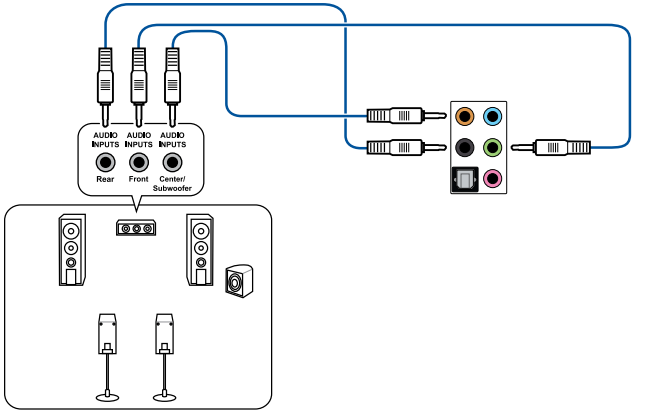
Connect to 2.1 channel Speakers



Connect to 4.1 channel Speakers

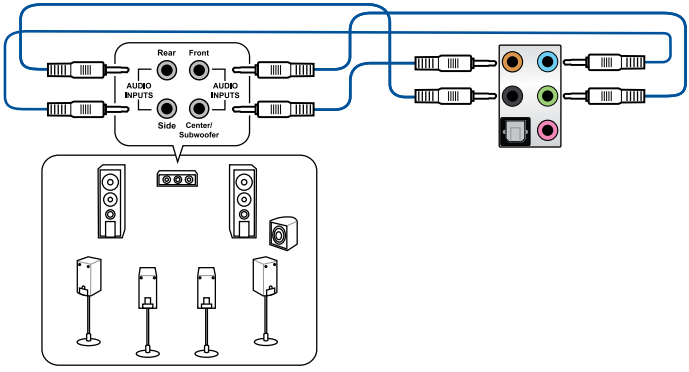


Connect to 5.1 channel Speakers



If you are using Windows® 8.1/10 platform, use only the light blue audio port for Side Speaker Out in a 6-channel configuration.

Connect to 7.1 channel Speakers



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.

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 **ST990R30.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> or <F2> during the Power-On Self Test (POST). If you do not press <Delete> or <F2>, 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.

After doing either of the three options, press <Delete> key to enter BIOS.

- 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 **3.10 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 **1.1.7 Jumpers** for information on how to erase the RTC RAM.
- The BIOS setup program does not support the Bluetooth devices.

Please visit ASUS website for the detailed BIOS content manual.

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.

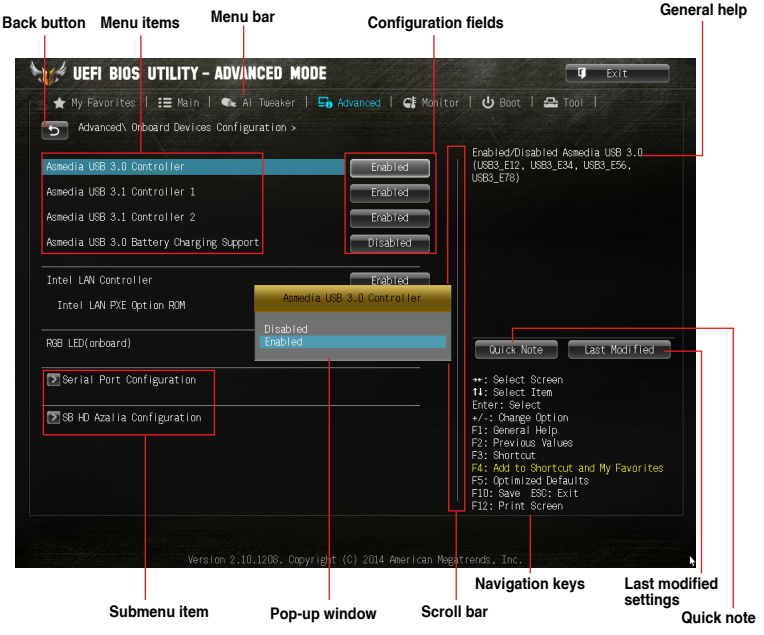
The default screen for entering the BIOS setup program can be changed. Refer to the **Setup Mode** item in section **3.7 Boot menu** for details.

- The 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 the <F7> hotkey.



Menu bar

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

My Favorites	For saving the frequently-used system settings and configuration
Main	For changing the basic system configuration
Ai 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 (My Favorites, 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.

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.

Quick Note button

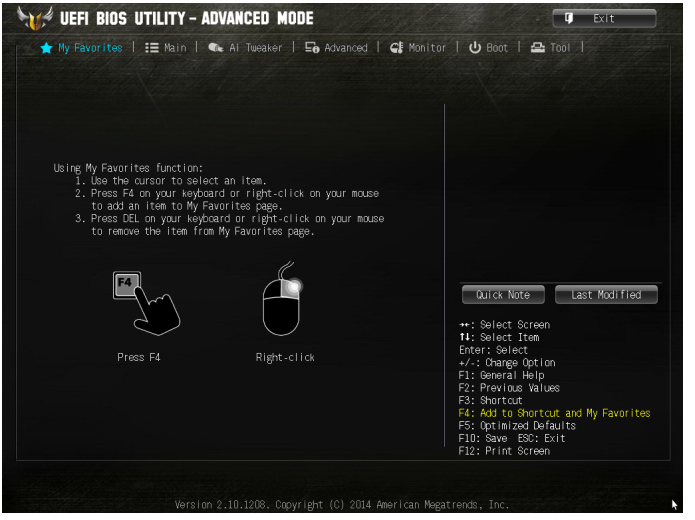
This button allows you to enter notes of the activities that you have done in BIOS.

Last Modified button

This button shows the items that you last modified and saved in BIOS Setup.

3.3 My Favorites

My Favorites is your personal space where you can easily save and access your favorite BIOS items.



Adding items to My Favorites

To add frequently-used BIOS items to My Favorites:

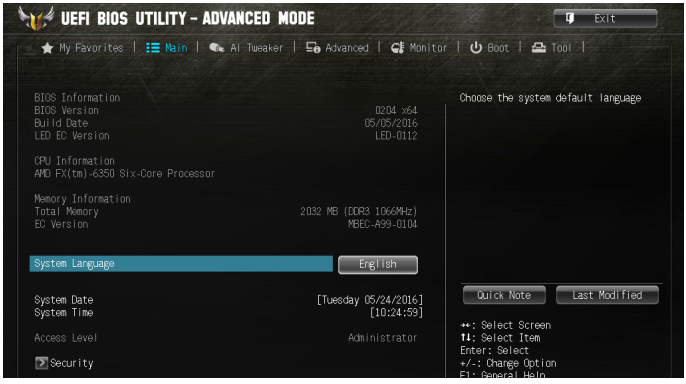
1. Use the arrow keys to select an item that you want to add. When using a mouse, hover the pointer to the item.
2. Press <F4> on your keyboard or right-click on your mouse to add the item to My Favorites page.

You cannot add the following items to My Favorites:

- Items with submenu options
- User-configurable items such as language and boot device order
- Configuration items such as Memory SPD Information, system time and date

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.



System Language [English]

Allows you to choose the BIOS language version from the options.

Configuration options: [English] [Français] [Deutsch] [简体中文] [繁體中文] [日本語] [Español] [Русский]

System Date [Day xx/xx/xxxx]

Allows you to set the system date.

System Time [xx:xx:xx]

Allows you to set the system time.

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 **1.1.7 Jumpers** for information on how to erase the RTC RAM.
- 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 Ai Tweaker menu

The Ai Tweaker menu items allow you to configure overclocking-related items. Scroll down on the menu to display more 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.

Current CPU Speed : xxxxMHz

Displays the current CPU speed.

Target CPU Speed : xxxxMHz

Displays the target CPU speed.

Current Memory Frequency : xxxxMHz

Displays the current memory frequency.

Current NB Frequency : xxxxMHz

Displays the current NB frequency.

Current HT Link Speed : xxxxMHz

Displays the current HT link speed.

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.

[D.O.C.P.] Allows you to select a DRAM O.C. profile, and the related parameters will be adjusted automatically.

CPU Ratio [Auto]

Allows user can manually adjust the maximum non-CPB mode CPU ratio. The value will be limit to CPU base or factory setting. Use the <+> and <-> keys to adjust the ratio. The valid value ranges vary according to your CPU model.

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.

CPU/NB Frequency [Auto]

Allows you to set the ratio between the NB (in CPU) Clock and the CPU Bus Frequency.

Configuration options: [Auto] [1200MHz] [1400MHz] [1600MHz] [1800MHz] [2000MHz] [2200MHz] [2400MHz] [2600MHz] [2800MHz] [3000MHz] [3200MHz]

HT Link Speed [Auto]

Allows you to select the HyperTransport link speed.

Configuration options: [Auto] [800MHz] [1000MHz] [1200MHz] [1400MHz] [1600MHz] [1800MHz] [2000MHz] [2200MHz] [2400MHz]

CPU Spread Spectrum [Auto]

[Auto] Automatic configuration.

[Disabled] Enhances the BCLK overclocking ability.

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

PCIe Spread Spectrum [Auto]

[Auto] Automatic configuration.

[Disabled] Enhances the PCIE overclocking ability.

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

EPU Power Saving Mode [Disabled]

The ASUS EPU (Energy Processing Unit) sets the CPU in its minimum power consumption settings. Enable this item to set lower CPU core/cache voltage and achieve the best energy saving condition.

Configuration options: [Disabled] [Enabled]

The following item appears only when you set EPU Power Saving Mode to **[Enabled]**.

EPU Setting [Auto]

This item allows you to set power saving mode.

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

OC Tuner

OC Tuner utility automatically overclocks the frequency and voltage of the CPU and DRAM. Press <Enter> to start auto tuning. It takes around five minutes, and the system will reboot for several times until auto tuning is completed.

Configuration options: [OK] [Cancel]

The configuration options for the following sub-items vary depending on the CPU/DIMMs you install on the motherboard.

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 <Enter>.

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

DRAM Driving Control

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

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

DIGI+ Power Control

CPU Load-Line Calibration [Auto]

Load-line is defined by AMD VRM spec and affects CPU voltage. The CPU working voltage will decrease proportionally to CPU loading. Higher value gets a higher voltage and better overclocking performance, but increases the CPU and VRM thermal. This item allows you to enable or disable the CPU Load-Line Calibration function.

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

CPU/NB Load-Line Calibration [Auto]

This item allows you to enable or disable the CPU/NB Load-Line Calibration function.

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

CPU Current Capability [Auto]

This item provides a total power range for CPU overclocking. A higher value setting provides higher power consumption delivery and extends the overclocking frequency range simultaneously.

Configuration options: [Auto] [100%] [110%] [120%] [130%] [140%]

Configure higher values when overclocking or under a high CPU loading for extra power support.

CPU/NB 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: [Auto] [100%] [110%] [120%] [130%]

CPU Power Phase Control [Standard]

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.

[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 Voltage Frequency [Auto]

Switching frequency will affect the VRM transient response and component thermal. Setting a higher frequency gets faster transient response.

[Auto] Allows you to enable or disable the Spread Spectrum item.

[Manual] Allows you to manually set the frequency with a 10k Hz interval.

The following item appears only when you set CPU Voltage Frequency to **[Auto]**.

VRM Spread Spectrum [Disabled]
This item allows you to enable the spread spectrum to enhance system stability.

Configuration options: [Disabled] [Enabled]

The following item appears only when you set CPU Voltage Frequency to **[Manual]**.

VRM Fixed Frequency Mode [300]
This item allows you to set a higher frequency for a quicker transient response speed. Use the <+> or <-> to adjust the value. The values range from 200 KHz to 400 KHz with an interval of 10 KHz.

CPU Power Duty Control [T.Probe]

[T.Probe] Maintains the VRM thermal balance.

[C.Probe Current] Maintains the VRM current balance.

CPU Power Response Control [Auto]

Configuration options: [Auto] [Regular] [Medium] [Fast] [Ultra Fast]

CPU/NB Power Response Control [Auto]

Configuration options: [Auto] [Regular] [Medium] [Fast] [Ultra Fast]

CPU Power Thermal Control [130]

Higher temperature provides a wider CPU power thermal range and extends the overclocking tolerance to enlarge the overclocking potential.

Configuration options: [130] - [151]

CPU & NB Voltage [Offset Mode]

Allows you to set the CPU & NB Voltage Mode. Different sub-items appear according to the **CPU & NB Voltage Mode** item setting.

Configuration options: [Offset Mode] [Manual Mode]

The following items appear only when you set CPU & NB Voltage to **[Offset Mode]**.

Offset Mode Sign [+]

This item allows you to set the offset mode sign.

Configuration options: [+] [-]

CPU Offset Voltage [Auto]

This item allows you to set the CPU Offset voltage. Use the <+> or <-> to adjust the value. The values range from 0.006250V to 0.700000V with an interval of 0.06250V.

CPU/NB Offset Mode Sign [+]

This item allows you to set the offset mode sign.

Configuration options: [+] [-]

CPU/NB Offset Voltage [Auto]

This item allows you to set the CPU/NB Offset voltage. Use the <+> or <-> to adjust the value. The values range from 0.006250V to 0.700000V with an interval of 0.06250V.

The following items appear only when you set CPU & NB Voltage to **[Manual Mode]**.

CPU Manual Voltage [Auto]

This item allows you to set a fixed CPU voltage. Use the <+> or <-> to adjust the value. The values range from 0.006250V to 2.075000V with an interval of 0.06250V.

CPU/NB Manual Voltage [Auto]

This item allows you to set a fixed CPU/NB voltage. Use the <+> or <-> to adjust the value. The values range from 0.500000V to 1.900000V with an interval of 0.06250V.

CPU VDDA Voltage [Auto]

Allows you to set the CPU VDDA voltage. Use the <+> or <-> to adjust the value. The values range from 2.200000V to 2.800000V with a 0.006250V interval.

DRAM Voltage [Auto]

Allows you to set the DRAM voltage. Use the <+> or <-> to adjust the value. The values range from 1.200000V to 2.200000V with a 0.006250V interval.

NB Voltage [Auto]

Allows you to set the Northbridge voltage. Use the <+> or <-> to adjust the value. The values range from 0.860000V to 2.135000V with a 0.005000V interval.

NB HT Voltage [Auto]

Allows you to set the Northbridge HyperTransport voltage. Use the <+> or <-> to adjust the value. The values range from 1.200000V to 1.400000V with a 0.006250V interval.

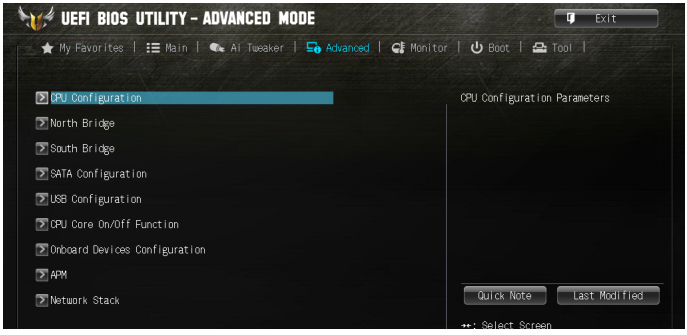
NB 1.8V Voltage [Auto]

Allows you to set the NB 1.8V voltage. Use the <+> or <-> to adjust the value. The values range from 1.801800V to 2.805000V with a 0.006600V interval.

3.6 Advanced menu

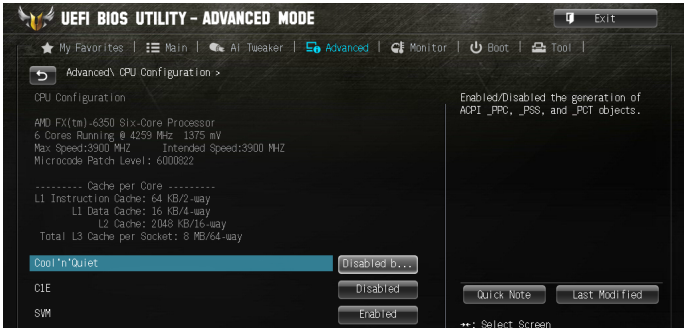
The Advanced menu items allow you to change the settings for the CPU and other system devices.

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



3.6.1 CPU Configuration

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



The items shown in submenu may be different due to the CPU you installed.

Cool'n'Quiet [Always Disabled]

This item allows you to enable or disable the Cool 'n' Quiet function.

Configuration options: [Disabled by CPU] [Always Enabled] [Always Disabled]

C1E [Disabled]

This item allows your system to utilize the AMD specific ACPI states to save power consumption.

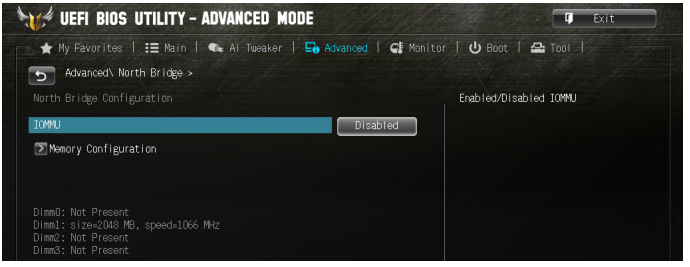
Configuration options: [Disabled] [Enabled]

SVM [Enabled]

[Disabled] Disables this function.

[Enabled] Enables the AMD Secure Virtual Machine mode.

3.6.2 North Bridge Configuration



IOMMU [Disabled]

Allows you to enable or disable the input/output memory management unit (IOMMU)

Configuration options: [Enabled] [Disabled]

When the IOMMU is set to [Enabled], the following item appears:

IOMMU Mode [Disabled]

Allows you to set the IOMMU Mode that supports LINUX-based systems to convert 32bit I/O to 64-bit memory-mapped I/O.
Configuration options: [Disabled] [64MB]

Memory Configuration

Bank Interleaving [Auto]

Allows you to enable Memory Bank Interleaving function.
Configuration options: [Auto] [Disabled]

Channel Interleaving [Auto]

Allows you to enable Memory Channel Interleaving function.
Configuration options: [Auto] [Disabled]

Warm Boot RAM [Enabled]

Allows you to enable or disable re-use data in RAM after warm boot to speed-up boot.
Configuration options: [Enabled] [Disabled]

Memory Clear [Disabled]

Allows you to enable or disable the Memory Clear functionality control.
Configuration options: [Enabled] [Disabled]

ECC Mode [Enabled]

Allows you to enable or disable the Error Correcting Code (ECC) Mode.
Configuration options: [Enabled] [Disabled]

Power Down Enable [Disabled]

Allows you to enable or disable DDR power down mode.
Configuration options: [Enabled] [Disabled]

Memory Hole Remapping [Enabled]

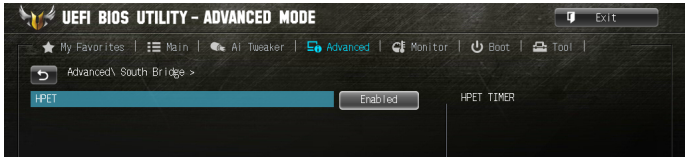
Allows you to enable or disable Memory Hole Remapping function.
Configuration options: [Enabled] [Disabled]

DCT Unganged Mode [Enabled]

Allows you to select unganged DRAM mode (64-bit width).
[Enabled]: Unganged mode.

[Disabled]: Ganged mode.

3.6.3 South Bridge Configuration



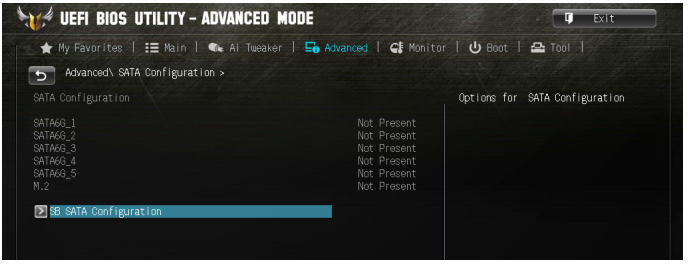
HPET [Enabled]

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

Configuration options: [Enabled] [Disabled]

3.6.4 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.



SB SATA Configuration

Allows you to set SATA options.

OnChip SATA Channel [Enabled]

Allows you to enable or disable serial ATA.

Configuration options: [Enabled] [Disabled]

The following items appear only when you set OnChip SATA Channel to **[Enabled]**.

SATA Port1 - Port4 [AHCI]

[IDE] Set to [IDE] when you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices.

[AHCI] Set to [AHCI] 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] when you want to create a RAID configuration from the SATA hard disk drives.

The following item appears only when you set SATA Port1 - Port4 to **[RAID]**.

Board SATA RAID ROM [Legacy ROM]
This item allows you to select Board SATA RAID ROM.
Configuration options: [Disabled] [Legacy ROM] [UEFI DRIVER]

SATA Port5 & M.2(SATA mode) [AHCI]

Allows you to set the SATA Port5 & M.2(SATA mode) mode.

Configuration options: [AHCI] [IDE]

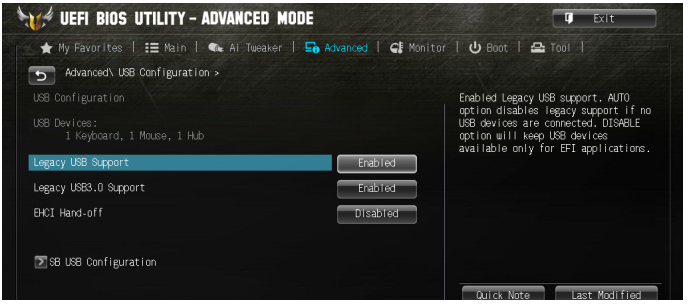
- When the **SATA Port1 - Port 4** and the **SATA Port5 & M.2(SATA mode)** items are set to [AHCI], the information of the SATA connectors can be seen only under the OS environment or during POST.
- The configuration options of SATA Port5 & M.2(SATA mode) will vary according to the configuration option of the SATA Port1 - Port4.

The following item appears only when you set SATA Port1 - Port4 to **[IDE]** or **[AHCI]**.

S.M.A.R.T. Status Check [Enabled]
[Disabled] Disables the S.M.A.R.T feature.
[Enabled] Enables the S.M.A.R.T feature.

3.6.5 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]

[Disabled] The USB devices can be used only for the BIOS setup program.

[Enabled] Enables the support for USB devices on legacy operating systems (OS).

[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.

The following item appears only when you set Legacy USB Support to **[Auto]** or **[Enabled]**.

Legacy USB3.0 Support [Enabled]

[Disabled] Disables the function.

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

EHCI Hand-off [Disabled]

[Disabled] Disables the function.

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

SB USB Configuration

Options for SB USB Configuration.

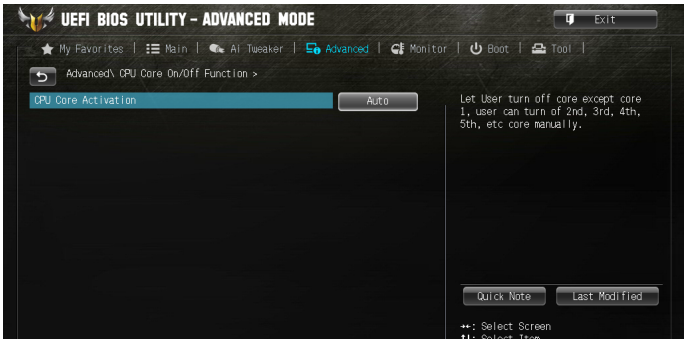
USB PORT 1 ~ 4 [Enabled]

Configuration options: [Disabled] [Enabled]

USB PORT 11 ~ 14 [Enabled]

Configuration options: [Disabled] [Enabled]

3.6.6 CPU Core On/Off Function



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

CPU Core Activation [Auto]

This item lets user turn off cores except core 1, user can turn off 2nd, 3rd, 4th, 5th, etc core manually. Configuration options: [Auto] [Manual]

The following items appear only when you set CPU Core Activation to **[Manual]**.

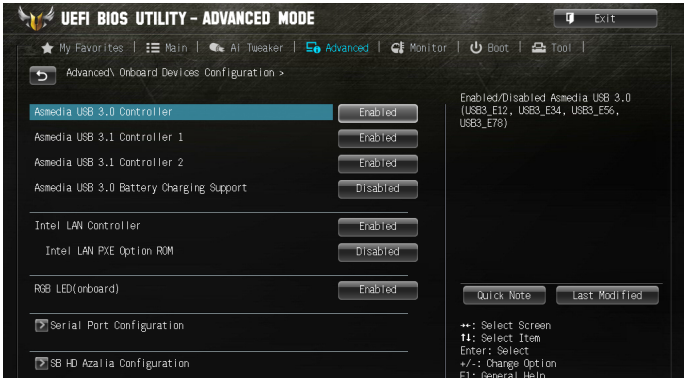
3rd & 4th Core [Enabled]

Configuration options: [Disabled] [Enabled]

5th & 6th Core [Enabled]

Configuration options: [Disabled] [Enabled]

3.6.7 Onboard Devices Configuration



Asmedia USB 3.0 Controller [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the front USB 3.0 controller.

Asmedia USB 3.1 Controller 1 [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the rear USB 3.1 controller.

Asmedia USB 3.1 Controller 2 [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the rear USB 3.1 controller.

Asmedia USB 3.1/3.0 Battery Charging Support [Disabled]

[Disabled] Disables this function

[Enabled] Enables the Asmedia USB 3.1/3.0 battery charging function.

USB Type C Power Switch [Auto]

[Auto] The system will automatically detect your USB Type C devices and provide suitable power if needed.

[Enabled] The USB Type C port will always provide power to your devices.

Intel LAN Controller [Enabled]

[Disabled] Disables the controller.

[Enabled] Enables the Intel LAN controller.

The following item appears only when you set Intel LAN Controller to **[Enabled]**.

Lntel LAN PXE Option ROM [Disabled]

This item allows you to enable or disable the Intel LAN PXE OPROM.

Configuration options: [Disabled] [Enabled]

RGB LED (onbaord) [Enabled]

[Enabled] LEDs will always light up at the S0 (Working), S3 (Sleep), and S5 (Soft off) states, but not light up at the S5 state when the “ErP Ready” is enabled.

[Disabled] LEDs will not light up.

M.2 Bandwidth<PCIE> [x4]

When M.2 bandwidth is set to x4, PCIe16_2 will have no function.

Configuration options: [x4] [disable]

Serial Port Configuration

The sub-items in this menu allow you to set the serial port configuration.

Serial Port [Enabled]

Allows you to enable or disable the serial port (COM).

Configuration options: [Disabled] [Enabled]

The following item appears only when you set Serial Port to **[Enabled]**.

Change Settings [IO=3F8h; IRQ=4]

This item appears only when you set the previous item to [Enabled] and allows you to select the Serial Port base address.

Configuration options: [IO=3F8h; IRQ=4] [IO=2F8h; IRQ=3] [IO=3E8h; IRQ=4] [IO=2E8h; IRQ=3]

SB HD Azalia Configuration

HD Azalia Configuration

Allows you to change the HD Azalia configuration.

[Disabled] Disables the device.

[Enabled] Enables the High Definition Audio Azalia device.

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

Azalia Front Panel [HD]

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

[AC97] Sets the front panel audio connector (AAFP) mode to legacy AC'97

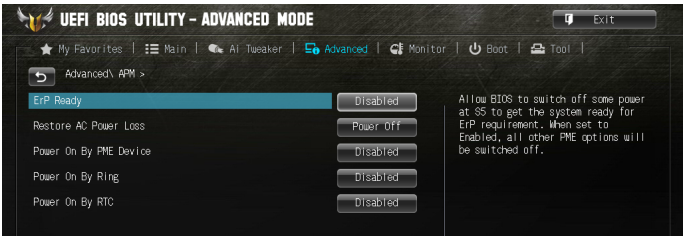
[HD] Sets the front panel audio connector (AAFP) mode to high definition audio.

SPDIF Out Type [SPDIF]

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

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

3.6.8 APM



ErP Ready [Disabled]

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

Configuration options: [Disabled] [Enabled]

Restore AC Power Loss [Power Off]

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

[Power On] The system goes into on 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 PME [Disabled]

[Disabled] Disables the PME to wake up by PCI/PCIE devices.

[Enabled] Allows you to turn on the system through a PCI/PCIE LAN or modem card. This feature requires an ATX power supply that provides at least 1A on the +5VSB lead.

Power On By Ring [Disabled]

[Disabled] Disables Ring to generate a wake event.

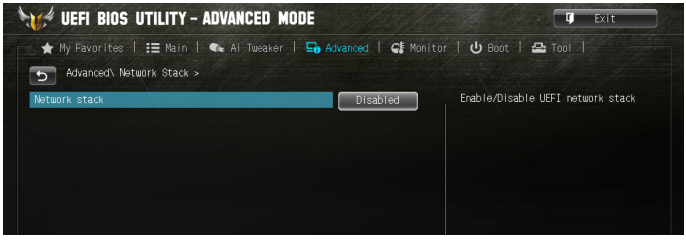
[Enabled] Enables Ring to generate a wake event.

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.

3.6.9 Network Stack



Network Stack [Disabled]

This item allows user to disable or enable the UEFI network stack.

Configuration options: [Disabled] [Enabled]

The following item appears only when you set Network Stack to **[Enabled]**.

Ipv4 PXE Support [Enabled]

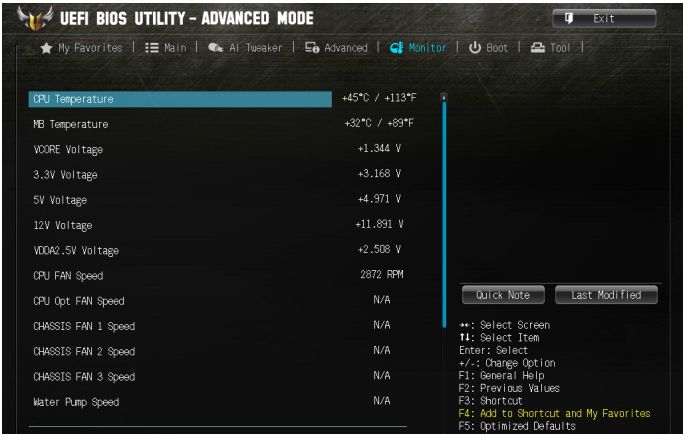
Configuration options: [Disabled] [Enabled]

Ipv6 PXE Support [Enabled]

Configuration options: [Disabled] [Enabled]

3.7 Monitor menu

The Monitor menu displays the system temperature/power status, and allows you to change the fan settings. Scroll down on the menu to display more items.



CPU Temperature / MB Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the CPU and motherboard temperatures. Select **Ignore** if you do not wish to display the detected temperatures.

VCORE Voltage, 3.3V Voltage, 5V Voltage, 12V Voltage, VDDA2.5V Voltage

The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select **Ignore** if you do not want to detect this item.

CPU Fan Speed, CPU Opt Fan Speed, Chassis Fan 1-3 Speed, Water Pump Speed [xxxx RPM] or [Ignore] / [N/A]

The onboard hardware monitor automatically detects and displays the CPU and chassis fan speeds in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows N/A. Select **Ignore** if you do not wish to display the detected speed.

CPU Q-Fan Control [PWM Mode]

[Disabled] Disable the Q-Fan control.

[PWM Mode] Enable the CPU Q-Fan control feature in PWM mode for 4-pin CPU fan.

[DC Mode] Enable the CPU Q-Fan control feature in DC mode for 3-pin CPU fan.

The following items appear only when you set CPU Q-Fan Control to **[PWM Mode]** or **[DC Mode]**.

CPU_FAN Speed Low Limit [600 RPM]

This item allows you to disable or set the CPU fan warning speed.

Configuration options: [Ignore] [100 RPM] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

CPU Fan Profile [Standard]

This item allows you to set the appropriate performance level of the CPU fan.

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

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

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

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

The following 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. The CPU fan will operate at the maximum duty cycle when the temperature is higher than the limit.

CPU Lower Temperature [20]

Use the <+> or <-> keys to adjust the lower limit of the CPU temperature. The values range from 20 to 75. The CPU fan will operate at the minimum duty cycle when the temperature is lower than the limit.

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 Fan Min. Duty Cycle(%) [30]

Use the <+> and <-> keys to adjust the minimum CPU fan duty cycle. The values range from 0% to 100%. When the CPU temperature is lower than the lower limit, the CPU fan will operate at the minimum duty cycle.

Chassis 1-3 Q-Fan Control [Disabled]

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

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

The following items appear only when you set Chassis Q-Fan Control to **[Enabled]**.

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

This item allows you to disable or set the chassis fan warning speed.

Configuration options: [Ignore] [100 RPM] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Chassis Fan 1-3 Profile [Standard]

This item 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 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 chassis temperature. The values range from 40°C to 90°C. The chassis will operate at the maximum duty cycle when the temperature is higher than the limit.

Chassis Lower Temperature [40]

Displays the lower limit of the chassis temperature.

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

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 Fan Min. Duty Cycle(%) [60]

Use the <+> and <-> keys to adjust the minimum chassis fan duty cycle. The values range from 60% to 100%. When the chassis temperature is under 40°C, the chassis fan will operate at the minimum duty cycle.

Water Pump Control [PWM mode]

[Disabled] Disable the Water Pump control feature.

[DC mode] Enable the Water Pump control in DC mode for 3-pin chassis fan.

[PWM mode] Enable the Water Pump control in PWM mode for 4-pin chassis fan.

The following items appear only when you set the Water Pump Control to **[DC mode]** or **[PWM mode].**

PUMP Fan Speed Low Limit [600 RPM]

This item allows you to disable or set the water pump warning speed.

Configuration options: [Ignore] [100 RPM] [200 RPM] [300 RPM] [400 RPM] [500 RPM] [600 RPM]

Water Pump Upper Temperature [70]

Use the <+> and <-> keys to adjust the upper limit of the CPU temperature. The values range from 40°C to 90°C. The water pump will operate at the maximum duty cycle when the temperature is higher than the limit.

Water Pump Lower Temperature [20]

Use the <+> or <-> keys to adjust the lower limit of the CPU temperature. The values range from 20 to 75. The water pump will operate at the minimum duty cycle when the temperature is lower than the limit.

Water Pump Max. Duty Cycle(%) [100]

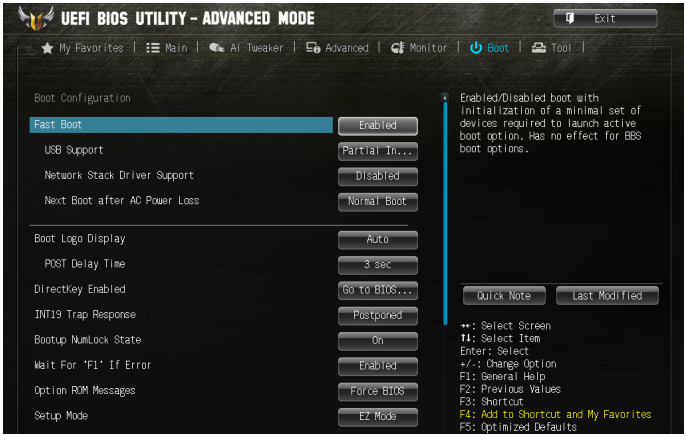
Use the <+> and <-> keys to adjust the maximum water pump duty cycle. The values range from 0% to 100%. When the CPU temperature reaches the upper limit, the water pump will operate at the maximum duty cycle.

Water Pump Min. Duty Cycle(%) [100]

Use the <+> and <-> keys to adjust the minimum water pump duty cycle. The values range from 0% to 100%. When the CPU temperature is lower than the lower limit, the water pump will operate at the minimum duty cycle.

3.8 Boot menu

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



Fast Boot [Enabled]

[Disabled] Allows your system to go back to its normal boot speed.

[Enabled] Allows your system to accelerate the boot speed.

The following items appear only when you set the Fast Boot to **[Enabled]**.

USB Support [Partial Initialization]

[Disabled] All USB devices will not be available until OS boot up for a fastest POST time.

[Full Initialization] All USB devices will be available during POST. This process will extend the POST time.

[Partial Initialization] For a faster POST time, only the USB ports with keyboard and mouse connections will be detected.

Network Stack Driver Support [Disabled]

[Disabled] Select to skip the network stack driver from loading during POST.

[Enabled] Select to load the network stack driver during POST.

Next Boot after AC Power Loss [Normal Boot]

[Normal Boot] Returns to normal boot on the next boot after AC power loss.

[Fast Boot] Accelerates the boot speed on the next boot after AC power loss.

Boot Logo Display [Auto]

[Auto] Sets the boot logo to display during POST.

[Full Screen] Sets the boot logo display in full screen during POST.

[Disabled] Disables the boot logo display during POST.

The following item appears only when you set the Boot Logo Display to **[Auto]** and **[Full Screen]**.

Post Delay Time [3 sec]

This item allows you to select a desired additional POST waiting time to easily enter the BIOS Setup. You can only execute the POST delay time during normal boot. The values range from 0 to 10 seconds.

This feature only works when set under normal boot.

The following items appear only when you set the Boot Logo Display to **[Disabled]**.

Post Report [5 sec]

This item allows you to select a desired POST report waiting time.

Configuration options: [1 sec] - [10 sec] [Until Press ESC]

DirectKey Enabled [Go to BIOS Setup]

[Go to BIOS Setup] Allows the system to go to the BIOS setup directly when you press the DirectKey button.

[Disable] Disables the DirectKey function. However the system will only power on or off when you press the Directkey button.

INT19 Trap Response [Postponed]

This item allows you to set the BIOS reaction on INT19 trapping by Option ROM.

[Immediate] Execute the trap right away.

[Postponed] Execute the trap during legacy boot.

Bootup NumLock State [On]

This item allows you to enable or disable power-on state of the NumLock.

Configuration options: [On] [Off]

Wait For 'F1' If Error [Enabled]

This item allows your system to wait for the <F1> key to be pressed when error occurs.

Configuration options: [Disabled] [Enabled]

Option ROM Messages [Force BIOS]

Configuration options: [Force BIOS] [Keep Current]

Setup Mode [EZ Mode]

[Advanced Mode] This item allows you to go to Advanced Mode of the BIOS after POST.

[EZ Mode] This item allows you to go to EZ Mode of the BIOS after POST.

CSM (Compatibility Support Module)

This item allows you to configure the CSM (Compatibility Support Module) items to fully support the various VGA, bootable devices and add-on devices for better compatibility.

Launch CSM [Enabled]

[Auto] The system automatically detects the bootable devices and the add-on devices.

[Enabled] For better compatibility, enable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.

[Disabled] Disable the CSM to fully support the non-UEFI driver add-on devices or the Windows® UEFI mode.

The following items appear only when you set the Launch CSM to **[Enabled]**.

Boot Devices Control [UEFI and Legacy OPROM]
This item allows you to select the type of devices that you want to boot.

Configuration options: [UEFI and Legacy OPROM] [Legacy OPROM only] [UEFI only]

Boot from Network Devices [Legacy OpROM first]
This item allows you to select the type of network devices that you want to launch.

Configuration options: [Legacy OpROM first] [UEFI driver first] [Ignore]

Boot from Storage Devices [Legacy OpROM first]
This item allows you to select the type of storage devices that you want to launch.

Configuration options: [Both, Legacy OpROM first] [Both, UEFI first] [Legacy OpROM first] [UEFI driver first] [Ignore]

Boot from PCI-E/PCI Expansion Devices [Legacy OpROM first]
This item allows you to select the type of PCI-E/PCI expansion devices that you want to launch.

Configuration options: [Legacy OpROM first] [UEFI driver first]

Secure Boot

This item allows you to configure the Windows® Secure Boot settings and manage its keys to protect the system from unauthorized access and malwares during POST.

OS Type [Windows UEFI mode]

[Windows UEFI Mode]	This item allows you to select your installed operating system. Execute the Microsoft® Secure Boot check. Only select this option when booting on Windows® UEFI mode or other Microsoft® Secure Boot compliant OS.
[Other OS]	Get the optimized function when booting on Windows® non-UEFI mode. Microsoft® Secure Boot only supports Windows® UEFI mode.

Key Management

Clear Secure Boot keys

This item allows you to clear all default Secure Boot keys.

Save Secure Boot Keys

This item allows you to save the PK (Platform Keys) to a USB storage device.

PK Management

Delete PK

This item allows you to delete the PK from your system. Once the PK is deleted, all the system's Secure Boot keys will not be active.

Configuration options: [Yes] [No]

Load PK from File

This item allows you to load the downloaded PK from a USB storage device.

The PK file must be formatted as a UEFI variable structure with time-based authenticated variable.

KEK Management

Key-exchange Key (KEK) refers to Microsoft® Secure Boot Key-Enrollment Key (KEK).

Delete the KEK

Allows you to delete the KEK from your system.

Configuration options: [Yes] [No]

Load KEK from File

Allows you to load the downloaded KEK from a USB storage device.

Append KEK from File

Allows you to load the additional KEK from a storage device for an additional db and dbx loaded management.

The KEK file must be formatted as a UEFI variable structure with time-based authenticated variable.

DB Management

Delete the db

Allows you to delete the db file from your system.

Configuration options: [Yes] [No]

Load db from File

Allows you to load the downloaded db from a USB storage device.

Append db from File

Allows you to load the additional db from a storage device so that more images can be loaded securely.

The db file must be formatted as a UEFI variable structure with time-based authenticated variable.

DBX Management

Delete the dbx

Allows you to delete the dbx file from your system.

Load dbx from File

Allows you to load the downloaded dbx from a USB storage device.

Configuration options: [Yes] [No]

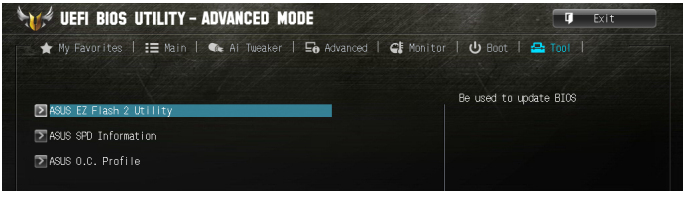
Append dbx from File

Allows you to load the additional dbx from a storage device so that more db's images cannot be loaded.

The dbx file must be formatted as a UEFI variable structure with time-based authenticated variable.

3.9 Tool menu

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



ASUS EZ Flash 2 Utility

Allows you to run ASUS EZ Flash 2. Press <Enter> to launch the ASUS EZ Flash 2 screen.

For more details, see section **3.11.2 ASUS EZ Flash 2 Utility**.

ASUS SPD Information

DIMM Slot # [Slot 2]

Displays the Serial Presence Detect (SPD) information of the DIMM module installed on the selected slot.

Configuration options: [Slot 1] [Slot 2] [Slot 3] [Slot 4]

ASUS O.C. Profile

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

The **Setup Profile Status** items show **Not Installed** if no profile is created.

Label

Allows you input the label of the setup profile..

Save to Profile

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**.

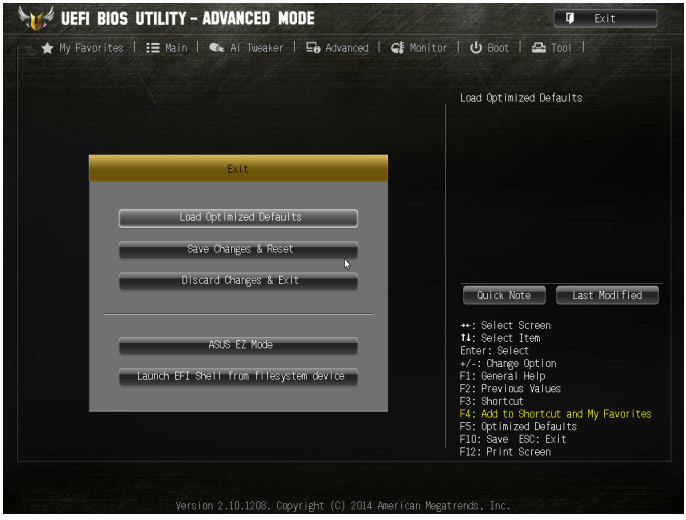
Load from Profile

Allows you to load the previous BIOS settings saved in the BIOS Flash. Key in the profile number that saved your CMOS 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.

3.10 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 devices that have a filesystem.

3.11 Updating BIOS

The ASUS website publishes the latest BIOS versions to provide enhancements on system stability, compatibility,and 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 to system's failure to boot. Carefully follow the instructions in this chapter to update your BIOS when necessary.

Visit http://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. EZ 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.

3.11.1 EZ Update

The EZ Update is a utility that allows you to update the motherboard BIOS in Windows® environment.

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

3.11.2 ASUS EZ Flash 2 Utility

The ASUS EZ Flash 2 feature allows you to update the BIOS without using an OS-based utility. Press <Enter> to launch the EZ Flash 2 screen.

Before you start using this utility, download the latest BIOS file from the ASUS website at www.asus.com.

To update the BIOS using EZ Flash 2:

1. Insert the USB flash disk that contains the latest BIOS file to the USB port.
2. Enter the **Advanced Mode** of the BIOS setup program. Go to the **Tool** menu to select **ASUS EZ Flash Utility** and press <Enter>.
3. Press <Tab> to switch to the **Drive** field.
4. Press the Up/Down arrow keys to find the USB flash disk that contains the latest BIOS then press <Enter>.
5. Press <Tab> to switch to the **Folder Info** field.
6. Press the Up/Down arrow keys to find the BIOS file then press <Enter> to perform the BIOS update process. Reboot the system when the update process is done.

- This function supports USB flash disks formatted using FAT32 or FAT16 on a single partition only.
- Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Optimized Defaults** item under the **Exit** menu.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

3.11.3 ASUS CrashFree BIOS 3 utility

The ASUS CrashFree BIOS 3 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 updated BIOS file.

- Before using this utility, rename the BIOS file in the removable device into **ST990R30.CAP**.
- The BIOS file in the support DVD may not be the latest version. Download the latest BIOS file from the ASUS website at www.asus.com.

Recovering the BIOS

To recover the BIOS:

1. Turn on the system.
2. Insert the support DVD to the optical drive or the USB flash drive that contains 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 CrashFree BIOS 3 utility automatically.
4. The system requires you to enter BIOS Setup to recover BIOS settings. 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!

Software Support

4

4.1 Installing an operating system

Motherboard settings and hardware options vary. The setup procedures presented in this chapter are for reference only. Refer to Windows® operating system documentation for detailed information.

4.2 Support DVD information

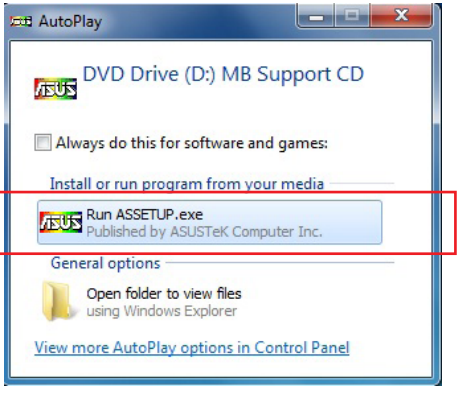
The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website at www.asus.com for updates.

4.2.1 Running the support DVD

Ensure that you have an Administrator account before running the support DVD in your operating system.

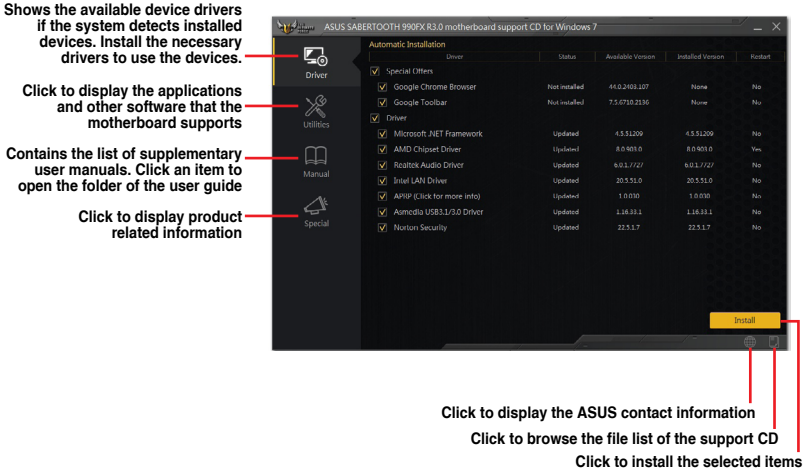
To run the Support DVD:

1. Place the Support DVD into the optical drive.
2. In the **AutoPlay** dialog box, Click **Run ASSETUP.EXE**.



If the **AutoPlay** dialog box does not appear, browse the contents of the support DVD and double-Click **\\bin\ASSETUP.EXE** to launch the **ASUS motherboard support DVD** main menu.

Support DVD main menu



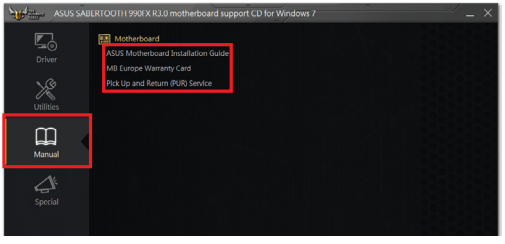
4.2.2 Obtaining the software manuals

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** tab before opening the files.

To read about your motherboard's software manual:

1. Run the Support DVD.
2. In the Support DVD main menu, click the **Manual** tab.
3. Click the software manual that you wish to read.



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

Chapter 4

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.

4.4 AI Suite 3

AI Suite 3 is an all-in-one interface that integrates several ASUS utilities and allows you to launch and operate these utilities simultaneously.

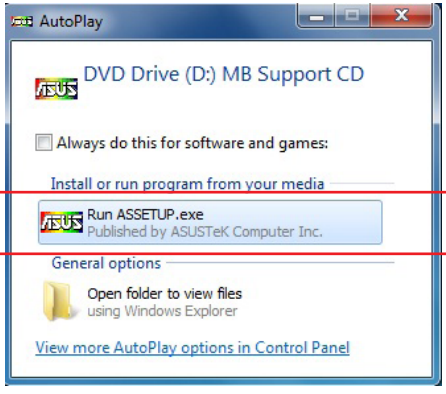
Installing AI Suite 3

Ensure that you have an Administrator account before installing AI Suite 3 in Windows® 7, Windows® 8, or Windows® 8.1 operating systems.

To install AI Suite 3 on your computer:

Windows® 7 OS

1. Place the Support DVD into the optical drive.
2. In the **AutoPlay** dialog box, click or tap **Run ASSETUP.exe** then select the **Utilities** tab.



3. From the **Utilities** tab, click or tap **AI Suite 3** then follow the succeeding onscreen instructions.

Windows® 8 and Windows® 8.1 OS

1. Place the Support DVD into the optical drive then follow onscreen instructions.
2. From the **ASUS motherboard support DVD** main menu, select the Utilities tab and click or tap **AI Suite 3**.
3. Follow the succeeding onscreen instructions.

   If the **ASUS motherboard support DVD** main menu did not appear, try the following:

   a. Go to the **Start Screen** then click or tap the **Desktop** app.

   b. On the lower left corner of the Desktop, click or tap **File Explorer**  then select your DVD drive and tap or double-click or tap the **Setup** application.

Launching AI Suite 3

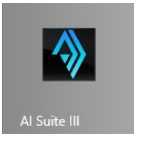
Windows® 7 OS

From the Desktop, click or tap **Start > All Programs > ASUS > AI Suite 3 > AI Suite 3**.

You can also launch AI Suite in Windows® 7 by clicking or tapping  on the Notification area.

Windows® 8 and Windows® 8.1 OS

To launch AI Suite 3 in Windows® 8 or Windows® 8.1, tap the AI Suite 3 app on the Start Screen (or if you're using a mouse, click or tap the AI Suite 3 app on the Start Screen).

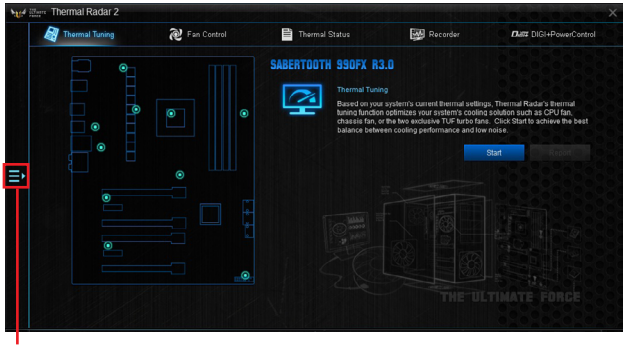


AI Suite 3 Main menu

The AI Suite 3 main menu gives you easy-access controls and insight to what's going on with your computer - allowing you to optimize performance settings while at the same time ensuring system stability.

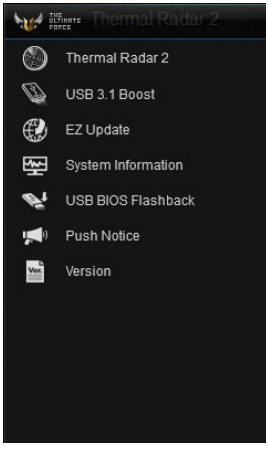
The AI Suite main menu includes is a quick-access menu bar that allows you to swiftly launch any of the integrated ASUS utilities. Click on the left of the menu to launch the menu bar.

The AI Suite 3 screenshots in this section are for reference only and can vary depending on motherboard model.



Click to launch AI Suite 3 menu bar

AI Suite 3 main menu bar



- Some functions in the AI Suite 3 main menu in this user guide may vary depending on the motherboard model.
- Refer to the software manual in the support DVD or visit the ASUS website at www.asus.com for detailed software configuration.

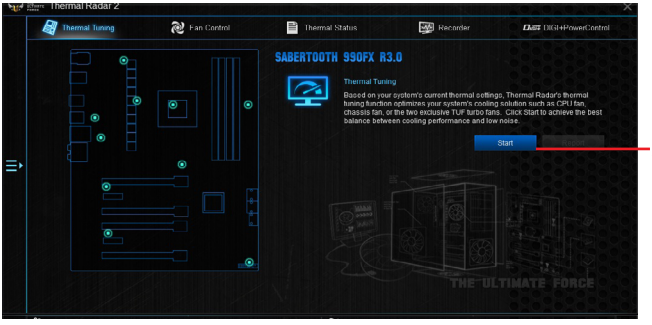
Chapter 4

4.4.1 Thermal Radar 2

Thermal Radar 2 lets you control fans, monitor your graphics card temperature and other key components in real time, or auto-tune your thermal settings.

Thermal Tuning

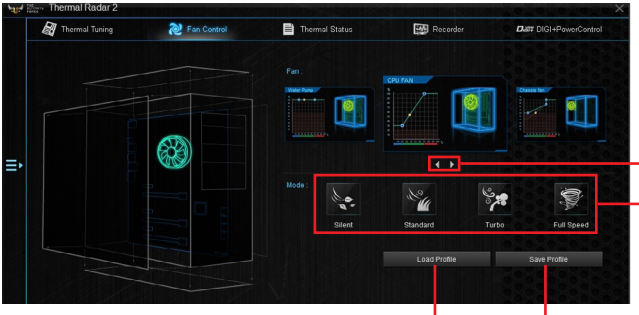
This function optimizes your system's cooling solution based on your system's current thermal settings. It allows you to configure your CPU, chassis, and add on fan to achieve the best balance between cooling performance and low noise.



Click or tap to automatically start the Thermal Tuning process

Fan Control

Allows you to configure the settings of the fans installed on your system. You can also load or save a fan's profile to tune the thermal condition of your system.



Click or tap to switch between items

Click or tap to switch between modes

Click or tap to load saved profiles

Click or tap to save the settings of the new profile

Chapter 4

VGA

Allows you to configure the thermal settings of an installed ASUS graphics card.

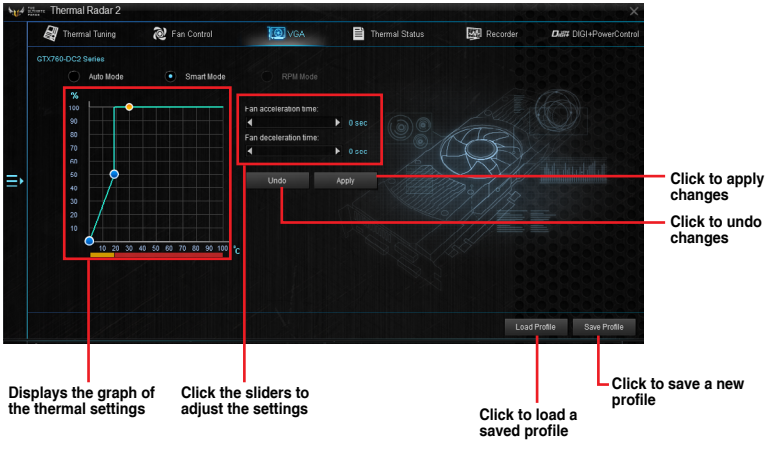
- The VGA tab on Thermal Radar 2 appears only when you install an optional ASUS graphics card into your system.
- The VGA feature of Thermal Radar 2 supports ASUS NVidia 700/900 Series and AMD R7/R9 Series graphics card only.

VGA - Auto Mode

The system loads the optimal values for the graphic card's thermal settings.

VGA - Smart Mode

Manually adjust the acceleration and deceleration time of the graphic card's fans.



VGA - RPM Mode

Allows you to manually adjust the fan's speed (in rpm).

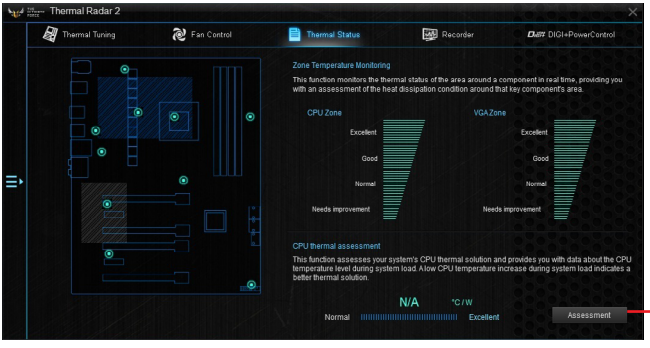
Move the slider up or down to adjust the settings

Click to load a saved profile

Click to save a new profile

Thermal Status

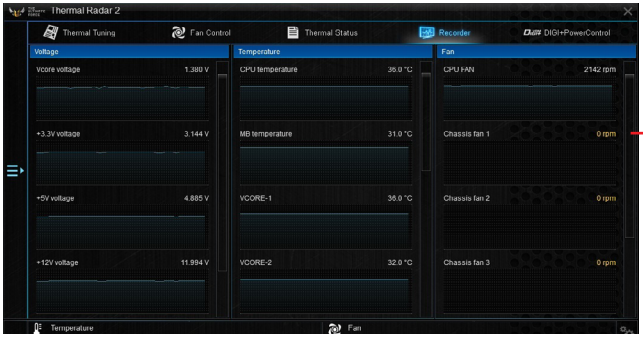
Displays the current status of the thermal condition of your system.



Click or tap to run the assessment report of your current thermal settings

Recorder

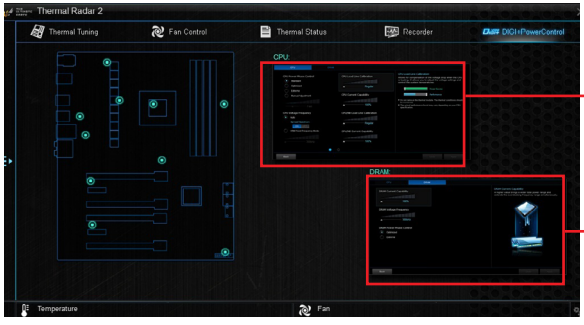
Displays and monitors the status of the thermal setting and condition of your system.



Click or tap to scroll down/up

DIGI+ Power Control

ASUS DIGI+ Power Control features the revolutionary and innovative digital VRM and DRAM Voltage controllers. These controllers offers ultra-precise memory and voltage tuning for optimal system efficiency, stability and performance.

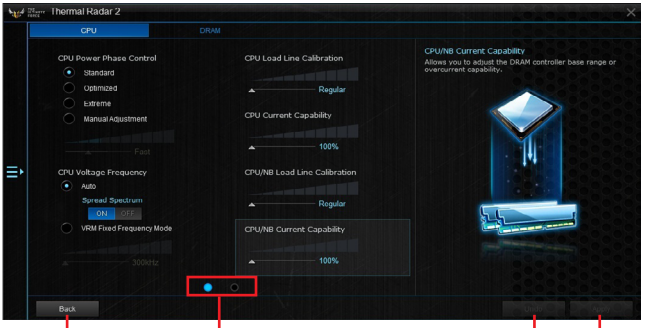


Click or tap to go the CPU configurations screen

Click or tap to go the DRAM configurations screen

Chapter 4

DIGI+PowerControl - CPU



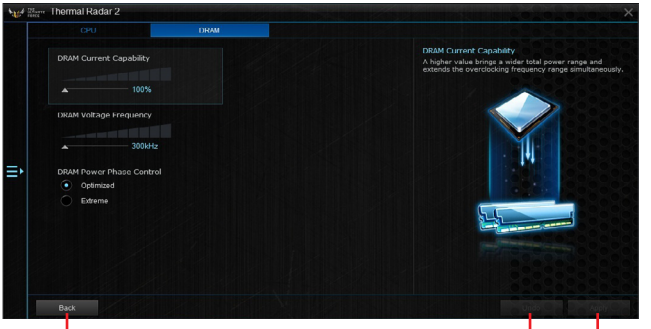
Click or tap to go back to the previous screen

Click or tap to switch between items

Click or tap to undo the changes

Click or tap to apply the changes

DIGI+PowerControl - DRAM



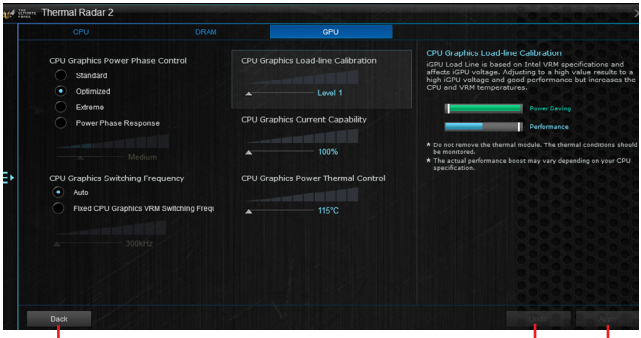
Click or tap to go back to the previous screen

Click or tap to undo the changes

Click or tap to apply the changes

Chapter 4

DIGI+PowerControl - GPU



Click or tap to go back to the previous screen

Click or tap to undo the changes

Click or tap to apply the changes

4.4.2 USB 3.1 Boost

USB 3.1 Boost technology supports UASP (USB Attached SCSI Protocol) that automatically speeds up the transfer rates of your USB storage devices.

Launching USB 3.1 Boost

To launch USB 3.1 Boost, cclick on the left of the AI Suite 3 main menu, then select **USB 3.1 Boost**.

Using the USB 3.1 Boost

Click or tap to enable the USB device's normal data transfer rate

Click or tap to enable UASP or Turbo Mode for a faster data transfer rate

Click or tap to select a USB device

Ensure to connect your USB 3.1/3.0 device to the USB 3.1/3.0 ports that support USB 3.1 Boost. Refer to section **2.3.1 Rear I/O connection** of your user guide for more details.

- USB 3.1 Boost automatically detects the USB 3.1/3.0 devices that support UASP.
- The data transfer speed varies with USB devices. For a higher data transfer performance, use a USB 3.1 device.

4.4.3 EZ Update

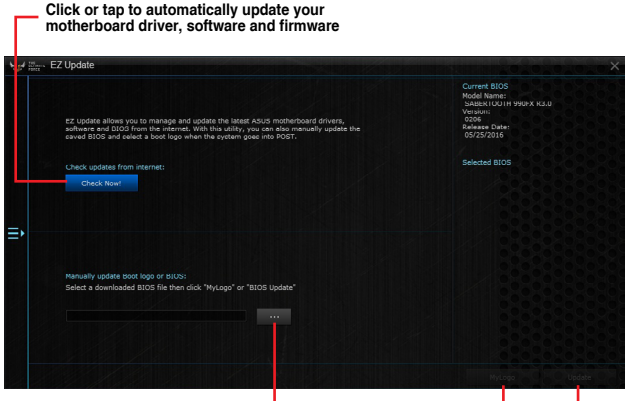
EZ Update is a utility that allows you to automatically update your motherboard's software, drivers and BIOS easily.

With this utility, you can also manually update the BIOS and select the boot logo that displays during POST.

Launching EZ Update

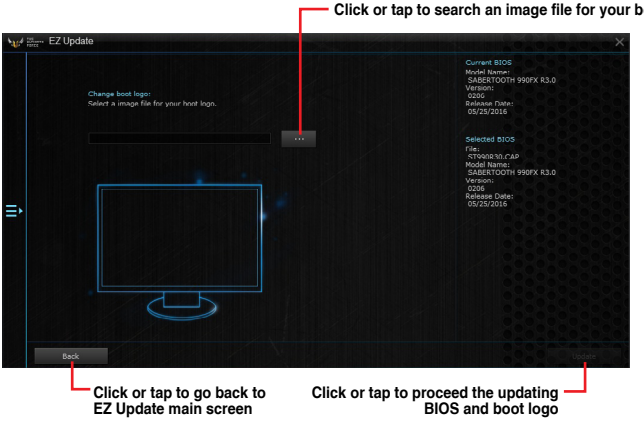
To launch EZ Update, click on the left of the AI Suite 3 main menu, then select **EZ Update**.

Using EZ Update



Chapter 4

Manually update the BIOS and selecting a boot logo



After you click or tap **BIOS Update** button, click or tap **Flash** to update the BIOS and upload the boot logo in your system.

4.4.4 System Information

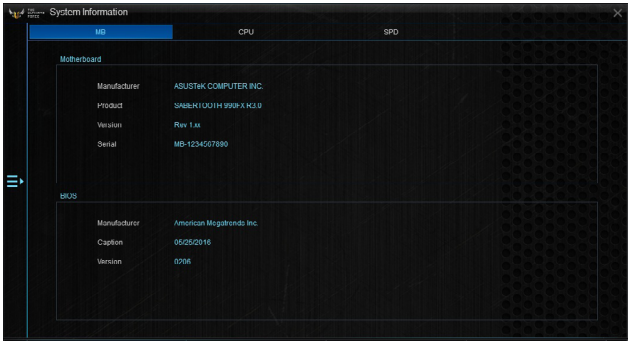
This utility allows you get the detailed information of the motherboard, CPU, and memory settings.

Launching the System Information

To launch System Information, click on the left of the AI Suite 3 main menu, then select **System Information**.

Viewing the motherboard information

Click or tap the **MB** tab to view the motherboard's information.



Viewing the CPU information

Click or tap the **CPU** tab to view the processor's information.

Viewing the SPD information

Click or tap the **SPD** tab to view the memory's information.

Chapter 4

4.4.5 USB BIOS Flashback

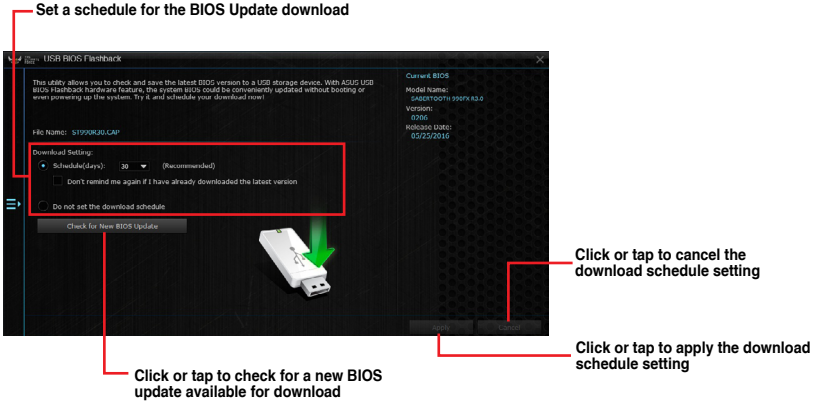
USB BIOS Flashback allows you to check and save the latest BIOS version to a USB storage device. Use this utility to quickly check for the latest available BIOS and set the BIOS download schedule.

Launching USB BIOS Flashback

To launch USB BIOS Flashback, click on the left of the AI Suite 3 main menu, then select **USB BIOS Flashback**.

USB BIOS Flashback is available only in selected motherboard models.

Using USB BIOS Flashback



Scheduling the BIOS download

1. In the Download Setting field, tick **Schedule (days)** then select the number of days for the BIOS download schedule.
2. Click or tap **Apply** to save the BIOS download schedule. Click or tap **Cancel** to cancel the download schedule.

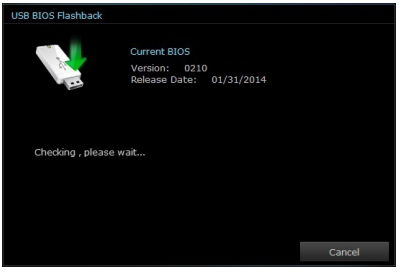
Downloading the latest BIOS

Before you start downloading, ensure that you have installed the USB storage device to your computer's USB port that supports USB BIOS Flashback. Refer to section **2.3.1 Rear I/O connection** of this user guide for more details.

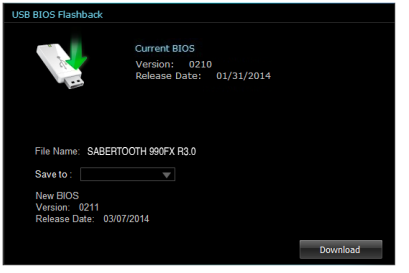
To download the updated BIOS:

1. From the USB BIOS Flashback screen, click or tap **Check for New BIOS Update**.

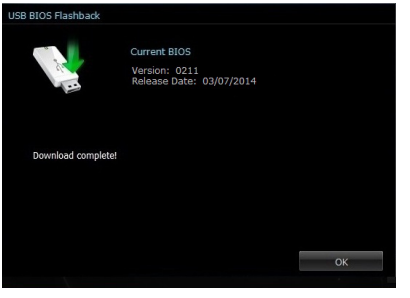
   Wait for the system to check the latest BIOS version.



2. After the utility detects a new BIOS, click or tap from the Save to: field, select the USB flash drive, then click or tap **Download**.



3. After the download is complete, click or tap **OK**.



4.4.6 Push Notice

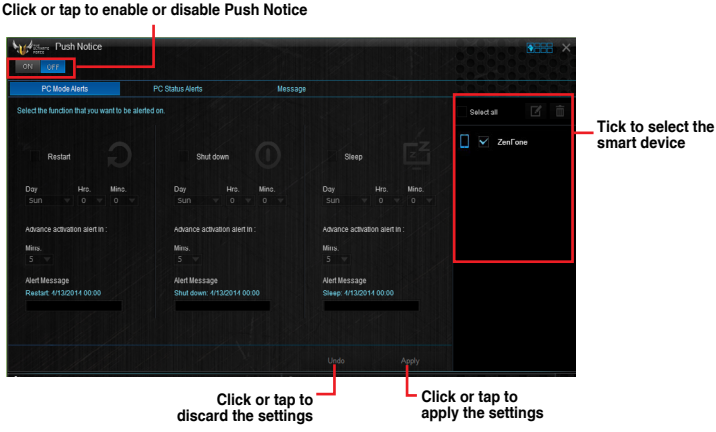
This utility allows you get the detailed status of your system to your smart device. You can also send messages to your smart device using this utility.

Before using this utility, ensure that you pair your computer with your smart device. For pairing information, refer to section **Pairing your computer and smart device**.

Launching Push Notice on your computer

To launch Push Notice, click on the left of the AI Suite 3 main menu, then select **Push Notice**.

Push Notice screen



You can also enable the Push Notice via the Push Notice shortcut on the lower-right corner of your screen. To do this, click or tap **<<** then click or tap then select .

Pairing your computer and smart device

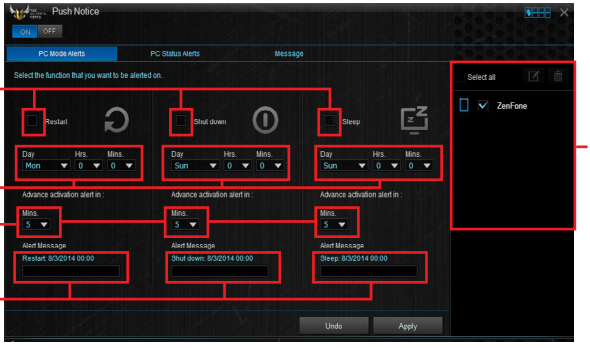
To pair your computer and smart device:

1. On your smart device, tap Push Notice to launch Push Notice.
2. Tap **Push Scan** then tap the name of your computer that you want to pair with.

To pair your computer and smart device, ensure that both are connected to the same wireless network.

Setting up PC Mode alerts of your computer

This feature allows you to restart, shut down, or put your computer to sleep mode and sends an alert to your smart device.



Tick these to enable mode alerts

Set the day and time to enable the PC modes

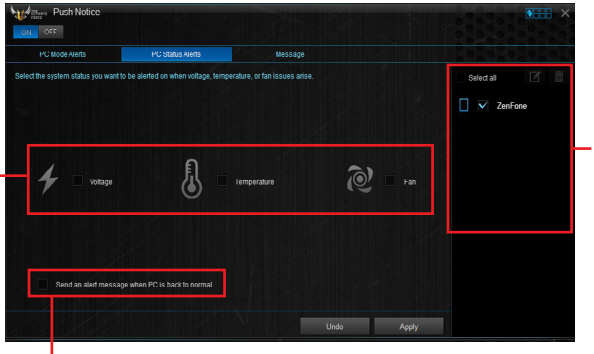
Set the minutes to send the alert before the PC mode/s activation

Key in your messages for more information

Tick to select the smart device

Setting up PC Status alerts

This feature allows you to send alerts of the unusual activities of the voltage, temperature, and fan settings of your computer to your smart device.



Tick to select and send alerts to your smart device

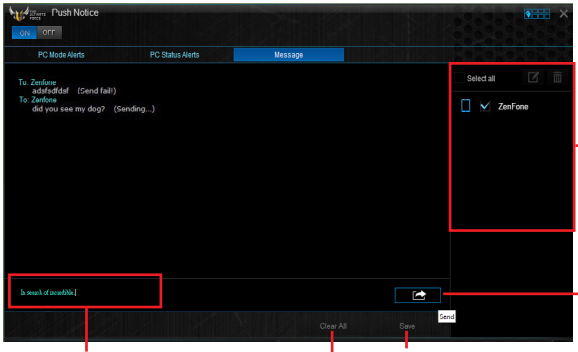
Tick to select the smart device

Tick to send alert when the components selected are back to its normal status

Sending messages to your smart device

This feature allows you to send messages to your smart device.

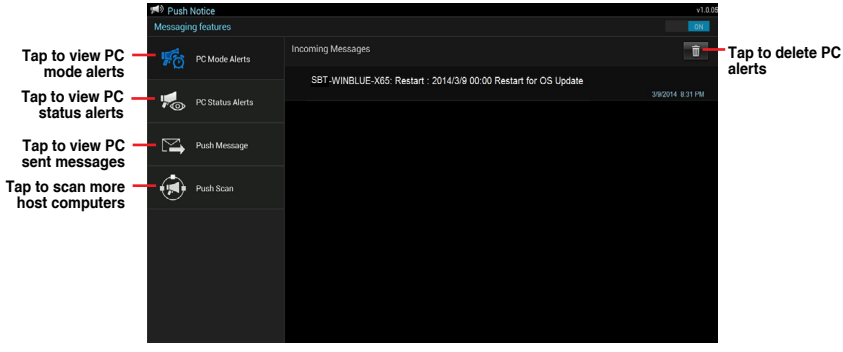
You can also send messages via the Push Notice messaging shortcut on the lower-right corner of your screen. To do this, click or tap << then click or tap then select .



Viewing your computer status on your smart device

Tap on your smart device to launch Push Notice.

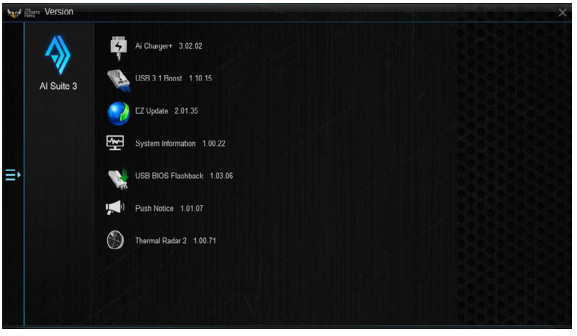
Push Notice



Chapter 4

4.4.7 Version

Displays the installed software or utilities and their current version.



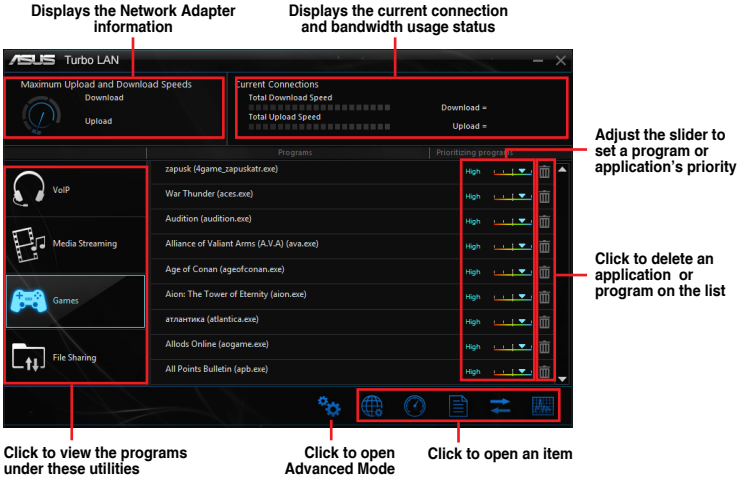
Chapter 4

4.5 Turbo LAN

Turbo LAN is a network traffic shaping technology that lowers lag and helps reduce delays during data transfers or when playing online games. It allows you to set programs or application's network priorities to currently running games or applications.

Turbo LAN features an intuitive user interface and an Advance Mode that tweakers can use to configure hardcore controls or settings.

To launch Turbo LAN, click or tap the on the desktop.



Using the Advance Mode

The Advance Mode allows you to configure the priorities of your programs or applications or configure your network device.

To go to the Advanced Mode, click or tap .

The Advanced Mode contains the following utilities:

- **Preferences:** Allows you to control the network's traffic to optimize the program's performance, favor ping time, and avoid packet loss.
- **Protocols:** Allows you to set priority to the network adapter and its protocol to reduce delay during data transfer, and maintain the speed of Internet access.
- **Programs:** Allows you to set priority to the programs or applications.
- **Traffic Shaping:** Allows you set the priority to the network adapter and its protocol to reduce delay during data transfer and speeds up the Internet access.
- **Adapter Info:** Displays the information about the installed network adapter in your system.
- **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.

4.6 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.

Realtek® HD Audio Manager

Realtek® HD Audio Manager for Windows® 8.1 / Windows® 7

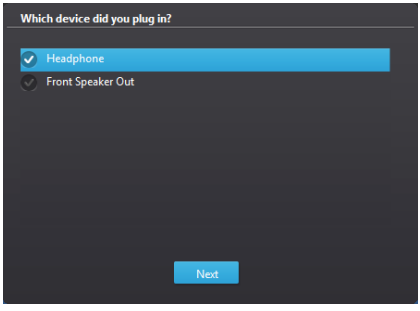
Selecting an audio output

Realtek HD Audio Manager allows you to select the type of audio output depending on the output device that you are using.

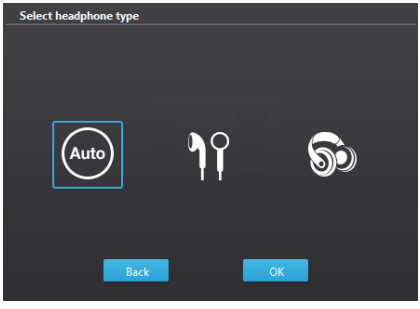
To select an audio output:

1. Insert the audio device's jack to the Line Out (lime) port. If the audio device's jack is already inserted to the corresponding port, Click on the Realtek HD Audio Manager.

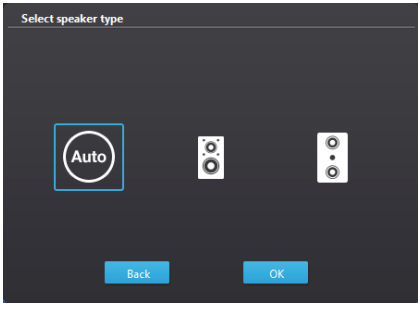
2. On the pop-up window, tick the audio device that you plugged to the Line Out port then Click **Next**.



   a. If you select **Headphone**, Click to select the type of headphone installed then Click **OK**.



   b. If you select **Front Speaker Out,** Click to select the type of speaker installed then Click **OK**.



RAID Support

5

5.1 RAID configurations

The motherboard comes with the AMD® SB950 chipset that allows you to configure Serial ATA hard disk drives as RAID sets. The motherboard supports the following RAID configurations: RAID 0, RAID 1, RAID 10 and RAID 5.

- 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 / Vista 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.

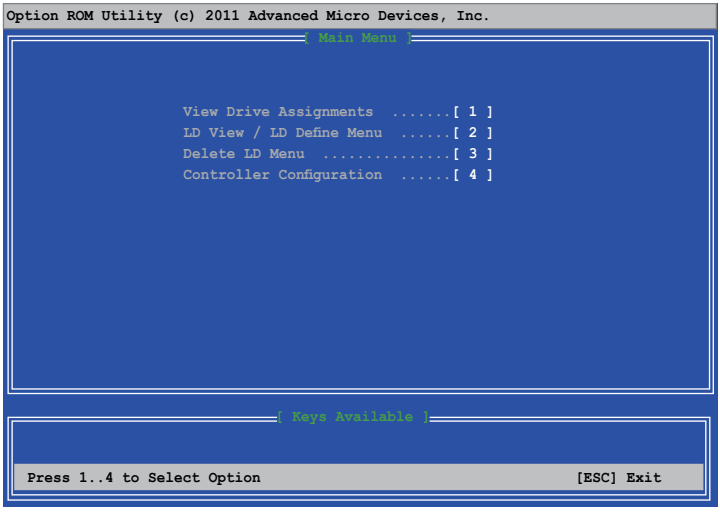
Refer to Chapter 3 for details on entering and navigating through the BIOS Setup

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

5.1.4 AMD® Option ROM Utility

To enter the AMD® Option ROM utility:

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



The Main Menu allows you to select an operation to perform. The Main Menu options include:

- View Drive Assignments: shows the status of the hard disk drives.
- LD View / LD Define Menu: displays the existing RAID set information / creates a RAID 0, RAID 1, RAID 5 or RAID 10 configuration.
- Delete LD Menu: deletes a selected RAID set and partition.
- Controller Configuration: shows the system resources configuration.

Press <1>, <2>, <3>, or <4> to enter the option you need; press <ESC> to exit the utility.

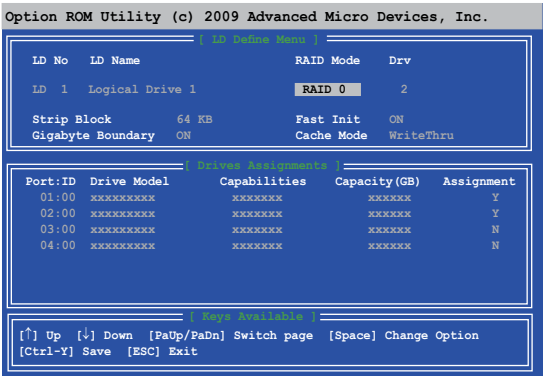
The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

To create a RAID volume using more than four hard disk drives, ensure that the SATA connectors 5/6 are set to [RAID] mode.

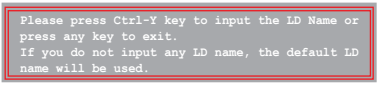
Creating a RAID volume

To create a RAID volume:

1. In the Main Menu, press <2> to enter the LD View / LD Define Menu function.
2. Press <Ctrl> + <C>, and the following screen appears.

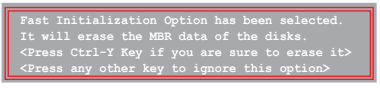


3. Move to the RAID Mode item and press <Space> to select a RAID mode to create.
4. Move to the Assignment item by using the down arrow key and set Y to select the hard disk drives you want to include in the RAID set.
5. Press <Ctrl> + <Y> to save the setting.
6. The utility prompts the following message. Press <Ctrl> + <Y> to input the LD name.



7. Eenter an LD name, and then press any key to continue.

8. Press <Ctrl> + <Y> to erase the MBR, or you may press any key to abort the settings.



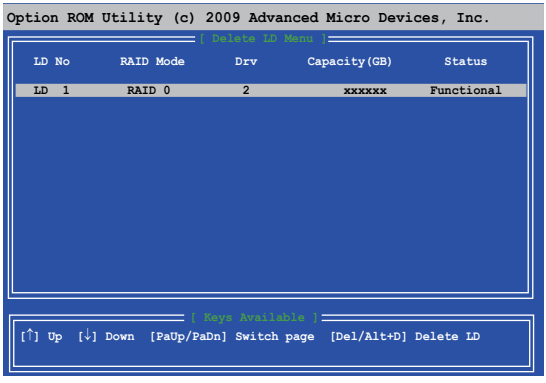
9. Press <Ctrl> + <Y> to enter the screen to modify the array capacity, or press any key to use the maximum capacity.

Deleting a RAID configuration

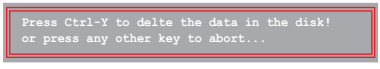
Take caution when deleting a RAID volume. You will lose all data on the hard disk drives when you delete a RAID volume.

To delete a RAID volume:

1. In the Main Menu, press <3> to enter the Delete LD function.
2. Select the RAID item you want to delete and press <Del> or <Alt> + <D>.



3. The utility prompts the following messages:

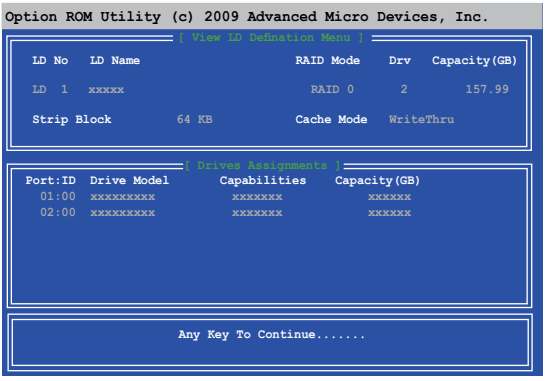


Press <Ctrl> + <Y> to delete the RAID volume.

Displaying a RAID set information

To display a RAID set information:

1. In the Main Menu, press <2> to enter the **LD View / LD Define Menu** function.
2. Select a RAID item and press <Enter> to display its information.



5.2 Creating a RAID driver disk

5.2.1 Creating a RAID driver disk in Windows®

To install the RAID driver for Windows® 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.

To set up a Windows® UEFI operating system under RAID mode, ensure to load the UEFI driver for your optical drive.

5.3 ASUS AMD Series SATA Mode Notice

The **SATA6G_1-4** and **SATA6G_5** connectors of this motherboard are set to **AHCI** mode by default to enhance the SATA performance.

For Windows® XP operating system, load the **AMD® AHCI 32/64 bit WinXP Driver** with a USB flash drive during the OS installation. Refer to section **5.2 Creating a RAID driver disk** for details.

5.3.1 Installing AHCI driver in Windows® XP

To install the AHCI 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 insert the floppy disk with the AHCI driver into the floppy disk drive.
3. When prompted to select the SCSI adapter to install, ensure that you select **AMD® AHCI Compatible RAID Controller - x86 / x64 platform**.
4. Follow the succeeding screen instructions to complete the installation.

For Windows® 7 / Vista OS, you can install the **AMD® SATA AHCI Driver** from the motherboard support DVD after the OS installation for better compatibility.

5.3.2 Converting an existing system drive from IDE mode to AHCI mode

If your existing Windows® OS is installed to a SATA hard drive that was set to IDE mode during OS installation, you may encounter system boot failure after connecting the hard drive to the new motherboard with the SATA port set to AHCI mode by default. Follow the instructions below to prevent system boot failure.

- For Windows® 7 / Vista OS, refer to http://support.microsoft.com/kb/922976 for system booting solution.
- For Windows® XP OS, we recommend a clean installation of the OS for complete AHCI support.

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**.

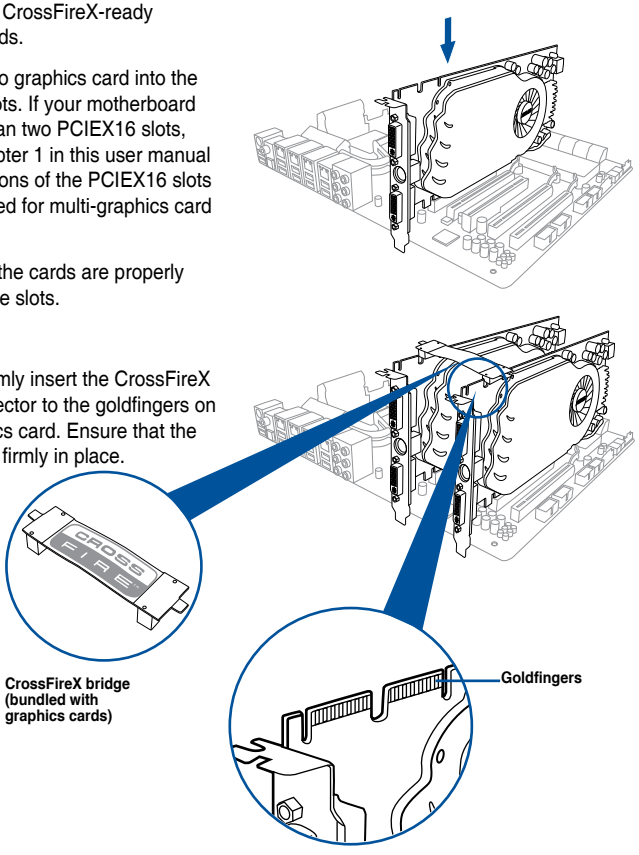
   For Windows 7, go to **Control Panel** > **Programs and Features**.
3. Select your current graphics card driver/s.
4. For Windows XP, select **Add/Remove**.

   For Windows 7, select **Uninstall**.
5. Turn off your computer.

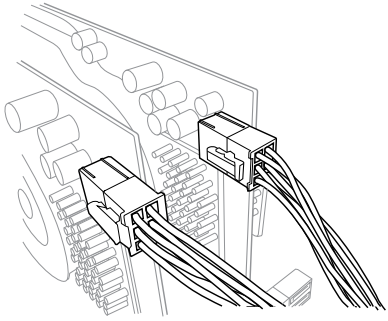
6.1.3 Installing two CrossFireX™ graphics cards

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.



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 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® CrossFireX™ technology. Download the latest driver from the AMD website (www.amd.com).

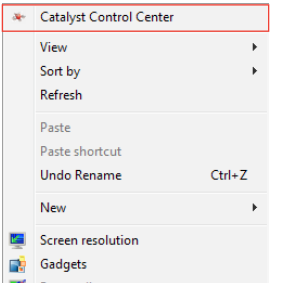
6.1.5 Enabling the AMD® CrossFireX™ technology

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

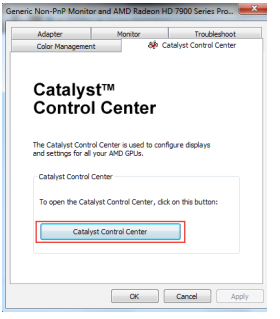
Launching the AMD Catalyst Control Center

To launch the AMD Catalyst Control Center:

1. Right-click on the Windows® desktop and select **Catalyst Control Center**.

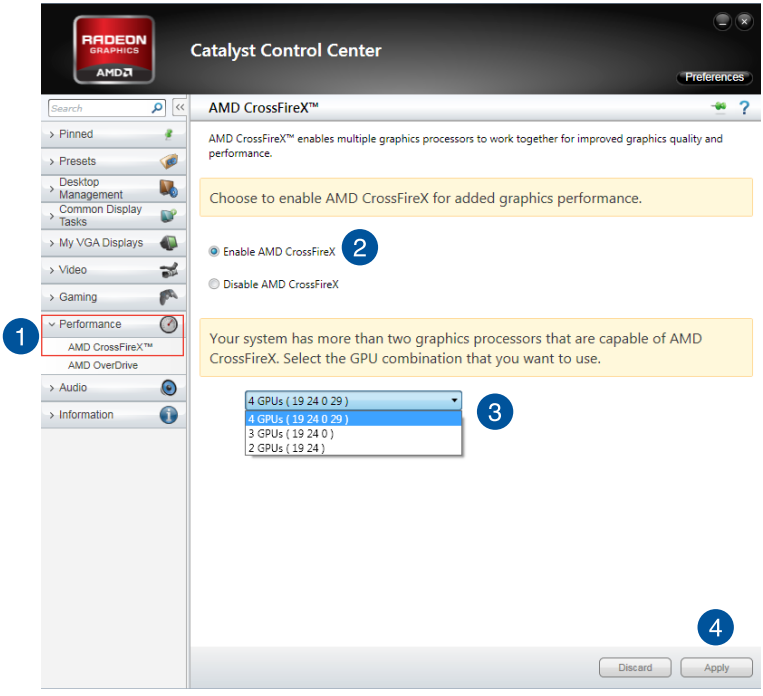


2. Click **Catalyst Control Center** to configure the displays and settings of your AMD graphic cards.



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

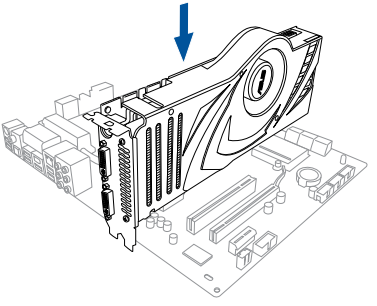
- In SLI mode, you should have two identical SLI-ready graphics cards that are NVIDIA® certified.
- Ensure that your graphics card driver supports the NVIDIA SLI technology. Download the latest driver from the NVIDIA website at www.nvidia.com.
- Ensure that your power supply unit (PSU) can provide at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

- We recommend that you install additional chassis fans for better thermal environment.
- Visit the NVIDIA zone website (http://www.nzone.com) for the latest certified graphics card and supported 3D application list.

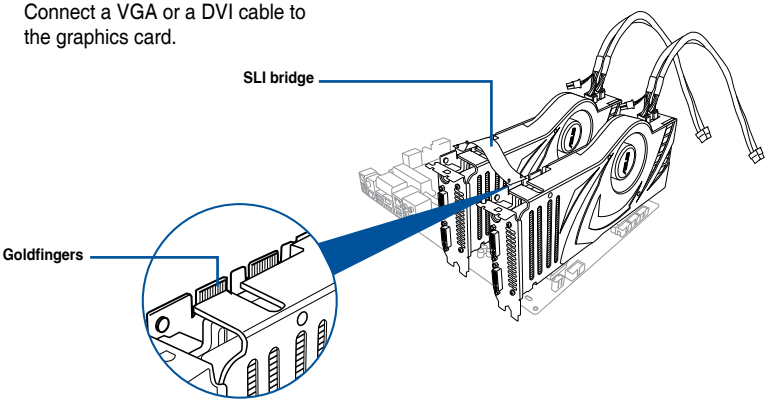
6.2.2 Installing two SLI-ready graphics cards

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



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

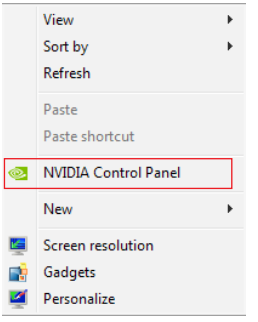
After installing your graphics cards and the device drivers, enable the SLI feature in NVIDIA® Control Panel under the Windows® 7 operating system.

Launching the NVIDIA Control Panel

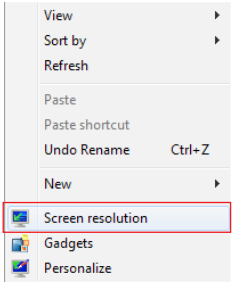
You can launch the NVIDIA Control Panel by the following two methods.

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

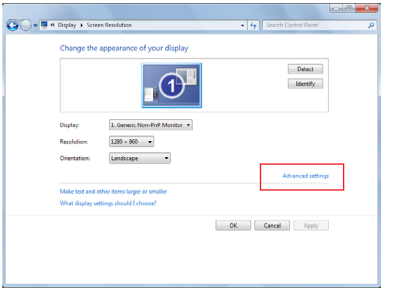
The NVIDIA Control Panel window appears (See Step B3).



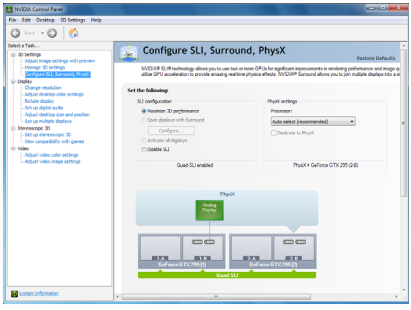
B1. If you cannot see the NVIDIA Control Panel item in step (A), select **Screen Resolution**.



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

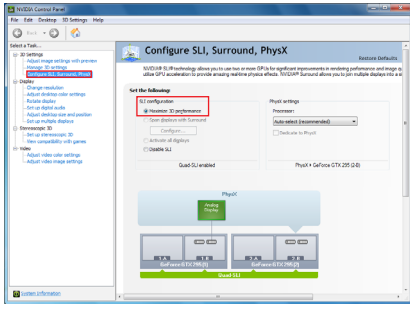


B3. The NVIDIA Control Panel window appears.



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**.



Appendix

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.

Cut 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

Class B ITE

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用す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。

VCCI－B

KC: Korea Warning Statement

B급 기기 (가정용 방송통신기자재)
이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

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.

Regional notice for California

WARNING! This product may contain chemicals known to the State of California to cause cancer, birth defects or other reproductive harm. Wash hands after handling.

Google™ License Terms

English ASUSTeK Computer Inc. hereby declares that this device is in compliance with the essential requirements and other relevant provisions of related Directives. Full text of EU declaration of conformity is available at: www.asus.com/support

Français AsusTek Computer Inc. déclare par la présente que cet appareil est conforme aux critères essentiels et autres clauses pertinentes des directives concernées. La déclaration de conformité de l'UE peut être téléchargée à partir du site Internet suivant : www.asus.com/support.

Deutsch ASUSTeK Computer Inc. erklärt hiermit, dass dieses Gerät mit den wesentlichen Anforderungen und anderen relevanten Bestimmungen der zugehörigen Richtlinien übereinstimmt. Der gesamte Text der EU-Konformitätserklärung ist verfügbar unter: www.asus.com/support

Italiano ASUSTeK Computer Inc. con la presente dichiara che questo dispositivo è conforme ai requisiti essenziali e alle altre disposizioni pertinenti con le direttive correlate. Il testo completo della dichiarazione di conformità UE è disponibile all'indirizzo: www.asus.com/support

Русский Компания ASUS заявляет, что это устройство соответствует основным требованиям и другим соответствующим условиям соответствующих директив. Подробную информацию, пожалуйста, смотрите на www.asus.com/support

Български С настоящото ASUSTeK Computer Inc. декларира, че това устройство е в съответствие със съществените изисквания и другите приложими постановления на свързаните директиви. Пълният текст на декларацията за съответствие на ЕС е достъпна на адрес: www.asus.com/support

Hrvatski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj sukladan s bitnim zahtjevima i ostalim odgovarajućim odredbama vezanih direktiva. Cijeli tekst EU izjave o sukladnosti dostupan je na: www.asus.com/support

Čeština Společnost ASUSTeK Computer Inc. tímto prohlašuje, že toto zařízení splňuje základní požadavky a další příslušná ustanovení souvisejících směrnic. Plné znění prohlášení o shodě EU je k dispozici na adrese: www.asus.com/support

Dansk ASUSTeK Computer Inc. erklærer hermed, at denne enhed er i overensstemmelse med hovedkravene og andre relevante bestemmelser i de relaterede direktiver. Hele EU-overensstemmelseserklæringen kan findes på: www.asus.com/support

Nederlands ASUSTeK Computer Inc. verklaart hierbij dat dit apparaat voldoet aan de essentiële vereisten en andere relevante bepalingen van de verwante richtlijnen. De volledige tekst van de EU-verklaring van conformiteit is beschikbaar op: www.asus.com/support

Eesti Käesolevaga kinnitab ASUSTeK Computer Inc, et see seade vastab asjakohaste direktiivide oluliste nõuetele ja teistele asjassepuutuvatele sätetele. EL vastavusdeklaratsiooni täielik tekst on saadaval järgmisel aadressil: www.asus.com/support

Suomi ASUSTeK Computer Inc. ilmoittaa täten, että tämä laite on asiaankuuluvien direktiivien olennaisten vaatimusten ja muiden tätä koskevien säädösten mukainen. EU-yhdenmukaisuusilmoituksen koko teksti on luettavissa osoitteessa: www.asus.com/support

Ελληνικά Με το παρόν, η AsusTek Computer Inc. δηλώνει ότι αυτή η συσκευή συμμορφώνεται με τις θεμελιώδεις απαιτήσεις και άλλες σχετικές διατάξεις των Οδηγιών της ΕΕ. Το πλήρες κείμενο της δήλωσης συμβατότητας είναι διαθέσιμο στη διεύθυνση: www.asus.com/support

Magyar Az ASUSTeK Computer Inc. ezennel kijelenti, hogy ez az eszköz megfelel a kapcsolódó Irányelvek lényeges követelményeinek és egyéb vonatkozó rendelkezéseinek. Az EU megfelelőségi nyilatkozat teljes szövege innen letölthető: www.asus.com/support

Latviski ASUSTeK Computer Inc. ar šo paziņo, ka šī ierīce atbilst saistīto Direktīvu būtiskajām prasībām un citiem citiem saistošajiem nosacījumiem. Pilns ES atbilstības paziņojuma teksts pieejams šeit: www.asus.com/support

Lietuvių „ASUSTeK Computer Inc." šiuo tvirtina, kad šis įrenginys atitinka pagrindinius reikalavimus ir kitas svarbias susijusių direktyvų nuostatas. Visą ES atitikties deklaracijos tekstą galima rasti: www.asus.com/support

Norsk ASUSTeK Computer Inc. erklærer herved at denne enheten er i samsvar med hovedsaklige krav og andre relevante forskrifter i relaterte direktiver. Fullstendig tekst for EU-samsvarserklæringen finnes på: www.asus.com/support

Polski Firma ASUSTeK Computer Inc. niniejszym oświadcza, że urządzenie to jest zgodne z zasadniczymi wymogami i innymi właściwymi postanowieniami powiązanych dyrektyw. Pełny tekst deklaracji zgodności UE jest dostępny pod adresem: www.asus.com/support

Português A ASUSTeK Computer Inc. declara que este dispositivo está em conformidade com os requisitos essenciais e outras disposições relevantes das Diretivas relacionadas. Texto integral da declaração da UE disponível em: www.asus.com/support

Română ASUSTeK Computer Inc. declară că acest dispozitiv se conformează cerințelor esențiale și altor prevederi relevante ale directivelor conexe. Textul complet al declarației de conformitate a Uniunii Europene se găsește la: www.asus.com/support

Srpski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj u saglasnosti sa osnovnim zahtevima i drugim relevantnim odredbama povezanih Direktiva. Pun tekst EU deklaracije o usaglašenosti je dostupan da adresi: www.asus.com/support

Slovensky Spoločnosť ASUSTeK Computer Inc. týmto vyhlasuje, že toto zariadenie vyhovuje základným požiadavkám a ostatým príslušným ustanoveniam príslušných smerníc. Celý text vyhlásenia o zhode pre štáty EÚ je dostupný na adrese: www.asus.com/support

Slovenščina ASUSTeK Computer Inc. izjavlja, da je ta naprava skladna z bistvenimi zahtevami in drugimi ustreznimi določbami povezanih direktiv. Celotno besedilo EU-izjave o skladnosti je na voljo na spletnem mestu: www.asus.com/support

Español Por la presente, ASUSTeK Computer Inc. declara que este dispositivo cumple los requisitos básicos y otras disposiciones pertinentes de las directivas relacionadas. El texto completo de la declaración de la UE de conformidad está disponible en: www.asus.com/support

Svenska ASUSTeK Computer Inc. förklarar härmed att denna enhet överensstämmer med de grundläggande kraven och andra relevanta föreskrifter i relaterade direktiv. Fulltext av EU-försäkran om överensstämmelse finns på: www.asus.com/support

Українська ASUSTeK Computer Inc. заявляє, що цей пристрій відповідає основним вимогам та іншим відповідним положенням відповідних Директив. Повний текст декларації відповідності стандартам ЄС доступний на: www.asus.com/support

Türkçe AsusTek Computer Inc., bu aygıtın temel gereksinimlerle ve ilişkili Yönergelerin diğer ilgili koşullarıyla uyumlu olduğunu beyan eder. AB uygunluk bildiriminin tam metni şu adreste bulunabilir: www.asus.com/support

Bosanski ASUSTeK Computer Inc. ovim izjavljuje da je ovaj uređaj usklađen sa bitnim zahtjevima i ostalim odgovarajućim odredbama vezanih direktiva. Cijeli tekst EU izjave o usklađenosti dostupan je na: www.asus.com/support

ASUS contact information

ASUSTeK COMPUTER INC.

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Web site	www.asus.com

Technical Support

Telephone	+86-21-38429911
Fax	+86-21-5866-8722, ext. 9101#
Online support	http://qr.asus.com/techserv

ASUS COMPUTER INTERNATIONAL (America)

Address	800 Corporate Way, Fremont, CA 94539, USA
Telephone	+1-510-739-3777
Fax	+1-510-608-4555
Web site	http://www.asus.com/us/

Technical Support

Support fax	+1-812-284-0883
Telephone	+1-812-282-2787
Online support	http://qr.asus.com/techserv

ASUS COMPUTER GmbH (Germany and Austria)

Address	Harkort Str. 21-23, 40880 Ratingen, Germany
Fax	+49-2102-959931
Web site	http://www.asus.com/de
Online contact	http://eu-rma.asus.com/sales

Technical Support

Telephone	+49-2102-5789555
Support Fax	+49-2102-959911
Online support	http://qr.asus.com/techserv

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 : SABERTOOTH 990FX R3.0

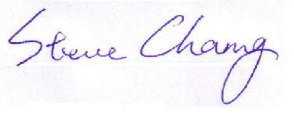
Conforms to the following specifications:

☒ FCC Part 15, Subpart B, Unintentional 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 : **Jun. 30, 2016**

Ver. 140331