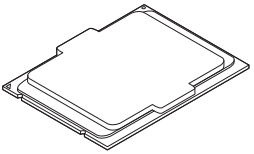
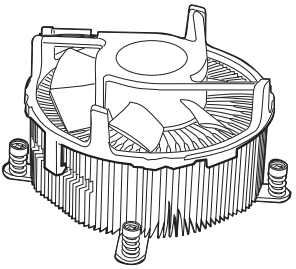
Quick Start

Thank you for purchasing the MSI® **Creator X299** motherboard. This Quick Start section provides demonstration diagrams about how to install your computer. Some of the installations also provide video demonstrations. Please link to the URL to watch it with the web browser on your phone or tablet. You may have even link to the URL by scanning the QR code.

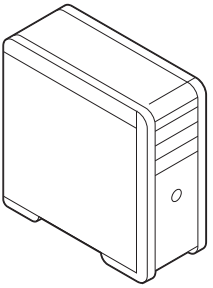
Preparing Tools and Components



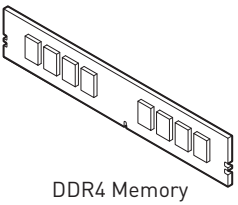
Intel® LGA 2066 CPU



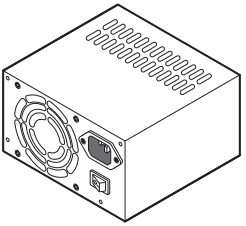
CPU Fan



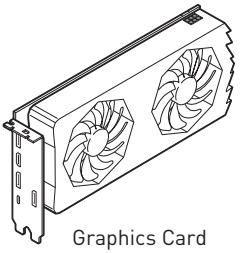
Chassis



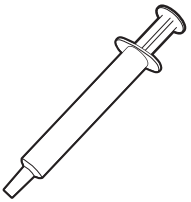
DDR4 Memory



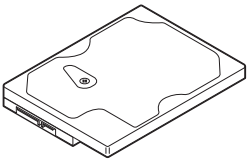
Power Supply Unit



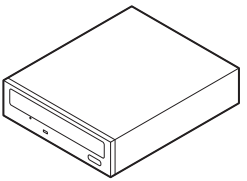
Graphics Card



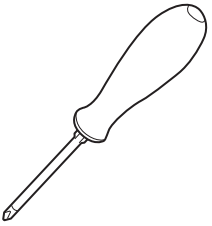
Thermal Paste



SATA Hard Disk Drive



SATA DVD Drive



Phillips Screwdriver

A Package of Screws

Safety Information

• The components included in this package are prone to damage from electrostatic discharge (ESD). Please adhere to the following instructions to ensure successful computer assembly.

• Ensure that all components are securely connected. Loose connections may cause the computer to not recognize a component or fail to start.

• Hold the motherboard by the edges to avoid touching sensitive components.

• It is recommended to wear an electrostatic discharge (ESD) wrist strap when handling the motherboard to prevent electrostatic damage. If an ESD wrist strap is not available, discharge yourself of static electricity by touching another metal object before handling the motherboard.

• Store the motherboard in an electrostatic shielding container or on an anti-static pad whenever the motherboard is not installed.

• Before turning on the computer, ensure that there are no loose screws or metal components on the motherboard or anywhere within the computer case.

• Do not boot the computer before installation is completed. This could cause permanent damage to the components as well as injury to the user.

• If you need help during any installation step, please consult a certified computer technician.

• Always turn off the power supply and unplug the power cord from the power outlet before installing or removing any computer component.

• Keep this user guide for future reference.

• Keep this motherboard away from humidity.

• Make sure that your electrical outlet provides the same voltage as is indicated on the PSU, before connecting the PSU to the electrical outlet.

• Place the power cord such a way that people can not step on it. Do not place anything over the power cord.

• All cautions and warnings on the motherboard should be noted.

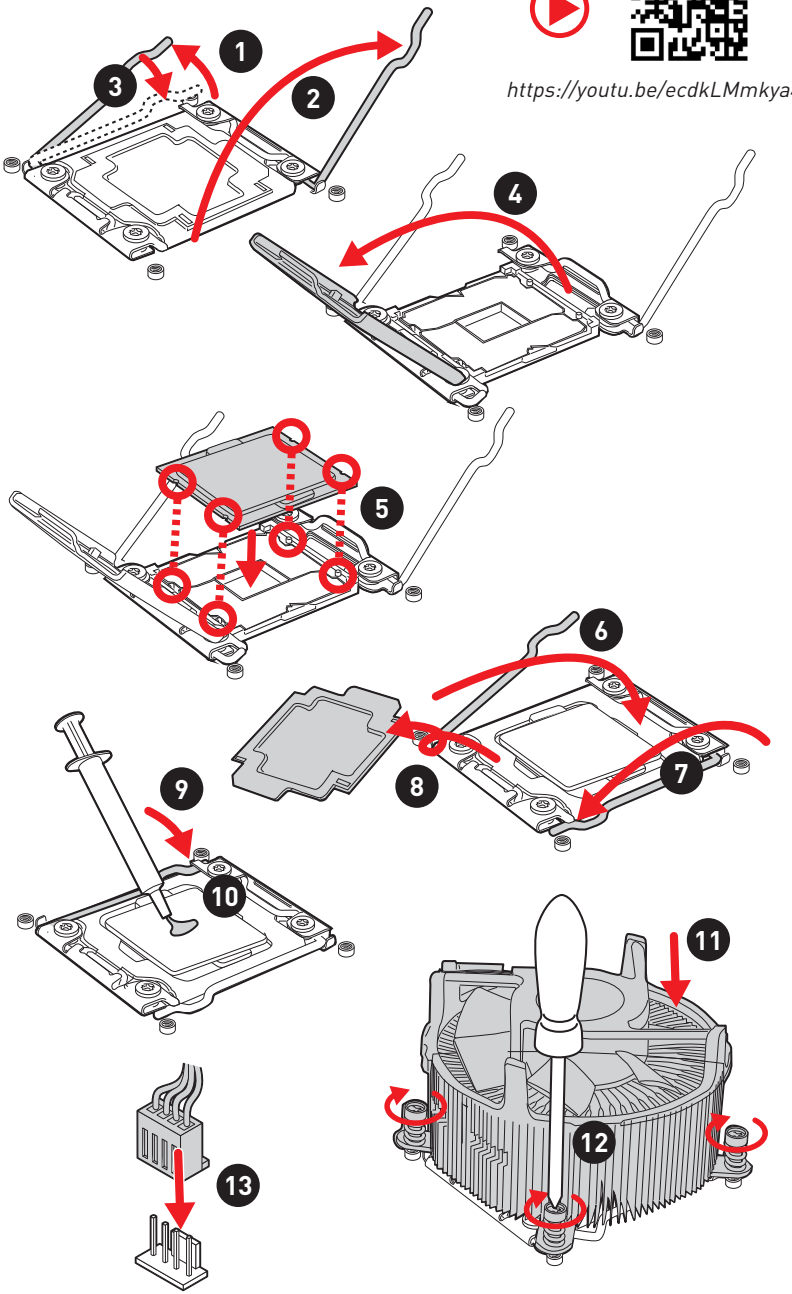
• If any of the following situations arises, get the motherboard checked by service personnel:

  - Liquid has penetrated into the computer.
  - The motherboard has been exposed to moisture.
  - The motherboard does not work well or you can not get it work according to user guide.
  - The motherboard has been dropped and damaged.
  - The motherboard has obvious sign of breakage.

• Do not leave this motherboard in an environment above 60°C (140°F), it may damage the motherboard.

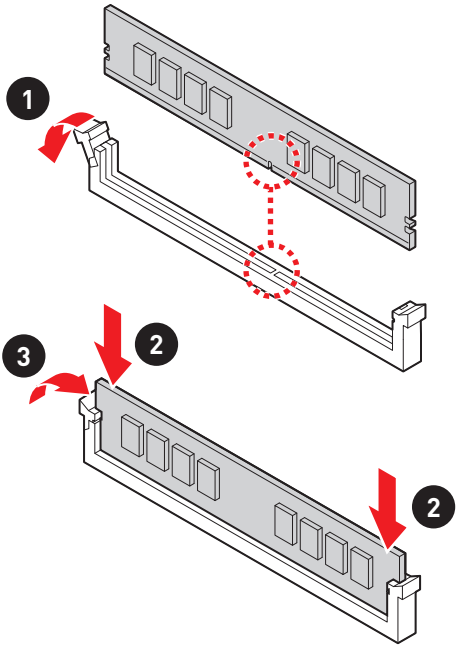
Installing a Processor

https://youtu.be/ecdkLMmkya4



Installing DDR4 memory

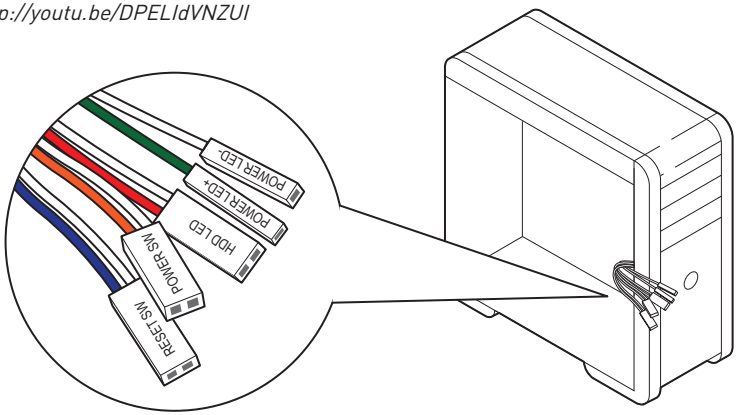
http://youtu.be/T03aDrJPyQs

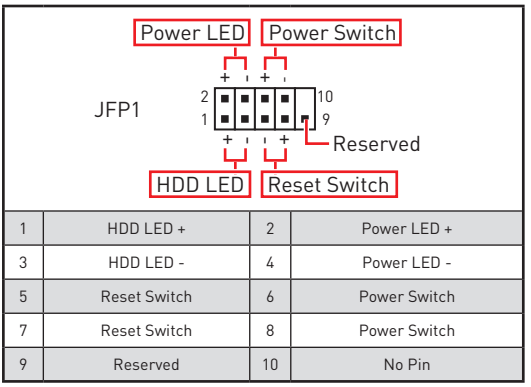


	B1	B2	A1	A2	CPU	C2	C1	D2	D1
1 DIMM					Intel® Core™ X-series 10000/ 9000/ 78xx (above) processors		✓		
2 DIMMs			✓				✓		
4 DIMMs	✓		✓				✓		✓
8 DIMMs	✓	✓	✓	✓		✓	✓	✓	✓

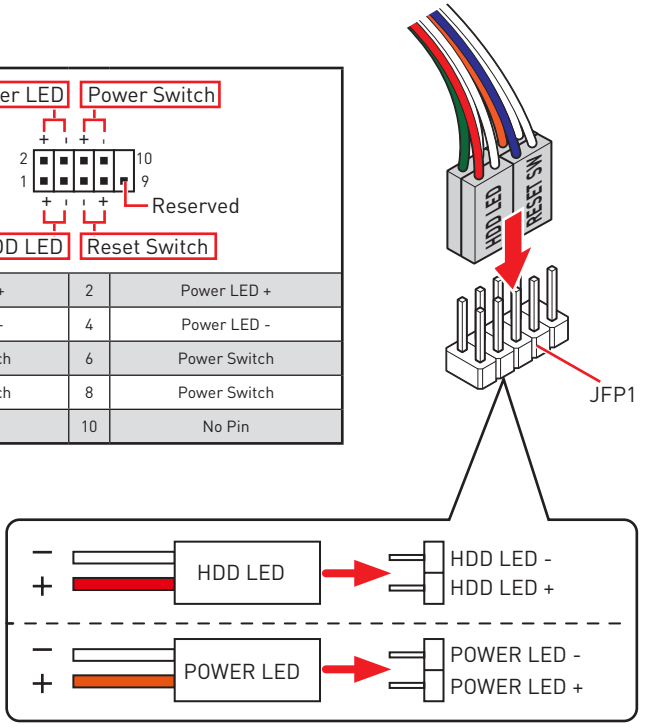
Connecting the Front Panel Header

http://youtu.be/DPELIdVNZUI

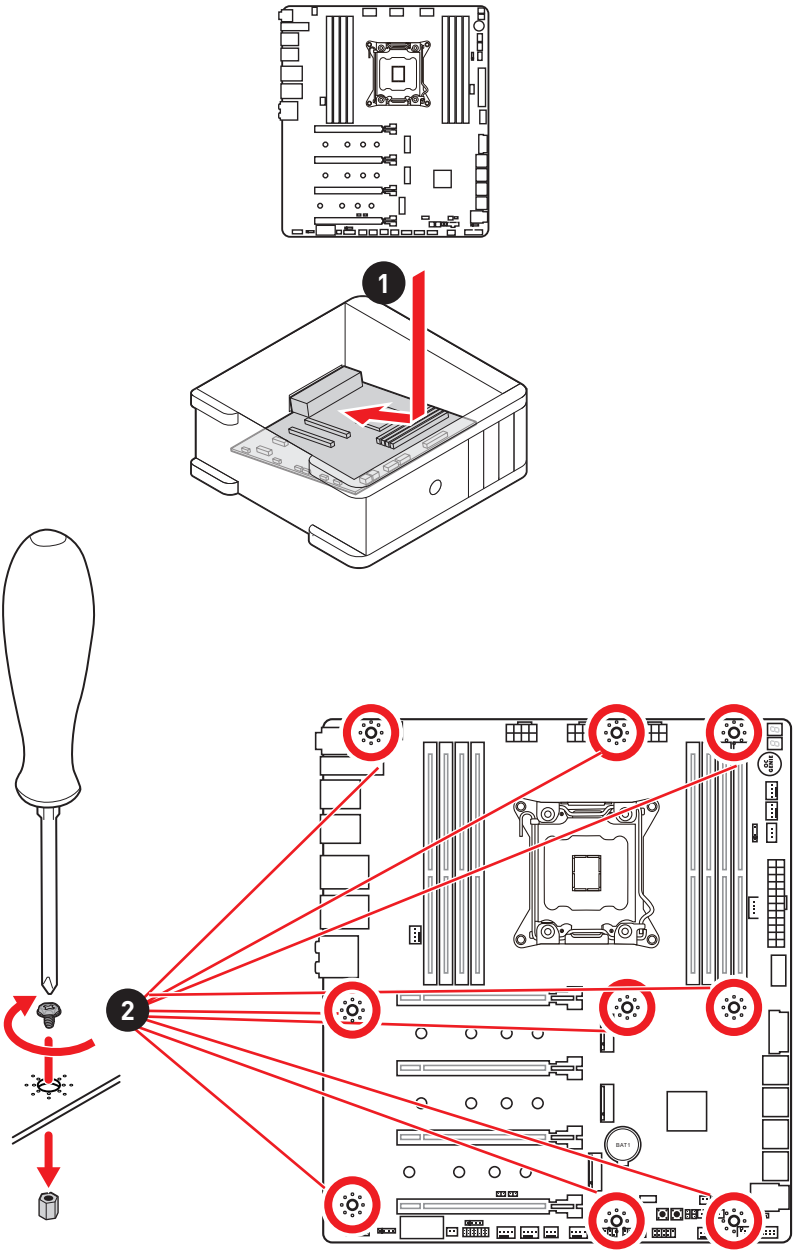




1	HDD LED +	2	Power LED +
3	HDD LED -	4	Power LED -
5	Reset Switch	6	Power Switch
7	Reset Switch	8	Power Switch
9	Reserved	10	No Pin

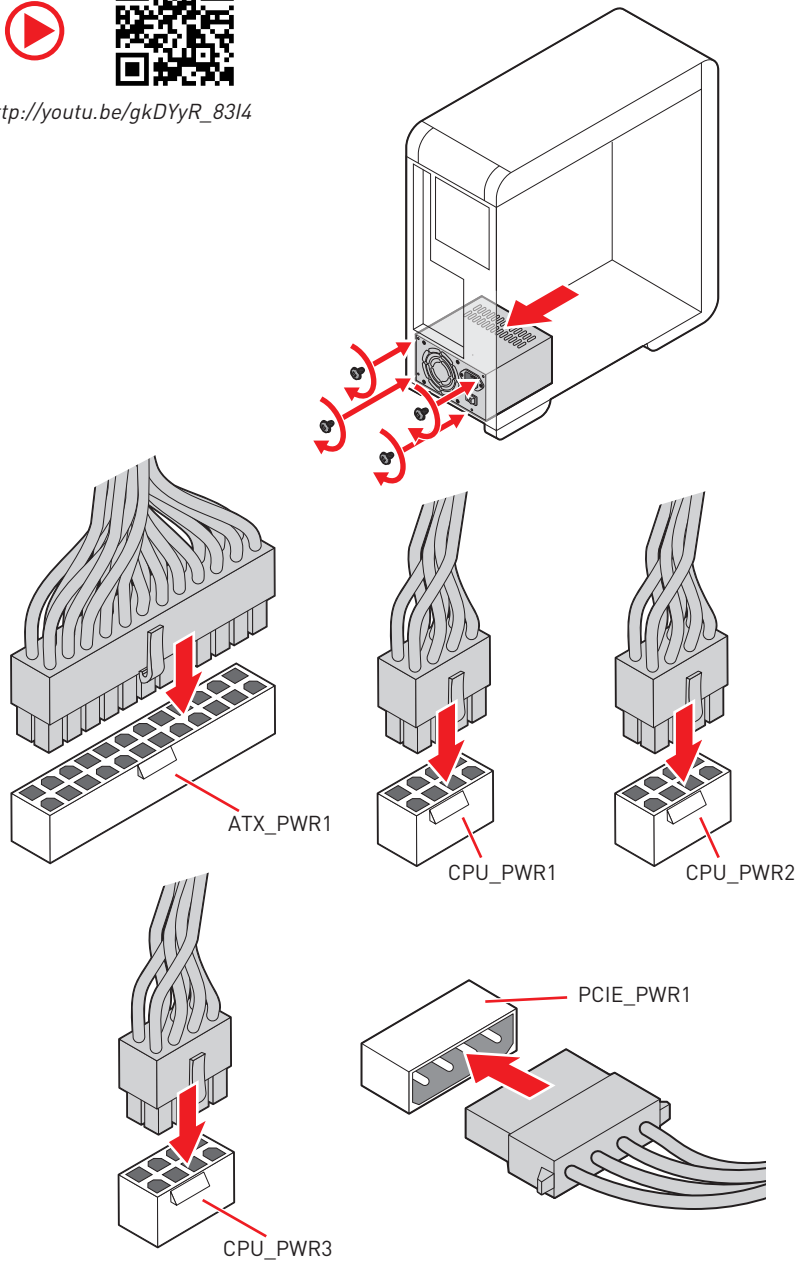


Installing the Motherboard



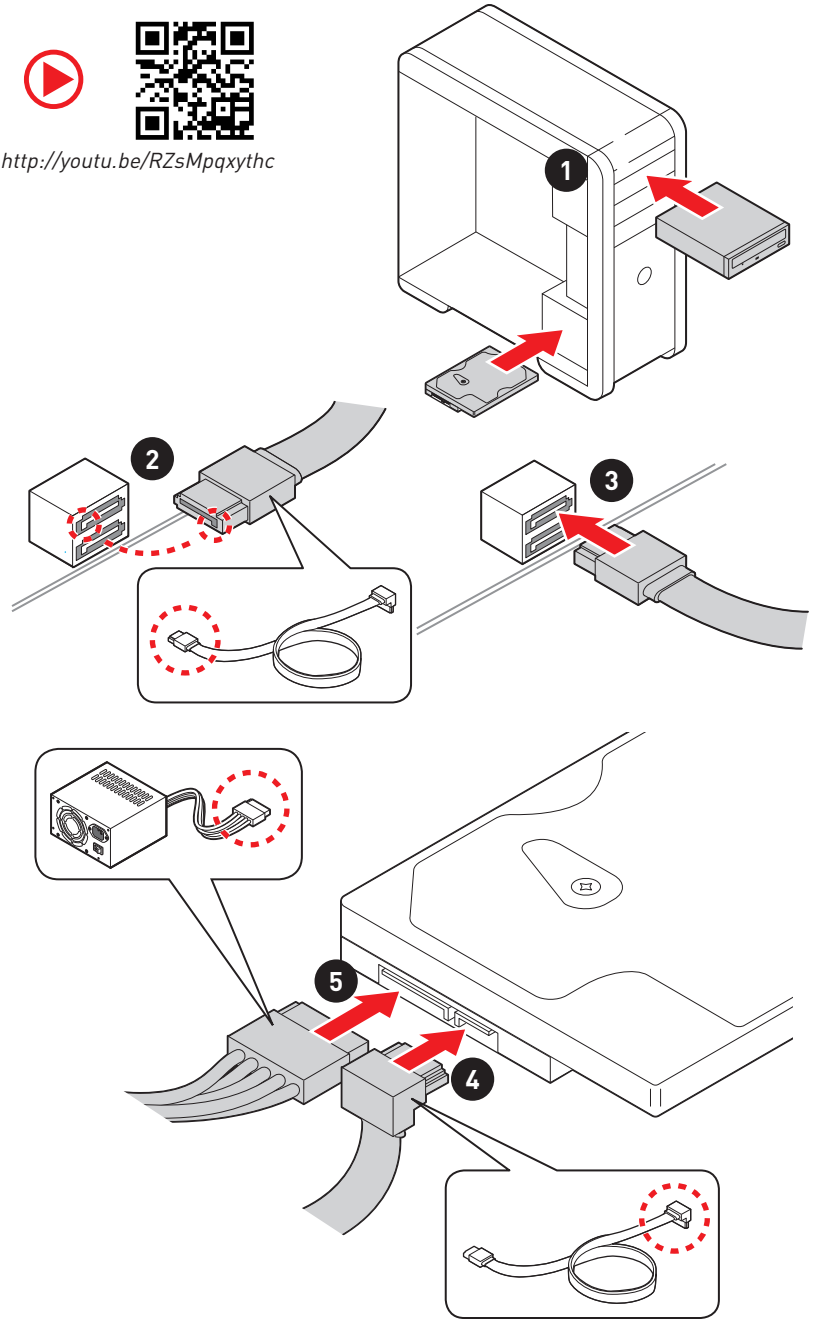
Connecting the Power Connectors

http://youtu.be/gkDYyR_83I4



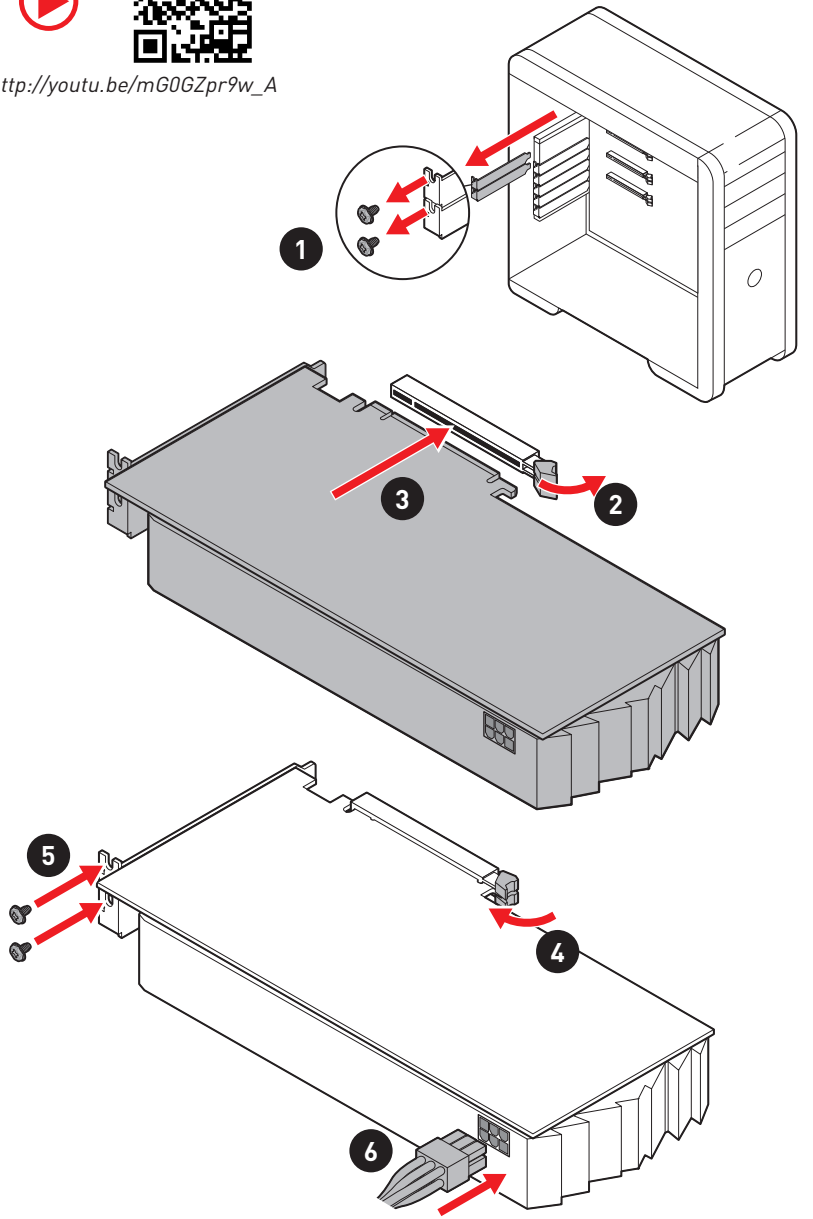
Installing SATA Drives

http://youtu.be/RZsMpqxythc

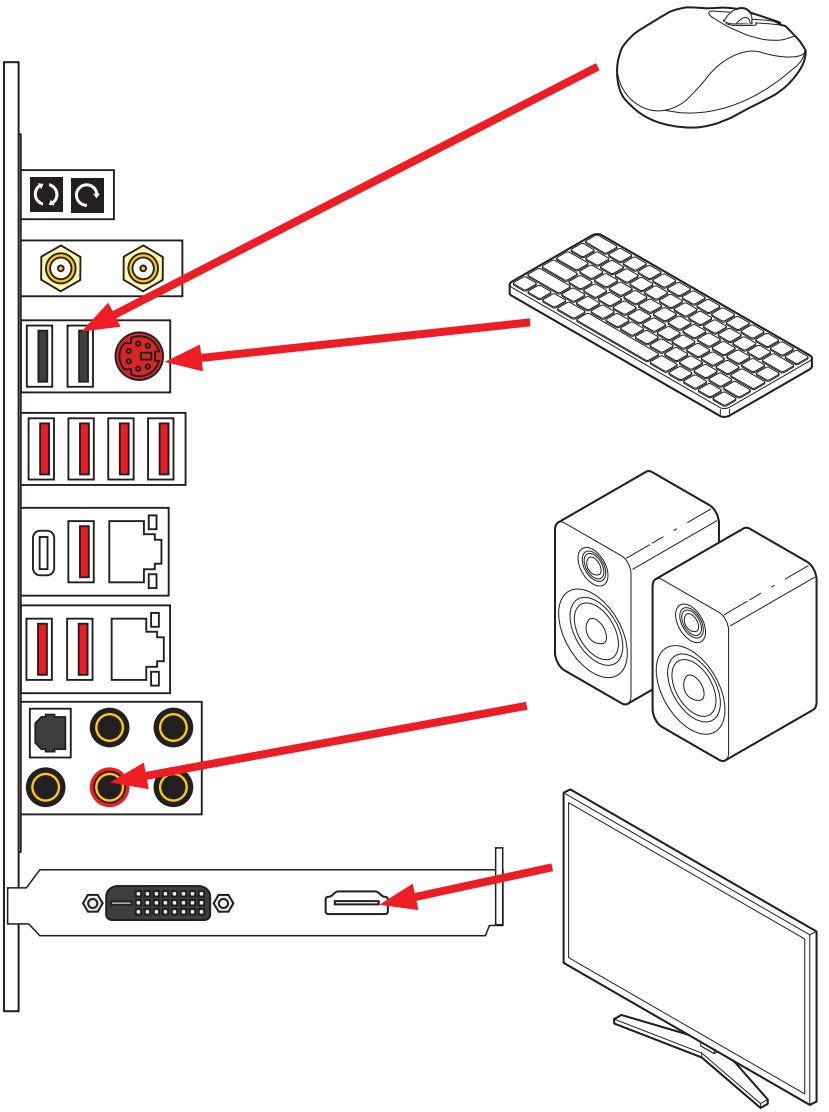


Installing a Graphics Card

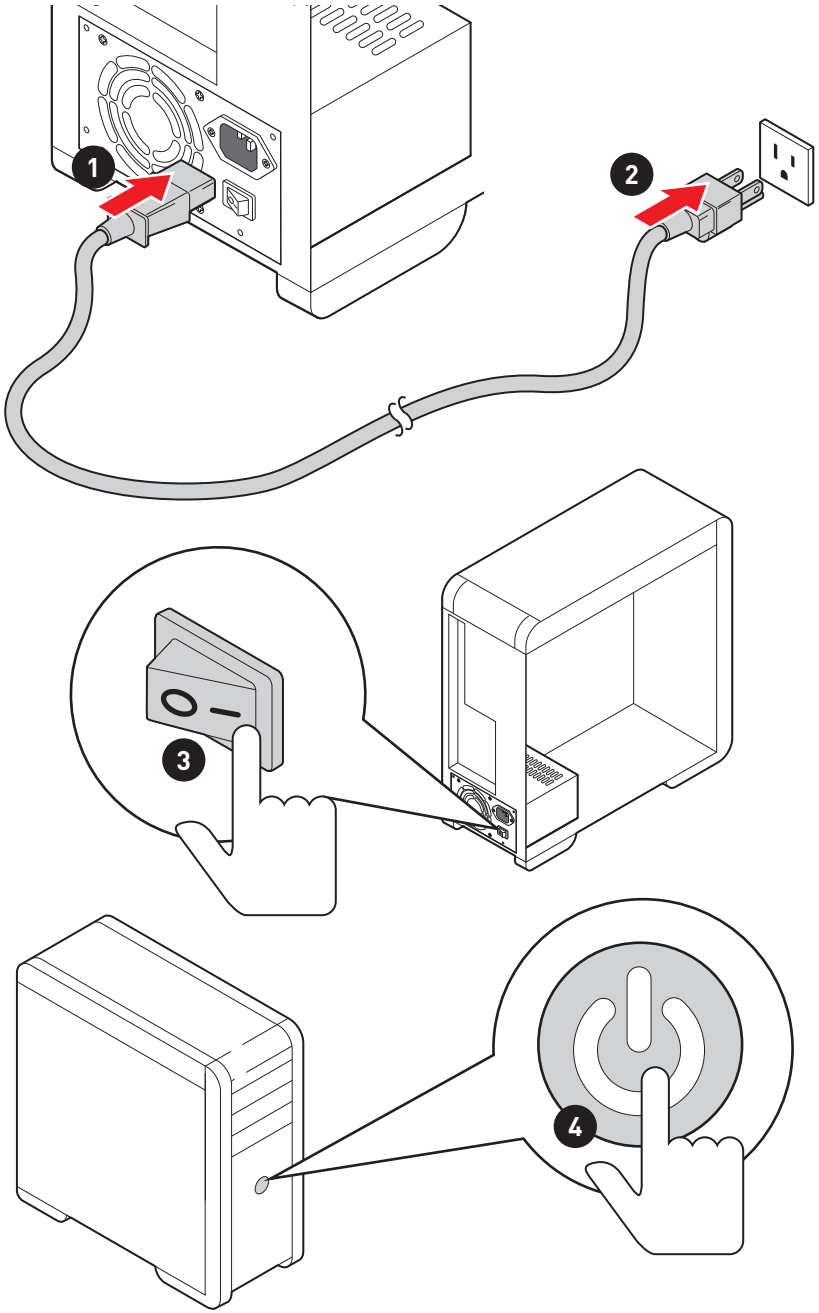
http://youtu.be/mG0GZpr9w_A



Connecting Peripheral Devices



Power On



Contents

Specifications

CPU	Supports Intel® Core™ X-series 10000/ 9000/ 78xx (above) processors for socket LGA2066
Chipset	Intel® X299 Chipset
Memory	• 8x DDR4 memory slots, support up to 256GB* ▪ Support DDR4 4266+(OC)/ 4133(OC)/ 4000(OC)/ 3866(OC)/ 3733(OC)/3600(OC)/ 3466(OC)/ 3400(OC)/ 3333(OC)/ 3300(OC)/ 3200(OC)/ 3000(OC)/ 2933/ 2666/ 2400/ 2133 • Quad channel memory architecture • Supports non-ECC UDIMM memory • Supports Intel® Extreme Memory Profile (XMP) * Please refer www.msi.com for more information on compatible memory.
Expansion Slots	• 4x PCIe 3.0 x16 slots ▪ Support x8/ x8/ x16/ x8 and x16/ x0/ x16/ x8 modes with the 48-lane CPU. ▪ Support x8/ x8/ x16/ x8 and x16/ x0/ x16/ x8 modes with the 44-lane CPU.* ▪ Support x8/ x8/ x8/ x0 and x16/ x0/ x8/ x0 modes with the 28-lane CPU.** * The PCI_E4 slot will run 3.0 x4 speed with 44-lane CPU when installing M.2 PCIe device into M2_3 slot. ** The PCI_E4 slot is unavailable with 28-lane CPU.
Multi-GPU	• Supports 4-Way NVIDIA® SLI® Technology* • Supports 4-Way AMD® CrossFire™ Technology* * Depends on the installed CPU.
LAN	• 1x Intel® I219V Gigabit LAN controller • 1x Aquantia® AQC107 10-Gigabit LAN controller
Wireless LAN & Bluetooth®	Intel® Wi-Fi 6 AX200 ▪ Supports 802.11 a/b/g/n/ac/ax, MU-MINO Rx, 2.4GHz-5GHz (160MHz) up to 2.4Gbps ▪ Supports Bluetooth® 5 ▪ The Wireless module is pre-install in the M2_4 (Key-E) slot
Audio	Realtek® ALC1220 Codec • 7.1-Channel High Definition Audio • Supports Optical S/PDIF output

Continued on next page

Continued from previous page

Storage	Intel® X299 Chipset • 8x SATA 6Gb/s ports • 1x M.2 slot (M2_1, Key M)* ▪ Supports up to PCIe 3.0 x4 and SATA 6Gb/s, 2242/ 2260/ 2280/ 22110 storage devices ▪ Intel® Rapid Start Technology ▪ Intel® Optane™ Memory Ready • 1x U.2 port, supports PCIe 3.0 x4 NVMe storage • Supports Intel® Smart Response Technology Intel® CPU • 2x M.2 slots (M2_2 & M2_3, Key M)* ▪ Support up to PCIe 3.0 x4, 2242/ 2260/ 2280/ 22110 storage devices* * M2_3 slot is unavailable with 28-lane CPU.
RAID	Intel® X299 Chipset • Supports RAID 0, RAID 1, RAID 5 and RAID 10 for SATA storage devices • Supports RAID 0 and RAID 1 for M.2 PCIe storage devices
USB	ASMedia® ASM3242 Chipset ▪ 1x USB 3.2 Gen2x2 (SuperSpeed USB 20 Gbps) Type-C port on the back panel ASMedia® ASM3142 Chipset ▪ 1x USB 3.2 Gen2 (SuperSpeed USB 10 Gbps) Type-C port through the internal USB connector ASMedia® ASM1074 Chipset ▪ 7x USB 3.2 Gen1 (SuperSpeed USB) Type-A ports on the back panel Intel® X299 Chipset ▪ 4x USB 3.2 Gen1 (SuperSpeed USB) ports through the internal USB connectors ▪ 6x USB 2.0 (High-speed USB) ports (2 Type-A ports on the back panel, 4 ports through the internal USB connectors)

Continued on next page

Continued from previous page

Internal Connectors	• 1x 24-pin ATX main power connector • 3x 8-pin ATX 12V power connectors • 1x flat 4-pin ATX 12V power connector (Provides additional power for PCIe x16 slots) • 8x SATA 6Gb/s connectors • 1x U.2 port • 2x USB 2.0 connectors (support additional 4 USB 2.0 ports) • 2x USB 3.2 Gen 1 connectors (support additional 4 USB 3.2 Gen 1 ports) • 1x USB 3.2 Gen 2 Type-C Port • 1x 4-pin CPU fan connector • 4x 4-pin system fan connectors • 2x 4-pin extend system fan connectors • 1x 4-pin water-pump fan connector • 1x 3-pin Water Flow connector • 1x Front panel audio connector • 2x System panel connectors • 1x TPM module connector • 1x Chassis Intrusion connector • 1x 2-pin Thermal Sensors connector • 1x Thunderbolt Add-on Card Connector • 1x Virtual RAID on CPU connector
LED Connectors	• 1x 4-pin RGB LED connector • 2x 3-pin RAINBOW LED connectors • 1x 3-pin CORSAIR connector
Switch	• 1x Multi-BIOS switch
Internal Buttons	• 1x Power button • 1x Reset button • 1x OC GENIE 4 knob
Jumpers	• 1x Clear CMOS jumper • 1x Slow mode booting jumper
Debug LED	• 1x Debug Code LED • 4x EZ Debug LEDs

Continued on next page

Continued from previous page

Back Panel Connectors	• 1x Clear CMOS Button • 1x Flash BIOS Button • 2x Wi-Fi Antenna connectors • 1x PS/2 keyboard/ mouse combo port • 2x USB 2.0 ports • 7x USB 3.2 Gen 1 Type-A ports • 1x USB 3.2 Gen 2x2 Type-C port • 1x Gigabit LAN (RJ45) port • 1x 10-Gigabit LAN (RJ45) port • 5x OFC audio jacks • 1x Optical S/PDIF Out connector
I/O Controller	NUVOTON NCT6797 Controller Chip
Hardware Monitor	• CPU/ System temperature detection • CPU/ System fan speed detection • CPU/ System fan speed control
Form Factor	• EATX Form Factor • 12 in. x 10.7 in. (30.5 cm x 27.2 cm)
BIOS Features	• 2x 128 Mb flash • UEFI AMI BIOS • ACPI 6.1, SM BIOS 2.8 • Multi-language
Software	• Drivers • CREATOR CENTER • Nahimic Audio • CPU-Z MSI GAMING • MSI App Player (BlueStacks) • Open Broadcaster Software (OBS) • Google Chrome™ ,Google Toolbar, Google Drive • Norton™ Internet Security Solution

Continued on next page

Continued from previous page

Creator Center Features	• Creator Optimization • Creator Hotkey • Mystic Light • Hardware Monitor • True Color • Live update • Speed Up • Smart Tool • Super Charger Please refer to http://download.msi.com/manual/mb/CREATORCENTER.pdf for more details.
Special Features	• Audio ▪ Audio Boost 4 ▪ Nahimic 3 ▪ Voice Boost • Network ▪ 10G Super LAN ▪ LAN Manager ▪ Dual LAN ▪ Intel WiFi • Storage ▪ Triple Turbo M.2 • Cooling ▪ Extended Heatsink Design ▪ M.2 Shield Frozr ▪ Pump Fan ▪ Fan Control • LED ▪ Mystic Light ▪ Mystic Light Extension (RGB) ▪ Mystic Light Extension (RAINBOW) ▪ Mystic Light Extension(CORSAIR) ▪ Mystic light SYNC ▪ Ambient Link ▪ EZ DEBUG LED

Continued on next page

Continued from previous page

Special Features	• Protection ▪ DDR4 Steel Armor ▪ M.2 Shield Frozr ▪ PCI-E Steel Armor ▪ Pre-installed IO shielding • Performance ▪ Multi GPU-SLI Technology ▪ Multi GPU-CrossFire Technology ▪ DDR4 Boost ▪ Core Boost ▪ OC Engine (Clock gen) ▪ USB with type A+C ▪ Lightning USB ▪ Lightning USB 20G ▪ Front Lightning USB (20PIN) ▪ Triple CPU Power • User Experience ▪ Creator CENTER ▪ Creator HOTKEY ▪ Speed Up ▪ Total Fan control ▪ Live Update ▪ APP Player • BIOS ▪ Click BIOS 5 ▪ System saver ▪ Dual BIOS

JCORSAIR1 Connector Specification

Supporting CORSAIR RGB Products	Maximum connection
Lighting PRO RGB LED Strip	20* * 20% brightness is recommended when the number of LED strips exceeds 8.
HD120 RGB Fan	6
SP120 RGB Fan	6
LL120 RGB Fan	6

Package contents

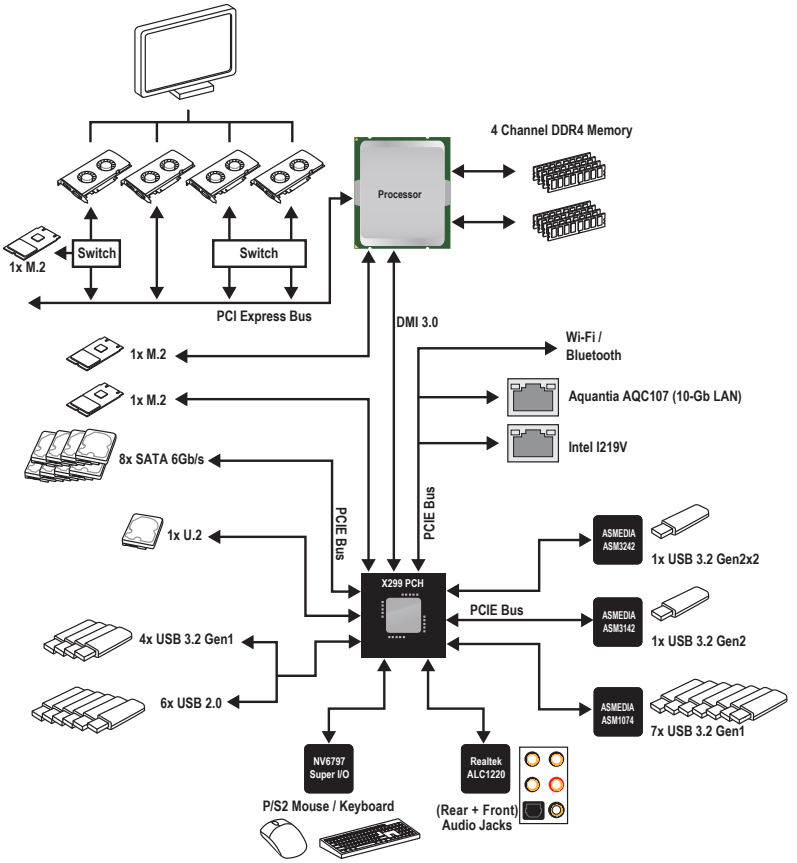
Please check the contents of your motherboard package. It should contain:

Motherboard	Creator X299	
Documentation	User manual	1
	Quick installation guide	1
Application	USB drive with drivers & utilities	1
Cables	SATA 6Gb/s cable	4
	LED JRGB Y cable	1
	LED JCORSAIR cable	1
	LED JRAINBOW cable	1
	Thermistor cable	1
	Thunderbolt cable	1
Expansion cards	M.2 XPANDER-AERO GEN4 card	1
	Thunderbolt card	1
Accessories	Wi-Fi antenna	1
	Case Badge	1
	SATA cable stickers	1
	Product registration card	1
	M.2 screw	3

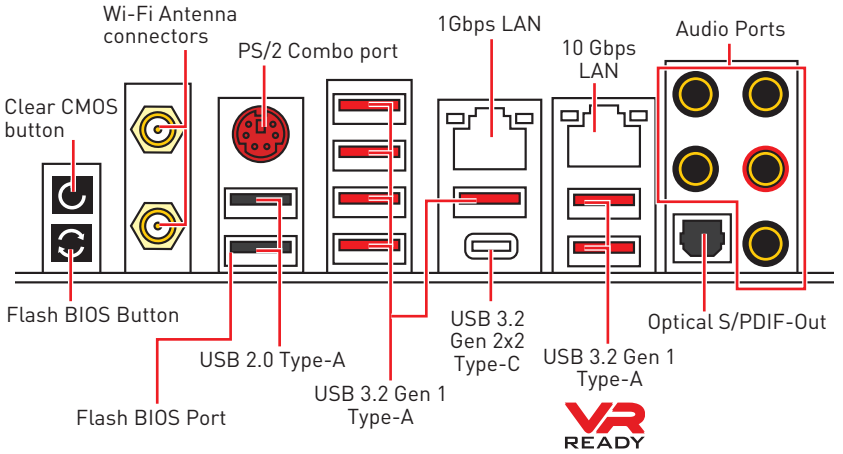
Important

If any of the above items are damaged or missing, please contact your retailer.

Block Diagram



Rear I/O Panel

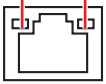


• **Clear CMOS button** - Power off your computer. Press and hold the Clear CMOS button for about 5-10 seconds to reset BIOS to default values.

• **Flash BIOS Port/ Button** - Please refer to page 64 for Updating BIOS with Flash BIOS Button.

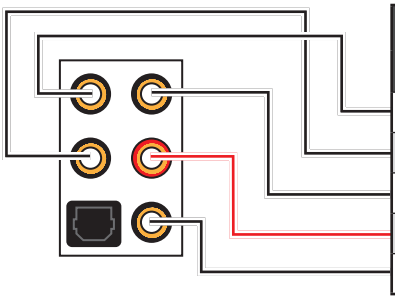
LAN Port LED Status Table

Link/ Activity LED	
Status	**Description**
Off	No link
Yellow (1Gb LAN) Green (10Gb LAN)	Linked
Blinking	Data activity



Speed LED		
Status	**Gigabit LAN**	**10 Gbps LAN**
Off	10 Mbps	–
Green	100 Mbps	100 Mbps / 1 Gbps
Orange	1 Gbps	10 Gbps

Audio Ports Configuration

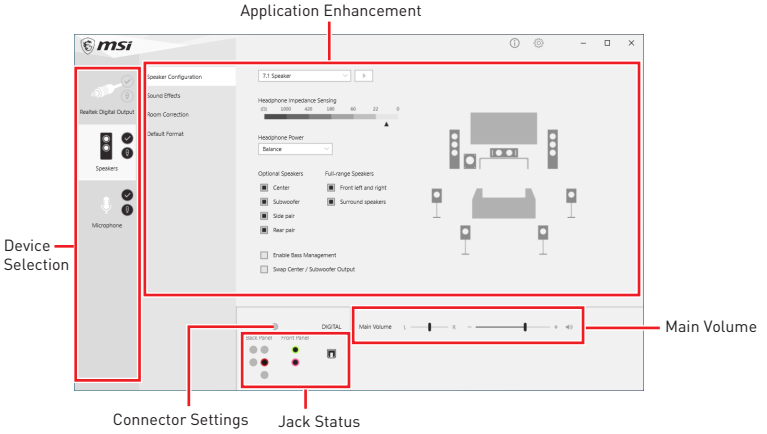


Audio Ports	Channel			
	2	4	6	8
Center/ Subwoofer Out			●	●
Rear Speaker Out		●	●	●
Line-In/ Side Speaker Out				●
Line-Out/ Front Speaker Out	●	●	●	●
Mic In				

(●: connected, **Blank**: empty)

Realtek Audio Console

After Realtek Audio Console is installed. You can use it to change sound settings to get better sound experience.



• **Device Selection** - allows you to select a audio output source to change the related options. The **check** sign indicates the devices as default.

• **Application Enhancement** - the array of options will provide you a complete guidance of anticipated sound effect for both output and input device.

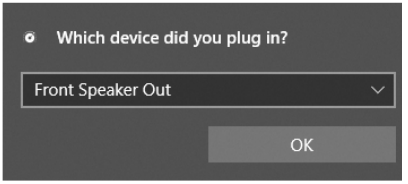
• **Main Volume** - controls the volume or balance the right/left side of the speakers that you plugged in front or rear panel by adjust the bar.

• **Jack Status** - depicts all render and capture devices currently connected with your computer.

• **Connector Settings** - configures the connection settings.

Auto popup dialog

When you plug into a device at an audio jack, a dialogue window will pop up asking you which device is current connected.

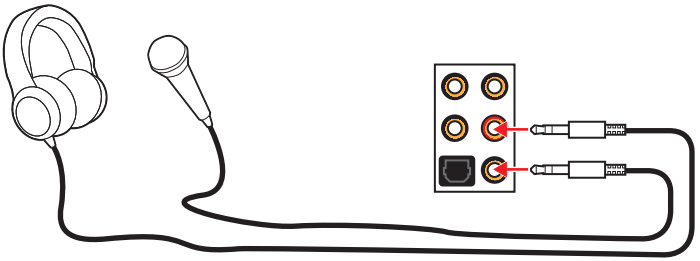


Each jack corresponds to its default setting as shown on the next page.

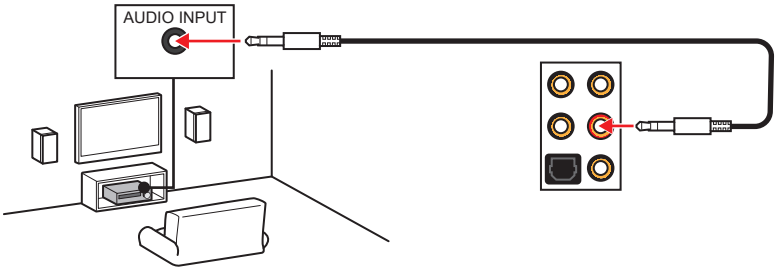
Important

The pictures above for reference only and may vary from the product you purchased.

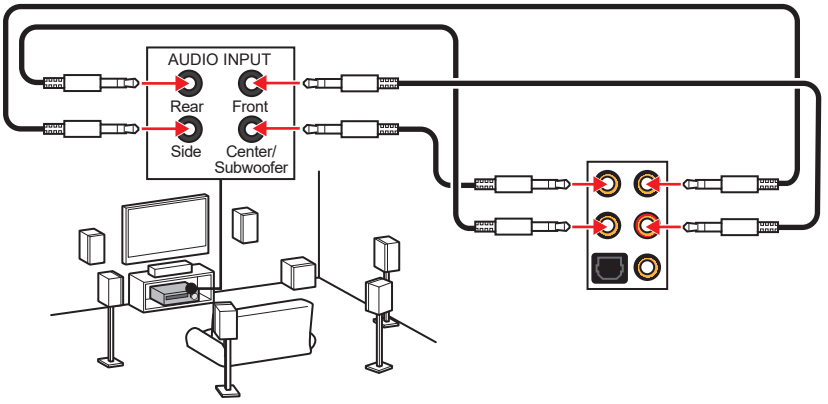
Audio jacks to headphone and microphone diagram



Audio jacks to stereo speakers diagram

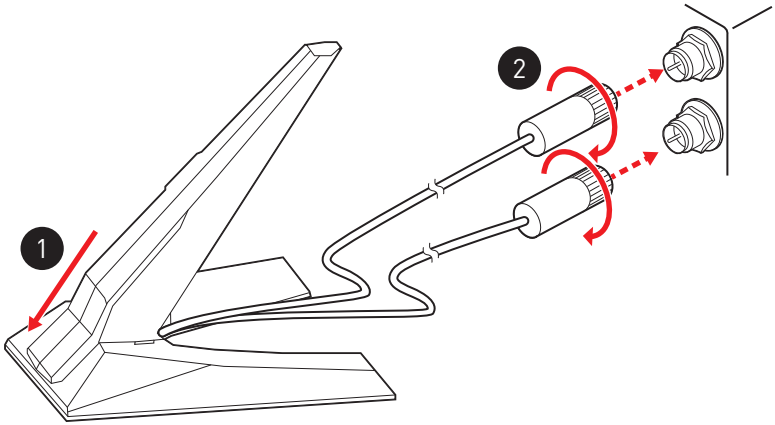


Audio jacks to 7.1-channel speakers diagram

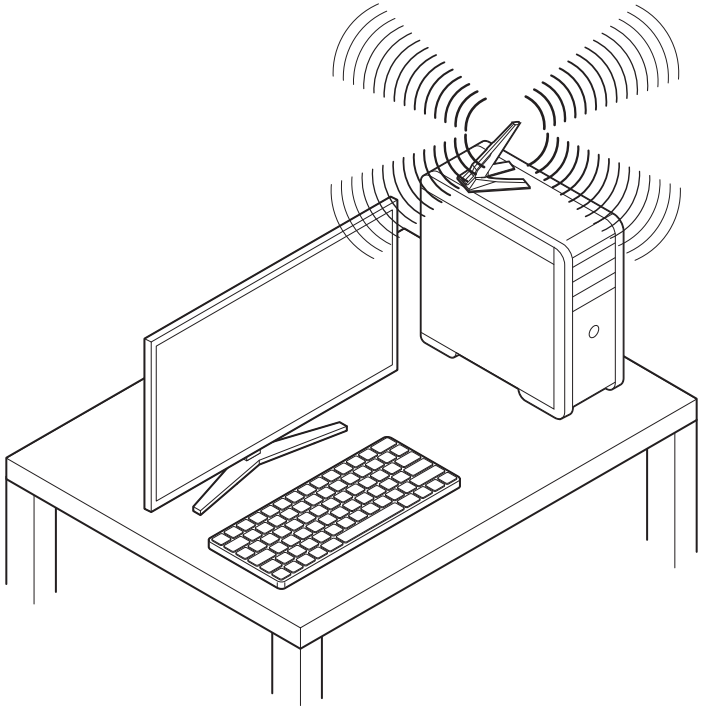


Installing Antennas

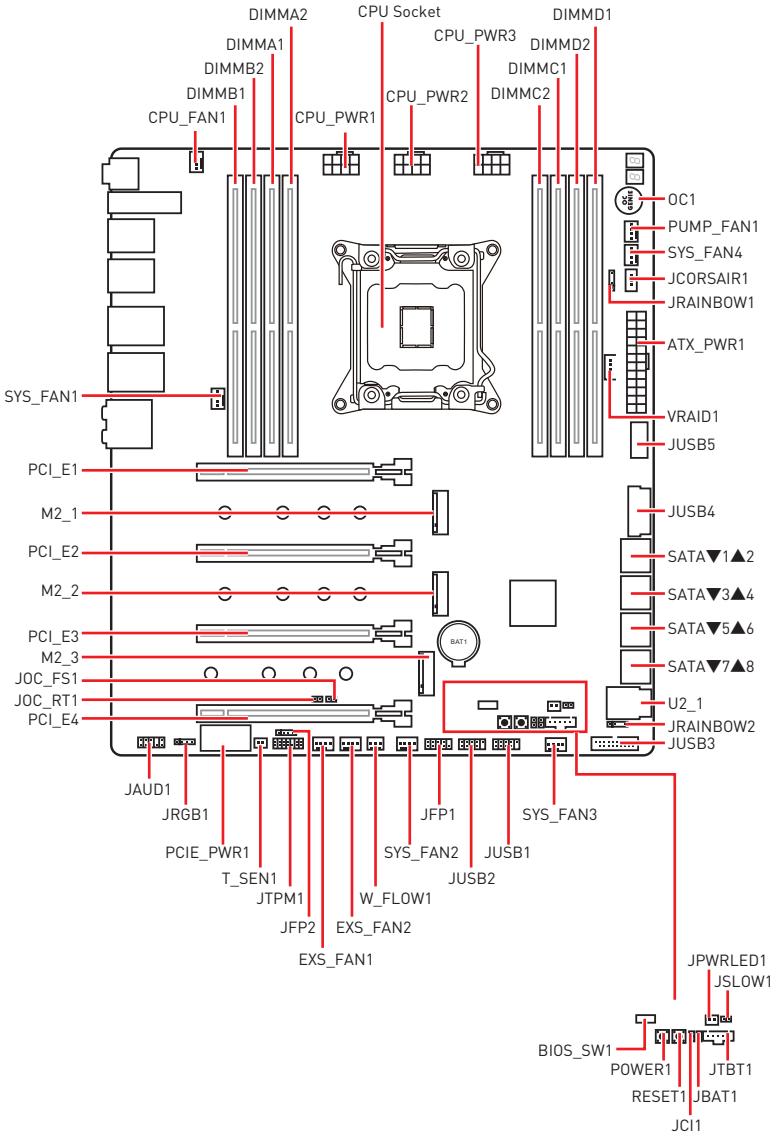
1. Combine the antenna with the base.
2. Screw two antenna cables tight to the WiFi antenna connectors as shown.



3. Place the antenna as high as possible.



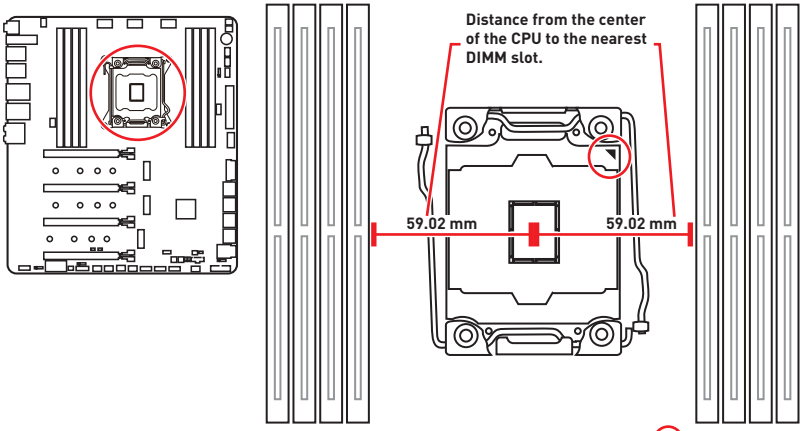
Overview of Components



Component Contents

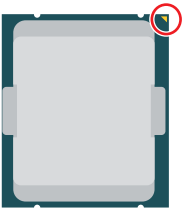
Port Name	Port Type	Page
BIOS_SW1	Multi-BIOS Switch	51
CPU_FAN1, PUMP_FAN1, SYS_FAN1~4, EXS_FAN1~2	Fan Connectors	45
CPU_PWR1~3, ATX_PWR1, PCIE_PWR1	Power Connectors	41
CPU Socket	LGA2066 Socket	29
DIMMA1~D2	DIMM Slots	30
JAUD1	Front Audio Connector	49
JBAT1	Clear CMOS Jumper	50
JCI1	Chassis Intrusion Connector	49
JCORSAIR1	CORSAIR Connector	54
JFP1, JFP2	Front Panel Connectors	40
JPWRLED1	LED power input	55
JRAINBOW1~2	Addressable RGB LED connectors	53
JRGB1	RGB LED connector	52
JSLOW1	Slow Mode Booting Jumper	44
JTBT1	Thunderbolt Add-on Card Connector	50
JTPM1	TPM Module Connector	48
JUSB1~2	USB 2.0 Connectors	48
JUSB3~4	USB 3.2 Gen1 Connector	47
JUSB5	USB 3.2 Gen 2 Type-C Connector	47
M2_1~3	M.2 Slots (Key M)	36
OC1	OC GENIE 4 Knob	42
OC_FS1	OC Force Enter BIOS Jumper	44
OC_RT1	OC Retry Jumper	44
PCI_E1~4	PCIe Expansion Slots	32
POWER1, RESET1	Power Button, Reset Button	50
SATA1~8	SATA 6Gb/s Connectors	40
T_SEN1	Thermal Sensor Connector	46
U2_1	U.2 Connector	35
VRAID1	Virtual RAID on CPU Connector	34
W_FLOW1	Water Flow Meter Connector	46

CPU Socket



Introduction to the LGA 2066 CPU

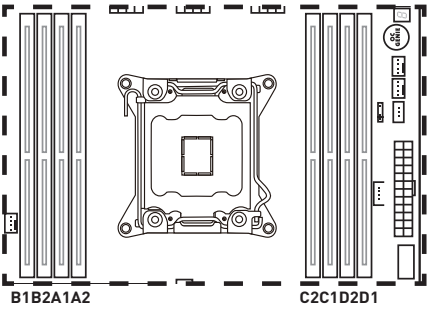
The surface of the LGA 2066 CPU has four **notches** and a **golden triangle** to assist in correctly lining up the CPU for motherboard placement. The golden triangle is the Pin 1 indicator.



Important

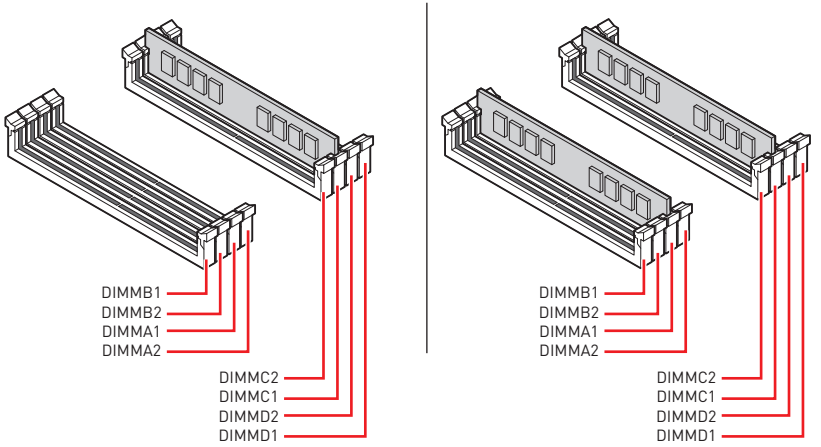
- *Always unplug the power cord from the power outlet before installing or removing the CPU.*
- *Please retain the CPU protective cap after installing the processor. MSI will deal with Return Merchandise Authorization (RMA) requests if only the motherboard comes with the protective cap on the CPU socket.*
- *When installing a CPU, always remember to install a CPU heatsink. A CPU heatsink is necessary to prevent overheating and maintain system stability.*
- *Confirm that the CPU heatsink has formed a tight seal with the CPU before booting your system.*
- *Overheating can seriously damage the CPU and motherboard. Always make sure the cooling fans work properly to protect the CPU from overheating. Be sure to apply an even layer of thermal paste (or thermal tape) between the CPU and the heatsink to enhance heat dissipation.*
- *Whenever the CPU is not installed, always protect the CPU socket pins by covering the socket with the plastic cap.*
- *If you purchased a separate CPU and heatsink/ cooler, Please refer to the documentation in the heatsink/ cooler package for more details about installation.*
- *This motherboard is designed to support overclocking. Before attempting to overclock, please make sure that all other system components can tolerate overclocking. Any attempt to operate beyond product specifications is not recommended. MSI® does not guarantee the damages or risks caused by inadequate operation beyond product specifications.*

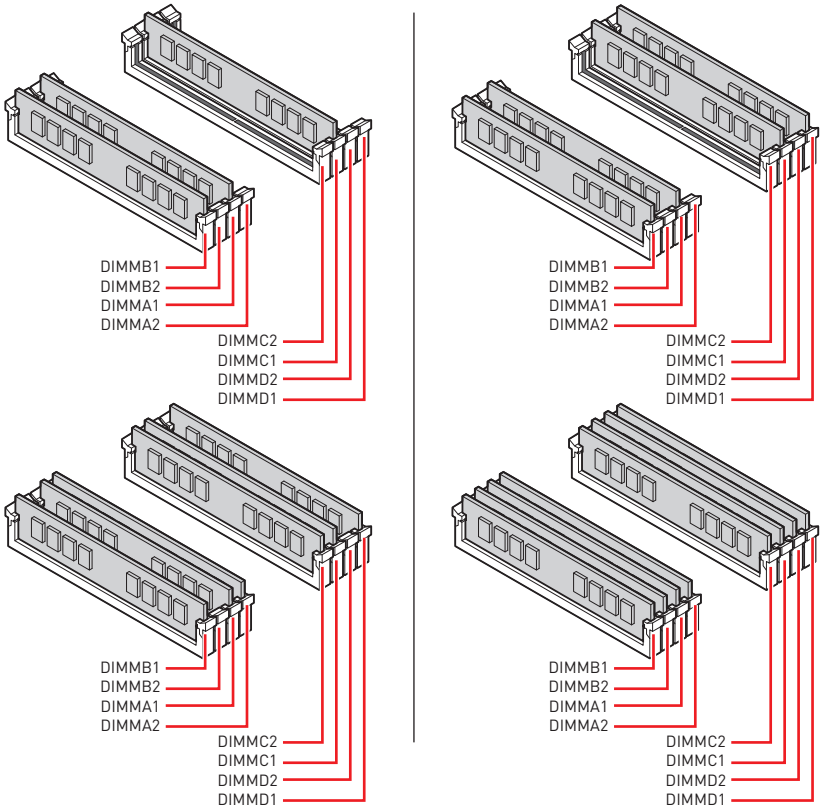
DIMM Slots



Memory module installation recommendation

	B1	B2	A1	A2	CPU	C2	C1	D2	D1
1 DIMM					Intel® Core™ X-series 10000/ 9000/ 78xx (above) processors		✓		
2 DIMMs			✓				✓		
3 DIMMs	✓		✓				✓		
4 DIMMs	✓		✓				✓		✓
5 DIMMs	✓		✓			✓	✓		✓
6 DIMMs	✓		✓	✓		✓	✓		✓
7 DIMMs	✓	✓	✓	✓		✓	✓		✓
8 DIMMs	✓	✓	✓	✓		✓	✓	✓	✓

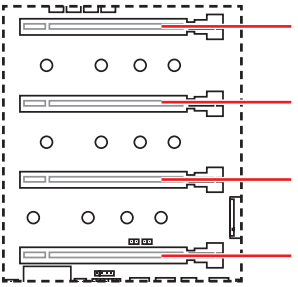




Important

- *Always insert a memory module in the **DIMMC1** slot first.*
- *To ensure system stability for Dual/ Triple/ Quad channel mode, memory modules must be of the same type, number and density. And for every channel, the odd number DIMM slot must to be installed first.*
- *Some memory modules may operate at a lower frequency than the marked value when overclocking due to the memory frequency operates dependent on its Serial Presence Detect (SPD). Go to BIOS and find the **DRAM Frequency** to set the memory frequency if you want to operate the memory at the marked or at a higher frequency.*
- *It is recommended to use a more efficient memory cooling system for full DIMMs installation or overclocking.*
- *The stability and compatibility of installed memory modules depend on installed CPU and devices when overclocking.*
- *Please refer www.msi.com for more information on compatible memory.*

PCI_E1~4: PCIe Expansion Slots



PCI_E1: PCIe 3.0 x16 (CPU lanes)

PCI_E2: PCIe 3.0 x8 (CPU lanes)

PCI_E3: PCIe 3.0 x16 (CPU lanes)

PCI_E4: PCIe 3.0 x8 (CPU lanes)

PCIe, M2_2 and M2_3 slots bandwidth table

for 48-lane CPU

Graphics Card	2-Way	2-Way	2-Way*	3-Way	3-Way*	4-Way*
PCI_E1	@ 3.0 x8	@ 3.0 x16	@ 3.0 x16	@ 3.0 x8	@ 3.0 x16	@ 3.0 x8
PCI_E2	@ 3.0 x8	Empty	Empty	@ 3.0 x8	Empty	@ 3.0 x8
PCI_E3	Empty	Empty	@ 3.0 x16	@ 3.0 x16	@ 3.0 x16	@ 3.0 x16
PCI_E4	Empty	@ 3.0 x8	Empty	Empty	@ 3.0 x8	@ 3.0 x8
M2_2	3.0 x4	3.0 x4	3.0 x4	3.0 x4	3.0 x4	3.0 x4
M2_3	3.0 x4	3.0 x4	3.0 x4	3.0 x4	3.0 x4	3.0 x4

(@: graphics card slot, *: best combination)

for 44-lane CPU

Graphics Card	2-Way	2-Way	2-Way*	3-Way	3-Way*	4-Way	4-Way*
PCI_E1	@ 3.0 x8	@ 3.0 x16	@ 3.0 x16	@ 3.0 x8	@ 3.0 x16	@ 3.0 x8	@ 3.0 x8
PCI_E2	@ 3.0 x8	Empty	Empty	@ 3.0 x8	Empty	@ 3.0 x8	@ 3.0 x8
PCI_E3	Empty	Empty	@ 3.0 x16	@ 3.0 x16	@ 3.0 x16	@ 3.0 x16	@ 3.0 x16
PCI_E4	Empty	@ 3.0 x8	Empty	Empty	@ 3.0 x8	@ 3.0 x4	@ 3.0 x8
M2_2	3.0 x4	3.0 x4	3.0 x4	3.0 x4	3.0 x4	3.0 x4	3.0 x4
M2_3	3.0 x4	Empty	3.0 x4	3.0 x4	Empty	3.0 x4	Empty

(@: graphics card slot, *: best combination)

Important

The PCI_E4 slot will run 3.0 x4 speed when installing M.2 PCIe device into M2_3 slot.

for 28-lane CPU

Graphics Card	2-Way	2-Way*	3-Way*
PCI_E1	@ 3.0 x8	@ 3.0 x16	@ 3.0 x8
PCI_E2	@ 3.0 x8	Empty	@ 3.0 x8
PCI_E3	Empty	@ 3.0 x8	@ 3.0 x8
PCI_E4	—	—	—
M2_2	3.0 x4	3.0 x4	3.0 x4
M2_3	—	—	—

(@: graphics card slot, —: unavailable, *: best combination)

Important

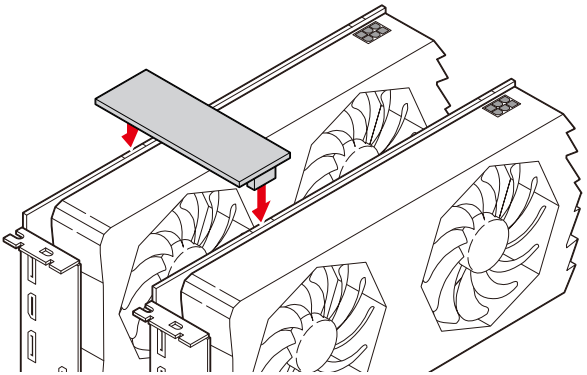
- *The PCI_E4 slot and M2_3 slot are unavailable with 28-lane CPU.*
- *If you install a large and heavy graphics card, you need to use a tool such as **MSI Gaming Series Graphics Card Bolster** to support its weight to prevent deformation of the slot.*
- *For a single PCIe x16 expansion card installation with optimum performance, using the **PCI_E1** slot is recommended.*
- *When adding or removing expansion cards, always turn off the power supply and unplug the power supply power cable from the power outlet. Read the expansion card's documentation to check for any necessary additional hardware or software changes.*

Installing SLI graphics cards

For power supply recommendations for SLI configurations, please refer to the user guide of your graphics card to make sure you meet all the system requirements.

To install SLI graphics cards:

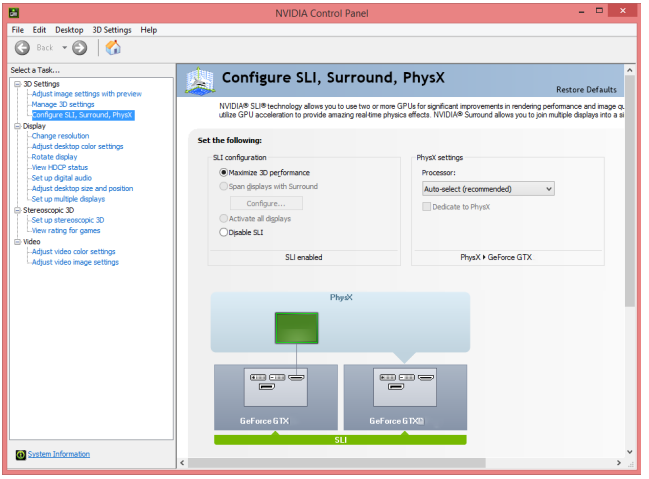
1. Turn off your computer and disconnect the power cord, install two graphics cards into the **PCI_E1** and **PCI_E3** slots.
2. Connect the two cards together using the **SLI Bridge Connector.**



3. Connect all PCIe power connectors of the graphics cards.

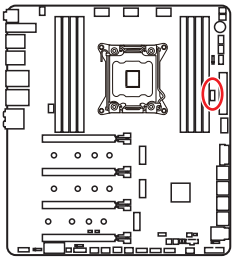
4. Reconnect the power cord, power up the computer and install the drivers and software included in your graphics card package.

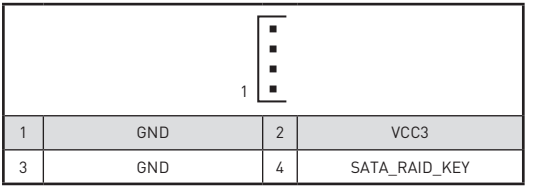
5. Right-click the Windows desktop and select **NVIDIA Control Panel** from the menu, click on **Configure SLI, Surround, PhysX** in the left task pane and select **Maximize 3D performance** in the SLI configuration menu, and then click **Apply**.



VRAID1: Virtual RAID on CPU Connector

This connector allows you to connect the VROC (Virtual RAID on CPU) key module. You need to enable the VROC function with Intel® RSTe (Intel® Rapid Storage Technology enterprise) driver.





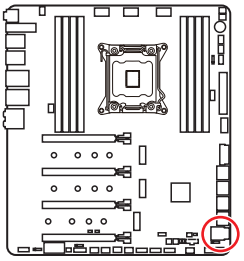
1	GND	2	VCC3
3	GND	4	SATA_RAID_KEY

Important

The VROC key module is purchased separately.

U2_1: U.2 Connector

This connector is a U.2 interface port. Each connector can connect to one PCIe 3.0 x4 NVMe storage device.

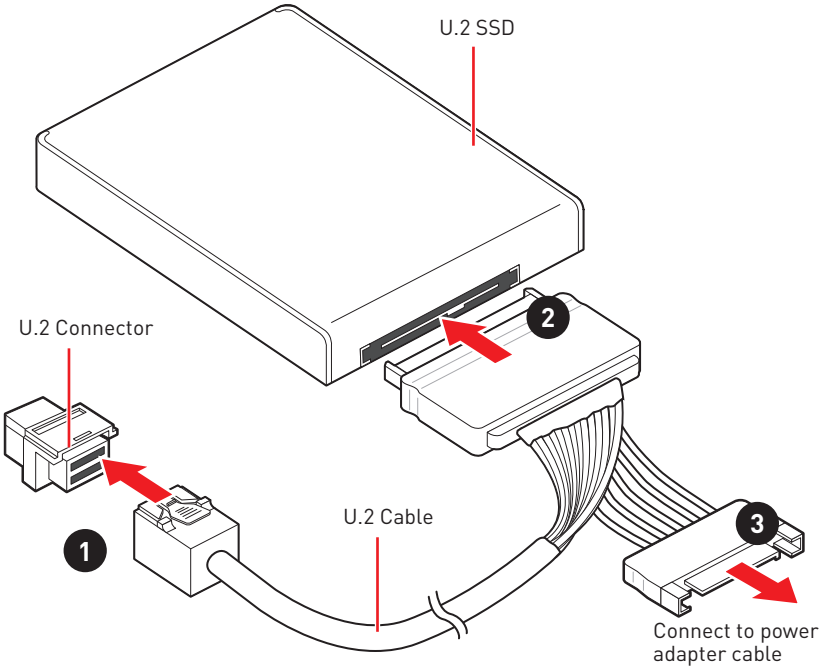


Video Demonstration

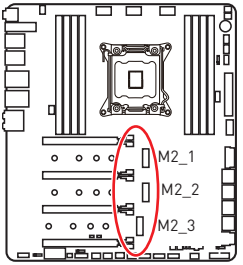
Watch the video to learn how to Install U.2 SSD. http://youtu.be/KgFvKDxymvw

Installing U.2 SSD

1. Connect the U.2 cable to the U.2 connector on the motherboard.
2. Connect the U.2 cable to the U.2 SSD.
3. Connect the U.2 cable to power adapter cable.



M2_1~3: M.2 Slots (Key M)

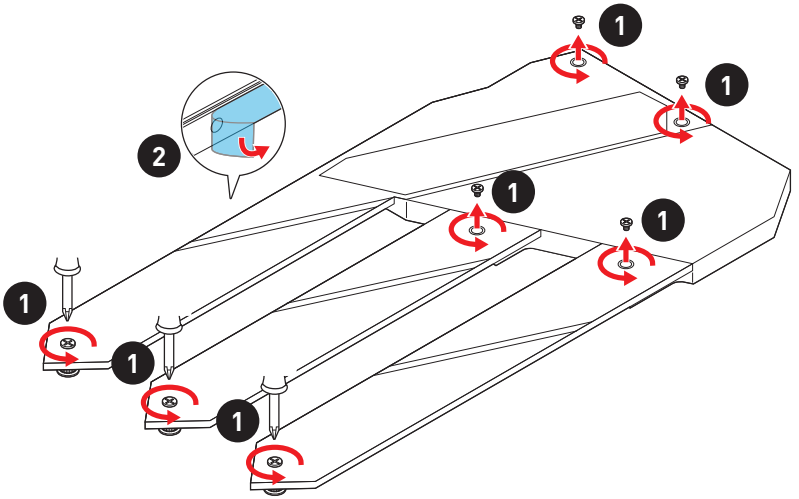


Important

- *Intel® RST only supports PCIe M.2 SSD with UEFI ROM.*
- *Intel® Optane™ Memory Ready for M2_1 slot.*
- *M2_2 & M2_3 slots only support PCIe 3.0 interface.*

Installing M.2 module

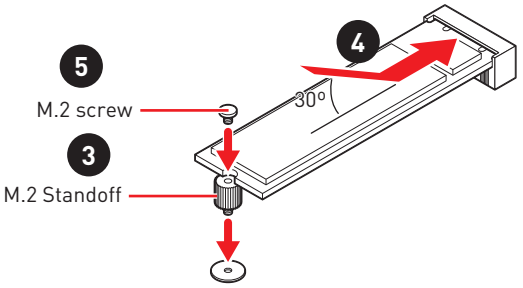
1. Loosen the screws of M.2 SHIELD FROZR heatsink.
2. Lift the M.2 SHIELD FROZR heatsink and remove the protective films from the thermal pads.



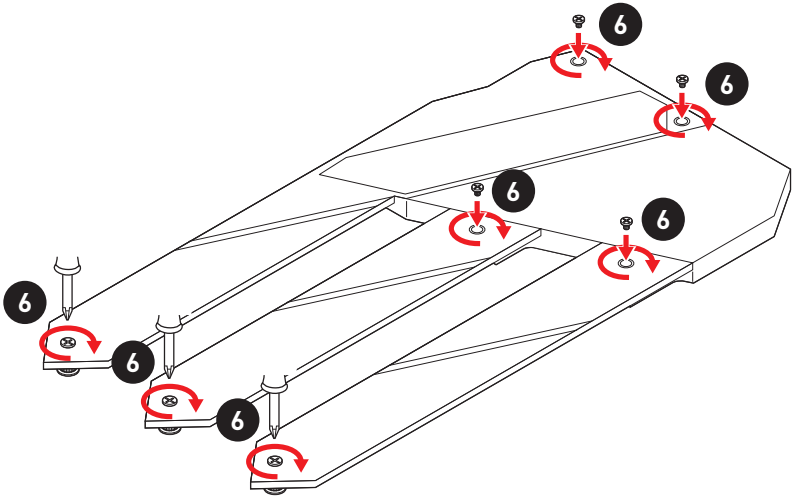
3. For **2242**/ **2260** M.2 SSD, please move and fasten the M.2 standoff to the appropriate position to your M.2 SSD.
   For **2280** M.2 SSD, please skip this step.
   For **22110** M.2 SSD, please remove the M.2 standoff.

4. Insert your M.2 SSDs into the M.2 slots at a 30-degree angle.

5. If the M.2 SSD is shorter than the M.2 SHIELD FROZR heatsink, please secure the M.2 SSD in place with M.2 screw. If the length of M.2 SSD equals the M.2 SHIELD FROZR heatsink, please skip this step.



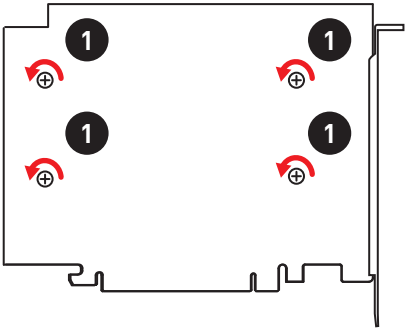
6. Put the M.2 SHIELD FROZR heatsink back in place and secure it.



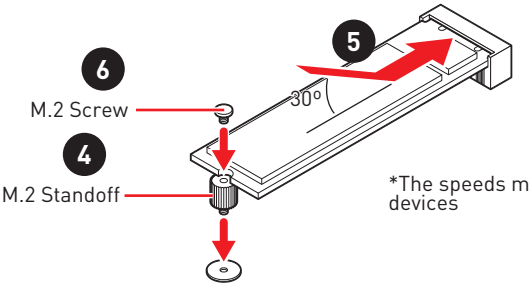
Installing M.2 XPANDER-AERO card

To install the M.2 XPANDER-AERO card, please follows the steps below.

1. Remove the heatsink by loosening four screws on the back of the M.2 XPANDER-AERO card.

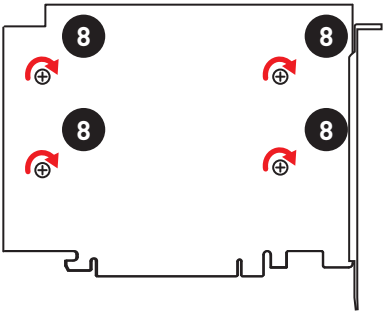


2. Loosen M.2 screw from M.2 standoff.
3. Loosen M.2 standoff.
4. Move and fasten M.2 standoff to the appropriate location for your M.2 SSD.
5. Insert your M.2 SSD into the M.2 slot at a 30-degree angle.
6. Secure the M.2 device in place with M.2 screw.



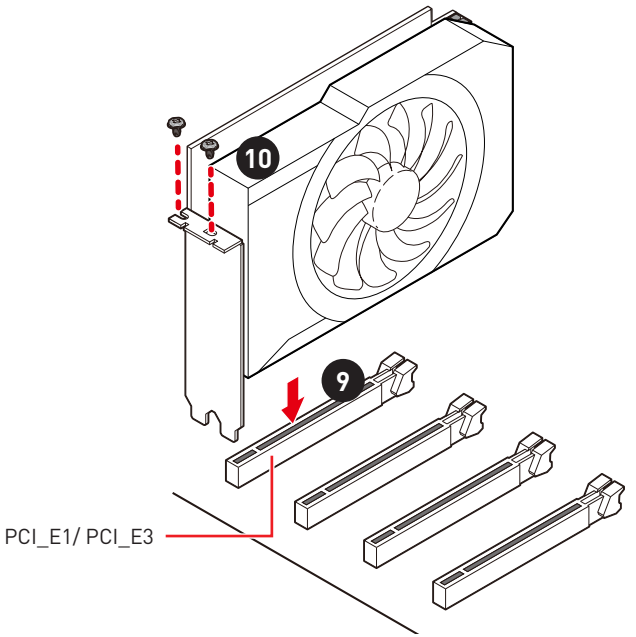
*The speeds may vary for different devices

7. Remove the protective film from the thermal pad of the heatsink.
8. Reinstall and secure the heatsink with four heatsink screws.



9. Insert the M.2 XPANDER-AERO card into the **PCI_E1 or PCI_E3** slot.

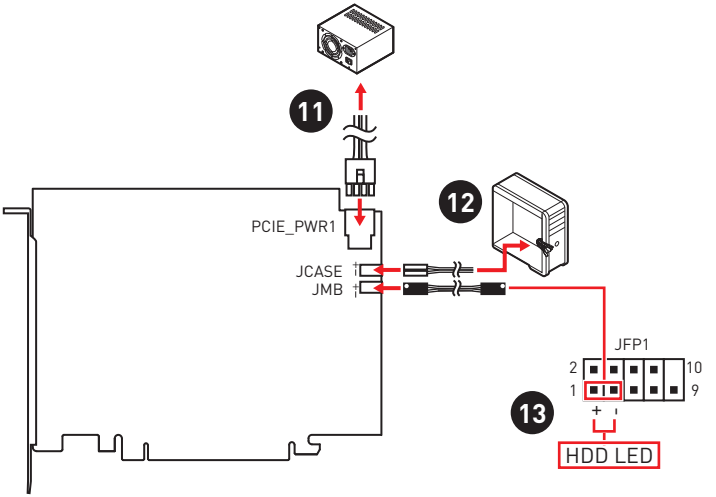
10. Use the screw to secure the M.2 XPANDER-AERO card.



11. Connect the PCIE_PWR1 to the power supply.

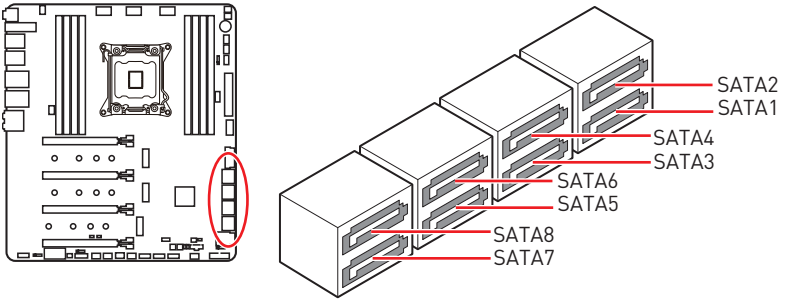
12. Connect the case's HDD LED cable to the JCASE connector.

13. Using the supplied HDD LED cable to connect the JMB connector and JFP1's HDD pins (pin 1 & pin3).



SATA1~8: SATA 6Gb/s Connectors

These connectors are SATA 6Gb/s interface ports. Each connector can connect to one SATA device.

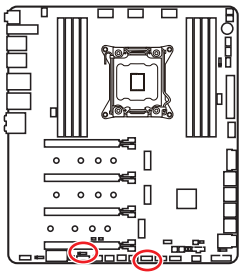


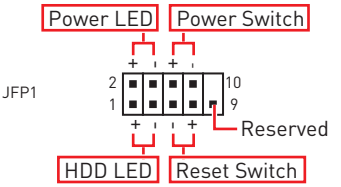
Important

- *Please do not fold the SATA cable at a 90-degree angle. Data loss may result during transmission otherwise.*
- *SATA cables have identical plugs on either sides of the cable. However, it is recommended that the flat connector be connected to the motherboard for space saving purposes.*

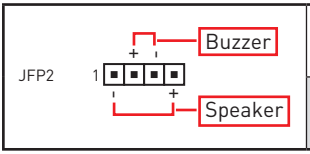
JFP1, JFP2: Front Panel Connectors

These connectors connect to the switches and LEDs on the front panel.





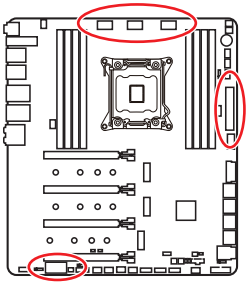
1	HDD LED +	2	Power LED +
3	HDD LED -	4	Power LED -
5	Reset Switch	6	Power Switch
7	Reset Switch	8	Power Switch
9	Reserved	10	No Pin



1	Speaker -	2	Buzzer +
3	Buzzer -	4	Speaker +

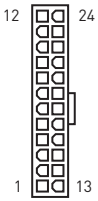
CPU_PWR1~3, ATX_PWR1, PCIE_PWR1: Power Connectors

These connectors allow you to connect an ATX power supply.



CPU_PWR1~3

1	Ground	5	+12V
2	Ground	6	+12V
3	Ground	7	+12V
4	Ground	8	+12V



ATX_PWR1

1	+3.3V	13	+3.3V
2	+3.3V	14	-12V
3	Ground	15	Ground
4	+5V	16	PS-ON#
5	Ground	17	Ground
6	+5V	18	Ground
7	Ground	19	Ground
8	PWR OK	20	Res
9	5VSB	21	+5V
10	+12V	22	+5V
11	+12V	23	+5V
12	+3.3V	24	Ground

PCIE_PWR1

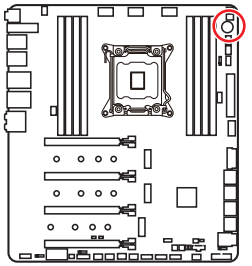
1	+12V	3	Ground
2	Ground	4	+5V

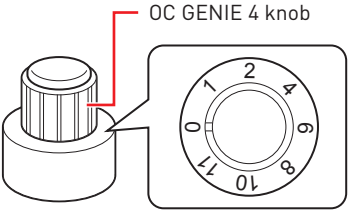
Important

Make sure that all the power cables are securely connected to a proper ATX power supply to ensure stable operation of the motherboard.

OC1: OC GENIE 4 Knob

This knob allows you to manually select a stage from number 0 (default) to number 11 (extreme) for overclocking the processor. The processor's voltage and frequency will be automatically adjusted after you power on your computer. This function will only be available if the installed processor supports this function.





Using OC GENIE 4 Knob

To setup the OC GENIE 4 knob, take the following steps:

1. Set the OC GENIE 4 knob to hardware mode in BIOS Setup.
2. Power off the computer.
3. Refer to **OC GENIE 4 Knob overclocking stage table** and rotate the OC GENIE 4 knob to select the overclocking stage as you desire.
4. Power on and then OC GENIE 4 will automatically overclock processor depending on the stage you selected.

To disable OC GENIE 4:

1. Set the OC GENIE 4 knob to HW mode in BIOS Setup.
2. Power off the computer.
3. Rotate the OC GENIE 4 knob to 0 and then power on. The configuration parameters will be returned to default values.

Important

- *When enabling OC GENIE 4 mode, it is recommended to use liquid CPU cooler with dual fan radiator for better cooling and performance.*
- *You can also control the OC GENIE 4 function in **BIOS Setup** or with **MSI CREATOR CENTER** software.*
- *In order to optimize performance and improve system stability, when you activate the OC GENIE 4 function, please leave the settings in the **BIOS > OC** menu unchanged.*
- *The success of overclocking depends on the components of your computer.*
- *We do not guarantee the OC GENIE 4 overclocking range or the damages/ risks caused by overclocking behavior.*
- *MSI components are recommended for better compatibility when using OC GENIE 4 function.*

OC GENIE 4 Knob overclocking stage table

Stage	CPU Max Frequency					
	i7-7800X	i7-7820X	i9-7900X	i9-7920X	i9-7940X	i9-7960X
0	3.5 GHz	3.6 GHz	3.3 GHz	2.9 GHz	3.1 GHz	2.8 GHz
1	4.1 GHz	4.4 GHz	4.4 GHz	4.4 GHz	4.4 GHz	4.3 GHz
2	4.2 GHz	4.5 GHz	4.5 GHz	4.5 GHz	4.5 GHz	4.4 GHz
4	4.3 GHz	4.6 GHz	4.6 GHz	4.6 GHz	4.6 GHz	4.5 GHz
6	4.4 GHz	4.7 GHz	4.7 GHz	4.7 GHz	4.7 GHz	4.6 GHz
8	4.5 GHz	4.8 GHz	4.8 GHz	4.8 GHz	4.8 GHz	4.7 GHz
10	4.6 GHz	4.9 GHz	4.9 GHz	4.9 GHz	4.9 GHz	4.8 GHz
11	4.7 GHz	5.0 GHz	5.0 GHz	5.0 GHz	5.0 GHz	4.9 GHz

Stage	CPU Max Frequency					
	i9-7980XE	i7-9800X	i9-9820X	i9-9900X	i9-9920X	i9-9940X
0	2.6 GHz	3.8 GHz	3.3 GHz	3.5 GHz	3.5 GHz	3.3 GHz
1	4.3 GHz	4.5 GHz	4.2 GHz	4.5 GHz	4.5 GHz	4.5 GHz
2	4.4 GHz	4.6 GHz	4.3 GHz	4.6 GHz	4.6 GHz	4.6 GHz
4	4.5 GHz	4.7 GHz	4.4 GHz	4.7 GHz	4.7 GHz	4.7 GHz
6	4.6 GHz	4.8 GHz	4.5 GHz	4.8 GHz	4.8 GHz	4.8 GHz
8	4.7 GHz	4.9 GHz	4.6 GHz	4.9 GHz	4.9 GHz	4.9 GHz
10	4.8 GHz	5.0 GHz	4.7 GHz	5.0 GHz	5.0 GHz	5.0 GHz
11	4.9 GHz	5.1 GHz	4.8 GHz	5.1 GHz	5.1 GHz	5.1 GHz

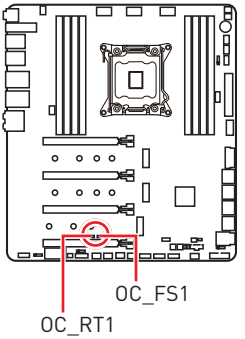
Stage	CPU Max Frequency					
	i9-9960X	i9-9980XE	i9-10980XE	i9-10940X	i9-10920X	i9-10900X
0	3.1 GHz	3.0 GHz	3.0 GHz	3.3 GHz	3.5 GHz	3.7 GHz
1	4.5 GHz	4.5 GHz	4.7 GHz	4.7 GHz	4.7 GHz	4.6 GHz
2	4.6 GHz	4.6 GHz	4.8 GHz	4.8 GHz	4.8 GHz	4.7 GHz
4	4.7 GHz	4.7 GHz	4.9 GHz	4.9 GHz	4.9 GHz	4.8 GHz
6	4.8 GHz	4.8 GHz	5.0 GHz	5.0 GHz	5.0 GHz	4.9 GHz
8	4.9 GHz	4.9 GHz	5.1 GHz	5.1 GHz	5.1 GHz	5.0 GHz
10	5.0 GHz	5.0 GHz	5.2 GHz	5.2 GHz	5.2 GHz	5.1 GHz
11	5.1 GHz	5.1 GHz	5.3 GHz	5.3 GHz	5.3 GHz	5.2 GHz

OC_RT1: OC Retry Jumper

When you close this jumper, the system will keep retrying OC items until it boot up successfully.

OC_FS1: OC Force Enter BIOS Jumper

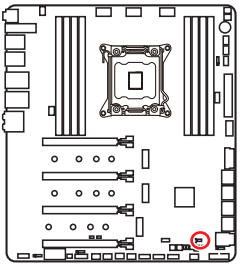
When you close this jumper, the system will be forced access to the BIOS and skip OC failure messages .



OC_RT1	Normal (default)	Keep retrying OC
OC_FS1	Normal (default)	Force access to the BIOS and skip OC failure messages

JSLOW1: Slow Mode Booting Jumper

This jumper is used for LN2 cooling solution, that provides the extreme overclocking conditions, to boot at a stable processor frequency and to prevent the system from crashing.



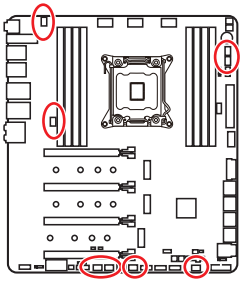
Normal (default)	Enabled (Please enable this jumper during BIOS POST.)

Important

- *Users will try extreme low temperature overclocking at their own risks. The overclocking results will vary according to the CPU version.*
- *Please don't switch to **Enabled** when power-off or the system will be un-bootable.*

CPU_FAN1, PUMP_FAN1, SYS_FAN1~4, EXS_FAN1~2: Fan Connectors

Fan connectors can be classified as PWM (Pulse Width Modulation) Mode or DC Mode. PWM Mode fan connectors provide constant 12V output and adjust fan speed with speed control signal. DC Mode fan connectors control fan speed by changing voltage. This motherboard can automatically detect PWM and DC mode. However, you can follow the instruction below to adjust the fan connector to PWM or DC Mode manually.



CPU_FAN1/
SYS_FAN1/ SYS_FAN4
(Default Auto mode)

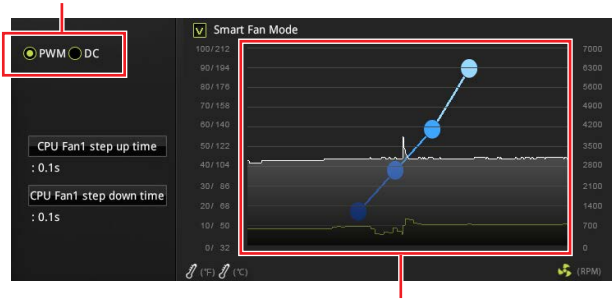
SYS_FAN2/ SYS_FAN3
EXS_FAN1/ EXS_FAN2
(Default Auto mode)

PUMP_FAN1
(Default PWM mode)

Switching fan mode and adjusting fan speed

You can switch between PWM mode and DC mode and adjust fan speed in **BIOS > HARDWARE MONITOR**.

Select **PWM** mode or **DC** mode



There are gradient points of the fan speed that allow you to adjust fan speed in relation to CPU temperature.

Important

Make sure fans are working properly after switching the PWM/ DC mode.

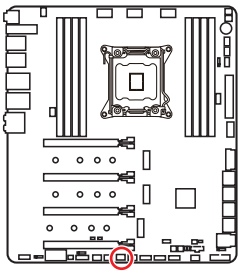
Pin definition of fan connectors

PWM Mode pin definition			
1	Ground	2	+12V
3	Sense	4	Speed Control Signal

DC Mode pin definition			
1	Ground	2	Voltage Control
3	Sense	4	NC

W_FLOW1: Water Flow Meter Connector

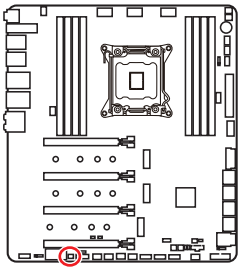
This connector allows you to connect a water flow meter to monitor the flow rate of your liquid cooling system.

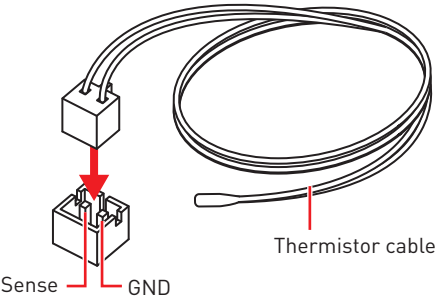


1			
1	Ground	3	WFLOW IN
2	WFLOW PWR		

T_SEN1: Thermal Sensor Connector

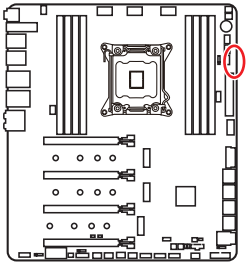
This connector allows you to connect the theral sensor cable and use it to monitor the temperature of the detection point.





V-Check Points Lite

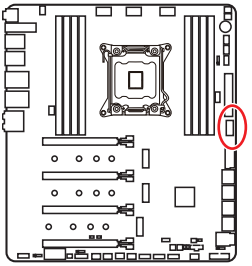
These voltage checkpoints are used to measure the current system voltages. A multimeter (not included) will be required to check voltages. To measure voltage, place test leads on the GND (screw mountin g hole) and a V-Check Point. Please refer to the manual of your multimeter for more information.

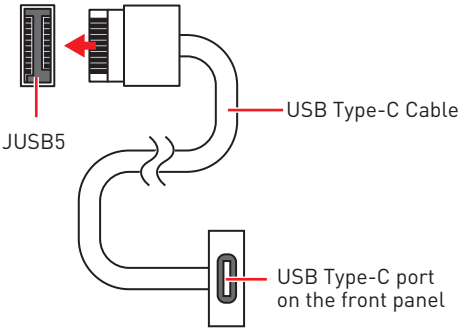


- VCCIN
- VSA
- GND
- VCCIO
- VCC_DDR
- CORE
- RING

JUSB5: USB 3.2 Gen 2 Type-C Connector

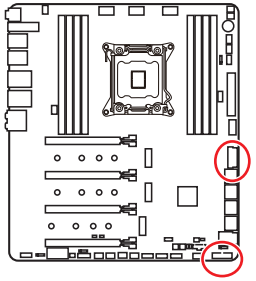
This connector allows you to connect USB 3.2 Gen 2 Type-C connector on the front panel. The connector possesses a foolproof design. When you connect the cable, be sure to connect it with the corresponding orientation.

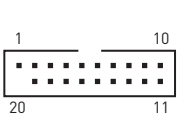


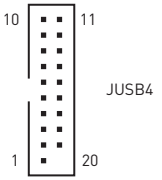


JUSB3~4: USB 3.2 Gen1 Connector

These connectors allow you to connect USB 3.2 Gen1 ports on the front panel.







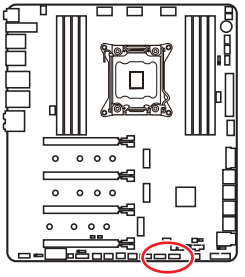
1	Power	11	USB2.0+
2	USB3_RX_DN	12	USB2.0-
3	USB3_RX_DP	13	Ground
4	Ground	14	USB3_TX_C_DP
5	USB3_TX_C_DN	15	USB3_TX_C_DN
6	USB3_TX_C_DP	16	Ground
7	Ground	17	USB3_RX_DP
8	USB2.0-	18	USB3_RX_DN
9	USB2.0+	19	Power
10	NC	20	No Pin

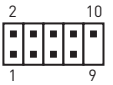
Important

Note that the Power and Ground pins must be connected correctly to avoid possible damage.

JUSB1~2: USB 2.0 Connectors

These connectors allow you to connect USB 2.0 ports on the front panel.





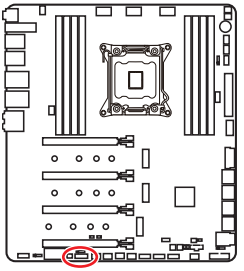
1	VCC	2	VCC
3	USB0-	4	USB1-
5	USB0+	6	USB1+
7	Ground	8	Ground
9	No Pin	10	NC

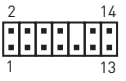
Important

- *Note that the VCC and Ground pins must be connected correctly to avoid possible damage.*
- *In order to recharge your iPad,iPhone and iPod through USB ports, please install MSI® CREATOR CENTER utility.*

JTPM1: TPM Module Connector

This connector is for TPM (Trusted Platform Module). Please refer to the TPM security platform manual for more details and usages.

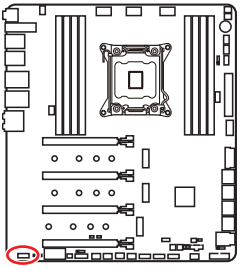


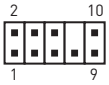


1	LPC Clock	2	3V Standby power
3	LPC Reset	4	3.3V Power
5	LPC address & data pin0	6	Serial IRQ
7	LPC address & data pin1	8	5V Power
9	LPC address & data pin2	10	No Pin
11	LPC address & data pin3	12	Ground
13	LPC Frame	14	Ground

JAUD1: Front Audio Connector

This connector allows you to connect audio jacks on the front panel.

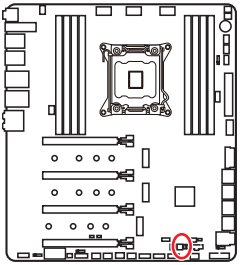




1	MIC L	2	Ground
3	MIC R	4	NC
5	Head Phone R	6	MIC Detection
7	SENSE_SEND	8	No Pin
9	Head Phone L	10	Head Phone Detection

JCI1: Chassis Intrusion Connector

This connector allows you to connect the chassis intrusion switch cable.



Normal (default)

Trigger the chassis intrusion event

Using chassis intrusion detector

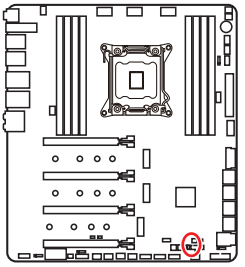
1. Connect the **JCI1** connector to the chassis intrusion switch/ sensor on the chassis.
2. Close the chassis cover.
3. Go to **BIOS > SETTINGS > Security > Chassis Intrusion Configuration**.
4. Set **Chassis Intrusion** to **Enabled**.
5. Press **F10** to save and exit and then press the **Enter** key to select **Yes**.
6. Once the chassis cover is opened again, a warning message will be displayed on screen when the computer is turned on.

Resetting the chassis intrusion warning

1. Go to **BIOS > SETTINGS > Security > Chassis Intrusion Configuration**.
2. Set **Chassis Intrusion** to **Reset**.
3. Press **F10** to save and exit and then press the **Enter** key to select **Yes**.

JBAT1: Clear CMOS (Reset BIOS) Jumper

There is CMOS memory onboard that is external powered from a battery located on the motherboard to save system configuration data. If you want to clear the system configuration, set the jumpers to clear the CMOS memory.



Keep Data

(default)

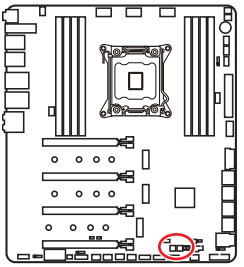
Clear CMOS/
Reset BIOS

Resetting BIOS to default values

1. Power off the computer and unplug the power cord.
2. Use a jumper cap to short **JBAT1** for about 5-10 seconds.
3. Remove the jumper cap from **JBAT1**.
4. Plug the power cord and Power on the computer.

POWER1, RESET1: Power Button, Reset Button

The Power / Reset button allows you to power on / reset the computer.

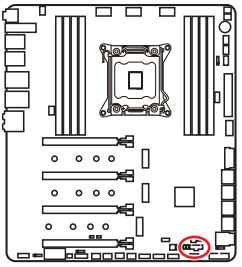


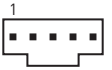
POWER1
(Power button

RESET1
(Reset button)

JTBT1: Thunderbolt Add-on Card Connector

This connector allows you to connect the add-on Thunderbolt I/O card.

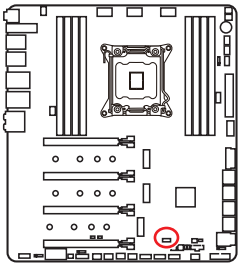


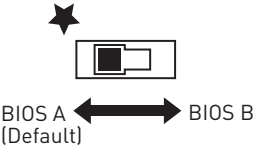


1	FORCE_PWR	2	SCI_EVENT
3	SLP_S3#	4	SLP_S5#
5	GND		

BIOS_SW1: Multi-BIOS Switch

This motherboard has two built-in BIOS ROMs. If one is crashed, you can shift to the other for booting by sliding the switch.





Recovering BIOS

When BIOS updating fails or causes the computer non-bootable, you can recover the failed BIOS by the steps below. Before recovering, please download the latest BIOS file that matches your motherboard model from MSI website. And then save the BIOS file to the root of the USB flash drive.

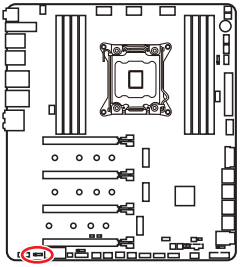
1. Power off the computer.
2. Switch to the normal BIOS ROM with **Multi-BIOS switch**.
3. Insert the USB flash drive into the computer.
4. Power on the computer and press Del key to enter BIOS setup during POST.
5. Select the **M-FLASH** tab and click on **Yes** to reboot the system and enter the flash mode.
6. Select a BIOS file to perform the BIOS recovering process.
7. Switch to the failed BIOS ROM with **Multi-BIOS switch**, and click on **Yes** to start recovering BIOS.
8. After the recovering process is completed, the system will reboot automatically

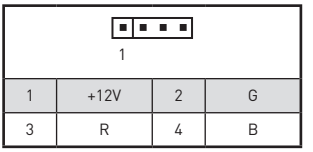
Important

- *Do not use the Multi-BIOS switch when system is booting up.*
- *You can also use the **Flash BIOS Button** utility to flash BIOS. Please refer to BIOS section for details.*

JRGB1: RGB LED connector

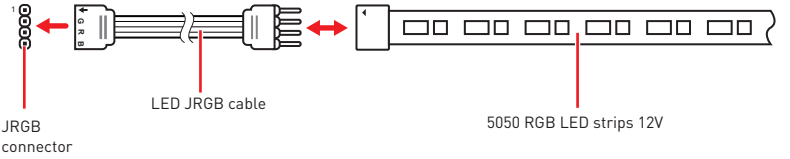
The JRGB connector allows you to connect the 5050 RGB LED strips 12V.



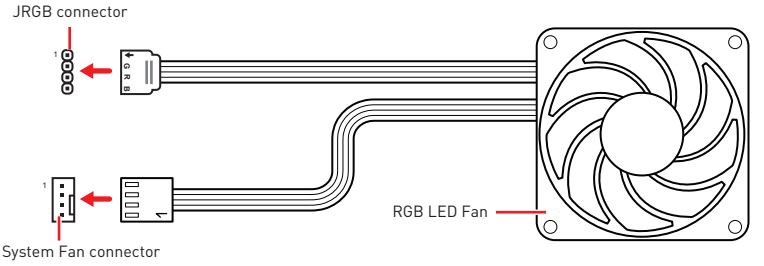


1	+12V	2	G
3	R	4	B

RGB LED Strip Connection



RGB LED Fan Connection

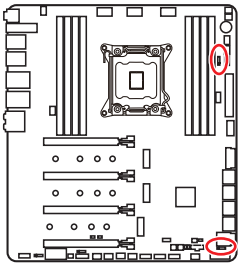


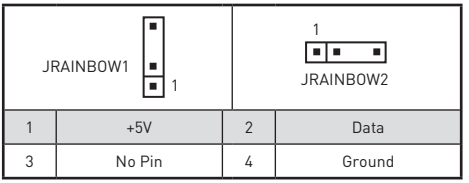
Important

- *The JRGB connector supports up to 2 meters continuous 5050 RGB LED strips (12V/G/R/B) with the maximum power rating of 3A (12V).*
- *Always turn off the power supply and unplug the power cord from the power outlet before installing or removing the RGB LED strip.*
- *Please use MSI's software to control the extended LED strip.*

JRAINBOW1~2: Addressable RGB LED connectors

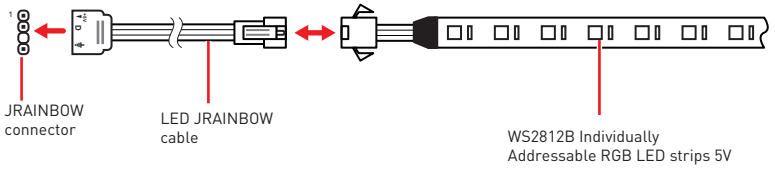
The JRAINBOW connectors allow you to connect the WS2812B Individually Addressable RGB LED strips 5V.



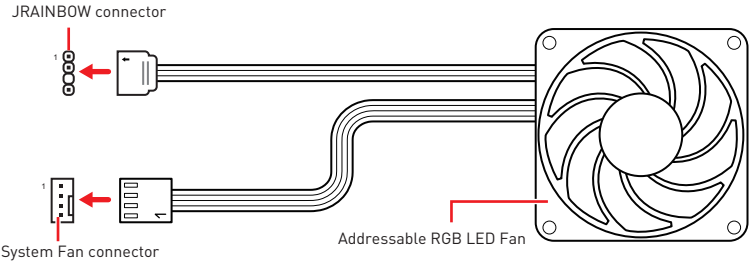


1	+5V	2	Data
3	No Pin	4	Ground

Addressable RGB LED Strip Connection



Addressable RGB LED Fan Connection



CAUTION

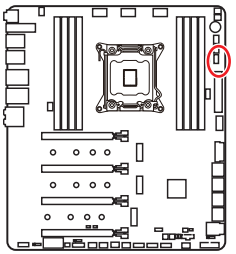
Do not connect the wrong type of LED strips. The JRGB connector and the JRAINBOW connector provide different voltages, and connecting the 5V LED strip to the JRGB connector will result in damage to the LED strip.

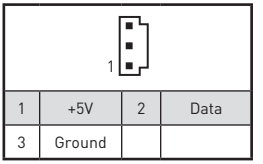
Important

- *The JRAINBOW connector supports up to 75 LEDs WS2812B Individually Addressable RGB LED strips (5V/Data/Ground) with the maximum power rating of 3A (5V). In the case of 20% brightness, the connector supports up to 200 LEDs.*
- *Always turn off the power supply and unplug the power cord from the power outlet before installing or removing the RGB LED strip.*
- *Please use MSI's software to control the extended LED strip.*

JCORSAIR1: CORSAIR Connector

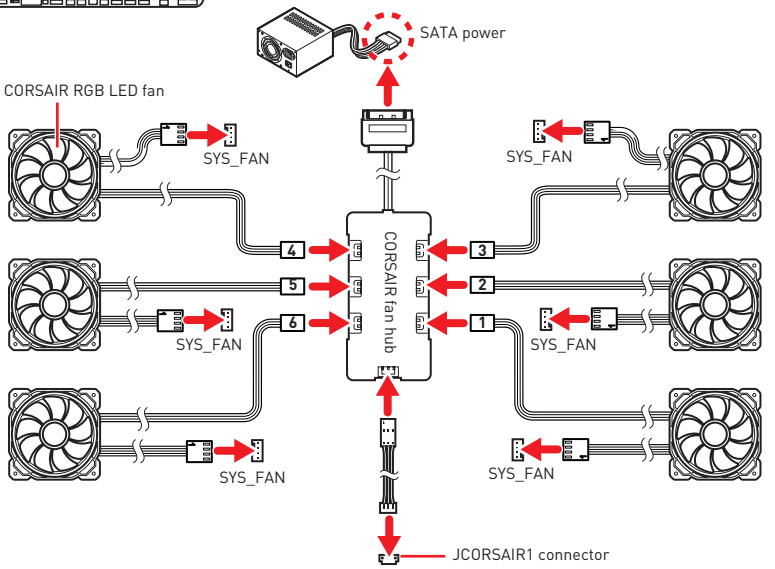
The JCORSAIR1 connector allows you to connect the CORSAIR Individually Addressable Lighting PRO RGB LED strips 5V or CORSAIR RGB fans with the CORSAIR fan hub. Once all items are connected properly, you can control the CORSAIR RGB LED strips and fans with MSI's software.



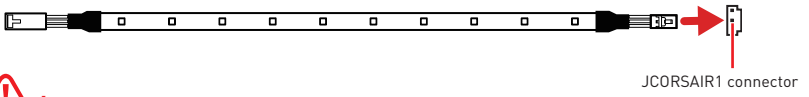


1	+5V	2	Data
3	Ground		

CORSAIR RGB Fan Connection



CORSAIR Lighting Node PRO Connection



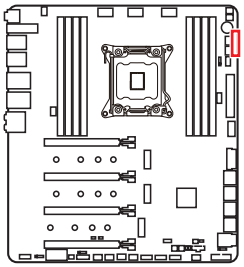
Important

- *Fans must start at 1 and continue in series. 1 > 2 > 3 > 4 > 5 > 6. Any fan not connected in series will break communication and the RGB LED lighting function will not work.*
- *Quantity of RGB LED Fans or RGB LED Lighting PRO strips supported may differ between models. Please refer to the motherboard specification.*
- *CORSAIR RGB LED Fan and CORSAIR Lighting Node PRO can't be used at the same time.*

Onboard LEDs

EZ Debug LED

These LEDs indicate the debug status of the motherboard.



CPU - indicates CPU is not detected or fail.

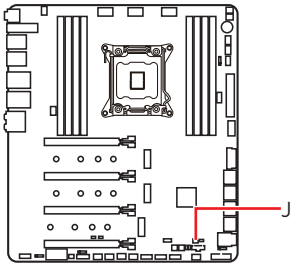
DRAM - indicates DRAM is not detected or fail.

VGA - indicates GPU is not detected or fail.

BOOT - indicates the booting device is not detected or fail.

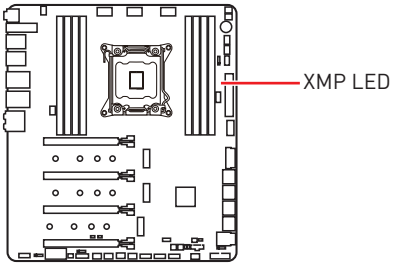
JPWRLED1: LED power input

This connector is used by retailers to demonstrate onboard LED lights.



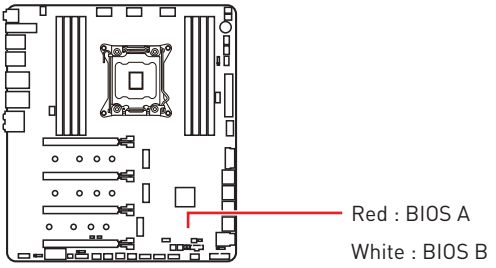
XMP LED

This LED indicates the XMP (Extreme Memory Profile) mode is enabled.



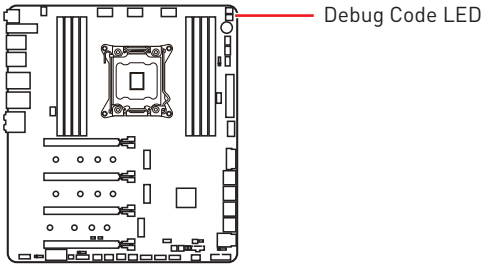
Multi-BIOS LEDs

Multi-BIOS LEDs indicate which BIOS ROM is in operation.



Debug Code LED

The Debug Code LED displays progress and error codes during and after POST. Refer to the Debug Code LED table for details.



Hexadecimal Character Table

Hexadecimal	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Debug Code LED display	0	1	2	3	4	5	6	7	8	9	A	b	C	d	E	F

Boot Phases

Security (SEC) – initial low-level initialization

Pre-EFI Initialization (PEI) – memory initialization

Driver Execution Environment (DXE) – main hardware initialization

Boot Device Selection (BDS) – system setup, pre-OS user interface & selecting a bootable device (CD/DVD, HDD, USB, Network, Shell, ...)

Debug Code LED Table

SEC Progress Codes

01	Power on. Reset type detection (soft/hard)
02	AP initialization before microcode loading
03	System Agent initialization before microcode loading
04	PCH initialization before microcode loading
06	Microcode loading
07	AP initialization after microcode loading
08	System Agent initialization after microcode loading
09	PCH initialization after microcode loading
0B	Cache initialization

SEC Error Codes

0C - 0D	Reserved for future AMI SEC error codes
0E	Microcode not found
0F	Microcode not loaded

PEI Progress Codes

10	PEI Core is started
11	Pre-memory CPU initialization is started
12 - 14	Pre-memory CPU initialization (CPU module specific)
15	Pre-memory System Agent initialization is started
16 - 18	Pre-Memory System Agent initialization (System Agent module specific)
19	Pre-memory PCH initialization is started
1A - 1C	Pre-memory PCH initialization (PCH module specific)
2B	Memory initialization. Serial Presence Detect (SPD) data reading
2C	Memory initialization. Memory presence detection
2D	Memory initialization. Programming memory timing information
2E	Memory initialization. Configuring memory
2F	Memory initialization (other)
31	Memory Installed
32	CPU post-memory initialization is started
33	CPU post-memory initialization. Cache initialization
34	CPU post-memory initialization. Application Processor(s) (AP) initialization
35	CPU post-memory initialization. Boot Strap Processor (BSP) selection
36	CPU post-memory initialization. System Management Mode (SMM) initialization
37	Post-Memory System Agent initialization is started
38 - 3A	Post-Memory System Agent initialization (System Agent module specific)
3B	Post-Memory PCH initialization is started
3C - 3E	Post-Memory PCH initialization (PCH module specific)
4F	DXE IPL is started

PEI Error Codes

50	Memory initialization error. Invalid memory type or incompatible memory speed
51	Memory initialization error. SPD reading has failed
52	Memory initialization error. Invalid memory size or memory modules do not match
53	Memory initialization error. No usable memory detected
54	Unspecified memory initialization error
55	Memory not installed
56	Invalid CPU type or Speed
57	CPU mismatch
58	CPU self test failed or possible CPU cache error
59	CPU micro-code is not found or micro-code update is failed
5A	Internal CPU error
5B	Reset PPI is not available
5C - 5F	Reserved for future AMI error codes

DXE Progress Codes

60	DXE Core is started
61	NVRAM initialization
62	Installation of the PCH Runtime Services
63	CPU DXE initialization is started
64 - 67	CPU DXE initialization (CPU module specific)
68	PCI host bridge initialization
69	System Agent DXE initialization is started
6A	System Agent DXE SMM initialization is started
6B - 6F	System Agent DXE initialization (System Agent module specific)
70	PCH DXE initialization is started
71	PCH DXE SMM initialization is started
72	PCH devices initialization
73 - 77	PCH DXE Initialization (PCH module specific)
78	ACPI module initialization
79	CSM initialization
7A - 7F	Reserved for future AMI DXE codes
90	Boot Device Selection (BDS) phase is started
91	Driver connecting is started
92	PCI Bus initialization is started
93	PCI Bus Hot Plug Controller Initialization
94	PCI Bus Enumeration 32
95	PCI Bus Request Resources
96	PCI Bus Assign Resources
97	Console Output devices connect
98	Console input devices connect
99	Super IO Initialization
9A	USB initialization is started
9B	USB Reset

9C	USB Detect
9D	USB Enable
9E -9F	Reserved for future AMI codes
A0	IDE initialization is started
A1	IDE Reset
A2	IDE Detect
A3	IDE Enable
A4	SCSI initialization is started
A5	SCSI Reset
A6	SCSI Detect
A7	SCSI Enable
A8	Setup Verifying Password
A9	Start of Setup
AB	Setup Input Wait
AD	Ready To Boot event
AE	Legacy Boot event
AF	Exit Boot Services event
B0	Runtime Set Virtual Address MAP Begin
B1	Runtime Set Virtual Address MAP End
B2	Legacy Option ROM Initialization
B3	System Reset
B4	USB hot plug
B5	PCI bus hot plug
B6	Clean-up of NVRAM
B7	Configuration Reset (reset of NVRAM settings)
B8 - BF	Reserved for future AMI codes

DXE Error Codes

D0	CPU initialization error
D1	System Agent initialization error
D2	PCH initialization error
D3	Some of the Architectural Protocols are not available
D4	PCI resource allocation error. Out of Resources
D5	No Space for Legacy Option ROM
D6	No Console Output Devices are found
D7	No Console Input Devices are found
D8	Invalid password
D9	Error loading Boot Option (LoadImage returned error)
DA	Boot Option is failed (StartImage returned error)
DB	Flash update is failed
DC	Reset protocol is not available

S3 Resume Progress Codes

E0	S3 Resume is stared (S3 Resume PPI is called by the DXE IPL)
E1	S3 Boot Script execution
E2	Video repost
E3	OS S3 wake vector call
E4 - E7	Reserved for future AMI progress codes

S3 Resume Error Codes

E8	S3 Resume Failed
E9	S3 Resume PPI not Found
EA	S3 Resume Boot Script Error
EB	S3 OS Wake Error
EC - EF	Reserved for future AMI error codes

Recovery Progress Codes

F0	Recovery condition triggered by firmware (Auto recovery)
F1	Recovery condition triggered by user (Forced recovery)
F2	Recovery process started
F3	Recovery firmware image is found
F4	Recovery firmware image is loaded
F5 - F7	Reserved for future AMI progress codes

Recovery Error Codes

F8	Recovery PPI is not available
F9	Recovery capsule is not found
FA	Invalid recovery capsule
FB - FF	Reserved for future AMI error codes

ACPI States Codes

The following codes appear after booting and the operating system into ACPI modes.

01	System is entering S1 sleep state
02	System is entering S2 sleep state
03	System is entering S3 sleep state
04	System is entering S4 sleep state
05	System is entering S5 sleep state
10	System is waking up from the S1 sleep state
20	System is waking up from the S2 sleep state
30	System is waking up from the S3 sleep state
40	System is waking up from the S4 sleep state
AC	System has transitioned into ACPI mode. Interrupt controller is in PIC mode.
AA	System has transitioned into ACPI mode. Interrupt controller is in APIC mode.

CPU Temperature

00 - 99	Displays current CPU temperature after the system has fully booted into the OS.

Installing OS, Drivers & Utilities

Please download and update the latest utilities and drivers at www.msi.com

Installing Windows® 10

1. Power on the computer.
2. Insert the Windows® 10 installation disc/USB into your computer.
3. Press the **Restart** button on the computer case.
4. Press **F11** key during the computer POST (Power-On Self Test) to get into Boot Menu.
5. Select the Windows® 10 installation disc/USB from the Boot Menu.
6. Press any key when screen shows **Press any key to boot from CD or DVD...** message.
7. Follow the instructions on the screen to install Windows® 10.

Installing Drivers

1. Start up your computer in Windows® 10.
2. Insert MSI USB Drive into the USB port.
3. Click the **Select to choose what happens with this disc** pop-up notification, then select **Run DVDSetup.exe** to open the installer. If you turn off the AutoPlay feature from the Windows Control Panel, you can still manually execute the **DVDSetup.exe** from the root path of the MSI USB Drive.
4. The installer will find and list all necessary drivers in the **Drivers/Software** tab.
5. Click the **Install** button in the lower-right corner of the window.
6. The drivers installation will then be in progress, after it has finished it will prompt you to restart.
7. Click **OK** button to finish.
8. Restart your computer.

Installing Utilities

Before you install utilities, you must complete drivers installation.

1. Open the installer as described above.
2. Click the **Utilities** tab.
3. Select the utilities you want to install.
4. Click the **Install** button in the lower-right corner of the window.
5. The utilities installation will then be in progress, after it has finished it will prompt you to restart.
6. Click **OK** button to finish.
7. Restart your computer.

BIOS Setup

The default settings offer the optimal performance for system stability in normal conditions. You should **always keep the default settings** to avoid possible system damage or failure booting unless you are familiar with BIOS.

Important

• *BIOS items are continuously update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be for reference only. You could also refer to the **HELP** information panel for BIOS item description.*

• *The pictures in this chapter are for reference only and may vary from the product you purchased.*

Entering BIOS Setup

Please refer the following methods to enter BIOS setup.

Press **Delete** key, when the **Press DEL key to enter Setup Menu, F11 to enter Boot Menu** message appears on the screen during the boot process.

Function key

F1: General Help

F2: Add/ Remove a favorite item

F3: Enter Favorites menu

F4: Enter CPU Specifications menu

F5: Enter Memory-Z menu

F6: Load optimized defaults

F7: Switch between Advanced mode and EZ mode

F8: Load Overclocking Profile

F9: Save Overclocking Profile

F10: Save Change and Reset*

F12: Take a screenshot and save it to USB flash drive (FAT/ FAT32 format only).

Ctrl+F:Enter Search page

* When you press F10, a confirmation window appears and it provides the modification information. Select between Yes or No to confirm your choice.

Resetting BIOS

You might need to restore the default BIOS setting to solve certain problems. There are several ways to reset BIOS:

- Go to BIOS and press **F6** to load optimized defaults.
- Short the **Clear CMOS** jumper/ button on the motherboard.

Important

*Be sure the computer is off before clearing CMOS data. Please refer to the **Clear CMOS** jumper/ button section for resetting BIOS.*

Updating BIOS

Updating BIOS with M-FLASH

Before updating:

Please download the latest BIOS file that matches your motherboard model from MSI website. And then save the BIOS file into the USB flash drive.

Updating BIOS:

1. Insert the USB flash drive that contains the update file into the USB port.
2. Please refer the following methods to enter flash mode.
   - Reboot and press **Ctrl + F5** key during POST and click on **Yes** to reboot the system.
   - Reboot and press **Del** key during POST to enter BIOS. Click the **M-FLASH** button and click on **Yes** to reboot the system.
3. Select a BIOS file to perform the BIOS update process.
4. When prompted, switch to the target BIOS ROM with **Multi-BIOS switch**, and click on **Yes** to start recovering BIOS.
5. After the flashing process is 100% completed, the system will reboot automatically.

Updating the BIOS with MSI CREATOR CENTER

Before updating:

Make sure the LAN driver is already installed and the Internet connection is set properly.

Updating BIOS:

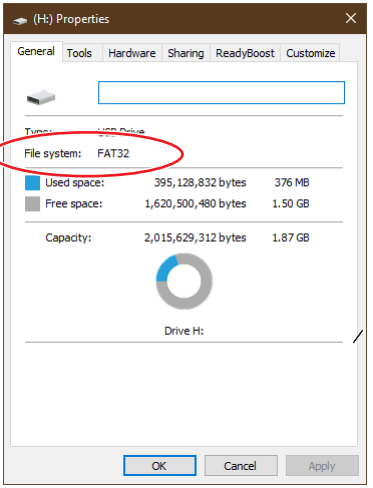
1. Install and launch MSI CREATOR CENTER.
2. Select **BIOS Update**.
3. Click on **Scan** button.
4. Click on **Download** icon to download and install the latest BIOS file.
5. Click **Next** and choose **In Windows mode**. And then click **Next** and **Start** to start updating BIOS.
6. After the flashing process is 100% completed, the system will restart automatically.

Updating BIOS with Flash BIOS Button

1. Please download the latest BIOS file that matches your motherboard model from the MSI® website.
2. Rename the BIOS file to **MSI.ROM**, and save it to the root of your USB flash drive (FAT32 format).
3. Connect the power supply to **CPU_PWR1** and **ATX_PWR1**. (No need to install CPU and memory.)
4. Plug the USB flash drive that contains the MSI.ROM file into the **Flash BIOS Port** on the rear I/O panel.
5. Press the **Flash BIOS** Button to flash BIOS, and the LED starts flashing.
6. The LED will be turned off when the process is completed.

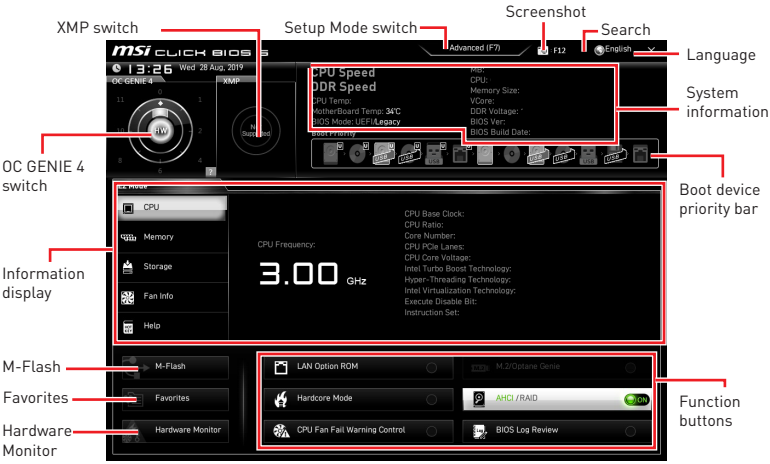
Important

*Only the FAT32 format USB flash drive supports updating BIOS by **Flash BIOS Button**. To check your drive, go to Windows Explorer, right click on the drive icon and go to Properties.*



EZ Mode

At EZ mode, it provides the basic system information and allows you to configure the basic setting. To configure the advanced BIOS settings, please enter the Advanced Mode by pressing the **Setup Mode switch** or **F7** function key.



• **OC GENIE 4 switch (optional)** - click on the center button to switch the **OC GENIE 4** be controlled by **software** (**SW**) or **hardware** (**HW**) . The inner circle represents the current stage of hardware OC GENIE 4 and the outer circle stands for software. You can read the abilities of OC GENIE 4 by clicking on the **question mark** in the right-bottom corner. This function will only be available if the installed processor supports this function.

Important

*Please don't make any changes in OC menu and don't load defaults to keep the optimal performance and system stability after activating the **OC GENIE 4** function.*

• **XMP switch** - click on the inner circle to enable/ disable the X.M.P. (Extreme Memory Profile). Switch the outer circle to select the X.M.P. profile. This switch will only be available if the X.M.P. supported memory module is installed.

• **Setup Mode switch** - press this tab or the **F7** key to switch between Advanced mode and EZ mode.

• **Screenshot** - click on this tab or the **F12** key to take a screenshot and save it to USB flash drive (FAT/ FAT32 format only).

• **Search** - click on this tab or the **Ctrl+F** keys and the search page will show. It allows you to search by BIOS item name, enter the item name to find the item listing. Move the mouse over a blank space and right click the mouse to exit search page.

Important

In search page, only the F6, F10 and F12 function keys are available.

• **Language** - allows you to select the language of BIOS setup.

• **System information** - shows the CPU/ DDR speed, CPU/ MB temperature, MB/ CPU type, memory size, CPU/ DDR voltage, BIOS version and build date.

• **Boot device priority bar** - you can move the device icons to change the boot priority. The boot priority from high to low is left to right.

• **Information display** - click on the **CPU**, **Memory**, **Storage**, **Fan Info** and **Help** buttons on left side to display related information.

• **Function buttons** - enable or disable the **LAN Option ROM, M.2/Optane Genie, Hardcore mode, AHCI, RAID, CPU Fan Fail Warning Control** and **BIOS Log Review** by clicking on their respective button.

  ▪ **Hardcore Mode** - when enabled, set and keep the CPU to full speed mode to maximize system performance. This feature will increase power consumption.

• **M-Flash** - click on this button to display the **M-Flash** menu that provides the way to update BIOS with a USB flash drive.

• **Hardware Monitor** - click on this button to display the **Hardware Monitor** menu that allows you to manually control the fan speed by percentage.

• **Favorites** - press the **Favorites** tab or the **F3** key to enter **Favorites** menu. It allows you to create personal BIOS menu where you can save and access favorite/ frequently-used BIOS setting items.

  ▪ **Default HomePage** - allows you to select a BIOS menu (e.g. SETTINGS, OC...,etc) as the BIOS home page.

  ▪ **Favorite1~5** - allows you to add the frequently-used/ favorite BIOS setting items in one page.

  ▪ **To add a BIOS item to a favorite page (Favorite 1~5)**

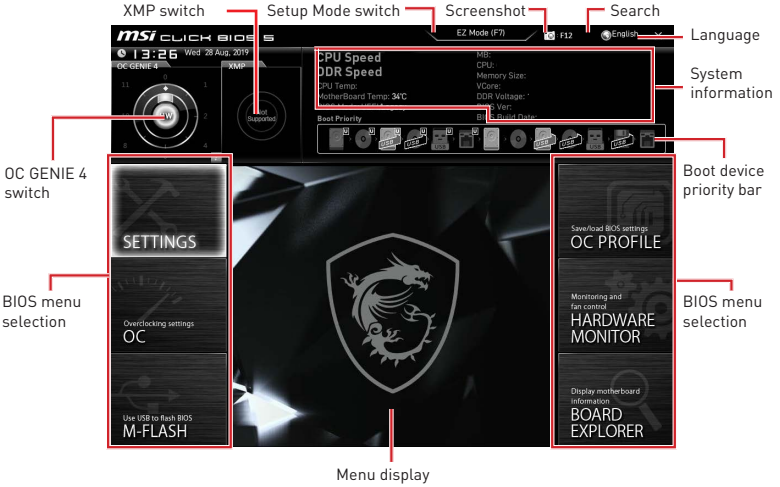
  1. Move the mouse over a BIOS item not only on BIOS menu but also on search page.
  2. Right-click or press **F2** key.
  3. Choose a favorite page and click on **OK.**

  ▪ **To delete a BIOS item from favorite page**

  1. Move the mouse over a BIOS item on favorite page (Favorite 1~5)
  2. Right-click or press **F2** key.
  3. Choose **Delete** and click on **OK**.

Advanced Mode

Press **Setup Mode switch** or **F7** function key can switch between EZ Mode and Advanced Mode in BIOS setup.



BIOS menu selection - the following options are available:

- **SETTINGS** - allows you to specify the parameters for chipset and boot devices.
- **OC** - allows you to adjust the frequency and voltage. Increasing the frequency may get better performance.
- **M-FLASH** - provides the way to update BIOS with a USB flash drive.
- **OC PROFILE** - allows you to manage overclocking profiles.
- **HARDWARE MONITOR** - allows you to set the speeds of fans and monitor voltages of system.
- **BOARD EXPLORER** - provides the information of installed devices on this motherboard.

• **Menu display** - provides BIOS setting items and information to be configured.

SETTINGS

System Status

▶ System Date

Sets the system date. Use tab key to switch between date elements.

The format is <day> <month> <date> <year>.

<day>	Day of the week, from Sun to Sat, determined by BIOS. Read-only.
<month>	The month from Jan. through Dec.
<date>	The date from 1 to 31 can be keyed by numeric function keys.
<year>	The year can be adjusted by users.

▶ System Time

Sets the system time. Use tab key to switch between time elements.

The time format is <hour> <minute> <second>.

▶ SATA PortX/ M2_X

Shows the information of connected SATA/ M.2 devices.

Important

If the connected SATA device is not displayed, turn off computer and re-check SATA cable and power cable connections of the device and motherboard.

▶ System Information

Shows detailed system information, including CPU type, BIOS version, and Memory (read only).

▶ DMI Information

Shows system information, desktop Board Information and chassis Information. (Read only).

Advanced

▶ PCI Subsystem Settings

Sets PCI express interface protocol and latency timer. Press **Enter** to enter the sub-menu.

▶ PEGX - Max Link Speed [Auto]

Sets PCI Express protocol of PCIe x16 slots for matching different installed devices.

[Auto] This item will be configured automatically by BIOS.

[Gen1] Enables PCIe Gen1 support only.

[Gen2] Enables PCIe Gen2 support only.

[Gen3] Enables PCIe Gen3 support only.

▶ PCI Latency Timer [32]

Sets latency timer of PCI interface device.

[Options: 32, 64, 96, 128, 160, 192, 224, 248 PCI Bus clocks]

▶ Above 4G memory/ Crypto Currency mining [Disabled]

Enables or disables 64-bit capable devices to be decoded in above 4G address space. It is only available if the system supports 64-bit PCI decoding.

[Enabled] Allows you to utilize more than 4x GPUs.

[Disabled] Disables this function.

▶ ACPI Settings

Sets ACPI parameters of onboard power LED behaviors. Press **Enter** to enter the sub-menu.

▶ Power LED [Blinking]

Sets shining behaviors of the onboard Power LED.

[Dual Color] The power LED turns to another color to indicate the S3 state.

[Blinking] The power LED blinks to indicate the S3 state.

▶ Integrated Peripherals

Sets integrated peripherals' parameters, such as LAN, HDD, USB and audio. Press **Enter** to enter the sub-menu.

▶ Onboard LAN Controller/ Onboard LAN Controller2 [Enabled]

Enables or disables the onboard LAN controller/ onboard LAN controller2.

▶ LAN Option ROM [Disabled]

Enables or disables the legacy network Boot Option ROM for detailed settings. This item will appear when **Onboard LAN Controller** is enabled.

[Enabled] Enables the onboard LAN Boot ROM.

[Disabled] Disables the onboard LAN Boot ROM.

▶ Network Stack [Disabled]

Sets UEFI network stack for optimizing IPv4 / IPv6 function.

[Enabled] Enables UEFI network stack.

[Disabled] Disables UEFI network stack.

▶ Ipv4 PXE Support [Enabled]

When **Enabled**, the system UEFI network stack will support Ipv4 protocol. This item will appear when **Network Stack** is enabled.

[Enabled] Enables the Ipv4 PXE boot support.

[Disabled] Disables the Ipv4 PXE boot support.

▶ Ipv6 PXE Support [Enabled]

When **Enabled**, the system UEFI network stack will support Ipv6 protocol. This item will appear when **Network Stack** is enabled.

[Enabled] Enables the Ipv6 PXE boot support.

[Disabled] Disables the Ipv6 PXE boot support.

▶ SATA Mode [AHCI Mode]

Sets the operation mode of the onboard SATA controller.

[AHCI Mode] Specify the AHCI mode for SATA storage devices. AHCI (Advanced Host Controller Interface) offers some advanced features to enhance the speed and performance of SATA storage device, such as Native Command Queuing (NCQ) and hot-plugging.

[RAID Mode] Enables RAID function for SATA storage devices.

▶ M2_X-RST Pcie Storage Remapping [Disabled]

Enables or disables Intel Rapid Storage Technology for M.2 PCIe devices.

▶ M.2/Optane Genie [Disabled]

Enables or disables Intel RST support for M.2 SSDs or Optane memory.

▶ SATAx Hot Plug [Disabled]

Allows user to enable or disable the SATA hot plug support.

[Enabled] Enables hot plug support for the SATA ports.

[Disabled] Disables hot plug support for the SATA ports.

▶ HD Audio Controller [Enabled]

Enables or disables the onboard High Definition Audio controller.

▶ HPET [Enabled]

Enables or disables the HPET (High Precision Event Timers) support.

▶ Thunderbolt(TM) Configuration

▶ Discrete Thunderbolt(TM) Support [Disabled]

Enables or disables Thunderbolt™ support.

▶ USB Configuration

Sets the onboard USB controller and device function. Press **Enter** to enter the sub-menu.

▶ USB Controller [Enabled]

Enables or disables all USB controller.

▶ XHCI Hand-off [Disabled]

Enables or disables XHCI hand-off support for the operating system without XHCI hand-off feature. This item will appear when **USB Controller** is enabled.

▶ Legacy USB Support [Enabled]

Sets Legacy USB function support.

[Auto]

[Enabled] Enable the USB support under legacy mode.

[Disabled] The USB devices will be unavailable under legacy mode.

▶ USB Speed Optimization [Auto]

Enables or Disables the USB speed optimization. If set to Auto, BIOS will optimize the USB speed automatically.

▶ Power Management Setup

Sets system Power Management of EuP2013 and AC Power Loss behaviors. Press **Enter** to enter the sub-menu.

▶ ErP Ready [Disabled]

Enables or disables the system power consumption according to ErP regulation.

[Enabled]	Optimize the system power consumption according to ErP regulation. It will not support S4 & S5 wake up by USB, PCI and PCIe devices.
[Disabled]	Disables this function.

▶ Restore after AC Power Loss [Power Off]

Sets the system behaviors while encountering the AC power loss.

[Power Off]	Leaves the system in power off state after restoring AC power.
[Power On]	Boot up the system after restoring AC power.
[Last State]	Restores the system to the previous state (power on/ power off) before AC power loss.

▶ System Power Fault Protection [Disabled]

Enables or disables the system to boot up when detecting abnormal voltage input.

[Enabled]	Protect the system from unexpected power operation and remain the shut down status.
[Disabled]	Disables this function.

▶ Windows OS Configuration

Sets Windows OS detailed configuration and behaviors. Press **Enter** to enter the sub-menu.

▶ BIOS UEFI/CSM Mode [CSM]

Select CSM (Compatibility Support Module) or UEFI mode to meet the system requirement.

[CSM]	For the non-UEFI driver add-on devices or non-UEFI mode OS.
[UEFI]	For the UEFI driver add-on devices and UEFI mode OS.

▶ MSI Fast Boot [Disabled]

MSI Fast Boot is the fastest way to boot the system. It will disable more devices to speed up system boot time which is faster than the boot time of **Fast Boot**.

[Enabled]	Enables the MSI Fast Boot function to speed up booting time. And the following **Fast Boot** field will be disabled and fixed.
[Disabled]	Disables MSI Fast Boot.

Important

*When MSI Fast Boot is enabled, you can use **MSI FAST BOOT** application to enter BIOS setup if needed. Please refer **Entering BIOS Setup** section for details.*

▶ **Fast Boot [Enabled]**

Enables or disables the fast boot feature for Windows 10. This item will only be available when **MSI Fast Boot** is disabled.

[Enabled] Enables the Fast Boot configuration to accelerate system boot time.

[Disabled] Disables the Fast Boot configuration.

▶ **Secure Boot**

Sets the Windows secure boot to prevent the unauthorized accessing. Press **Enter** to enter the sub-menu. This sub-menu will appear when **BIOS UEFI/CSM Mode** sets to **UEFI**.

▶ **Secure Boot Support [Disabled]**

Enables or disables secure boot support.

[Enabled] Enables the secure boot function and allow you to set the secure boot settings.

[Disabled] Disables this function.

▶ **Secure Boot Mode [Standard]**

Selects the secure boot mode. This item is to select how the secure boot keys be loaded. This item appears when **Secure Boot Support** is enabled.

[Standard] The system will automatically load the secure keys from BIOS.

[Custom] Allows user to configure the secure boot settings and manually load the secure keys.

▶ **Key Management**

Manages the secure boot keys. Press <Enter> to enter the sub-menu. This sub-menu will appear when **Secure Boot Mode** sets to **Custom**.

▶ **Wake Up Event Setup**

Sets system wake up behaviors for different sleep modes. Press **Enter** to enter the sub-menu.

▶ **Wake Up Event By [BIOS]**

Selects the wake up event by BIOS or operating system.

[BIOS] Activates the following items, set wake up events of these items.

[OS] The wake up events will be defined by OS.

▶ **Resume By RTC Alarm [Disabled]**

Disables or enables the system wake up by RTC Alarm.

[Enabled] Enables the system to boot up on a scheduled time/ date.

[Disabled] Disables this function.

▶ **Date (of month) Alarm/ Time (hh:mm:ss) Alarm**

Sets RTC alarm date/ Time. If Resume By RTC Alarm is set to [Enabled], the system will automatically resume (boot up) on a specified date/hour/minute/ second in these fields (using the **+** and **-** keys to select the date & time settings).

▶ Resume By PCI-E Device [Disabled]

Enables or disables the wake up function of installed PCI-E expansion cards, integrated LAN controllers or USB devices which are supported by third party integrated chips.

[Enabled] Enables the system to be awakened from the power saving modes when activity or input signal of PCIe device is detected.

[Disabled] Disables this function.

▶ Resume By Onboard Intel LAN [Disabled]

Enables or disables the system wake up by Onboard Intel LAN.

[Enabled] Enables the system to be awakened from the power saving modes when activity or input signal of Intel LAN device is detected.

[Disabled] Disables this function.

▶ Resume by USB Device [Disabled]

Enables or disables the system wake up by USB devices.

[Enabled] Enables the system to be awakened from sleep state when activity of USB device is detected.

[Disabled] Disables this function.

▶ Resume From S3/S4/S5 by PS/2 Mouse [Disabled]

Enables or disables the system wake up by PS/2 mouse.

[Enabled] Enables the system to be awakened from S3/ S4/ S5 state when activity of PS/2 mouse is detected.

[Disabled] Disables this function.

▶ Resume From S3/S4/S5 by PS/2 Keyboard [Disabled]

Enables or disables the system wake up by PS/2 keyboard.

[Any Key] Enables the system to be awakened from S3/ S4/ S5 state when activity of any key on PS/2 keyboard is detected.

[Hot Key] Enables the system to be awakened from S3/ S4/ S5 state when activity of hot key on PS/2 keyboard is detected.

[Disabled] Disables this function.

▶ Hot Key [Ctrl+Space]

Selects a combination of keys as a hot key to wake the system. This item appears when you set the Resume From S3/S4/S5 by PS/2 Keyboard to **Hot Key**.

▶ Secure Erase+

Enables or disables Secure Erase+ function. **Secure Erase+** is the best way to effectively wipe all data from a SSD. Please note that data of SSD will be erased after enabling **Secure Erase+**.

▶ Intel (R) Ethernet Connection I219-V

Shows driver information and configuration of the ethernet controller parameter.

Boot

Sets the sequence of system boot devices.

▶ Full Screen Logo Display [Enabled]

Enables or disables to show the full screen logo while system POST.

[Enabled] Shows the logo in full screen.

[Disabled] Shows the POST messages.

▶ G02BIOS [Disabled]

Allows system to enter BIOS setup directly by pressing the Power button for 4 sec pon bootup.

[Enabled] The system boots straight to the BIOS setup by long pressing the power button about 4 seconds when the system is off.

[Disabled] Disables this function.

▶ Bootup NumLock State [On]

Select the keyboard NumLock state upon bootup.

▶ Info Block effect [Unlock]

Sets the state of Help information block.

[Unlock] Sliding effect.

[Lock] Fix the **Help** information block on the screen.

▶ POST Beep [Disabled]

Enables or disables POST beep.

▶ AUTO CLR_CMOS [Disabled]

Enables or disables the CMOS data to be resumed automatically when the booting process hang-up over 5 seconds.

▶ Boot Mode Select [LEGACY+UEFI]

Sets the system boot mode from legacy or UEFI architecture depending on OS installation requirement. This item will become un-selectable and will be configured automatically by BIOS when **BIOS UEFI/CSM Mode** sets to **UEFI**.

[UEFI] Enables UEFI BIOS boot mode support only.

[LEGACY+UEFI] Enables both Legacy BIOS boot mode and UEFI BIOS boot mode.

▶ FIXED BOOT ORDER Priorities

Sets device priority for system boot.

▶ Boot Option Priorities

These items are used to prioritize the installed boot devices.

Security

▶ Administrator Password

Sets administrator password for system security. User has full rights to change the BIOS items with administrator password. After setting the administrator password, the state of this item will show **Installed**.

▶ User Password

Sets User Password for system security. User has limited rights to change the BIOS items with user password. This item will be available when administrator password is set. After setting the user password, the state of this item will show **Installed**.

▶ Password Check [Setup]

Selects a condition that will request the password.

[Setup]	A password will be requested for entering the BIOS Setup.
[Boot]	A password will be requested for booting the system.

▶ Password Clear [Enabled]

Enables or disables the clear CMOS behavior to clear a set password.

[Enabled]	The password will be erased after clear CMOS.
[Disabled]	The password will always be kept.

Important

- *When selecting the Administrator / User Password items, a password box will appear on the screen. Type the password then press **Enter**. The password typed now will replace any previous set password from CMOS memory. You will be prompted to confirm the password. You may also press **Esc** key to abort the selection.*

- *To clear a set password, press **Enter** when you are prompted to enter a new password. A message will confirm the password is being disabled. Once the password is disabled, you can enter the setup and OS without authorization.*

▶ Trusted Computing

Sets TPM (Trusted Platform Module) function.

▶ Security Device Support [Disabled]

Enables or disables the TPM function to build the endorsement key for accessing the system.

▶ Chassis Intrusion Configuration

Press <Enter> to enter the sub-menu.

▶ Chassis Intrusion [Disabled]

Enables or disables recording messages when the chassis is opened. This function is ready for the chassis equips a chassis intrusion switch.

[Enabled]	Once the chassis is opened, the system will record and issue a warning message.
[Reset]	Clear the warning message. After clearing the message, please return to **Enabled** or **Disabled**.
[Disabled]	Disables this funcion.

Save & Exit

▶ Discard Changes and Exit

Exit BIOS setup without saving any change.

▶ Save Changes and Reboot

Save all changes and reboot the system.

▶ Save Changes

Save current changes.

▶ Discard Changes

Discard all changes and restore to the previous values.

▶ Restore Defaults

Restore or load all default values.

▶ Boot Override

The installed bootable devices will appear on this menu, you can select one of them to be the boot device.

OC

Important

- *Overclocking your PC manually is only recommended for advanced users.*
- *Overclocking is not guaranteed, and if done improperly, it could void your warranty or severely damage your hardware.*
- *If you are unfamiliar with overclocking, we advise you to use **OC GENIE 4** function for easy overclocking.*

▶ OC Explore Mode [Expert]

Enables or disables to show the normal or expert version of OC settings.

[Normal] Provides the regular OC settings in BIOS setup.

[Expert] Provides the advanced OC settings for OC expert to configure in BIOS setup.

Note: We use * as the symbol for the OC settings of Expert mode.

▶ CPU Ratio Apply Mode [All Core]*

Sets applied mode for CPU ratio. This item only appears when a CPU that supports **Turbo Boost** is installed.

[All Core] Enables the **CPU Ratio**. All CPU cores will run the same CPU ratio that be set in **CPU Ratio**.

[Per Core] Enables the **Core 0~X**. Sets each CPU core ratio separately in **Core 0~X**.

[Turbo Ratio] Enables the **Numbers of CPU Cores of Group X** and **Target CPU Turbo Ratio Group 1**. This option only appears when a CPU that supports this function is installed.

▶ CPU Ratio [Auto]

Sets the CPU ratio that is used to determine CPU clock speed. This item can only be changed if the processor supports this function.

▶ Numbers of CPU Cores of Group X [Auto] *

Sets the numbers of CPU cores as a group for running target CPU Turbo Ratio. This item only appears when a CPU that support this function is installed.

▶ Adjusted CPU Frequency

Shows the adjusted CPU frequency. Read-only.

▶ Core 0~X XX of XX [Auto]*

Allows you to set the CPU ratios for different number of active cores. These items only appear when a CPU that support this function is installed.

▶ CPU Ratio Offset When Running AVX [Auto]

Sets a offset value to lower the CPU core ratio. It could be helpful for heat dissipation when running AVX instruction set. If set to Auto, BIOS will configure this setting automatically. This item appears when the installed CPU supports this function.

▶ Ring Ratio [Auto]

Sets the ring ratio. The valid value range depends on the installed CPU.

▶ Adjusted Ring Frequency

Shows the adjusted Ring frequency. Read-only.

▶ Misc Setting*

Press Enter, + or - key to open or close the following 3 items related to CPU features.

▶ EIST [Enabled]*

Enables or disables the Enhanced Intel® SpeedStep Technology.

[Enabled] Enables the EIST to adjust CPU voltage and core frequency dynamically. It can decrease average power consumption and average heat production.

[Disabled] Disables EIST.

▶ Intel Turbo Boost [Enabled]*

Enables or disables the Intel® Turbo Boost. This item appears when the installed CPU supports this function.

[Enabled] Enables this function to boost CPU performance automatically above rated specifications when system request the highest performance state.

[Disabled] Disables this function.

▶ Enhanced Turbo [Auto]*

Enables or disables Enhanced Turbo function for all CPU cores to boost CPU performance. This item appears when the installed CPU supports this function.

[Auto] This setting will be configured automatically by BIOS.

[Enabled] All CPU cores would be increased to maximum turbo ratio.

[Disabled] Disables this function.

▶ CPU Base Clock (MHz)

Sets the CPU Base clock. You may overclock the CPU by adjusting this value. Please note that overclocking behavior and stability is not guaranteed. This item appears when a CPU that support this function is installed.

▶ CPU Base Clock Apply Mode [Auto]*

Sets the applying mode for adjusted CPU base clock.

[Auto] This setting will be configured automatically by BIOS.

[Next Boot] CPU will run the adjusted CPU base clock after rebooting.

[Immediate] CPU runs the adjusted CPU base clock immediately.

▶ Clockgen Features (optional)

Press Enter to enter the sub-menu. Sets the detailed clockgen features.

▶ Dynamic Frequency Control [Disabled]

Enables or disables to try different CPU BCLK under CPU loading to overclock the system. This item will be disabled when the Dynamic Frequency Search is enabled.

▶ DFC Baseline (MHz) [Auto]

Sets initial BCLK for dynamic overclocking if not reach the threshold. This item will be available when the Dynamic Frequency Control is enabled

▶ Threshold 1~3 (A) [Auto]

Sets the CPU current as the threshold for Dynamic Frequency Control. When CPU current reaches the value, it will run the Level 1/ 2/ 3 BCLK for dynamic overclocking. These items will appear when the Dynamic Frequency Control is enabled.

▶ Level 1~3 BCLK (MHz) [Auto]

Sets the CPU BCLK for the threshold. These items will appear when the Dynamic Frequency Control is enabled.

▶ Dynamic Frequency Search [Disabled]

Enables or disables to run the optimized dynamic BCLK. This item will be disabled when the Dynamic Frequency Control is enabled.

▶ Dynamic Frequency Search Mode [Once]

Sets the search mode of the dynamic BCLK. This item will be available when the Dynamic Frequency Search is enabled.

[Once] Run once in the next system boot.

[Each Power On] Run in every time when system is powered on.

▶ Dynamic Frequency Search Step (MHz) [Auto]

Sets the increase for running the dynamic BCLK. If set to Auto, BIOS will configure this setting automatically. This item will be available when the Dynamic Frequency Search is enabled.

▶ BCLK Amplitude [Auto]

Sets the value for BCLK Amplitude for overclocking. Higher value might benefit to get higher overclocking.

▶ SRC Clock Amplitude [Auto]

Sets the value for SRC clock Amplitude.

▶ SATA Clock Amplitude [Auto]

Sets the value for SATA clock Amplitude.

▶ BCLK Slew Rate [Auto]

Sets the value for BCLK Slew Rate for overclocking. The value might vary depending on the actual overclocking scenario.

▶ BCLK ORT Duration [Auto]

Sets the value for BCLK ORT duration for overclocking. The value might vary depending on the actual overclocking scenario.

▶ Extreme Memory Profile (X.M.P.) [Disabled]

X.M.P. (Extreme Memory Profile) is the overclocking technology by memory module. Please enable XMP or select a profile of memory module for overclocking the memory. This item will be available when the memory modules that support X.M.P. is installed.

▶ DRAM Reference Clock [Auto]*

Sets the DRAM reference clock. The valid value range depends on the installed CPU. This item appears when a CPU that supports this adjustment is installed.

▶ DRAM Frequency [Auto]

Sets the DRAM frequency. Please note the overclocking behavior is not guaranteed.

▶ Adjusted DRAM Frequency

Shows the adjusted DRAM frequency. Read-only.

▶ Memory Try It ! [Disabled]

It can improve memory compatibility or performance by choosing optimized memory preset.

▶ DRAM Timing Mode [Link]

Selects the memory timing mode.

[Link]	Allows user to configure the DRAM timing for all memory channel.
[UnLink]	Allows user to configure the DRAM timing for respective memory channel.

▶ Advanced DRAM Configuration

Press **Enter** to enter the sub-menu. User can set the memory timing for each/ all memory channel. The system may become un-stable or un-bootable after changing memory timing. If it occurs, please clear the CMOS data and restore the default settings. (Refer to the Clear CMOS jumper/ button section to clear the CMOS data, and enter the BIOS to load the default settings.)

▶ Memory Fast Boot [Auto]*

Enables or disables the initiation and training for memory every booting.

[Auto]	The setting will be configured automatically by BIOS.
[Enabled]	System will completely keep the archives of first intiation and training for memory. So the memory will not be initialed and trained when booting to accelerate the system booting time.
[Disabled]	The memory will be initialed and trained every booting.

▶ DigitALL Power

Press Enter to enter the sub-menu. Controls the digital powers related to CPU PWM.

▶ CPU Voltages control [Auto]

These options allows you to set the voltages related to CPU. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ DRAM Voltages control [Auto]

These options allows you to set the voltages related to memory. If set to **Auto**, BIOS will set these voltages automatically or you can set it manually.

▶ CPU Memory Changed Detect [Enabled]*

Enables or disables the system to issue a warning message during boot when the CPU or memory has been replaced.

[Enabled]	The system will issue a warning message during boot and than needs to load the default settings for new devices.
[Disabled]	Disables this function and keeps the current BIOS settings.

▶ OC Quick View Timer [3 Sec]*

Sets the duration of OC setting values showed on the screen. If set to Disabled, BIOS will not show the variations of OC setting.

▶ CPU Specifications

Press **Enter** to enter the sub-menu. This sub-menu displays the information of installed CPU. You can also access this information menu at any time by pressing [F4]. Read only.

▶ CPU Technology Support

Press **Enter** to enter the sub-menu. The sub-menu shows the key features of installed CPU. Read only.

▶ MEMORY-Z

Press **Enter** to enter the sub-menu. This sub-menu displays all the settings and timings of installed memory. You can also access this information menu at any time by pressing [F5].

▶ DIMMx Memory SPD

Press **Enter** to enter the sub-menu. The sub-menu displays the information of installed memory. Read only.

▶ CPU Features

Press **Enter** to enter the sub-menu.

▶ Hyper-Threading [Enabled]

Intel Hyper-Threading technology treats the multi cores inside the processor as multi logical processors that can execute instructions simultaneously. In this way, the system performance is highly improved. This item appears when the installed CPU supports this technology.

[Enable] Enables Intel Hyper-Threading technology.

[Disabled] Disables this item if the system does not support HT function.

▶ Active Processor Cores Control [Disabled]

Enables or disables the following items (Core0~X).

▶ Core0~X [Enabled]

Allows you to activate the CPU core separately. These items only appear when **Active Processor Cores Control** is enabled.

▶ Limit CPUID Maximum [Disabled]

Enables or disables the extended CPUID value.

[Enabled] BIOS limits the maximum CPUID input value to circumvent boot problems with older operating system that do not support the processor with extended CPUID value.

[Disabled] Use the actual maximum CPUID input value.

▶ Intel Virtualization Tech [Enabled]

Enables or disables Intel Virtualization technology.

[Enabled] Enables Intel Virtualization technology and allows a platform to run multiple operating systems in independent partitions. The system can function as multiple systems virtually.

[Disabled] Disables this function.

▶ Intel VT-D Tech [Disabled]

Enables or disables Intel VT-D (Intel Virtualization for Directed I/O) technology.

▶ Hardware Prefetcher [Enabled]

Enables or disables the hardware prefetcher (MLC Streamer prefetcher).

[Enabled] Allows the hardware prefetcher to automatically pre-fetch data and instructions into L2 cache from memory for tuning the CPU performance.

[Disabled] Disables the hardware prefetcher.

▶ Adjacent Cache Line Prefetch [Enabled]

Enables or disables the CPU hardware prefetcher (MLC Spatial prefetcher).

[Enabled] Enables adjacent cache line prefetching for reducing the cache latency time and tuning the performance to the specific application.

[Disabled] Enables the requested cache line only.

▶ CPU AES Instructions [Enabled]

Enables or disables the CPU AES (Advanced Encryption Standard-New Instructions) support. This item appears when a CPU supports this function.

▶ Intel Adaptive Thermal Monitor [Enabled]

Enables or disables the Intel adaptive thermal monitor function to protect the CPU from overheating.

[Enabled] Throttles down the CPU core clock speed when the CPU is over the adaptive temperature.

[Disabled] Disables this function.

▶ Intel C-State [Auto]

Enables or disables the Intel C-state. C-state is a processor power management technology defined by ACPI.

[Auto] This setting will be configured automatically by BIOS.

[Enabled] Detects the idle state of system and reduce CPU power consumption accordingly.

[Disabled] Disable this function.

▶ C1E Support [Disabled]

Enables or disables the C1E function for power-saving in halt state. This item appears when **Intel C-State** is enabled.

[Enabled] Enables C1E function to reduce the CPU frequency and voltage for power-saving in halt state.

[Disabled] Disables this function.

▶ Package C State Limit [Auto]

This item allows you to select a CPU C-state level for power-saving when system is idle. The options of C-state depend on the installed CPU. This item appears when **Intel C-State** is enabled.

▶ CFG Lock [Enabled]

Lock or un-lock the MSR 0xE2[15], CFG lock bit.

[Enabled] Locks the CFG lock bit.

[Disabled] Un-locks the CFG lock bit.

▶ Long Duration Power Limit (W) [Auto]

Sets the long duration TDP power limit for CPU in Turbo Boost mode.

▶ Long Duration Maintained (s) [Auto]

Sets the maintaining time for Long duration power Limit(W).

▶ Short Duration Power Limit (W) [Auto]

Sets the short duration TDP power limit for CPU in Turbo Boost mode.

▶ CPU Current Limit (A) [Auto]

Sets maximum current limit of CPU package in Turbo Boost mode. When the current is over the specified value, the CPU will automatically reduce the core frequency for reducing the current.

▶ Internal VR OVP OCP Protection [Auto]

Enables or disables the over-voltage protection and over-current protection for CPU internal VR (Voltage Regulator). This item only appears when a CPU that support this function is installed.

[Auto] This setting will be configured automatically by BIOS.

[Enabled] Enables the limitation of internal VR for over-voltage protection and over-current protection.

[Disabled] Disables this function for overclocking.

▶ Internal VR Efficiency Management [Auto]

Enables or disables the CPU internal VR efficiency management. This item only appears when a CPU that support this function is installed.

[Auto] This setting will be configured automatically by BIOS.

[Enabled] Enables the VR effciency management for power-saving control.

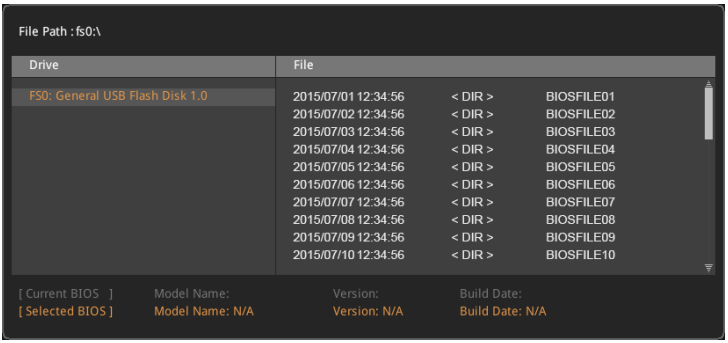
[Disabled] Disables this function.

M-FLASH

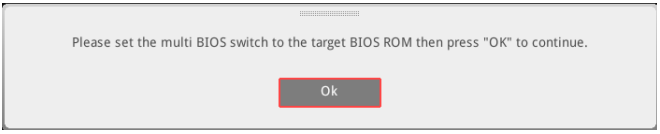
M-FLASH provides the way to update BIOS with a USB flash drive. Please down-load the latest BIOS file that matches your motherboard model from MSI website, save the BIOS file into your USB flash drive. And then follow the steps below to update BIOS.

1. Insert the USB flash drive that contains the update file into the computer.
2. Click on **M-FLASH** tab, a demand message will be prompted. Click on **Yes** to reboot and enter the flash mode.

3. The system will enter the flash mode and a file selection menu will appear after rebooting.



4. Select a BIOS file to perform the BIOS update process.
5. A message will pop-up. Please select a target BIOS ROM by switching the Multi-BIOS switch and then clicks on OK to start the flashing process.



6. After the flashing process is 100% completed, the system will reboot automatically.

OC PROFILE

▶ Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6 management. Press <Enter> to enter the sub-menu.

▶ Set Name for Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Name the current overclocking profile.

▶ Save Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Save the current overclocking profile.

▶ Load Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Load the current overclocking profile.

▶ Clear Overclocking Profile 1/ 2/ 3/ 4/ 5/ 6

Clear the current overclocking profile.

▶ OC Profile Load from ROM

Load OC profile from BIOS ROM.

▶ OC Profile Save to USB

Save OC profile to the USB flash drive. The USB flash drive should be FAT/ FAT32 format only.

▶ OC Profile Load from USB

Load OC profile from the USB flash drive. The USB flash drive should be FAT/ FAT32 format only.

HARDWARE MONITOR

▶ Temperature

The assignment fan will be controlled according to the selected temperature source. And you can set the duty cycle for each fan.

▶ Speed

Shows all fans' speeds.

▶ Fan Manage

- **PWM** - allows you to select the PWM mode for fan operation.
- **DC** - allows you to select the DC mode for fan operation.
- **Auto** (optional) - the BIOS will automatically detect the fan type and enable the default fan operation mode.
- **Fan step up/ down time** - allows you to set the value of each fan step up/ down.
- **Smart Fan Mode field** - allows you to drag the gradient points to configure the fan target speeds for **Smart Fan** mode. **Smart Fan** can control the fan speed automatically depending on the CPU temperature to keep it with in a specific range. If the current CPU temperature reaches to the target value, the **Smart Fan** function will be activated.

Important

The changing will achieve after you save the changes and reboot the system.

▶ Settings Buttons

- **All Full Speed** - configures all fans to run at full operating speed.
- **All Set Default** - configures all fans to run at default operating speed.
- **All Set Cancel** - discards current changes and restores previous operating fan speeds.

▶ Voltage display

Shows the current voltages of CPU, system and memory and current temperatures.

Nahimic 3

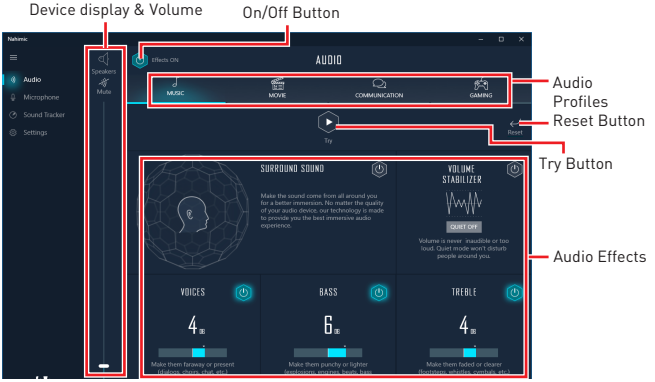
Nahimic 3 is designed to offer the best audio experience it contains audio effects, microphone effects and Sound Tracker.

Installation and Update

Nahimic 3 is included in the audio driver. If you need to install it or update it, please use the **Driver Disc** with your motherboard or download the driver from MSI's official website.

Audio Tab

From this tab, you can access all of Nahimic 3's audio effects, audio profiles and settings.



• **Device display & Volume** - displays the type of audio device currently being used as output, as well as its current volume.

  ▪ **Mute** - mutes the current audio output device.

• **Audio profiles** - allows you to choose between 4 factory audio profiles to fit your multimedia experience (Music, Gaming, Movie or Communication). All profiles can be modified as you wish.

• **On/Off Button** - allows you to turn all of Nahimic 3's audio effects in one click.

• **Audio Effects** - allows you to separately control any of the 5 audio effects.

  ▪ **Surround Sound** - it is an audio effect mainly dedicated to headphones acoustic experience.

    ▫ **Gaming and Movies** - virtualizes the multichannel audio stream from the game engine or the movie soundtrack and downmixes it in order to retrieve a multichannel listening experience over your stereo headphones or speakers.

    ▫ **Music** - expands the stereo for a wider sound stage.

  ▪ **Volume Stabilizer** - it maintains a constant volume for all elements of the audio experience (dialogs, soundtrack, explosions, etc.) to make them all sound softer, balanced or louder. The Quiet On / Off option allows to enter a night mode by removing some basses. This way, you won't disturb people around you if you're using speakers to play your media.

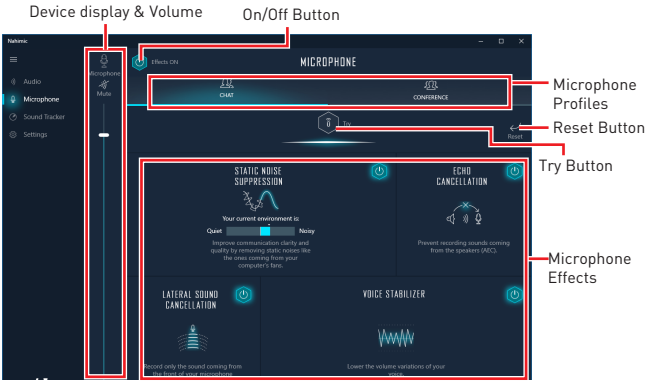
- **Voices** - it boosts (or removes) the speech in movies, video games and incoming communication from -12 to +12 dB.
- **Bass** - increases (or decreases) the energy in low frequencies from -12 to +12 dB.
- **Treble** - increases (or decreases) the energy in high frequencies from -12 to +12 dB.

• **Reset Button** - restores the current profile to its default values.

• **Try Button** - launches an audio sample that allows to test audio settings.

Microphone Tab

From this tab, you can access all of Nahimic 3's microphone effects and settings.



• **Device display and volume** - displays the type of recording device currently being used as input, as well as its current volume..

- **Mute** - mutes the current mic device.

• **Mic profiles** - allows you to choose between 2 factory mic profiles to fit your experience (Chat or Conference). All profiles can be modified as you wish.

• **On / Off button** - allows you to turn on and off all Nahimic 3's microphone effects in one click.

• **Microphone Effects** - allows you to separately control any of the 4 microphone effects.

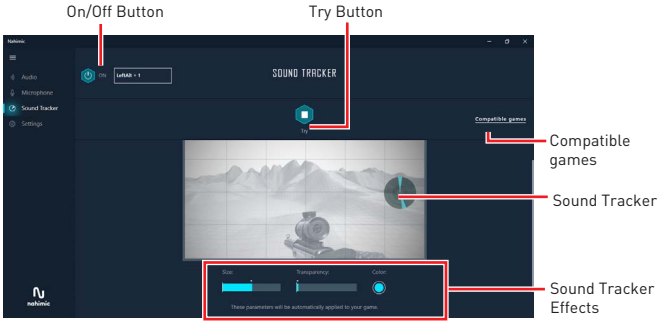
- **Static Noise Suppression** - it removes the static noises like the ones coming from your computer fans.
- **Echo Cancellation** - improves the voice quality by cancelling the echo.
- **Lateral Sound Cancellation** - it only records the sound coming from the front of your microphone.
- **Voice Stabilizer** - Levels the volume of your voice in order to avoid any saturation and maintains a constant and clear communication.

• **Reset Button** - restores the current profile to its default values.

• **Try Button** - Turns the microphone loopback On/Off.

Sound Tracker Tab

The Sound Tracker is an FPS oriented feature that provides a visual indication localizing the sources of the sounds while in a game. These are represented by dynamic segments pointing the direction of the sounds: the more opaque they are, the stronger the sounds are. Thanks to this feature, players are able to pick up an approaching threat more definitively and easily, thereby being even more dynamic. The Sound Tracker captures the 5.1 and 7.1 sound streams processed by your audio system, and is displayed in the applications and games using DirectX 9, 9c, 10 and 11.



• **ON / OFF Button** - allows you to enable/ disable the Sound Tracker by switching this option ON/ OFF.

• **Try Button** - launch a 7.1 audio sample allowing you to preview how the radar will react in your game.

• **Sound Tracker Effects**

  ▪ **Size** - allows you to adjust the scale of the Sound Tracker, making it look bigger or smaller.

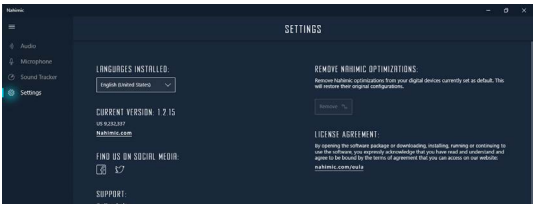
  ▪ **Transparency** - allows you to adjust the transparency of the Sound Tracker, making it look more or less discrete.

  ▪ **Color** - click the colored circle to open the color edition window. You can apply the color you want to the dynamic segments.

• **Compatible games** - clicking this link opens the official Nahimic website, and leads to the list of compatible games able to display the Sound Tracker.

Settings Tab

In this section, it allows you to select the language of Nahimic 3's UI.



RAID Configuration

Below are the different types of a RAID.

RAID 0 breaks the data into blocks which are written to separate hard drives. Spreading the hard drive I/O load across independent channels greatly improves I/O performance.

RAID 1 provides data redundancy by mirroring data between the hard drives and provides enhanced read performance.

RAID 5 provides data striping at the byte level and also stripe error correction information. This results in excellent performance and good fault tolerance.

RAID 10 uses four hard drives to create a combination of RAID 0 and 1 by forming a RAID 0 array from two RAID 1 arrays.

RAID level comparison

	RAID 0	RAID 1	RAID 5	RAID 10
Minimum # drives	2	2	3	4
Data protection	None	Excellent	Excellent	Excellent
Read performance	Excellent	OK	Good	OK
Write performance	Excellent	Good	OK	Good
Capacity utilization	100%	50%	67%~(1-1/n)	50%

Important

All the information/ volumes/ pictures listed in your system might differ from the illustrations in this appendix.

Enabling Intel® Rapid Storage Technology

In Legacy mode, we can change the **AHCI mode** to **RAID mode** and disable the **Fast Boot** then press **Ctrl + I** during the POST to enter the Intel Rapid Storage Technology Legacy mode. However, most newer version of operating systems support UEFI and the Intel Rapid Storage Technology UEFI mode can still run when the Fast Boot is enabled. Therefore we recommend that you use the UEFI BIOS for simple and advanced operations. The following description is based on the UEFI mode.

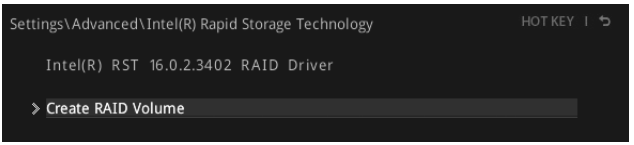
To enter the Intel(R) Rapid Storage Technology menu

1. Power on and press **Delete** key to enter BIOS Setup menu.
2. Press **F7** to switch to Advanced mode from EZ mode.
3. Go to **BIOS > SETTINGS > Advanced > Integrated Peripherals > SATA Mode** and change setting to **RAID/ Optane Mode**.
4. Go to **BIOS > SETTINGS > Advanced > Windows OS Configuration > BIOS UEFI/ CSM Mode** and change setting to **UEFI.**
5. Skip this step If you are only using SATA storage devices. If you are using NVMe PCIe SSDs, go to **BIOS > SETTINGS > Advanced > Integrated Peripherals > M2_X Pcie Storage Remapping** and change setting to **Enabled**.

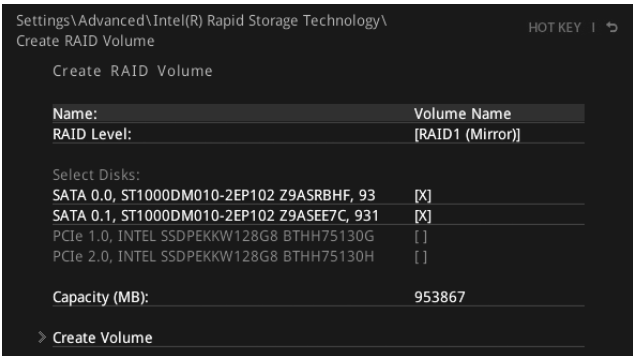
6. Press **F10** to save configuration and exit, and then reboot and press **Delete** key to enter BIOS Setup menu.
7. Go to **BIOS > SETTING > Advanced > Intel(R) Rapid Storage Technology** sub-menu**.**

Creating RAID Volume

1. As previously mentioned, enable Intel(R) Rapid Storage Technology.



2. Enter **Create RAID Volume** screen. The following screen appears:



3. Specify a **Name** for RAID volume.
4. Select the **RAID Level** best suited to your usage model in RAID Level.
5. In the **Select Disks** field, press **Space** key or press **Enter** key and use the ↑↓ **arrow keys** to select the option **X** to select the disks you want to create for the RAID volume.
6. Select the **Strip Size** for the RAID array. The available values range from 4KB to 128 KB in power of 2 increments. The strip size should be chosen based on the planned drive usage. Here are some typical values:
RAID0 -128KB / RAID10 - 64KB / RAID5 - 64KB.
7. Select the capacity of the volume in the **Capacity (MB)** field. The default value is the maximum volume capacity of the selected disks.
8. Go to the **Create Volume** field and press **Enter** to create the RAID volume. Upon completion you are returned to the **Intel(R) Rapid Storage Technology** menu.

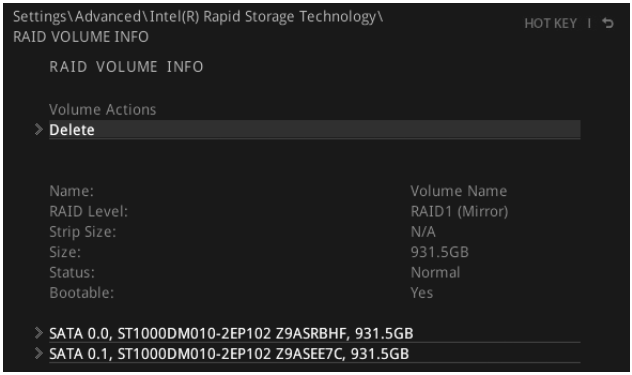
Removing a RAID Volume

Here you can delete the RAID volume, but please be noted that all data on RAID drives will be lost.

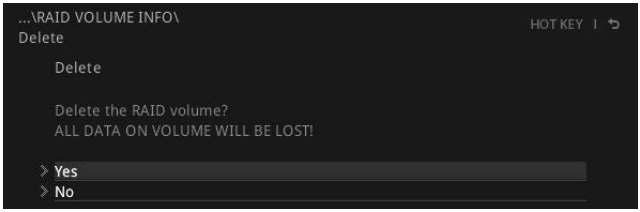
Important

If your system currently boots to RAID and you delete the RAID volume, your system will become unbootable.

1. Go to **BIOS > SETTING > Advanced > Intel(R) Rapid Storage Technology**.
2. Select the RAID volume from the **Intel(R) Rapid Storage Technology** screen to enter the **RAID VOLUME INFO** screen.



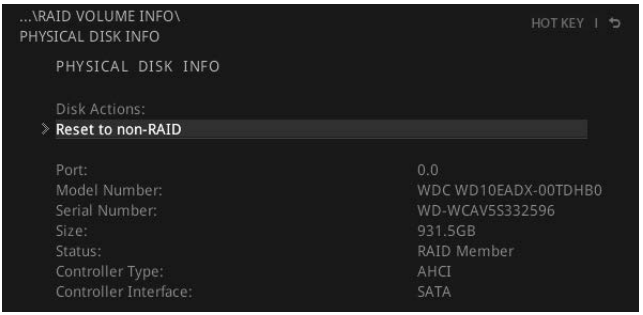
3. Select the **Delete** item and press **Enter** key to delete the selected RAID volume. The following screen appears:



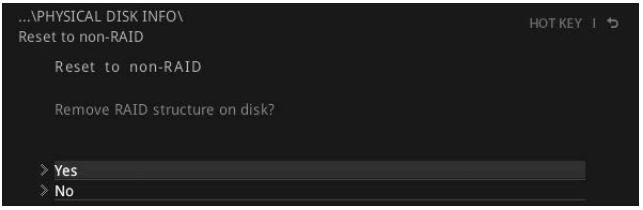
4. Select the **Yes** item and press **Enter** key to accept the volume deletion.

Resetting Disks to Non-RAID

1. Go to **BIOS > SETTING > Advanced > Intel(R) Rapid Storage Technology**.
2. Select the RAID volume from the **Intel(R) Rapid Storage Technology** screen to enter the **RAID VOLUME INFO** screen.
3. Select the disk and press **Enter** to enter **PHYSICAL DISK INFO** screen.



4. Select **Reset to non-RAID** item and press **Enter** to delete the RAID volume and remove any RAID structures from the drives. The following screen appears:



5. Select the **Yes** item and press **Enter** key to accept the disk reseting.

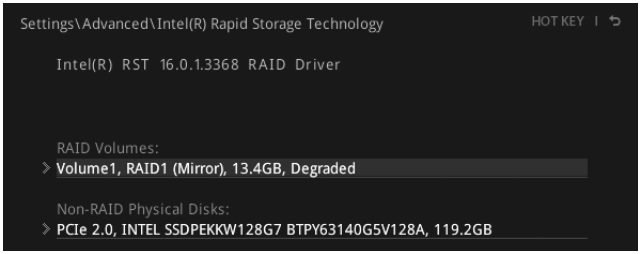
Important

- *You will lose all data on the RAID drives and any internal RAID structures when you perform this operation.*
- *Possible reasons to **Reset Disks to Non-RAID** could include issues such as incompatible RAID configurations or a failed volume or failed disk.*

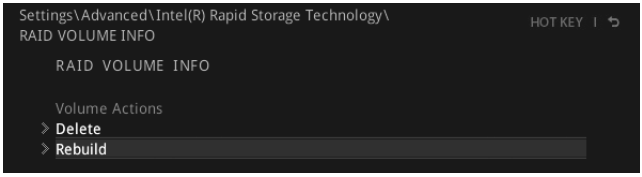
Rebuilding RAID Array

A RAID 1, RAID 5 or RAID 10 volume is reported as **Degraded** when one of its hard drive members fails or is temporarily disconnected, and data mirroring is lost. As a result, the system can only utilize the remaining functional hard drive member. To re-establish data mirroring and restore data redundancy, refer to the procedure below that corresponds to the current situation.

1. Power off.
2. Replace the failed hard drive with a new one that is of equal or greater capacity.
3. Reboot the system and go to **BIOS > SETTING > Advanced > Intel(R) Rapid Storage Technology**.



4. Select the **Degraded** RAID volume from the **Intel(R) Rapid Storage Technology** screen to enter the **RAID VOLUME INFO** screen.



5. Select the **Rebuild** item and press **Enter** key to rebuild the new hard drive.

Installing RAID Driver

New Operating System Installation

The following details the installation of the drivers while installing Windows 10 x64 bit Editions or newer operating system.

1. During the operating system installation, after selecting the location to install Windows click on **Load driver** button to install a third party RAID driver.
2. When prompted, insert the USB flash drive with **Intel RAID Drivers** and then click **Browse**.
3. Navigate to \\Storage\Intel\ the directory containing the saved Intel RAID drivers, then click **OK**.
4. Select the **(iaStorAC.inf)** driver, click **Next**.
5. You have successfully installed the RAID driver, and Windows setup should continue.
6. Leave the USB drive in the computer until the system reboots itself. Windows setup will need to copy the files after the RAID volume is formatted, and Windows setup starts copying files.

Installing Intel® Rapid Storage Technology Software

1. As previously mentioned, enable Intel(R) Rapid Storage Technology in BIOS.
2. Insert the MSI USB Dirve into the USB port.
3. Click the **Select to choose what happens with this disc** pop-up notification, then select **Run DVDSetup.exe** to open the installer. If you turn off the AutoPlay feature from the Windows Control Panel, you can still manually execute the **DVDSetup.exe** from the root path of the MSI USB Drive.
4. Under the **Drivers/Software** tab, check the **Intel RAID Drivers** check-box.
5. Click the **Install** button.
6. When prompt you to restart, click **OK** button to finish.
7. Restart your computer and enter the Windows operating system.
8. Double-click the **Intel® Rapid Storage Technology** icon to open the Intel® Rapid Storage Technology software.

Intel® Optane™ Memory Configuration

Intel® Optane™ memory can accelerate the Windows 10 64bit operating system. This section describes how to install and remove the Intel® Optane™ memory.

System Requirements

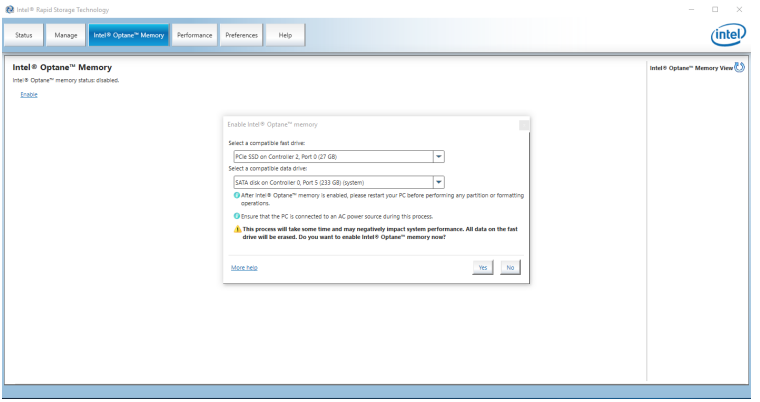
- Intel® Optane™ memory ready MSI® motherboards
- Supported 8th Gen, or later, Intel® Core™ - i Processor
- System BIOS that supports the Intel® Rapid Storage Technology (Intel® RST) 16 or later driver
- Operating system: Windows 10 64 bit (UEFI mode).
- Intel® Optane™ Memory Module

Installing the Intel® Optane™ memory

Install the Intel® Rapid Storage Technology 16.

1. Update BIOS (refer to the Updating BIOS section).
2. Install the Intel® Optane™ memory module.
   - Power off the system.
   - Refer to the Specifications for location to install your Intel® Optane™ memory module.
   - Install the Intel® Optane™ memory module into the M.2 slot.
3. Enable M.2/Optane Genie
   - Power on and press Delete key to enter BIOS Setup menu.
   - Enable M.2/Optane Genie by clicking the M.2/Optane Genie item.
   - Click Ok in the dialog.
   - Press F10 to save configuration and exit.
4. Install the Intel® Rapid Storage Technology
   - Reboot to operating system.
   - Insert the MSI USB Drive into the USB port.
   - Click the **Select to choose what happens with this disc** pop-up notification, then select **Run DVDSetup.exe** to open the installer. If you turn off the AutoPlay feature from the Windows Control Panel, you can still manually execute the **DVDSetup.exe** from the root path of the MSI USB Drive.
   - Under the **Drivers/Software** tab, check the **Intel RAID Drivers** check-box.
   - Click the **Install** button.
   - When prompt you to restart, click **OK** button to finish.
   - Reboot System.

5. Enable Intel® Optane™ Memory.
   - Run the Intel® Rapid Storage Technology software.
   - Click **Intel® Optane™ Memory** tab and click **Enable**.
   - Click **Yes** in the dialog.



6. Reboot System.

WARNING

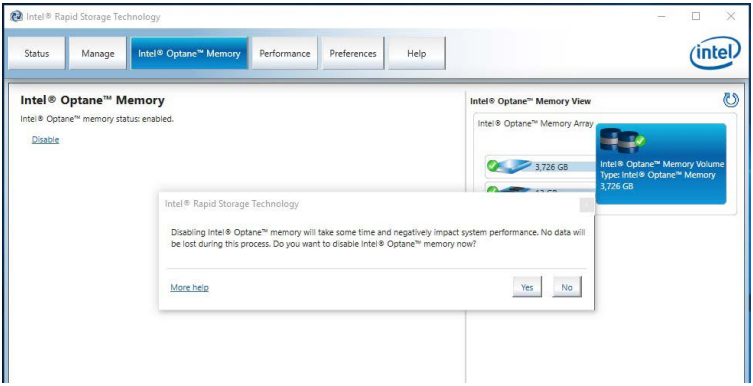
Once you enable Intel® Optane™ memory, in order to prevent seriously damage your operating system, please follow the cautions listed below.

- ***DO NOT set the SATA mode back to AHCI in BIOS.***
- ***DO NOT revert back to older version of the BIOS.***
- *DO NOT remove the Intel® Optane™ memory module.*
- ***DO NOT replace the CPU that is not supported by Intel® Optane™ Memory.***

Removing the Intel® Optane™ memory

If you no longer want to use Intel® Optane™ memory, you have to disable the Intel® Optane™ memory before removing the Intel® Optane™ memory module to avoid operating system damage. Please follow the steps below to remove the Intel® Optane™ memory.

1. Disable Intel® Optane™ Memory.
   - Disable Intel® Optane™ Memory via the Intel® Optane™ memory application (Intel® Rapid Storage Technology).
   - Click Yes in the dialog.



   - Reboot System.
2. Disable M.2/Optane Genie
   - Press Delete key to enter BIOS Setup menu during POST.
   - Disable M.2/Optane Genie by clicking M.2/Optane Genie item.
   - Click Ok in the dialog.
   - Press F10 to save configuration and exit.
3. Remove the Intel® Optane™ memory module.
   - Power off the system.
   - Remove the Intel® Optane™ memory module.

Troubleshooting

Before sending the motherboard for RMA repair, try to go over troubleshooting guide first to see if your got similar symptoms as mentioned below.

The power is not on.

• Connect the AC power cord to an electrical outlet securely.

• Check if all ATX power connectors like **ATX_PWR1, CPU_PWR1** are connected from the power supply to the motherboard?

• Some power supply units have a power button on the rear side, make sure the button is turned on.

• Check if the power switch cable is connected to **JFP1** pin header properly.

• Verify the **Clear CMOS** jumper **JBAT1** is set to **Keep DATA**.

• Test with another known working power supply of equal or greater wattage.

The power is on, but no signal to monitor

• Connect the monitor power cord to a electrical outlet securely.

• Make sure the monitor is turned on.

• Select different inputs on the monitor.

• If 3 long beeps are heard, remove all memory modules and try to install only one memory module in the **DIMMC1** slot first and then restart the computer.

• If 1 long 2 short beeps are heard, remove and reinstall the graphics card and then restart the computer.

• Test with another known working graphics card.

The computer does not boot after updating the BIOS

• Clear the CMOS.

• Use the secondary BIOS to bootup the system (Only for motherboard with Dual BIOS)

Lost BIOS password

• Clear the CMOS, but that will cause you to lose all customized settings in the BIOS.

There is no audio

• Adjust the volume.

• Connect the speakers/headphones to audio ports on the motherboard rear IO panel.

• Remove secondary speakers/ headphones, HDMI cables, USB audio devices.

• Test with another known working speaker or headphone.

There is no network

• Make sure the network chipset driver has been installed.

• Verify if the network cable is properly connected and make sure the LAN port LEDs are properly illuminated.

• Verify your TCP/IP settings.

• Restart or reset your router.

• Test with another known working LAN cable.

The USB device is not working

• Make sure your USB drive driver has been installed.

• Verify if USB device is listed in Windows® Device Manager.

• Connect the USB device to other USB port on the motherboard rear IO panel.

Regulatory Notices

FCC Compliance Statement

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Tested to comply with FCC standards
FOR HOME OR OFFICE USE

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.

CE Conformity

Products bearing the CE marking comply with one or more of the following EU Directives as may be applicable:

RED 2014/53/EU; Low Voltage Directive 2014/35/EU; EMC Directive 2014/30/EU; RoHS Directive 2011/65/EU.

Compliance with these directives is assessed using applicable European Harmonized Standards.

The point of contact for regulatory matters is MSI, MSI-NL Eindhoven 5706 5692 ER Son.

B급 기기 (가정용 방송통신기자재)

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

クラスB情報技術装置

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

C-Tick Compliance

N1996

Battery Information

European Union:

Batteries, battery packs, and accumulators should not be disposed of as unsorted household waste. Please use the public collection system to return, recycle, or treat them in compliance with the local regulations.

Taiwan:

廢電池請回收

For better environmental protection, waste batteries should be collected separately for recycling or special disposal.

California, USA:

The button cell battery may contain perchlorate material and requires special handling when recycled or disposed of in California.

For further information please visit:
http://www.dtsc.ca.gov/hazardouswaste/perchlorate/

CAUTION: There is a risk of explosion, if battery is incorrectly replaced.

Replace only with the same or equivalent type recommended by the manufacturer.

Chemical Substances Information

In compliance with chemical substances regulations, such as the EU REACH Regulation (Regulation EC No. 1907/2006 of the European Parliament and the Council), MSI provides the information of chemical substances in products at:

http://www.msi.com/html/popup/csr/evmtprtt_pcm.html

Environmental Policy

- The product has been designed to enable proper reuse of parts and recycling and should not be thrown away at its end of life.
- Users should contact the local authorized point of collection for recycling and disposing of their end-of-life products.
- Visit the MSI website and locate a nearby distributor for further recycling information.
- Users may also reach us at gpcontdev@msi.com for information regarding proper Disposal, Take-back, Recycling, and Disassembly of MSI products.

WEEE (Waste Electrical and Electronic Equipment) Statement

ENGLISH

To protect the global environment and as an environmentalist, MSI must remind you that...

Under the European Union ("EU") Directive on Waste Electrical and Electronic Equipment, Directive 2002/96/EC, which takes effect on August 13, 2005, products of "electrical

and electronic equipment" cannot be discarded as municipal wastes anymore, and manufacturers of covered electronic equipment will be obligated to take back such products at the end of their useful life. MSI will comply with the product take back requirements at the end of life of MSI-branded products that are sold into the EU. You can return these products to local collection points.

DEUTSCH

Hinweis von MSI zur Erhaltung und Schutz unserer Umwelt

Gemäß der Richtlinie 2002/96/EG über Elektro- und Elektronik-Altgeräte dürfen Elektro- und Elektronik-Altgeräte nicht mehr als kommunale Abfälle entsorgt werden. MSI hat europaweit verschiedene Sammel- und Recyclingunternehmen beauftragt, die in die Europäische Union in Verkehr gebrachten Produkte, am Ende seines Lebenszyklus zurückzunehmen. Bitte entsorgen Sie dieses Produkt zum gegebenen Zeitpunkt ausschliesslich an einer lokalen Altgerätesammelstelle in Ihrer Nähe.

FRANÇAIS

En tant qu'écologiste et afin de protéger l'environnement, MSI tient à rappeler ceci...

Au sujet de la directive européenne (EU) relative aux déchets des équipement électriques et électroniques, directive 2002/96/EC, prenant effet le 13 août 2005, que les produits électriques et électroniques ne peuvent être déposés dans les décharges ou tout simplement mis à la poubelle. Les fabricants de ces équipements seront obligés de récupérer certains produits en fin de vie. MSI prendra en compte cette exigence relative au retour des produits en fin de vie au sein de la communauté européenne. Par conséquent vous pouvez retourner localement ces matériels dans les points de collecte.

РУССКИЙ

Компания MSI предпринимает активные действия по защите окружающей среды, поэтому напоминаем вам, что....

В соответствии с директивой Европейского Союза (ЕС) по предотвращению загрязнения окружающей среды использованным электрическим и электронным оборудованием (директива WEEE 2002/96/EC), вступающей в силу 13 августа 2005 года, изделия, относящиеся к электрическому и электронному оборудованию, не могут рассматриваться как бытовой мусор, поэтому производители вышеперечисленного электронного оборудования обязаны принимать его для переработки по окончании срока службы. MSI обязуется соблюдать требования по приему продукции, проданной под маркой MSI на территории ЕС, в переработку по окончании срока службы. Вы можете вернуть эти изделия в специализированные пункты приема.

ESPAÑOL

MSI como empresa comprometida con la protección del medio ambiente, recomienda:

Bajo la directiva 2002/96/EC de la Unión Europea en materia de desechos y/o equipos electrónicos, con fecha de rigor desde el 13 de agosto de 2005, los productos clasificados como "eléctricos y equipos electrónicos" no pueden ser depositados en los contenedores habituales de su municipio, los fabricantes de equipos electrónicos, están obligados a hacerse cargo de dichos productos al termino de su período de vida. MSI estará comprometido con los términos de recogida de sus productos vendidos en la Unión Europea al final de su periodo de vida. Usted debe depositar estos productos en el punto limpio establecido por el ayuntamiento de su localidad o entregar a una empresa autorizada para la recogida de estos residuos.

NEDERLANDS

Om het milieu te beschermen, wil MSI u eraan herinneren dat....

De richtlijn van de Europese Unie (EU) met betrekking tot Vervuiling van Electrische en Electronische producten (2002/96/EC), die op 13 Augustus 2005 in zal gaan kunnen niet meer beschouwd worden als vervuiling. Fabrikanten van dit soort producten worden verplicht om producten retour te nemen aan het eind van hun levenscyclus. MSI zal overeenkomstig de richtlijn handelen voor de producten die de merknaam MSI dragen en verkocht zijn in de EU. Deze goederen kunnen geretourneerd worden op lokale inzamelingspunten.

SRPSKI

Da bi zaštitili prirodnu sredinu, i kao preduzeće koje vodi računa o okolini i prirodnoj sredini, MSI mora da vas podesti da...

Po Direktivi Evropske unije ("EU") o odbačenoj ekektronskoj i električnoj opremi, Direktiva 2002/96/EC, koja stupa na snagu od 13. Avgusta 2005, proizvodi koji spadaju pod "elektronsku i električnu opremu" ne mogu više biti odbačeni kao običan otpad i proizvođači ove opreme biće prinuđeni da uzmu natrag ove proizvode na kraju njihovog uobičajenog veka trajanja. MSI će poštovati zahtev o preuzimanju ovakvih proizvoda kojima je istekao vek trajanja, koji imaju MSI oznaku i koji su prodati u EU. Ove proizvode možete vratiti na lokalnim mestima za prikupljanje.

POLSKI

Aby chronić nasze środowisko naturalne oraz jako firma dbająca o ekologię, MSI przypomina, że...

Zgodnie z Dyrektywą Unii Europejskiej ("UE") dotyczącą odpadów produktów elektrycznych i elektronicznych (Dyrektywa 2002/96/EC), która wchodzi w życie 13 sierpnia 2005, tzw. "produkty oraz wyposażenie elektryczne i elektroniczne " nie mogą być traktowane jako śmieci komunalne, tak więc producenci tych produktów będą zobowiązani do odbierania ich w momencie gdy produkt jest wycofywany z użycia. MSI wypełni wymagania UE, przyjmując produkty (sprzedawane na terenie Unii Europejskiej) wycofywane z użycia. Produkty MSI będzie można zwracać w wyznaczonych punktach zbiorczych.

TÜRKÇE

Çevreci özelliğiyle bilinen MSI dünyada çevreyi korumak için hatırlatır:

Avrupa Birliği (AB) Kararnamesi Elektrik ve Elektronik Malzeme Atığı, 2002/96/EC Kararnamesi altında 13 Ağustos 2005 tarihinden itibaren geçerli olmak üzere, elektrikli ve elektronik malzemeler diğer atıklar gibi çöpe atılamayacak ve bu elektonik cihazların üreticileri, cihazların kullanım süreleri bittikten sonra ürünleri geri toplamakla yükümlü olacaktır. Avrupa Birliği'ne satılan MSI markalı ürünlerin kullanım süreleri bittiğinde MSI ürünlerin geri alınması isteği ile işbirliği içerisinde olacaktır. Ürünlerinizi yerel toplama noktalarına bırakabilirsiniz.

ČESKY

Záleží nám na ochraně životního prostředí - společnost MSI upozorňuje...

Podle směrnice Evropské unie ("EU") o likvidaci elektrických a elektronických výrobků 2002/96/EC platné od 13. srpna 2005 je zakázáno likvidovat "elektrické a elektronické výrobky" v běžném komunálním odpadu a výrobci elektronických výrobků, na které se tato směrnice vztahuje, budou povinni odebírat takové výrobky zpět po skončení jejich životnosti. Společnost MSI splní požadavky na odebírání výrobků značky MSI, prodávaných v zemích EU, po skončení jejich životnosti. Tyto výrobky můžete odevzdat v místních sběrnách.

MAGYAR

Annak érdekében, hogy környezetünket megvédjük, illetve környezetvédőként fellépve az MSI emlékezteti Önt, hogy ...

Az Európai Unió („EU") 2005. augusztus 13-án hatályba lépő, az elektromos és elektronikus berendezések hulladékairól szóló 2002/96/EK irányelve szerint az elektromos és elektronikus berendezések többé nem kezelhetőek lakossági hulladékként, és az ilyen elektronikus berendezések gyártói kötelessé válnak az ilyen termékek visszavételére azok hasznos élettartama végén. Az MSI betartja a termékvisszavétellel kapcsolatos követelményeket az MSI márkanév alatt az EU-n belül értékesített termékek esetében, azok élettartamának végén. Az ilyen termékeket a legközelebbi gyűjtőhelyre viheti.

ITALIANO

Per proteggere l'ambiente, MSI, da sempre amica della natura, ti ricorda che....

In base alla Direttiva dell'Unione Europea (EU) sullo Smaltimento dei Materiali Elettrici ed Elettronici, Direttiva 2002/96/EC in vigore dal 13 Agosto 2005, prodotti appartenenti alla categoria dei Materiali Elettrici ed Elettronici non possono più essere eliminati come rifiuti municipali: i produttori di detti materiali saranno obbligati a ritirare ogni prodotto alla fine del suo ciclo di vita. MSI si adeguerà a tale Direttiva ritirando tutti i prodotti marchiati MSI che sono stati venduti all'interno dell'Unione Europea alla fine del loro ciclo di vita. È possibile portare i prodotti nel più vicino punto di raccolta

日本JIS C 0950材質宣言

日本工業規格JIS C 0950により、2006年7月1日以降に販売される特定分野の電気および電子機器について、製造者による含有物質の表示が義務付けられます。

http://www.msi.com/html/popup/csr/cemm_jp.html

http://tw.msi.com/html/popup/csr_tw/cemm_jp.html

India RoHS

This product complies with the "India E-waste (Management and Handling) Rule 2011" and prohibits use of lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers in concentrations exceeding 0.1 weight % and 0.01 weight % for cadmium, except for the exemptions set in Schedule 2 of the Rule.

Türkiye EEE yönetmeliği

Türkiye Cumhuriyeti: EEE Yönetmeliğine Uygundur

Україна обмеження на наявність небезпечних речовин

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнані, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057.

Việt Nam RoHS

Kể từ ngày 01/12/2012, tất cả các sản phẩm do công ty MSI sản xuất tuân thủ Thông tư số 30/2011/TT-BCT quy định tạm thời về giới hạn hàm lượng cho phép của một số hóa chất độc hại có trong các sản phẩm điện, điện tử"

Wireless Radio Use

This device is restricted to indoor use when operating in the 2.4GHz, 5GHz frequency band.

Cet appareil doit être utilisé à l'intérieur.

당해 무선설비는 운용중 전파혼신 가능성이 있음.

この製品は、周波数帯域 2.4GHz, 5GHz で動作しているときは、屋内においてのみ使用可能です。

NCC無線設備警告聲明

工作頻率2.4GHz, 5GHz該頻段限於室內使用。

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Products with radio functionality (EMF)

This product incorporates a radio transmitting and receiving device. For computers in normal use, a separation distance of 20 cm ensures that radio frequency exposure levels comply with EU requirements. Products designed to be operated at closer proximities, such as tablet computers, comply with applicable EU requirements in typical operating positions. Products can be operated without maintaining a separation distance unless otherwise indicated in instructions specific to the product.

Restrictions for products with radio functionality

CAUTION: IEEE 802.11x wireless LAN with 5.15–5.35 GHz frequency band is restricted for indoor use only in all European Union member states, EFTA (Iceland, Norway, Liechtenstein), and most other European countries (e.g., Switzerland, Turkey, Republic of Serbia). Using this WLAN application outdoors might lead to interference issues with existing radio services.

Radio frequency bands and maximum power levels

Features	:802.11 a/b/g/n/ac, BT
Frequency Range	:2.4GHz, 5GHz
Modulation	:FHSS, DSSS, OFDM
Power Output	:10, 20, 23
Channel Band Width	:1, 5, 20 ,40 , 80MHz

MS-7B96主板产品中有害物质的名称及含量

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板组件*	×	○	○	○	○	○
电池**	×	○	○	○	○	○
外部信号连接头	×	○	○	○	○	○
线材	×	○	○	○	○	○

本表格依据 SJ/T 11364 的规定编制。

○: 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

×: 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求，但所有部件都符合欧盟RoHS要求。

* 印刷电路板组件: 包括印刷电路板及其构成的零部件。

** 电池本体上如有环保使用期限标识，以本体标识为主。

■ 上述有毒有害物质或元素清单会依型号之部件差异而有所增减。

■ 產品部件本体上如有环保使用期限标识，以本体标识为主。

限用物質含有情況標示聲明書

設備名稱：電腦主機板			型號(型式)：MS-7B96			
單元	限用物質及其化學符號					
	鉛 (Pb)	汞 (Hg)	鎘 (Cd)	六價鉻 (Cr^{+6})	多溴聯苯 (PBB)	多溴二苯醚 (PBDE)
電路板	○	○	○	○	○	○
電子元件	—	○	○	○	○	○
金屬機構件	—	○	○	○	○	○
塑膠機構件	○	○	○	○	○	○

備考1. “超出0.1 wt %” 及 “超出0.01 wt %” 係指限用物質之百分比含量超出百分比含量基準值。

備考2. “○” 係指該項限用物質之百分比含量未超出百分比含量基準值。

備考3. “—” 係指該項限用物質為排除項目。

Revision History

Version 1.0, 2019/09, First release.

Version 1.1, 2019/11, updated release.

Technical Support

If a problem arises with your system and no solution can be obtained from the user guide, please contact your place of purchase or local distributor. Alternatively, please try the following help resources for further guidance.

- Visit the MSI website for technical guide, BIOS updates, driver updates, and other information: http://www.msi.com
- Register your product at: http://register.msi.com