



Z390 PHANTOM GAMING X

Version 1.0

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- (2) this device must accept any interference received, including interference that may cause undesired operation.

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This device complies with directive 2014/53/EU issued by the Commision of the European Community.

This equipment complies with EU radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Operations in the 5.15-5.35GHz band are restricted to indoor usage only.

	AT	BE	BG	CH	CY	CZ	DE
	DK	EE	EL	ES	FI	FR	HR
	HU	IE	IS	IT	LI	LT	LU
	LV	MT	NL	NO	PL	PT	RO
	SE	SI	SK	TR	UK		



Radio transmit power per transceiver type

Function	Frequency	Maximum Output Power (EIRP)
WiFi	2400-2483.5 MHz	18.5 + / -1.5 dbm
	5150-5250 MHz	21.5 + / -1.5 dbm
	5250-5350 MHz	18.5 + / -1.5 dbm (no TPC)
		21.5 + / -1.5 dbm (TPC)
	5470-5725 MHz	25.5 + / -1.5 dbm (no TPC)
Bluetooth		28.5 + / -1.5 dbm (TPC)
	2400-2483.5 MHz	8.5 + / -1.5 dbm

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Chapter 1 Introduction

Thank you for purchasing ASRock Z390 Phantom Gaming X motherboard, a reliable motherboard produced under ASRock's consistently stringent quality control. It delivers excellent performance with robust design conforming to ASRock's commitment to quality and endurance.

In this documentation, Chapter 1 and 2 contains the introduction of the motherboard and step-by-step installation guides. Chapter 3 contains the operation guide of the software and utilities. Chapter 4 contains the configuration guide of the BIOS setup.



Because the motherboard specifications and the BIOS software might be updated, the content of this documentation will be subject to change without notice. In case any modifications of this documentation occur, the updated version will be available on ASRock's website without further notice. If you require technical support related to this motherboard, please visit our website for specific information about the model you are using. You may find the latest VGA cards and CPU support list on ASRock's website as well. ASRock website <http://www.asrock.com>.

1.1 Package Contents

- ASRock Z390 Phantom Gaming X Motherboard (ATX Form Factor)
- ASRock Z390 Phantom Gaming X Quick Installation Guide
- ASRock Z390 Phantom Gaming X Support CD
- 4 x Serial ATA (SATA) Data Cables (Optional)
- 1 x ASRock SLI_HB_Bridge_2S Card (Optional)
- 1 x ASRock WiFi 2.4/5 GHz Antenna (Optional)
- 1 x ASRock Screwdriver (Optional)
- 3 x Screws for M.2 Sockets (Optional)
- 3 x Standoffs for M.2 Sockets (Optional)

1.2 Specifications

Platform

- ATX Form Factor

CPU

- Supports 9th and 8th Gen Intel® Core™ Processors (Socket 1151)
- Digi Power design
- 14 Power Phase design
- Supports Intel® Turbo Boost 2.0 Technology
- Supports Intel® K-Series unlocked CPUs
- Supports ASRock BCLK Full-range Overclocking
- Supports ASRock Hyper BCLK Engine II

Chipset

- Intel® Z390

Memory

- Dual Channel DDR4 Memory Technology
- 4 x DDR4 DIMM Slots
- Supports DDR4 4266+(OC)*/4133(OC)/4000(OC)/3866(OC)/3800(OC)/3733(OC)/3600(OC)/3200(OC)/2933(OC)/2800(OC)/2666/2400/2133 non-ECC, un-buffered memory
- * Please refer to Memory Support List on ASRock's website for more information. (<http://www.asrock.com/>)
- Supports ECC UDIMM memory modules (operate in non-ECC mode)
- Max. capacity of system memory: 128GB
- Supports Intel® Extreme Memory Profile (XMP) 2.0
- 15μ Gold Contact in DIMM Slots

Expansion Slot

- 3 x PCI Express 3.0 x16 Slots (PCIe1/PCIe3/PCIe5: single at x16 (PCIe1); dual at x8 (PCIe1) / x8 (PCIe3); triple at x8 (PCIe1) / x4 (PCIe3) / x4 (PCIe5))*
- * Supports NVMe SSD as boot disks
- 2 x PCI Express 3.0 x1 Slots (Flexible PCIe)
- Supports AMD Quad CrossFireX™, 3-Way CrossFireX™ and CrossFireX™
- Supports NVIDIA® Quad SLI™ and SLI™
- Supports NVIDIA® NVLink™ with dual NVIDIA® GeForce® RTX series graphics cards*
- * NVIDIA NVLink Bridge does not come with the package. Please purchase it from NVIDIA® if necessary.

- 1 x Vertical M.2 Socket (Key E) with the bundled WiFi-802.11ax module (on the rear I/O)
- 15µ Gold Contact in VGA PCIe Slot (PCIe1)

Graphics

- * Intel® UHD Graphics Built-in Visuals and the VGA outputs can be supported only with processors which are GPU integrated.
- Supports Intel® UHD Graphics Built-in Visuals : Intel® Quick Sync Video with AVC, MVC (S3D) and MPEG-2 Full HW Encode1, Intel® InTru™ 3D, Intel® Clear Video HD Technology, Intel® Insider™, Intel® UHD Graphics
- DirectX 12
- HWAEncode/Decode: AVC/H.264, HEVC/H.265 8-bit, HEVC/H.265 10-bit, VP8, VP9 8-bit, VP9 10-bit (Decode only), MPEG2, MJPEG, VC-1 (Decode only)
- Dual graphics output: Support HDMI and DisplayPort 1.2 ports by independent display controllers
- Supports HDMI 1.4 with max. resolution up to 4K x 2K (4096x2160) @ 30Hz
- Supports DisplayPort 1.2 with max. resolution up to 4K x 2K (4096x2304) @ 60Hz
- Supports Auto Lip Sync, Deep Color (12bpc), xvYCC and HBR (High Bit Rate Audio) with HDMI 1.4 Port (Compliant HDMI monitor is required)
- Supports HDCP 2.2 with HDMI 1.4 and DisplayPort 1.2 Ports
- Supports 4K Ultra HD (UHD) playback with HDMI 1.4 and DisplayPort 1.2 Ports

Audio

- 7.1 CH HD Audio with Content Protection (Realtek ALC1220 Audio Codec)
- Premium Blu-ray Audio support
- Supports Surge Protection
- Nichicon Fine Gold Series Audio Caps
- 120dB SNR DAC with Differential Amplifier
- NE5532 Premium Headset Amplifier for Front Panel Audio Connector (Supports up to 600 Ohm headsets)
- Pure Power-In
- Direct Drive Technology
- PCB Isolate Shielding

- Impedance Sensing on Rear Out port
- Individual PCB Layers for R/L Audio Channel
- Gold Audio Jacks
- 15µ Gold Audio Connector
- Supports Creative SoundBlaster Cinema5

LAN

1 x 2.5 Gigabit LAN 10/100/1000/2500 Mb/s (Dragon RTL8125AG):

- Supports Phantom Gaming LAN Software
 - Smart Auto Adjust Bandwidth Control
 - Visual User Friendly UI
 - Visual Network Usage Statistics
 - Optimized Default Setting for Game, Browser, and Streaming Modes
 - User Customized Priority Control
- Supports Wake-On-LAN
- Supports Lightning/ESD Protection
- Supports Energy Efficient Ethernet 802.3az
- Supports PXE

2 x Gigabit LAN 10/100/1000 Mb/s (1 x Intel® I219V, 1 x Intel® I211AT):

- Supports Wake-On-LAN
- Supports Lightning/ESD Protection
- Supports Dual LAN with Teaming*

* Teaming is supported on Windows® 10 RS2 and above.

- Supports Energy Efficient Ethernet 802.3az
- Supports PXE

Wireless LAN

- Intel® 802.11ax WiFi Module
- Supports IEEE 802.11a/b/g/n/ax
- Supports Dual-Band (2.4/5 GHz)
- Supports high speed wireless connections up to 2.4Gbps
- 2 antennas to support 2 (Transmit) x 2 (Receive) diversity technology
- Supports Bluetooth 5.0 + High speed class II
- Supports MU-MIMO

Rear Panel I/O

- 2 x Antenna Ports
 - 1 x PS/2 Mouse/Keyboard Port
 - 1 x HDMI Port
 - 1 x DisplayPort 1.2
 - 1 x Optical SPDIF Out Port
 - 3 x USB 3.2 Gen2 Type-A Ports (10 Gb/s) (ReDriver) (Supports ESD Protection)
 - 1 x USB 3.2 Gen2 Type-C Port (10 Gb/s) (ReDriver) (Supports ESD Protection)
 - 4 x USB 3.2 Gen1 Ports (Intel® Z390) (Supports ESD Protection)
- * Ultra USB Power is supported on USB31_TA12 ports.
- * ACPI wake-up function is not supported on USB31_TA12 ports.
- 3 x RJ-45 LAN Ports with LED (ACT/LINK LED and SPEED LED)
 - 1 x Clear CMOS Button
 - HD Audio Jacks: Rear Speaker / Central / Bass / Line in / Front Speaker / Microphone (Gold Audio Jacks)

Storage

- 6 x SATA3 6.0 Gb/s Connectors, support RAID (RAID 0, RAID 1, RAID 5, RAID 10, Intel Rapid Storage Technology 16), NCQ, AHCI and Hot Plug*
 - 2 x SATA3 6.0 Gb/s Connectors by ASMedia ASM1061, support NCQ, AHCI and Hot Plug
- * M2_1, SATA3_0 and SATA3_1 share lanes. If either one of them is in use, the others will be disabled.
- * If M2_2 is occupied by a SATA-type M.2 device, SATA3_3 will be disabled.
- * M2_3, SATA3_4 and SATA3_5 share lanes. If either one of them is in use, the others will be disabled.
- 1 x Ultra M.2 Socket (M2_1), supports M Key type 2242/2260/2280 M.2 SATA3 6.0 Gb/s module and M.2 PCI Express module up to Gen3 x4 (32 Gb/s)**
 - 1 x Ultra M.2 Socket (M2_2), supports M Key type 2260/2280 M.2 SATA3 6.0 Gb/s module and M.2 PCI Express module up to Gen3 x4 (32 Gb/s)**

- 1 x Ultra M.2 Sockets (M2_3), supports M Key type 2230/2242/2260/2280/22110 M.2 SATA3 6.0 Gb/s module and M.2 PCI Express module up to Gen3 x4 (32 Gb/s)**

** Supports Intel® Optane™ Technology

** Supports NVMe SSD as boot disks

** Supports ASRock U.2 Kit

Connector

- 1 x SPI TPM Header
- 1 x Power LED and Speaker Header
- 2 x RGB LED Headers

* Support in total up to 12V/3A, 36W LED Strip

- 1 x Addressable LED Header

* Supports in total up to 5V/3A, 15W LED Strip

- 1 x CPU Fan Connector (4-pin)

* The CPU Fan Connector supports the CPU fan of maximum 1A (12W) fan power.

- 1 x CPU/Water Pump Fan Connector (4-pin) (Smart Fan Speed Control)

* The CPU/Water Pump Fan supports the water cooler fan of maximum 2A (24W) fan power.

- 6 x Chassis/Water Pump Fan Connectors (4-pin) (Smart Fan Speed Control)

* The Chassis/Water Pump Fan supports the water cooler fan of maximum 2A (24W) fan power.

* CPU_FAN2/WP, CHA_FAN1~6/WP can auto detect if 3-pin or 4-pin fan is in use.

- 1 x 24 pin ATX Power Connector (Hi-Density Power Connector)
- 1 x 8 pin 12V Power Connector (Hi-Density Power Connector)
- 1 x 4 pin 12V Power Connector (Hi-Density Power Connector)
- 1 x Front Panel Audio Connector (15μ Gold Audio Connector)
- 1 x Thunderbolt AIC Connector (5-pin)
- 2 x USB 2.0 Headers (Support 3 USB 2.0 ports) (Intel® Z390) (Supports ESD Protection)
- 2 x USB 3.2 Gen1 Headers (Support 4 USB 3.2 Gen1 ports) (ASMedia ASM1074 hub) (Supports ESD Protection)

- 1 x Front Panel Type C USB 3.2 Gen2 Header (ASMedia ASM1562 Retimer)
- 1 x Dr. Debug with LED
- 1 x Power Button with LED
- 1 x Reset Button with LED

BIOS Feature

- 2 x AMI UEFI Legal BIOS with multilingual GUI support (1 x Main BIOS and 1 x Backup BIOS)
- Supports Secure Backup UEFI Technology
- ACPI 6.0 Compliant wake up events
- SMBIOS 2.7 Support
- CPU Core/Cache, GT Core/Cache, DRAM, VTT DDR, PCH 1.05V, VCCIO, CPU PLL 2, VCCSA, VCCPLL, CPU Cold Bug Killer, CPU PLL 1, CLK VDD, DMI, CPU Internal PLL, GT PLL, Ring PLL, System Agent PLL, Memory Controller PLL Voltage Multi-adjustment

Hardware Monitor

- Temperature Sensing: CPU, CPU/Water Pump, Chassis/Water Pump Fans
- Fan Tachometer: CPU, CPU/Water Pump, Chassis/Water Pump Fans
- Quiet Fan (Auto adjust chassis fan speed by CPU temperature): CPU, CPU/Water Pump, Chassis/Water Pump Fans
- Fan Multi-Speed Control: CPU, CPU/Water Pump, Chassis/Water Pump Fans
- Voltage monitoring: +12V, +5V, +3.3V, CPU Vcore, DRAM, PCH 1.05V, VCCIO, DRAM VPP, VCCSA, VCCST, DMI, CPU Cold Bug Killer

OS

- Microsoft® Windows® 10 64-bit

Certifica- tions

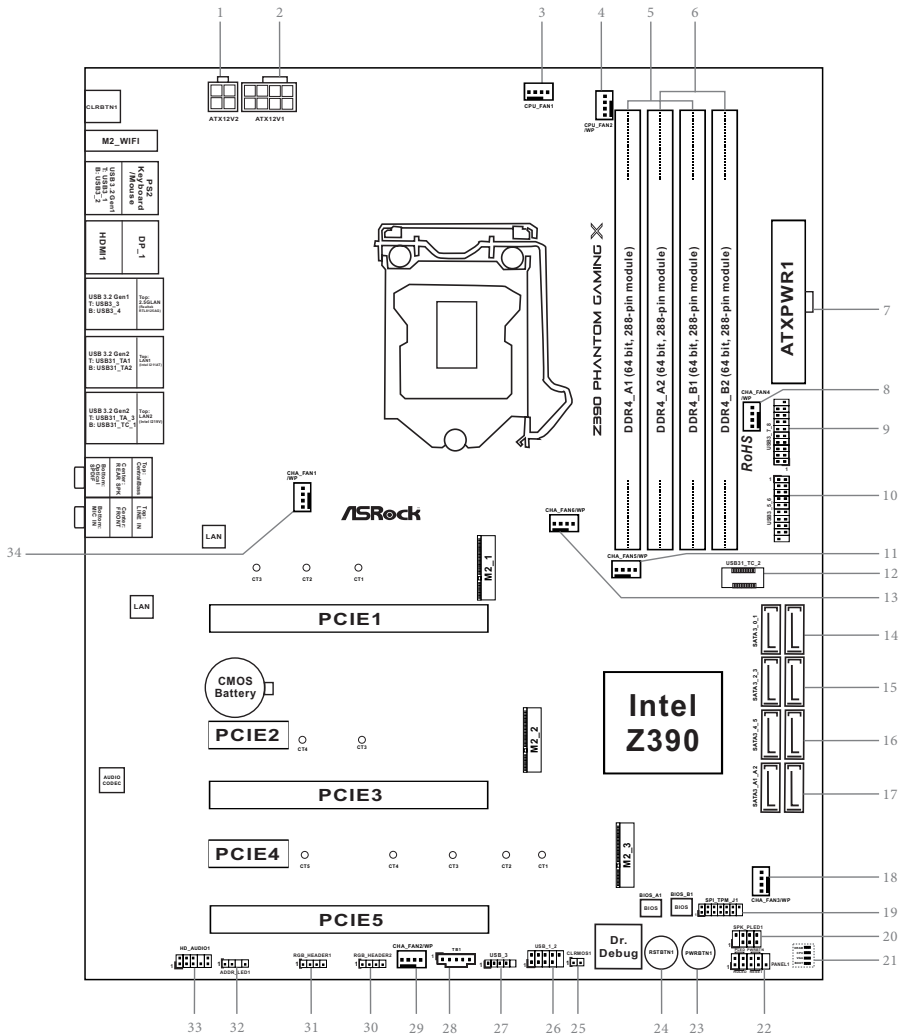
- FCC, CE
- ErP/EuP ready (ErP/EuP ready power supply is required)

* For detailed product information, please visit our website: <http://www.asrock.com>



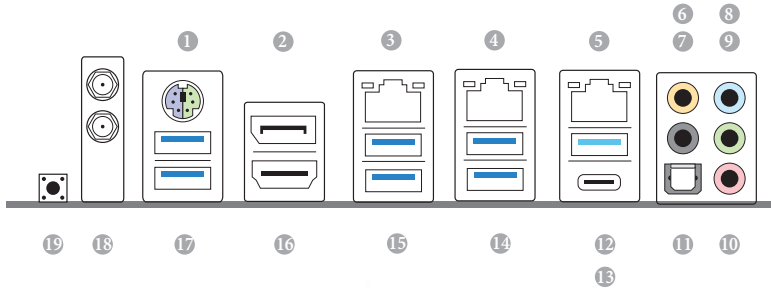
Please realize that there is a certain risk involved with overclocking, including adjusting the setting in the BIOS, applying Untied Overclocking Technology, or using third-party overclocking tools. Overclocking may affect your system's stability, or even cause damage to the components and devices of your system. It should be done at your own risk and expense. We are not responsible for possible damage caused by overclocking.

1.3 Motherboard Layout



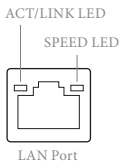
No.	Description
1	ATX 12V Power Connector (ATX12V2)
2	ATX 12V Power Connector (ATX12V1)
3	CPU Fan Connector (CPU_FAN1)
4	CPU Fan / Waterpump Fan Connector (CPU_FAN2/WP)
5	2 x 288-pin DDR4 DIMM Slots (DDR4_A1, DDR4_B1)
6	2 x 288-pin DDR4 DIMM Slots (DDR4_A2, DDR4_B2)
7	ATX Power Connector (ATXPWR1)
8	Chassis Fan / Waterpump Fan Connector (CHA_FAN4/WP)
9	USB 3.2 Gen1 Header (USB3_7_8)
10	USB 3.2 Gen1 Header (USB3_5_6)
11	Chassis Fan / Waterpump Fan Connector (CHA_FAN5/WP)
12	Front Panel Type C USB 3.2 Gen2 Header (USB31_TC_2)
13	Chassis Fan / Waterpump Fan Connector (CHA_FAN6/WP)
14	SATA3 Connectors (SATA3_0_1)
15	SATA3 Connectors (SATA3_2_3)
16	SATA3 Connectors (SATA3_4_5)
17	SATA3 Connectors (SATA3_A1_A2)
18	Chassis Fan / Waterpump Fan Connector (CHA_FAN3/WP)
19	SPI TPM Header (SPI_TPM_J1)
20	Power LED and Speaker Header (SPK_PLED1)
21	Post Status Checker (PSC)
22	System Panel Header (PANEL1)
23	Power Button with LED (PWRBTN1)
24	Reset Button with LED (RSTBTN1)
25	Clear CMOS Jumper (CLRMOSE1)
26	USB 2.0 Header (USB_1_2)
27	USB 2.0 Header (USB3)
28	Thunderbolt AIC Header (TB1)
29	Chassis Fan / Waterpump Fan Connector (CHA_FAN2/WP)
30	RGB LED Header (RGB_HEADER2)
31	RGB LED Header (RGB_HEADER1)
32	Addressable LED Header (ADDR_LED1)
33	Front Panel Audio Header (HD_AUDIO1)
34	Chassis Fan / Waterpump Fan Connector (CHA_FAN1/WP)

1.4 I/O Panel



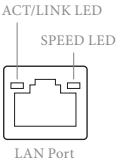
No.	Description	No.	Description
1	PS/2 Mouse/Keyboard Port	12	USB 3.2 Gen2 Type-A Port (USB31_TA_3)
2	DisplayPort 1.2	13	USB 3.2 Gen2 Type-C Port (USB31_TC_1)
3	2.5G LAN RJ-45 Port (Dragon RTL8125AG)*	14	USB 3.2 Gen2 Type-A Ports (USB31_TA_12)****
4	LAN RJ-45 Port (Intel® I211AT)**	15	USB 3.2 Gen1 Ports (USB3_3_4)
5	LAN RJ-45 Port (Intel® I219V)**	16	HDMI Port
6	Central / Bass (Orange)	17	USB 3.2 Gen1 Ports (USB3_12)
7	Rear Speaker (Black)	18	Antenna Ports
8	Line In (Light Blue)	19	Clear CMOS Button
9	Front Speaker (Lime)***		
10	Microphone (Pink)		
11	Optical SPDIF Out Port		

* There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.



Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	10Mbps connection
Blinking	Data Activity	Orange	100Mbps/1Gbps connection
On	Link	Green	2.5Gbps connection

** There are two LEDs on each LAN port. Please refer to the table below for the LAN port LED indications.



Activity / Link LED		Speed LED	
Status	Description	Status	Description
Off	No Link	Off	10Mbps connection
Blinking	Data Activity	Orange	100Mbps connection
On	Link	Green	1Gbps connection

*** If you use a 2-channel speaker, please connect the speaker's plug into "Front Speaker Jack". See the table below for connection details in accordance with the type of speaker you use.

Audio Output Channels	Front Speaker (No. 9)	Rear Speaker (No. 7)	Central / Bass (No. 6)	Line In (No. 8)
2	V	--	--	--
4	V	V	--	--
6	V	V	V	--
8	V	V	V	V

**** ACPI wake-up function is not supported on USB31_TA12 ports.

1.5 WiFi-802.11ax Module and ASRock WiFi 2.4/5 GHz Antenna

WiFi-802.11ax + BT Module

This motherboard comes with an exclusive WiFi 802.11 a/b/g/n/ax + BT v5.0 module (pre-installed on the rear I/O panel) that offers support for WiFi 802.11 a/b/g/n/ax connectivity standards and Bluetooth v5.0. WiFi + BT module is an easy-to-use wireless local area network (WLAN) adapter to support WiFi + BT. Bluetooth v5.0 standard features Smart Ready technology that adds a whole new class of functionality into the mobile devices. BT 5.0 also includes Low Energy Technology and ensures extraordinary low power consumption for PCs. The 2T2R WiFi solution sets a WiFi high speed standard and offers max link rate up to 2.4Gbps.

* The transmission speed may vary according to the environment.

Chapter 2 Installation

This is an ATX form factor motherboard. Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.

Pre-installation Precautions

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

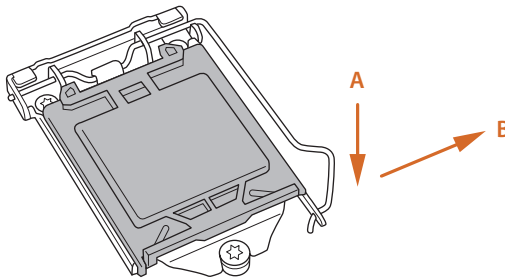
- Make sure to unplug the power cord before installing or removing the motherboard components. Failure to do so may cause physical injuries and damages to motherboard components.
- In order to avoid damage from static electricity to the motherboard's components, NEVER place your motherboard directly on a carpet. Also remember to use a grounded wrist strap or touch a safety grounded object before you handle the components.
- Hold components by the edges and do not touch the ICs.
- Whenever you uninstall any components, place them on a grounded anti-static pad or in the bag that comes with the components.
- When placing screws to secure the motherboard to the chassis, please do not over-tighten the screws! Doing so may damage the motherboard.

2.1 Installing the CPU

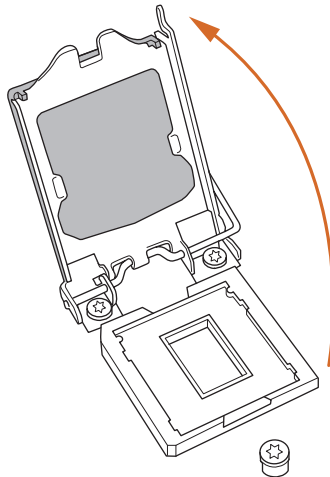


1. Before you insert the 1151-Pin CPU into the socket, please check if the **PnP cap** is on the socket, if the CPU surface is unclean, or if there are any **bent pins** in the socket. Do not force to insert the CPU into the socket if above situation is found. Otherwise, the CPU will be seriously damaged.
2. Unplug all power cables before installing the CPU.

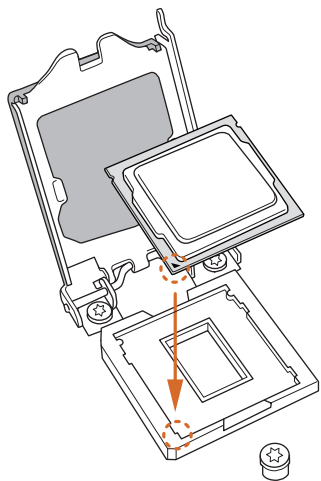
1



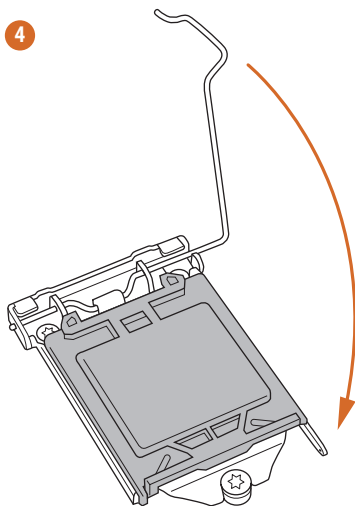
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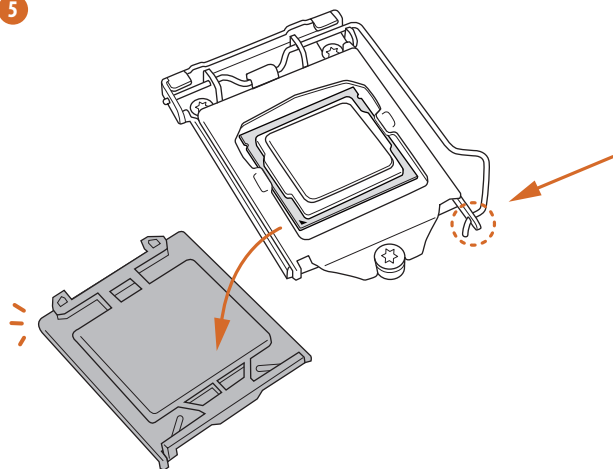
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4



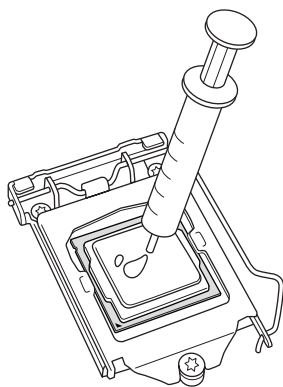
5



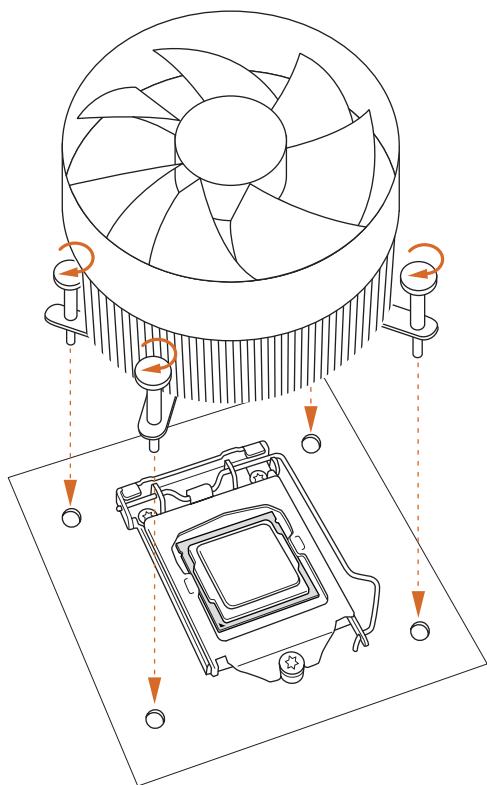


Please save and replace the cover if the processor is removed. The cover must be placed if you wish to return the motherboard for after service.

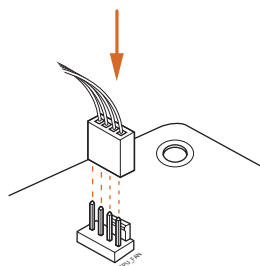
2.2 Installing the CPU Fan and Heatsink



1



2



2.3 Installing Memory Modules (DIMM)

This motherboard provides four 288-pin DDR4 (Double Data Rate 4) DIMM slots, and supports Dual Channel Memory Technology.



1. For dual channel configuration, you always need to install identical (the same brand, speed, size and chip-type) DDR4 DIMM pairs.
2. It is unable to activate Dual Channel Memory Technology with only one or three memory module installed.
3. It is not allowed to install a DDR, DDR2 or DDR3 memory module into a DDR4 slot; otherwise, this motherboard and DIMM may be damaged.

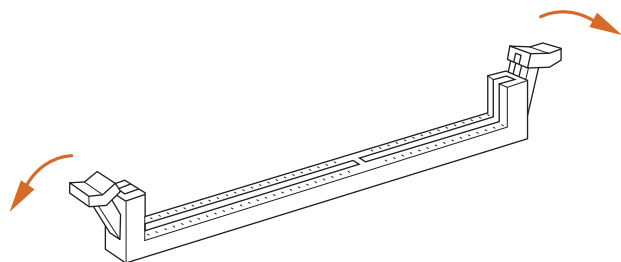
Dual Channel Memory Configuration

Priority	DDR4_A1	DDR4_A2	DDR4_B1	DDR4_B2
1		Populated		Populated
2	Populated	Populated	Populated	Populated

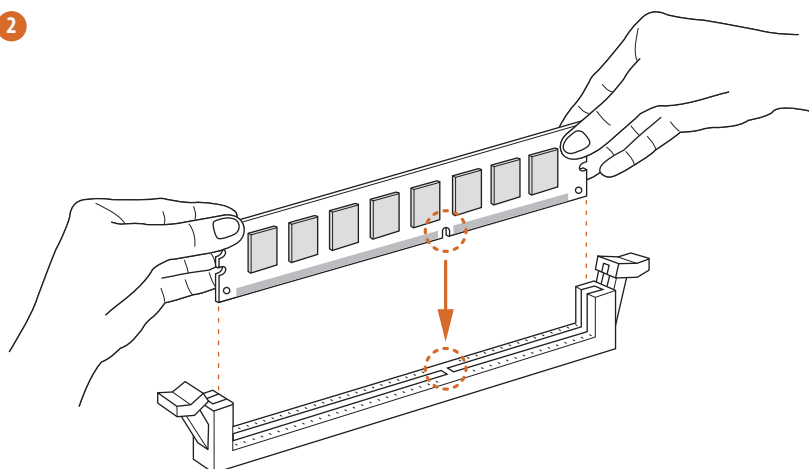


The DIMM only fits in one correct orientation. It will cause permanent damage to the motherboard and the DIMM if you force the DIMM into the slot at incorrect orientation.

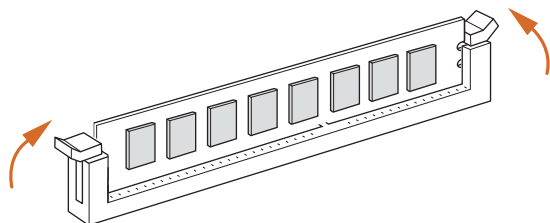
1



2



3



2.4 Expansion Slots (PCI Express Slots)

There are 5 PCI Express slots on the motherboard.



Before installing an expansion card, please make sure that the power supply is switched off or the power cord is unplugged. Please read the documentation of the expansion card and make necessary hardware settings for the card before you start the installation.

PCIe slots:

PCIE1 (PCIe 3.0 x16 slot) is used for PCI Express x16 lane width graphics cards.

PCIE2 (PCIe 3.0 x1 slot) is used for PCI Express x1 lane width cards.

PCIE3 (PCIe 3.0 x16 slot) is used for PCI Express x8 lane width graphics cards.

PCIE4 (PCIe 3.0 x1 slot) is used for PCI Express x1 lane width cards.

PCIE5 (PCIe 3.0 x16 slot) is used for PCI Express x4 lane width graphics cards.

PCIe Slot Configurations

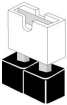
	PCIE1	PCIE3	PCIE5
Single Graphics Card	x16	N/A	N/A
Two Graphics Cards in CrossFireX™ or SLI™ Mode	x8	x8	N/A
Three Graphics Cards in 3-Way CrossFireX™ Mode	x8	x4	x4



For a better thermal environment, please connect a chassis fan to the motherboard's chassis fan connector (CHA_FAN1~6/WP) when using multiple graphics cards.

2.5 Jumpers Setup

The illustration shows how jumpers are setup. When the jumper cap is placed on the pins, the jumper is “Short”. If no jumper cap is placed on the pins, the jumper is “Open”.



Short



Open

Clear CMOS Jumper
(CLRMOS1)
(see p.9, No. 25)



2-pin Jumper

Short: Clear CMOS
Open: Default

CLRMOS1 allows you to clear the data in CMOS. The data in CMOS includes system setup information such as system password, date, time, and system setup parameters. To clear and reset the system parameters to default setup, please turn off the computer and unplug the power cord, then use a jumper cap to short the pins on CLRMOS1 for 3 seconds. Please remember to remove the jumper cap after clearing the CMOS. If you need to clear the CMOS when you just finish updating the BIOS, you must boot up the system first, and then shut it down before you do the clear-CMOS action.



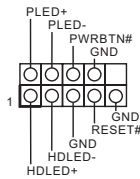
The Clear CMOS Button has the same function as the Clear CMOS jumper.

2.6 Onboard Headers and Connectors



Onboard headers and connectors are NOT jumpers. Do NOT place jumper caps over these headers and connectors. Placing jumper caps over the headers and connectors will cause permanent damage to the motherboard.

System Panel Header
(9-pin PANEL1)
(see p.9, No. 22)



Connect the power button, reset button and system status indicator on the chassis to this header according to the pin assignments below. Note the positive and negative pins before connecting the cables.



PWRBTN (Power Button):

Connect to the power button on the chassis front panel. You may configure the way to turn off your system using the power button.

RESET (Reset Button):

Connect to the reset button on the chassis front panel. Press the reset button to restart the computer if the computer freezes and fails to perform a normal restart.

PLED (System Power LED):

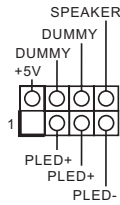
Connect to the power status indicator on the chassis front panel. The LED is on when the system is operating. The LED keeps blinking when the system is in S1/S3 sleep state. The LED is off when the system is in S4 sleep state or powered off (S5).

HDLED (Hard Drive Activity LED):

Connect to the hard drive activity LED on the chassis front panel. The LED is on when the hard drive is reading or writing data.

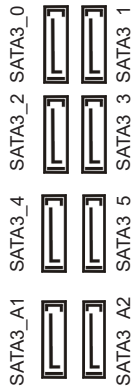
The front panel design may differ by chassis. A front panel module mainly consists of power button, reset button, power LED, hard drive activity LED, speaker and etc. When connecting your chassis front panel module to this header, make sure the wire assignments and the pin assignments are matched correctly.

Power LED and Speaker
Header
(7-pin SPK_PLED1)
(see p.9, No. 20)



Please connect the
chassis power LED and
the chassis speaker to this
header.

Serial ATA3 Connectors
(SATA3_0_1:
see p.9, No. 14)
(SATA3_2_3:
see p.9, No. 15)
(SATA3_4_5:
see p.9, No. 16)
(SATA3_A1_A2:
see p.9, No. 17)



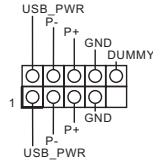
These eight SATA3
connectors support SATA
data cables for internal
storage devices with up to
6.0 Gb/s data transfer rate.
* M2_1, SATA3_0 and
SATA3_1 share lanes. If
either one of them is in
use, the others will be
disabled.

* If M2_2 is occupied by
a SATA-type M.2 device,
SATA3_3 will be disabled.

* M2_3, SATA3_4 and
SATA3_5 share lanes. If
either one of them is in
use, the others will be
disabled.

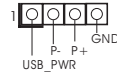
To minimize the boot
time, use Intel® Z390 SATA
ports (SATA3_0) for your
bootable devices.

USB 2.0 Headers
(9-pin USB_1_2)
(see p.9, No. 26)

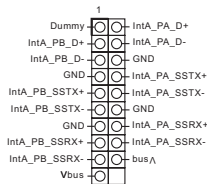


There are two USB 2.0 headers on this motherboard.

(4-pin USB3)
(see p.9, No. 27)

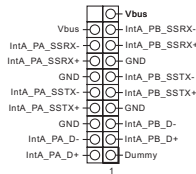


USB 3.2 Gen1 Headers
(19-pin USB3_5_6)
(see p.9, No. 10)

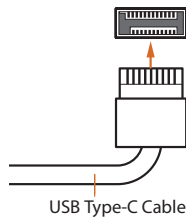


There are two headers on this motherboard. Each USB 3.2 Gen1 header can support two ports.

(19-pin USB3_7_8)
(see p.9, No. 9)

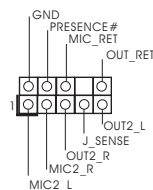


Front Panel Type C USB
3.2 Gen2 Header
(20-pin USB31_TC_2)
(see p.9, No. 12)



There is one Front Panel Type C USB 3.2 Gen2 Header on this motherboard. This header is used for connecting a USB 3.2 Gen2 module for additional USB 3.2 Gen2 ports.

Front Panel Audio Header
(9-pin HD_AUDIO1)
(see p.9, No. 33)



This header is for connecting audio devices to the front audio panel.



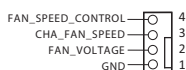
1. High Definition Audio supports Jack Sensing, but the panel wire on the chassis must support HDA to function correctly. Please follow the instructions in our manual and chassis manual to install your system.
2. If you use an AC'97 audio panel, please install it to the front panel audio header by the steps below:
 - A. Connect Mic_IN (MIC) to MIC2_L.
 - B. Connect Audio_R (RIN) to OUT2_R and Audio_L (LIN) to OUT2_L.
 - C. Connect Ground (GND) to Ground (GND).
 - D. MIC_RET and OUT_RET are for the HD audio panel only. You don't need to connect them for the AC'97 audio panel.
 - E. To activate the front mic, go to the "FrontMic" Tab in the Realtek Control panel and adjust "Recording Volume".

Chassis/Water Pump Fan

Connectors

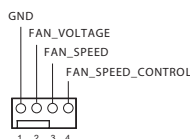
(4-pin CHA_FAN1/WP)

(see p.9, No. 34)



(4-pin CHA_FAN2/WP)

(see p.9, No. 29)

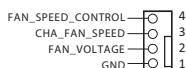


(4-pin CHA_FAN3/WP)

(see p.9, No. 18)

(4-pin CHA_FAN4/WP)

(see p.9, No. 8)

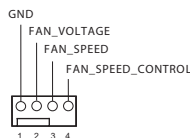


(4-pin CHA_FAN5/WP)

(see p.9, No. 11)

(4-pin CHA_FAN6/WP)

(see p.9, No. 13)



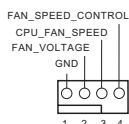
This motherboard

provides six 4-Pin water cooling chassis fan connectors. If you plan to connect a 3-Pin chassis water cooler fan, please connect it to Pin 1-3.

CPU Fan Connector

(4-pin CPU_FAN1)

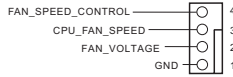
(see p.9, No. 3)



This motherboard pro-

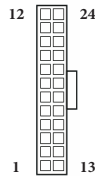
vides a 4-Pin CPU fan (Quiet Fan) connector. If you plan to connect a 3-Pin CPU fan, please connect it to Pin 1-3.

CPU/Water Pump Fan
Connector
(4-pin CPU_FAN2/WP)
(see p.9, No. 4)



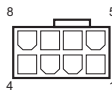
This motherboard provides a 4-Pin water cooling CPU fan connector. If you plan to connect a 3-Pin CPU water cooler fan, please connect it to Pin 1-3.

ATX Power Connector
(24-pin ATXPWR1)
(see p.9, No. 7)



This motherboard provides a 24-pin ATX power connector. To use a 20-pin ATX power supply, please plug it along Pin 1 and Pin 13.

ATX 12V Power
Connector
(8-pin ATX12V1)
(see p.9, No. 2)



This motherboard provides an 8-pin ATX 12V power connector. To use a 4-pin ATX power supply, please plug it along Pin 1 and Pin 5.

***Warning: Please make sure that the power cable connected is for the CPU and not the graphics card. Do not plug the PCIe power cable to this connector.**

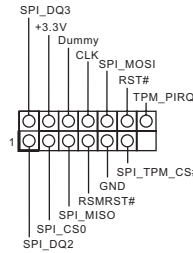
ATX 12V Power
Connector
(4-pin ATX12V2)
(see p.9, No. 1)



Please connect an ATX 12V power supply to this connector.

*The power supply plug fits into this connector in only one orientation.

SPI TPM Header
(13-pin SPI_TPM_J1)
(see p.9, No. 19)



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

Thunderbolt AIC
Connector
(5-pin TB1)
(see p.9, No. 28)



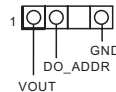
Please connect a Thunderbolt™ add-in card (AIC) to the Thunderbolt AIC connector via the GPIO cable.
*Please install the Thunderbolt™ AIC card to PCIE5 (default slot).

RGB LED Headers
(4-pin RGB_HEADER1)
(see p.9, No. 31)
(4-pin RGB_HEADER2)
(see p.9, No. 30)



RGB header is used to connect RGB LED extension cable which allows users to choose from various LED lighting effects.
Caution: Never install the RGB LED cable in the wrong orientation; otherwise, the cable may be damaged.
*Please refer to page 67 for further instructions on this header.

Addressable LED Header
(3-pin ADDR_LED1)
(see p.9, No. 32)



This header is used to connect Addressable LED extension cable which allows users to choose from various LED lighting effects.
Caution: Never install the Addressable LED cable in the wrong orientation; otherwise, the cable may be damaged.
*Please refer to page 68 for further instructions on this header.

2.7 Smart Switches

The motherboard has three smart switches: Power Button, Reset Button and Clear CMOS Button, allowing users to quickly turn on/off the system, reset the system or clear the CMOS values.

Power Button
(PWRBTN1)
(see p.9, No. 23)



Power Button allows users to quickly turn on/off the system.

Reset Button
(RSTBTN1)
(see p.9, No. 24)



Reset Button allows users to quickly reset the system.

Clear CMOS Button
(CLRBTN1)
(see p.11, No. 19)



Clear CMOS Button allows users to quickly clear the CMOS values.



This function is workable only when you power off your computer and unplug the power supply.

2.8 Dr. Debug

Dr. Debug is used to provide code information, which makes troubleshooting even easier. Please see the diagrams below for reading the Dr. Debug codes.

Code	Description
0x10	PEI_CORE_STARTED
0x11	PEI_CAR_CPU_INIT
0x15	PEI_CAR_NB_INIT
0x19	PEI_CAR_SB_INIT
0x31	PEI_MEMORY_INSTALLED
0x32	PEI_CPU_INIT
0x33	PEI_CPU_CACHE_INIT
0x34	PEI_CPU_AP_INIT
0x35	PEI_CPU_BSP_SELECT
0x36	PEI_CPU_SMM_INIT
0x37	PEI_MEM_NB_INIT
0x3B	PEI_MEM_SB_INIT
0x4F	PEI_DXE_IPL_STARTED
0x60	DXE_CORE_STARTED
0x61	DXE_NVRAM_INIT
0x62	DXE_SBRUN_INIT

0x63	DXE_CPU_INIT
0x68	DXE_NB_HB_INIT
0x69	DXE_NB_INIT
0x6A	DXE_NB_SMM_INIT
0x70	DXE_SB_INIT
0x71	DXE_SB_SMM_INIT
0x72	DXE_SB_DEVICES_INIT
0x78	DXE_ACPI_INIT
0x79	DXE_CSM_INIT
0x90	DXE_BDS_STARTED
0x91	DXE_BDS_CONNECT_DRIVERS
0x92	DXE_PCI_BUS_BEGIN
0x93	DXE_PCI_BUS_HPC_INIT
0x94	DXE_PCI_BUS_ENUM
0x95	DXE_PCI_BUS_REQUEST_RESOURCES
0x96	DXE_PCI_BUS_ASSIGN_RESOURCES
0x97	DXE_CON_OUT_CONNECT
0x98	DXE_CON_IN_CONNECT

0x99	DXE_SIO_INIT
0x9A	DXE_USB_BEGIN
0x9B	DXE_USB_RESET
0x9C	DXE_USB_DETECT
0x9D	DXE_USB_ENABLE
0xA0	DXE_IDE_BEGIN
0xA1	DXE_IDE_RESET
0xA2	DXE_IDE_DETECT
0xA3	DXE_IDE_ENABLE
0xA4	DXE_SCSI_BEGIN
0xA5	DXE_SCSI_RESET
0xA6	DXE_SCSI_DETECT
0xA7	DXE_SCSI_ENABLE
0xA8	DXE_SETUP_VERIFYING_PASSWORD
0xA9	DXE_SETUP_START
0xAB	DXE_SETUP_INPUT_WAIT
0xAD	DXE_READY_TO_BOOT
0xAE	DXE_LEGACY_BOOT

0xAF	DXE_EXIT_BOOT_SERVICES
0xB0	RT_SET_VIRTUAL_ADDRESS_MAP_BEGIN
0xB1	RT_SET_VIRTUAL_ADDRESS_MAP_END
0xB2	DXE_LEGACY_OPROM_INIT
0xB3	DXE_RESET_SYSTEM
0xB4	DXE_USB_HOTPLUG
0xB5	DXE_PCI_BUS_HOTPLUG
0xB6	DXE_NVRAM_CLEANUP
0xB7	DXE_CONFIGURATION_RESET
0xF0	PEI_RECOVERY_AUTO
0xF1	PEI_RECOVERY_USER
0xF2	PEI_RECOVERY_STARTED
0xF3	PEI_RECOVERY_CAPSULE_FOUND
0xF4	PEI_RECOVERY_CAPSULE_LOADED
0xE0	PEI_S3_STARTED
0xE1	PEI_S3_BOOT_SCRIPT
0xE2	PEI_S3_VIDEO_REPOST

0xE3 PEI_S3_OS_WAKE

0x50 PEI_MEMORY_INVALID_TYPE

0x53 PEI_MEMORY_NOT_DETECTED

0x55 PEI_MEMORY_NOT_INSTALLED

0x57 PEI_CPU_MISMATCH

0x58 PEI_CPU_SELF_TEST_FAILED

0x59 PEI_CPU_NO_MICROCODE

0x5A PEI_CPU_ERROR

0x5B PEI_RESET_NOT_AVAILABLE

0xD0 DXE_CPU_ERROR

0xD1 DXE_NB_ERROR

0xD2 DXE_SB_ERROR

0xD3 DXE_ARCH_PROTOCOL_NOT_AVAILABLE

0xD4 DXE_PCI_BUS_OUT_OF_RESOURCES

0xD5 DXE_LEGACY_OPROM_NO_SPACE

0xD6 DXE_NO_CON_OUT

0xD7 DXE_NO_CON_IN

0xD8	DXE_INVALID_PASSWORD
0xD9	DXE_BOOT_OPTION_LOAD_ERROR
0xDA	DXE_BOOT_OPTION_FAILED
0xDB	DXE_FLASH_UPDATE_FAILED
0xDC	DXE_RESET_NOT_AVAILABLE
0xE8	PEI_MEMORY_S3_RESUME_FAILED
0xE9	PEI_S3_RESUME_PPI_NOT_FOUND
0xEA	PEI_S3_BOOT_SCRIPT_ERROR
0xEB	PEI_S3_OS_WAKE_ERROR

2.9 Post Status Checker

Post Status Checker (PSC) diagnoses the computer when users power on the machine. It emits a red light to indicate whether the CPU, memory, VGA or storage is dysfunctional. The lights go off if the four mentioned above are functioning normally.

2.10 SLI™ and Quad SLI™ Operation Guide

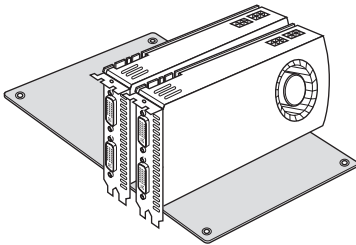
This motherboard supports NVIDIA® SLI™ and Quad SLI™ (Scalable Link Interface) technology that allows you to install up to two identical PCI Express x16 graphics cards.



Requirements

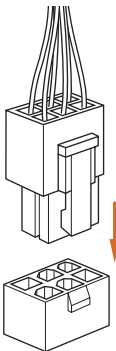
1. You should only use identical SLI™-ready graphics cards that are NVIDIA® certified.
2. Make sure that your graphics card driver supports NVIDIA® SLI™ technology. Download the drivers from the NVIDIA® website: www.nvidia.com
3. Make sure that your power supply unit (PSU) can provide at least the minimum power your system requires. It is recommended to use a NVIDIA® certified PSU. Please refer to the NVIDIA® website for details.

2.10.1 Installing Two SLI™-Ready Graphics Cards



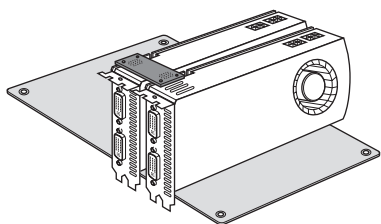
Step 1

Insert one graphics card into PCIE1 slot and the other graphics card to PCIE3 slot. Make sure that the cards are properly seated on the slots.



Step 2

If required, connect the auxiliary power source to the PCI Express graphics cards.

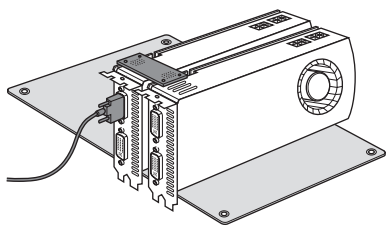


Step 3

Align and insert the ASRock SLI_HB_Bridge_2S Card to the goldfingers on each graphics card. Make sure the ASRock SLI_HB_Bridge_2S Card is firmly in place.



ASRock SLI_HB_Bridge_2S Card



Step 4

Connect a VGA cable or a DVI cable to the monitor connector or the DVI connector of the graphics card that is inserted to PCIE1 slot.

2.10.2 Driver Installation and Setup

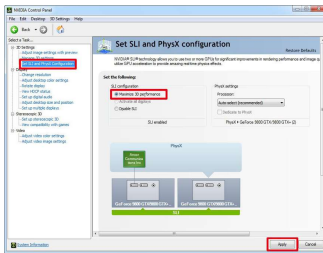
Install the graphics card drivers to your system. After that, you can enable the Multi-Graphics Processing Unit (GPU) in the NVIDIA® nView system tray utility. Please follow the below procedures to enable the multi-GPU.

For SLI™ and Quad SLI™ mode



Step 1

Double-click the **NVIDIA Control Panel** icon in the Windows® system tray.



Step 2

In the left pane, click **Set SLI and PhysX configuration**. Then select **Maximize 3D performance** and click **Apply**.

Step 3

Reboot your system.

Step 4

You can freely enjoy the benefits of SLI™ or Quad SLI™.

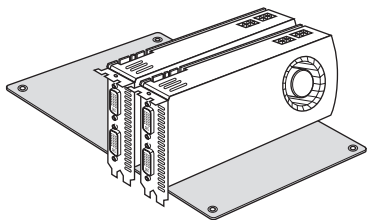
2.11 CrossFireX™, 3-Way CrossFireX™ and Quad CrossFireX™ Operation Guide

This motherboard supports CrossFireX™, 3-way CrossFireX™ and Quad CrossFireX™ that allows you to install up to three identical PCI Express x16 graphics cards.



1. You should only use identical CrossFireX™-ready graphics cards that are AMD certified.
2. Make sure that your graphics card driver supports AMD CrossFireX™ technology. Download the drivers from the AMD's website: www.amd.com
3. Make sure that your power supply unit (PSU) can provide at least the minimum power your system requires. It is recommended to use a AMD certified PSU. Please refer to the AMD's website for details.
4. If you pair a 12-pipe CrossFireX™ Edition card with a 16-pipe card, both cards will operate as 12-pipe cards while in CrossFireX™ mode.
5. Different CrossFireX™ cards may require different methods to enable CrossFireX™. Please refer to AMD graphics card manuals for detailed installation guide.

2.11.1 Installing Two CrossFireX™-Ready Graphics Cards



Step 1

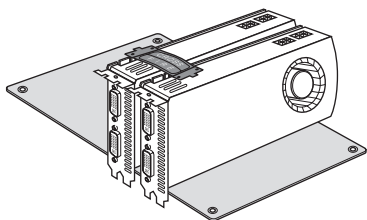
Insert one graphics card into PCIE1 slot and the other graphics card to PCIE3 slot. Make sure that the cards are properly seated on the slots.

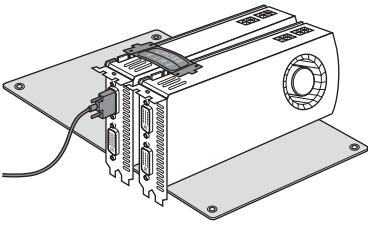


CrossFire Bridge

Step 2

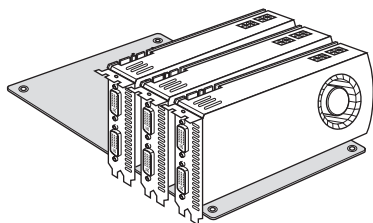
Connect two graphics cards by installing a CrossFire Bridge on the CrossFire Bridge Interconnects on the top of the graphics cards. (The CrossFire Bridge is provided with the graphics card you purchase, not bundled with this motherboard. Please refer to your graphics card vendor for details.)



**Step 3**

Connect a VGA cable or a DVI cable to the monitor connector or the DVI connector of the graphics card that is inserted to PCIe1 slot.

2.11.2 Installing Three CrossFireX™-Ready Graphics Cards



Step 1

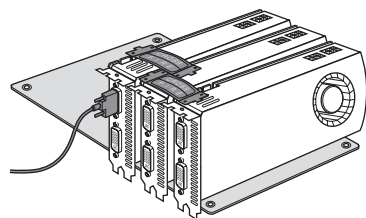
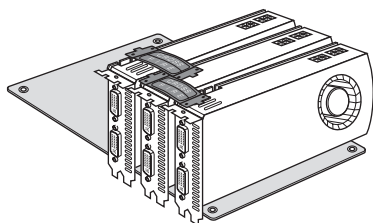
Insert one graphics card into PCIE1 slot, another graphics card to PCIE3 slot, and the other graphics card to PCIE5 slot. Make sure that the cards are properly seated on the slots.



CrossFire Bridge

Step 2

Use one CrossFire Bridge to connect the graphics cards on PCIE1 and PCIE3 slots, and use the other CrossFire Bridge to connect the graphics cards on PCIE3 and PCIE5 slots. (The CrossFire Bridge is provided with the graphics card you purchase, not bundled with this motherboard. Please refer to your graphics card vendor for details.)



Step 3

Connect a VGA cable or a DVI cable to the monitor connector or the DVI connector of the graphics card that is inserted to PCIE1 slot.

2.11.3 Driver Installation and Setup

Step 1

Power on your computer and boot into OS.

Step 2

Remove the AMD drivers if you have any VGA drivers installed in your system.



The Catalyst Uninstaller is an optional download. We recommend using this utility to uninstall any previously installed Catalyst drivers prior to installation. Please check AMD's website for AMD driver updates.

Step 3

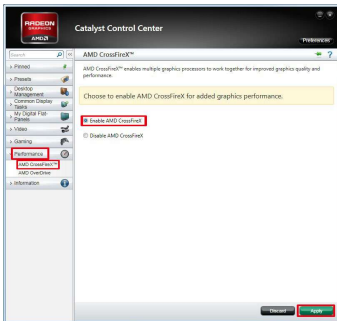
Install the required drivers and CATALYST Control Center then restart your computer. Please check AMD's website for details.



AMD Catalyst Control Center

Step 4

Double-click the **AMD Catalyst Control Center** icon in the Windows® system tray.



Step 5

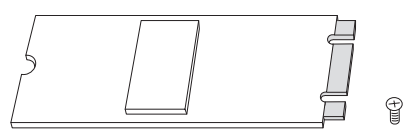
In the left pane, click **Performance** and then **AMD CrossFireX™**. Then select **Enable AMD CrossFireX** and click **Apply**. Select the GPU number according to your graphics card and click **Apply**.

2.12 M.2_SSD (NGFF) Module Installation Guide (M2_1)

The M.2, also known as the Next Generation Form Factor (NGFF), is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The Ultra M.2 Socket (M2_1) supports SATA3 6.0 Gb/s module and M.2 PCI Express module up to Gen3 x4 (32 Gb/s).

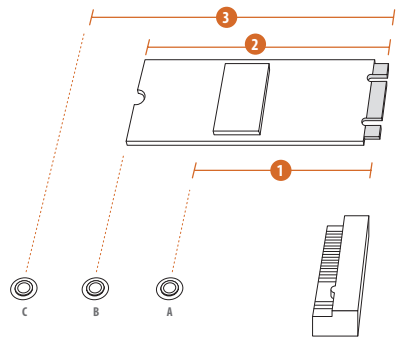
* M2_1, SATA3_0 and SATA3_1 share lanes. If either one of them is in use, the others will be disabled.

Installing the M.2_SSD (NGFF) Module



Step 1

Prepare a M.2_SSD (NGFF) module and the screw.



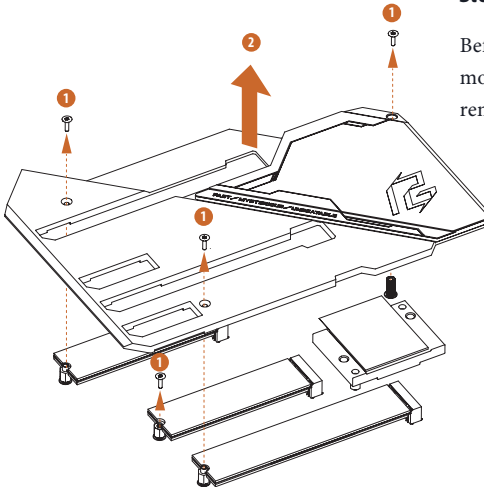
Step 2

Depending on the PCB type and length of your M.2_SSD (NGFF) module, find the corresponding nut location to be used.

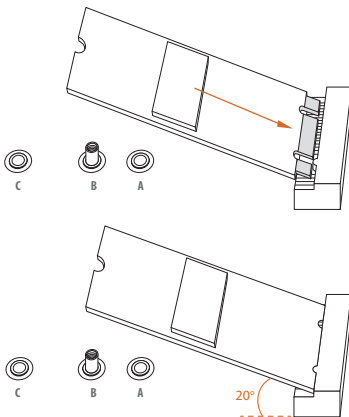
No.	1	2	3
Nut Location	A	B	C
PCB Length	4.2cm	6cm	8cm
Module Type	Type 2242	Type2260	Type 2280

Step 3

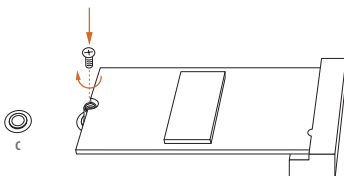
Before installing a M.2 (NGFF) SSD module, please loosen the screws to remove the M.2 heatsink.

**Step 4**

Prepare the M.2 standoff that comes with the package. Then hand tighten the standoff into the desired nut location on the motherboard. Align and gently insert the M.2 (NGFF) SSD module into the M.2 slot. Please be aware that the M.2 (NGFF) SSD module only fits in one orientation.

**Step 5**

Tighten the screw with a screwdriver to secure the module into place. Please do not overtighten the screw as this might damage the module.



M.2_SSD (NGFF) Module Support List

Vendor	Interface	P/N
ADATA	SATA3	AXNS381E-128GM-B
ADATA	SATA3	AXNS381E-256GM-B
ADATA	SATA3	ASU800NS38-256GT-C
ADATA	SATA3	ASU800NS38-512GT-C
ADATA	PCIe3 x4	ASX7000NP-128GT-C
ADATA	PCIe3 x4	ASX8000NP-256GM-C
ADATA	PCIe3 x4	ASX7000NP-256GT-C
ADATA	PCIe3 x4	ASX8000NP-512GM-C
ADATA	PCIe3 x4	ASX7000NP-512GT-C
Apacer	PCIe3 x4	AP240GZ280
Corsair	PCIe3 x4	CSSD-F240GBMP500
Crucial	SATA3	CT120M500SSD4
Crucial	SATA3	CT240M500SSD4
Intel	SATA3	Intel SSDSCKGW080A401/80G
Intel	PCIe3 x4	SSDPEKKF256G7
Intel	PCIe3 x4	SSDPEKKF512G7
Kingston	SATA3	SM2280S3
Kingston	PCIe3 x4	SKC1000/480G
Kingston	PCIe2 x4	SH2280S3/480G
OCZ	PCIe3 x4	RVD400 -M2280-512G (NVME)
PATRIOT	PCIe3 x4	PH240GPM280SSDR NVME
Plextor	PCIe3 x4	PX-128M8PeG
Plextor	PCIe3 x4	PX-1TM8PeG
Plextor	PCIe3 x4	PX-256M8PeG
Plextor	PCIe3 x4	PX-512M8PeG
Plextor	PCIe	PX-G256M6e
Plextor	PCIe	PX-G512M6e
Samsung	PCIe3 x4	SM961 MZVPW128HEGM (NVM)
Samsung	PCIe3 x4	PM961 MZVLW128HEGR (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250) (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250BW) (NVME)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe3 x4	SM951 (MZHPV256HDGL)
Samsung	PCIe3 x4	SM951 (MZHPV512HDGL)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe x4	XP941-512G (MZHPU512HCGL)
SanDisk	PCIe	SD6PP4M-128G
SanDisk	PCIe	SD6PP4M-256G
Team	SATA3	TM4PS4128GMC105
Team	SATA3	TM4PS4256GMC105
Team	SATA3	TM8PS4128GMC105
Team	SATA3	TM8PS4256GMC105
TEAM	PCIe3 x4	TM8FP2240G0C101

TEAM	PCIe3 x4	TM8FP2480GC110
Transcend	SATA3	TS256GMTS400
Transcend	SATA3	TS512GMTS600
Transcend	SATA3	TS512GMTS800
V-Color	SATA3	VLM100-120G-2280B-RD
V-Color	SATA3	VLM100-240G-2280RGB
V-Color	SATA3	VSM100-240G-2280
V-Color	SATA3	VLM100-240G-2280B-RD
WD	SATA3	WDS100T1B0B-00AS40
WD	SATA3	WDS240G1G0B-00RC30
WD	PCIe3 x4	WDS256G1X0C-00ENX0 (NVME)
WD	PCIe3 x4	WDS512G1X0C-00ENX0 (NVME)

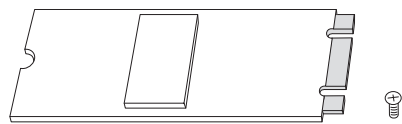
For the latest updates of M.2_SSD (NFGG) module support list, please visit our website for details: <http://www.asrock.com>

2.13 M.2_SSD (NGFF) Module Installation Guide (M2_2)

The M.2, also known as the Next Generation Form Factor (NGFF), is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The Ultra M.2 Socket (M2_2) supports SATA3 6.0 Gb/s module and M.2 PCI Express module up to Gen3 x4 (32 Gb/s).

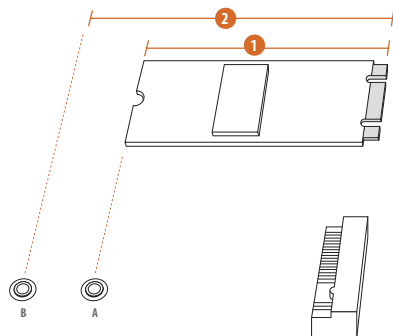
* If M2_2 is occupied by a SATA-type M.2 device, SATA3_3 will be disabled.

Installing the M.2_SSD (NGFF) Module



Step 1

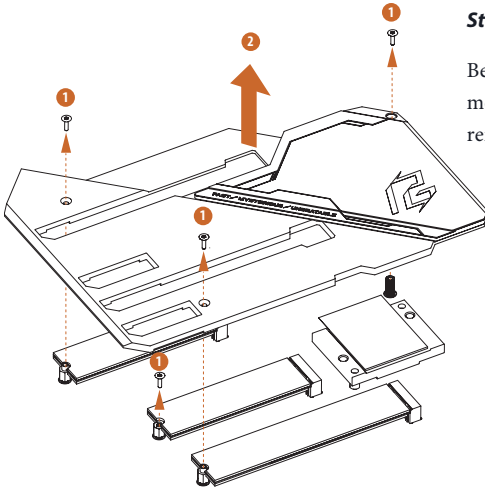
Prepare a M.2_SSD (NGFF) module and the screw.



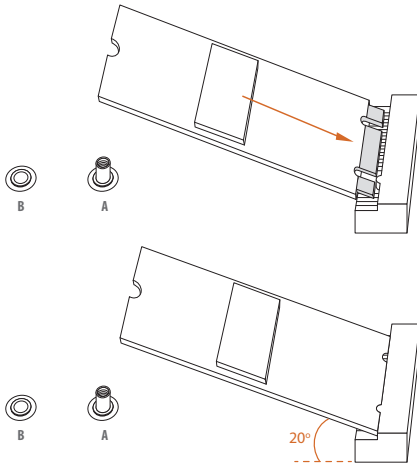
Step 2

Depending on the PCB type and length of your M.2_SSD (NGFF) module, find the corresponding nut location to be used.

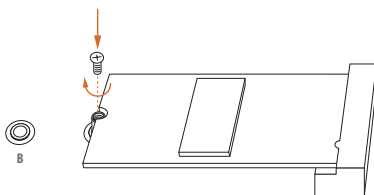
No.	1	2
Nut Location	A	B
PCB Length	6cm	8cm
Module Type	Type2260	Type 2280

**Step 3**

Before installing a M.2 (NGFF) SSD module, please loosen the screws to remove the M.2 heatsink.

**Step 4**

Prepare the M.2 standoff that comes with the package. Then hand tighten the standoff into the desired nut location on the motherboard. Align and gently insert the M.2 (NGFF) SSD module into the M.2 slot. Please be aware that the M.2 (NGFF) SSD module only fits in one orientation.

**Step 5**

Tighten the screw with a screwdriver to secure the module into place. Please do not overtighten the screw as this might damage the module.

M.2_SSD (NGFF) Module Support List

Vendor	Interface	P/N
ADATA	SATA3	AXNS381E-128GM-B
ADATA	SATA3	AXNS381E-256GM-B
ADATA	SATA3	ASU800NS38-256GT-C
ADATA	SATA3	ASU800NS38-512GT-C
ADATA	PCIe3 x4	ASX7000NP-128GT-C
ADATA	PCIe3 x4	ASX8000NP-256GM-C
ADATA	PCIe3 x4	ASX7000NP-256GT-C
ADATA	PCIe3 x4	ASX8000NP-512GM-C
ADATA	PCIe3 x4	ASX7000NP-512GT-C
Apacer	PCIe3 x4	AP240GZ280
Corsair	PCIe3 x4	CSSD-F240GBMP500
Crucial	SATA3	CT120M500SSD4
Crucial	SATA3	CT240M500SSD4
Intel	SATA3	Intel SSDSCKGW080A401/80G
Intel	PCIe3 x4	SSDPEKKF256G7
Intel	PCIe3 x4	SSDPEKKF512G7
Kingston	SATA3	SM2280S3
Kingston	PCIe3 x4	SKC1000/480G
Kingston	PCIe2 x4	SH2280S3/480G
OCZ	PCIe3 x4	RVD400 -M2280-512G (NVME)
PATRIOT	PCIe3 x4	PH240GPM280SSDR NVME
Plextor	PCIe3 x4	PX-128M8PeG
Plextor	PCIe3 x4	PX-1TM8PeG
Plextor	PCIe3 x4	PX-256M8PeG
Plextor	PCIe3 x4	PX-512M8PeG
Plextor	PCIe	PX-G256M6e
Plextor	PCIe	PX-G512M6e
Samsung	PCIe3 x4	SM961 MZVPW128HEGM (NVM)
Samsung	PCIe3 x4	PM961 MZVLW128HEGR (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250) (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250BW) (NVME)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe3 x4	SM951 (MZHPV256HDGL)
Samsung	PCIe3 x4	SM951 (MZHPV512HDGL)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe x4	XP941-512G (MZHPU512HCGL)
SanDisk	PCIe	SD6PP4M-128G
SanDisk	PCIe	SD6PP4M-256G
Team	SATA3	TM8PS4128GMC105
Team	SATA3	TM8PS4256GMC105

TEAM	PCIe3 x4	TM8FP2240G0C101
TEAM	PCIe3 x4	TM8FP2480GC110
Transcend	SATA3	TS512GMTS600
Transcend	SATA3	TS512GMTS800
V-Color	SATA3	VLM100-120G-2280B-RD
V-Color	SATA3	VLM100-240G-2280RGB
V-Color	SATA3	VSM100-240G-2280
V-Color	SATA3	VLM100-240G-2280B-RD
WD	SATA3	WDS100T1B0B-00AS40
WD	SATA3	WDS240G1G0B-00RC30
WD	PCIe3 x4	WDS256G1X0C-00ENX0 (NVME)
WD	PCIe3 x4	WDS512G1X0C-00ENX0 (NVME)

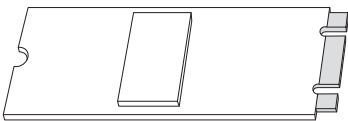
For the latest updates of M.2_SSD (NFGG) module support list, please visit our website for details: <http://www.asrock.com>

2.14 M.2_SSD (NGFF) Module Installation Guide (M2_3)

The M.2, also known as the Next Generation Form Factor (NGFF), is a small size and versatile card edge connector that aims to replace mPCIe and mSATA. The Ultra M.2 Socket (M2_3) supports M Key type 2230/2242/2260/2280/22110 M.2 SATA3 6.0 Gb/s module and M.2 PCI Express module up to Gen3 x4 (32 Gb/s).

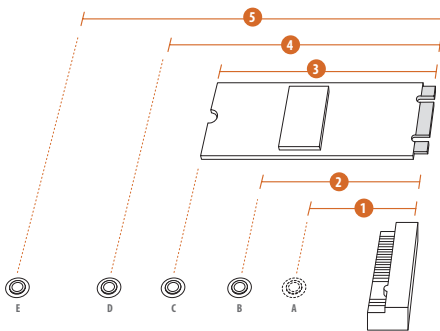
* M2_3, SATA3_4 and SATA3_5 share lanes. If either one of them is in use, the others will be disabled.

Installing the M.2_SSD (NGFF) Module



Step 1

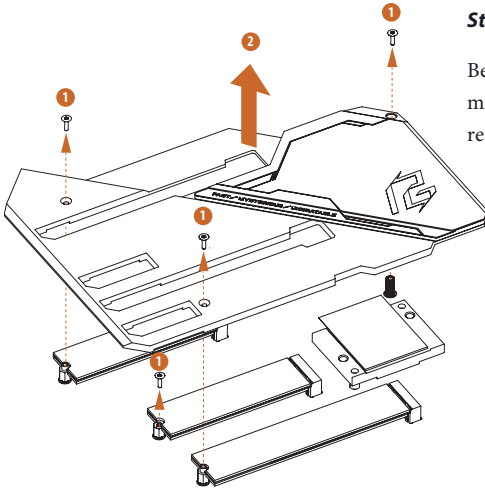
Prepare a M.2_SSD (NGFF) module and the screw.



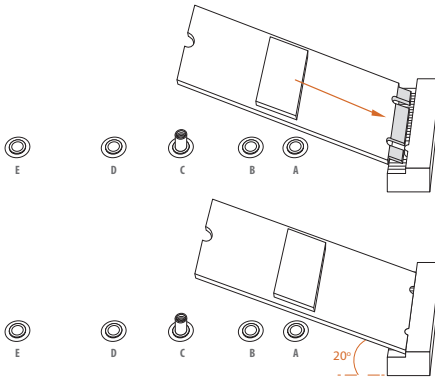
Step 2

Depending on the PCB type and length of your M.2_SSD (NGFF) module, find the corresponding nut location to be used.

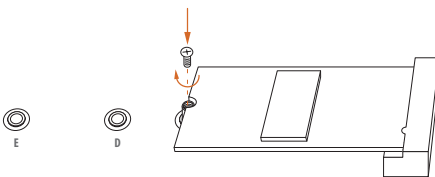
No.	1	2	3	4	5
Nut Location	A	B	C	D	E
PCB Length	3cm	4.2cm	6cm	8cm	11cm
Module Type	Type2230	Type 2242	Type2260	Type 2280	Type 22110

**Step 3**

Before installing a M.2 (NGFF) SSD module, please loosen the screws to remove the M.2 heatsink.

**Step 4**

Prepare the M.2 standoff that comes with the package. Then hand tighten the standoff into the desired nut location on the motherboard. Align and gently insert the M.2 (NGFF) SSD module into the M.2 slot. Please be aware that the M.2 (NGFF) SSD module only fits in one orientation.

**Step 5**

Tighten the screw with a screwdriver to secure the module into place. Please do not overtighten the screw as this might damage the module.

M.2_SSD (NGFF) Module Support List

Vendor	Interface	P/N
ADATA	SATA3	AXNS330E-32GM-B
ADATA	SATA3	AXNS381E-128GM-B
ADATA	SATA3	AXNS381E-256GM-B
ADATA	SATA3	ASU800NS38-256GT-C
ADATA	SATA3	ASU800NS38-512GT-C
ADATA	PCIe3 x4	ASX7000NP-128GT-C
ADATA	PCIe3 x4	ASX8000NP-256GM-C
ADATA	PCIe3 x4	ASX7000NP-256GT-C
ADATA	PCIe3 x4	ASX8000NP-512GM-C
ADATA	PCIe3 x4	ASX7000NP-512GT-C
Apacer	PCIe3 x4	AP240GZ280
Corsair	PCIe3 x4	CSSD-F240GBMP500
Crucial	SATA3	CT120M500SSD4
Crucial	SATA3	CT240M500SSD4
Intel	SATA3	Intel SSDSCCKGW080A401/80G
Intel	PCIe3 x4	SSDPEKKF256G7
Intel	PCIe3 x4	SSDPEKKF512G7
Kingston	SATA3	SM2280S3
Kingston	PCIe3 x4	SKC1000/480G
Kingston	PCIe2 x4	SH2280S3/480G
OCZ	PCIe3 x4	RVD400 -M2280-512G (NVME)
PATRIOT	PCIe3 x4	PH240GPM280SSDR NVME
Plextor	PCIe3 x4	PX-128M8PeG
Plextor	PCIe3 x4	PX-1TM8PeG
Plextor	PCIe3 x4	PX-256M8PeG
Plextor	PCIe3 x4	PX-512M8PeG
Plextor	PCIe	PX-G256M6e
Plextor	PCIe	PX-G512M6e
Samsung	PCIe3 x4	SM961 MZVPW128HEGM (NVM)
Samsung	PCIe3 x4	PM961 MZVLW128HEGR (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250) (NVME)
Samsung	PCIe3 x4	960 EVO (MZ-V6E250BW) (NVME)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe3 x4	SM951 (MZHPV256HDGL)
Samsung	PCIe3 x4	SM951 (MZHPV512HDGL)
Samsung	PCIe3 x4	SM951 (NVME)
Samsung	PCIe x4	XP941-512G (MZHPU512HCGL)
SanDisk	PCIe	SD6PP4M-128G
SanDisk	PCIe	SD6PP4M-256G
Team	SATA3	TM4PS4128GMC105
Team	SATA3	TM4PS4256GMC105
Team	SATA3	TM8PS4128GMC105
Team	SATA3	TM8PS4256GMC105

TEAM	PCIe3 x4	TM8FP2240G0C101
TEAM	PCIe3 x4	TM8FP2480GC110
Transcend	SATA3	TS256GMTS400
Transcend	SATA3	TS512GMTS600
Transcend	SATA3	TS512GMTS800
V-Color	SATA3	VLM100-120G-2280B-RD
V-Color	SATA3	VLM100-240G-2280RGB
V-Color	SATA3	VSM100-240G-2280
V-Color	SATA3	VLM100-240G-2280B-RD
WD	SATA3	WDS100T1B0B-00AS40
WD	SATA3	WDS240G1G0B-00RC30
WD	PCIe3 x4	WDS256G1X0C-00ENX0 (NVME)
WD	PCIe3 x4	WDS512G1X0C-00ENX0 (NVME)

For the latest updates of M.2_SSD (NFGG) module support list, please visit our website for details: <http://www.asrock.com>

Chapter 3 Software and Utilities Operation

3.1 Installing Drivers

The Support CD that comes with the motherboard contains necessary drivers and useful utilities that enhance the motherboard's features.

Running The Support CD

To begin using the support CD, insert the CD into your CD-ROM drive. The CD automatically displays the Main Menu if "AUTORUN" is enabled in your computer. If the Main Menu does not appear automatically, locate and double click on the file "ASRSETUP.EXE" in the Support CD to display the menu.

Drivers Menu

The drivers compatible to your system will be auto-detected and listed on the support CD driver page. Please click **Install All** or follow the order from top to bottom to install those required drivers. Therefore, the drivers you install can work properly.

Utilities Menu

The Utilities Menu shows the application software that the motherboard supports. Click on a specific item then follow the installation wizard to install it.

3.2 Phantom Gaming Tuning

Phantom Gaming Tuning is ASRock's multi purpose software suite with a new interface, more new features and improved utilities.

3.2.1 Installing Phantom Gaming Tuning

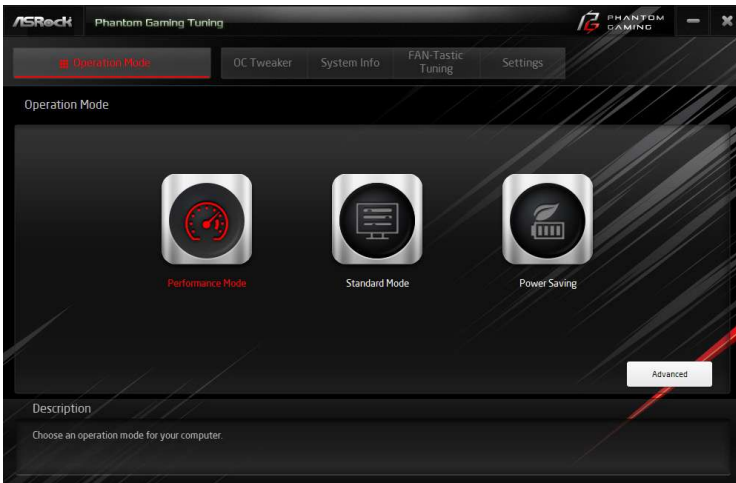
Phantom Gaming Tuning can be downloaded from ASRock Live Update & APP Shop. After the installation, you will find the icon "Phantom Gaming Tuning" on your desktop. Double-click the "Phantom Gaming Tuning"  icon, Phantom Gaming Tuning main menu will pop up.

3.2.2 Using Phantom Gaming Tuning

There are five sections in Phantom Gaming Tuning main menu: Operation Mode, OC Tweaker, System Info, FAN-Tastic Tuning and Settings.

Operation Mode

Choose an operation mode for your computer.



OC Tweaker

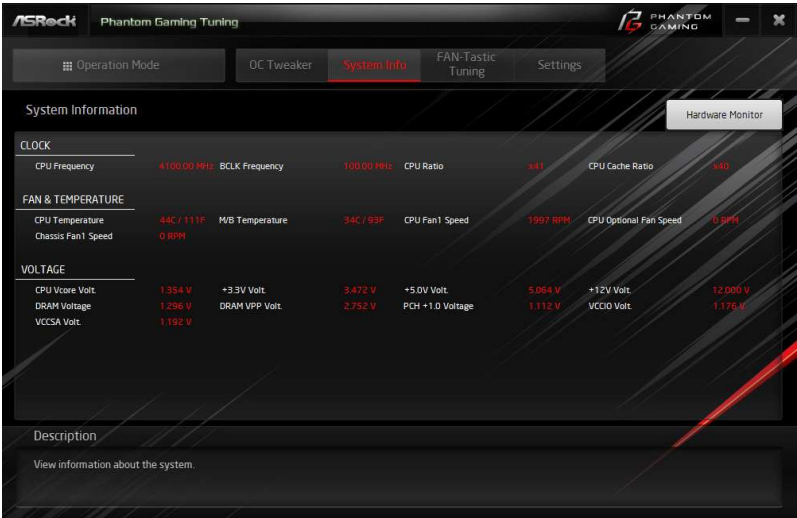
Configurations for overclocking the system.



System Info

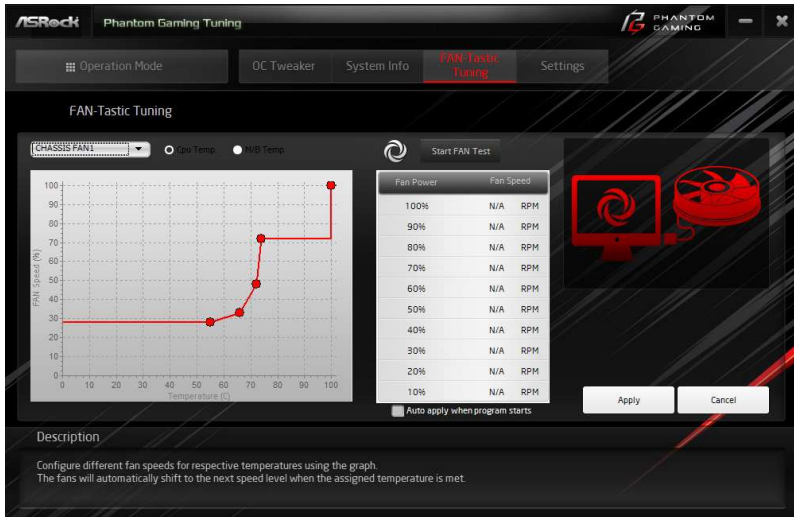
View information about the system.

*The System Browser tab may not appear for certain models.



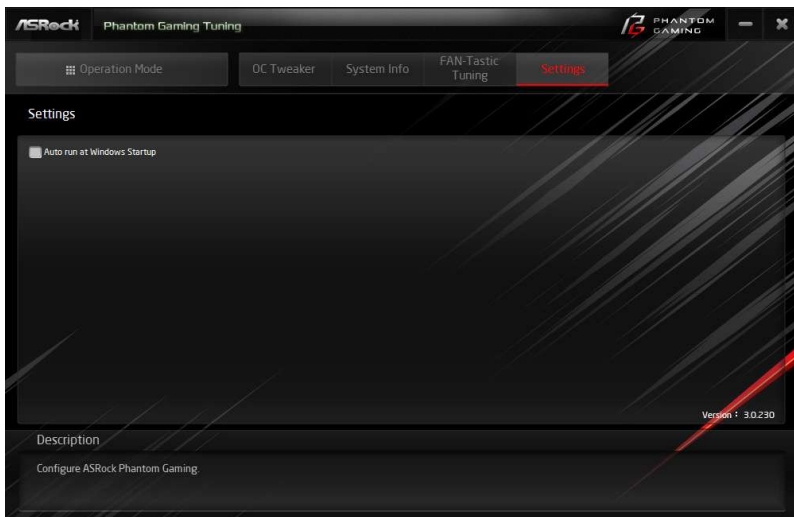
FAN-Tastic Tuning

Configure up to five different fan speeds using the graph. The fans will automatically shift to the next speed level when the assigned temperature is met.



Settings

Configure ASRock Phantom Gaming Tuning. Click to select "Auto run at Windows Startup" if you want Phantom Gaming Tuning to be launched when you start up the Windows operating system.



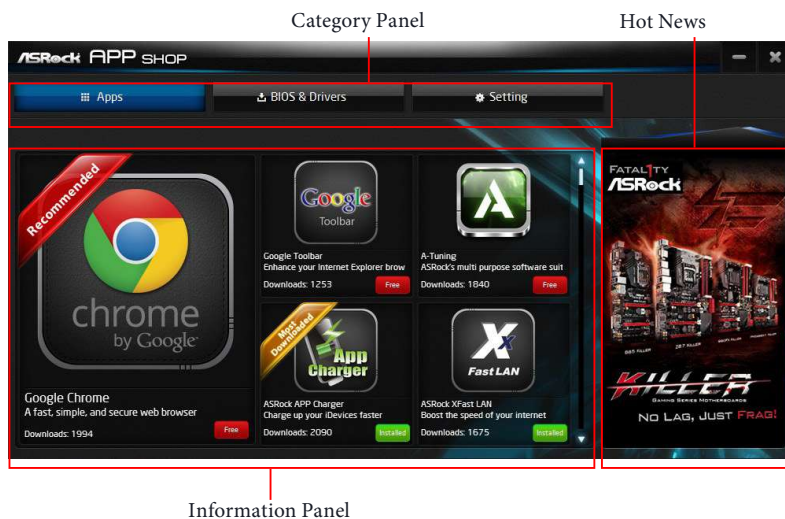
3.3 ASRock Live Update & APP Shop

The ASRock Live Update & APP Shop is an online store for purchasing and downloading software applications for your ASRock computer. You can quickly and easily install various apps and support utilities. With ASRock Live Update & APP Shop, you can optimize your system and keep your motherboard up to date simply with a few clicks.

Double-click  on your desktop to access ASRock Live Update & APP Shop utility.

**You need to be connected to the Internet to download apps from the ASRock Live Update & APP Shop.*

3.3.1 UI Overview



Category Panel: The category panel contains several category tabs or buttons that when selected the information panel below displays the relative information.

Information Panel: The information panel in the center displays data about the currently selected category and allows users to perform job-related tasks.

Hot News: The hot news section displays the various latest news. Click on the image to visit the website of the selected news and know more.

3.3.2 Apps

When the "Apps" tab is selected, you will see all the available apps on screen for you to download.

Installing an App

Step 1

Find the app you want to install.



The most recommended app appears on the left side of the screen. The other various apps are shown on the right. Please scroll up and down to see more apps listed.

You can check the price of the app and whether you have already installed it or not.



- The red icon displays the price or "Free" if the app is free of charge.



- The green "Installed" icon means the app is installed on your computer.

Step 2

Click on the app icon to see more details about the selected app.

Step 3

If you want to install the app, click on the red icon  to start downloading.



Step 4

When installation completes, you can find the green "Installed" icon appears on the upper right corner.



To uninstall it, simply click on the trash can icon .
*The trash icon may not appear for certain apps.

Upgrading an App

You can only upgrade the apps you have already installed. When there is an available new version for your app, you will find the mark of "New Version" appears below the installed app icon.



Step 1

Click on the app icon to see more details.

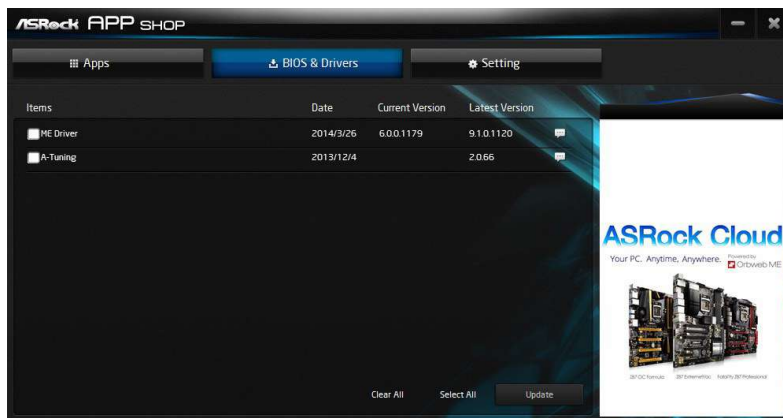
Step 2

Click on the yellow icon  to start upgrading.

3.3.3 BIOS & Drivers

Installing BIOS or Drivers

When the "BIOS & Drivers" tab is selected, you will see a list of recommended or critical updates for the BIOS or drivers. Please update them all soon.



Step 1

Please check the item information before update. Click on  to see more details.

Step 2

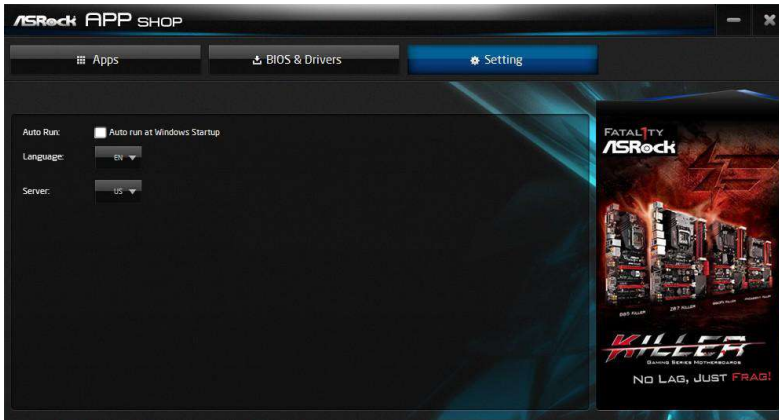
Click to select one or more items you want to update.

Step 3

Click Update to start the update process.

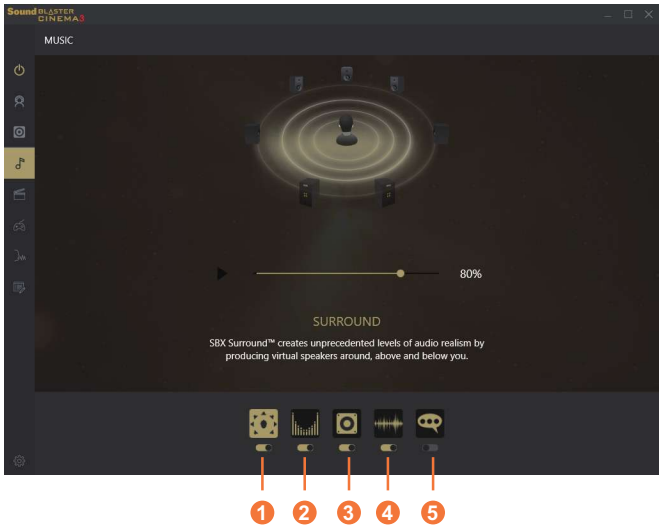
3.3.4 Setting

In the "Setting" page, you can change the language, select the server location, and determine if you want to automatically run the ASRock Live Update & APP Shop on Windows startup.



3.4 Creative SoundBlaster Cinema5

The SoundBlaster™ Cinema5, powered by the SBX Pro Studio technologies, is designed to bring the same great audio experience found in live performances, films, and recording studios to the PC. With this utility, you can easily enhance your audio environment in five modes, including Headphones, Speakers, Music, Movie, Game, Voice and Custom.



There are five functions in SoundBlaster™ Cinema5:

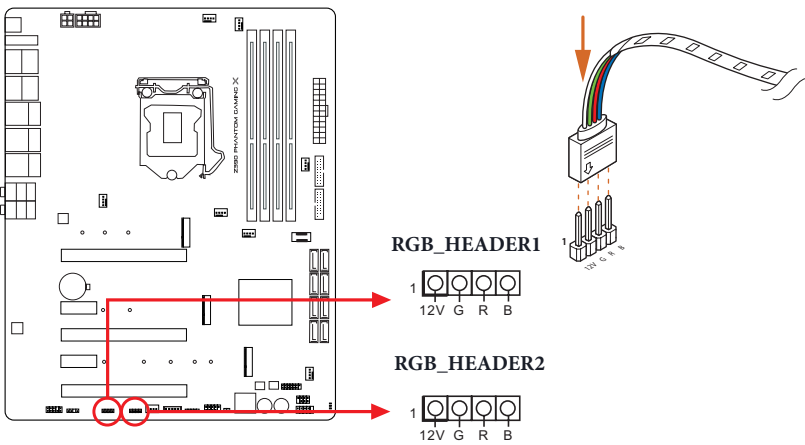
No.	Function	Description
1	Surround	Creating unprecedented levels of audio realism by producing virtual speakers around, above and below you.
2	Crystalizer	Making music sound as good as the artist originally intended by ensuring that every audio detail is heard.
3	Bass	Enhancing bass sound experience by expanding the low frequency tones.
4	Smart Volume	Minimizing abrupt volume changes by automatically adjusting the loudness of your audio playback.
5	Dialog Plus	Enhancing voices in music and movies for drastically clearer vocal range.

3.5 ASRock Polychrome SYNC

ASRock Polychrome SYNC is a lighting control utility specifically designed for unique individuals with sophisticated tastes to build their own stylish colorful lighting system. Simply by connecting the LED strip, you can customize various lighting schemes and patterns, including Static, Breathing, Strobe, Cycling, Music, Wave and more.

Connecting the LED Strip

Connect your RGB LED strips to the **RGB LED Headers (RGB_HEADER1, RGB_HEADER2)** on the motherboard.



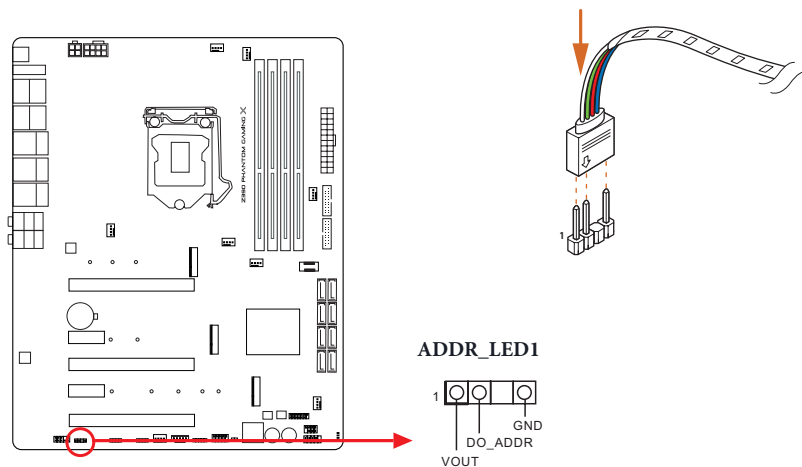
1. Never install the RGB LED cable in the wrong orientation; otherwise, the cable may be damaged.
2. Before installing or removing your RGB LED cable, please power off your system and unplug the power cord from the power supply. Failure to do so may cause damages to motherboard components.



1. Please note that the RGB LED strips do not come with the package.
2. The RGB LED header supports standard 5050 RGB LED strip (12V/G/R/B), with a maximum power rating of 3A (12V) and length within 2 meters.

Connecting the Addressable RGB LED Strip

Connect your Addressable RGB LED strip to the **Addressable LED Header (ADDR_LED1)** on the motherboard.



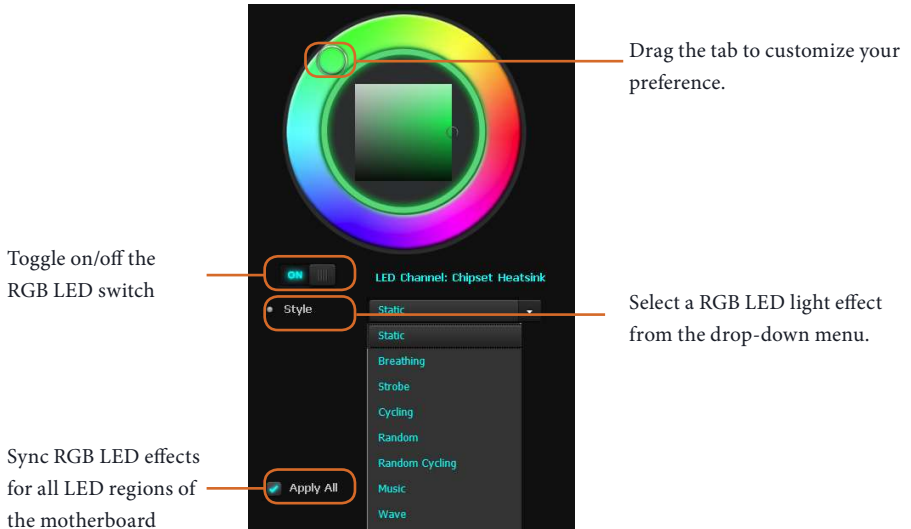
1. Never install the RGB LED cable in the wrong orientation; otherwise, the cable may be damaged.
2. Before installing or removing your RGB LED cable, please power off your system and unplug the power cord from the power supply. Failure to do so may cause damages to motherboard components.



1. Please note that the RGB LED strips do not come with the package.
2. The RGB LED header supports WS2812B addressable RGB LED strip (5V/Data/GND), with a maximum power rating of 3A (5V) and length within 2 meters.

ASRock Polychrome SYNC Utility

Now you can adjust the RGB LED color through the ASRock Polychrome SYNC Utility. Download this utility from the ASRock Live Update & APP Shop and start coloring your PC style your way!



Chapter 4 UEFI SETUP UTILITY

4.1 Introduction

This section explains how to use the UEFI SETUP UTILITY to configure your system. You may run the UEFI SETUP UTILITY by pressing <F2> or right after you power on the computer, otherwise, the Power-On-Self-Test (POST) will continue with its test routines. If you wish to enter the UEFI SETUP UTILITY after POST, restart the system by pressing <Ctl> + <Alt> + <Delete>, or by pressing the reset button on the system chassis. You may also restart by turning the system off and then back on.



Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions are for reference purpose only, and they may not exactly match what you see on your screen.

4.2 EZ Mode

The EZ Mode screen appears when you enter the BIOS setup program by default. EZ mode is a dashboard which contains multiple readings of the system's current status. You can check the most crucial information of your system, such as CPU speed, DRAM frequency, SATA information, fan speed, etc.

Press <F6> or click the "Advanced Mode" button at the upper right corner of the screen to switch to "Advanced Mode" for more options.



No.	Function
1	Help
2	Load UEFI Defaults
3	Save Changes and Exit
4	Discard Changes
5	Change Language
6	Switch to Advanced Mode

4.3 Advanced Mode

The Advanced Mode provides more options to configure the BIOS settings. Refer to the following sections for the detailed configurations.

To access the EZ Mode, press <F6> or click the "EZ Mode" button at the upper right corner of the screen.

4.3.1 UEFI Menu Bar

The top of the screen has a menu bar with the following selections:

Main	For setting system time/date information
OC Tweaker	For overclocking configurations
Advanced	For advanced system configurations
Tool	Useful tools
H/W Monitor	Displays current hardware status
Security	For security settings
Boot	For configuring boot settings and boot priority
Exit	Exit the current screen or the UEFI Setup Utility

4.3.2 Navigation Keys

Use <←→> key or <→> key to choose among the selections on the menu bar, and use <↑> key or <↓> key to move the cursor up or down to select items, then press <Enter> to get into the sub screen. You can also use the mouse to click your required item.

Please check the following table for the descriptions of each navigation key.

Navigation Key(s)	Description
+ / -	To change option for the selected items
<Tab>	Switch to next function
<PGUP>	Go to the previous page
<PGDN>	Go to the next page
<HOME>	Go to the top of the screen
<END>	Go to the bottom of the screen
<F1>	To display the General Help Screen
<F5>	Add / Remove Favorite
<F7>	Discard changes and exit the SETUP UTILITY
<F9>	Load optimal default values for all the settings
<F10>	Save changes and exit the SETUP UTILITY
<F12>	Print screen
<ESC>	Jump to the Exit Screen or exit the current screen

4.4 Main Screen

When you enter the UEFI SETUP UTILITY, the Main screen will appear and display the system overview.



My Favorite

Display your collection of BIOS items. Press F5 to add/remove your favorite items.

4.5 OC Tweaker Screen

In the OC Tweaker screen, you can set up overclocking features.



Because the UEFI software is constantly being updated, the following UEFI setup screens and descriptions are for reference purpose only, and they may not exactly match what you see on your screen.

Advanced Turbo

You can use this option to increase your system performance. This option appears only when your CPU supports this function. This option appears only when you adopt K-Series CPU.

Ln2 Overclocking Preset

You can use this option to load the Ln2 overclocking preset. Please note that overclocking may cause damage to your CPU and motherboard. It should be done at your own risk and expense.

Load Optimized CPU OC Setting

You can use this option to load optimized CPU overclocking setting. Please note that overclocking may cause damage to your CPU and motherboard. It should be done at your own risk and expense.

CPU Configuration

Performance mode

Intel Performance Mode allows you to do real-time overclocking by pressing the OC button. The OC LED reminds you the Performance mode is ON. Please select the overclocking rule for Performance mode.

[Disabled]

Select this item to disable Intel Performance Mode.

[CPU Ratio +1] , [CPU Ratio +2] and [CPU Ratio +3]

Select the level of overclocking performed.

[Multi Core Enhancement]

Select this item to allow the CPU to perform the highest frequency on all CPU cores simultaneously.

Multi Core Enhancement

Improve the system's performance by forcing the CPU to perform the highest frequency on all CPU cores simultaneously. Disable to reduce power consumption .

CPU Ratio

The CPU speed is determined by the CPU Ratio multiplied with the BCLK. Increasing the CPU Ratio will increase the internal CPU clock speed without affecting the clock speed of other components.

CPU Cache Ratio

The CPU Internal Bus Speed Ratio. The maximum should be the same as the CPU Ratio.

BCLK Frequency

The CPU speed is determined by the CPU Ratio multiplied with the BCLK. Increasing the BCLK will increase the internal CPU clock speed but also affect the clock speed of other components.

BCLK Spread Spectrum

Enable BCLK Spread Spectrum to reduce electromagnetic interference for passing EMI tests. Disable to achieve higher clock speeds when overclocking.

CPU BCLK Amplitude

Configure the BCLK Amplitude for ClockGen.

CPU Slew Rate

Configure the CPU Slew Rate. Adjust the BCLK signal by defining the maximum change rate of the output voltage. Higher value will result in a shorter signal rising time.

CPU PLL ORT

Configure the CPU PLL ORT. Overshoot Reduction Technology improves the BCLK signal to decrease overshoot/undershoot.

Divider

Configure the BCLK divider.

Boot Performance Mode

Select the performance state that the BIOS will set before OS handoff.

FCLK Frequency

Configure the FCLK Frequency.

AVX Ratio Offset

AVX Ratio Offset specifies a negative offset from the CPU Ratio for AVX workloads. AVX is a more stressful workload that lower the AVX ratio to ensure maximum possible ratio for SSE workloads.

BCLK Aware Adaptive Voltage

BCLK Aware Adaptive Voltage enable/disable. When enabled, pcode will be aware of the BCLK frequency when calculating the CPU V/F curves. This is ideal for BCLK OC to avoid high voltage overrides.

Ring to Core Ratio Offset

Disable Ring to Core Ratio Offset so the ring and core can run at the same frequency.

Intel SpeedStep Technology

Intel SpeedStep technology allows processors to switch between multiple frequencies and voltage points for better power saving and heat dissipation.

Intel Turbo Boost Technology

Intel Turbo Boost Technology enables the processor to run above its base operating frequency when the operating system requests the highest performance state.

Intel Speed Shift Technology

Enable/Disable Intel Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.

Long Duration Power Limit

Configure Package Power Limit 1 in watts. When the limit is exceeded, the CPU ratio will be lowered after a period of time. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

Long Duration Maintained

Configure the period of time until the CPU ratio is lowered when the Long Duration Power Limit is exceeded.

Short Duration Power Limit

Configure Package Power Limit 2 in watts. When the limit is exceeded, the CPU ratio will be lowered immediately. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

CPU Core Current Limit

Configure the current limit of the CPU core. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

GT Current Limit

Configure the current limit of the GT slice. A lower limit can protect the CPU and save power, while a higher limit may improve performance.

GT Frequency

Configure the frequency of the integrated GPU.

DRAM Configuration

Samsung B die Tight profile

Enable this option to load Samsung B die Tight profile.

DRAM Tweaker

Fine tune the DRAM settings by leaving marks in checkboxes. Click OK to confirm and apply your new settings.

DRAM Timing Configuration

Load XMP Setting

Load XMP settings to overclock the memory and perform beyond standard specifications.

BCLK Frequency

The CPU speed is determined by the CPU Ratio multiplied with the BCLK. Increasing the BCLK will increase the internal CPU clock speed but also affect the clock speed of other components.

DRAM Reference Clock

Select Auto for optimized settings.

DRAM Frequency

If [Auto] is selected, the motherboard will detect the memory module(s) inserted and assign the appropriate frequency automatically.

DRAM Clock

Choose a frequency to override to clock delay for memory training. DRAM Clock controls memory training only if ASRock Timing Optimization is disabled.

Primary Timing

CAS# Latency (tCL)

The time between sending a column address to the memory and the beginning of the data in response.

RAS# to CAS# Delay and Row Precharge (tRCDtRP)

RAS# to CAS# Delay : The number of clock cycles required between the opening of a row of memory and accessing columns within it.

Row Precharge: The number of clock cycles required between the issuing of the precharge command and opening the next row.

RAS# Active Time (tRAS)

The number of clock cycles required between a bank active command and issuing the precharge command.

Command Rate (CR)

The delay between when a memory chip is selected and when the first active command can be issued.

Secondary Timing

Write Recovery Time (tWR)

The amount of delay that must elapse after the completion of a valid write operation, before an active bank can be precharged.

Refresh Cycle Time (tRFC)

The number of clocks from a Refresh command until the first Activate command to the same rank.

RAS to RAS Delay (tRRD_L)

The number of clocks between two rows activated in different banks of the same rank.

RAS to RAS Delay (tRRD_S)

The number of clocks between two rows activated in different banks of the same rank.

Write to Read Delay (tWTR_L)

The number of clocks between the last valid write operation and the next read command to the same internal bank.

Write to Read Delay (tWTR_S)

The number of clocks between the last valid write operation and the next read command to the same internal bank.

Read to Precharge (tRTP)

The number of clocks that are inserted between a read command to a row precharge command to the same rank.

Four Activate Window (tFAW)

The time window in which four activates are allowed the same rank.

CAS Write Latency (tCWL)

Configure CAS Write Latency.

Third Timing**tREFI**

Configure refresh cycles at an average periodic interval.

tCKE

Configure the period of time the DDR4 initiates a minimum of one refresh command internally once it enters Self-Refresh mode.

Turn Around Timing

tRDRD_sg

Configure between module read to read delay.

tRDRD_dg

Configure between module read to read delay.

tRDRD_dr

Configure between module read to read delay.

tRDRD_dd

Configure between module read to read delay.

tRDWR_sg

Configure between module read to write delay.

tRDWR_dg

Configure between module read to write delay.

tRDWR_dr

Configure between module read to write delay.

tRDWR_dd

Configure between module read to write delay.

tWRRD_sg

Configure between module write to read delay.

tWRRD_dg

Configure between module write to read delay.

tWRRD_dr

Configure between module write to read delay.

tWRRD_dd

Configure between module write to read delay.

tWRWR_sg

Configure between module write to write delay.

tWRWR_dg

Configure between module write to write delay.

tWRWR_dr

Configure between module write to write delay.

tWRWR_dd

Configure between module write to write delay.

Round Trip Timing

RTL Init Value

Configure round trip latency init value for round trip latency training.

IO-L Init Value

Configure IO latency init value for IO latency training.

RTL (CH A)

Configure round trip latency for channel A.

RTL (CH B)

Configure round trip latency for channel B.

IO-L (CH A)

Configure IO latency for channel A.

IO-L (CH B)

Configure IO latency for channel B.

IO-L Offset (CH A)

Configure IO latency offset for channel A.

IO-L Offset (CH B)

Configure IO latency offset for channel B.

RFR Delay (CH A)

Configure RFR Delay for Channel A.

RFR Delay (CH B)

Configure RFR Delay for Channel B.

ODT Setting

ODT WR (A1)

Configure the memory on die termination resistors' WR for channel A1.

ODT WR (A2)

Configure the memory on die termination resistors' WR for channel A2.

ODT WR (B1)

Configure the memory on die termination resistors' WR for channel B1.

ODT WR (B2)

Configure the memory on die termination resistors' WR for channel B2.

ODT NOM (A1)

Use this to change ODT (CH A1) Auto/Manual settings. The default is [Auto].

ODT NOM (A2)

Use this to change ODT (CH A2) Auto/Manual settings. The default is [Auto].

ODT NOM (B1)

Use this to change ODT (CH B1) Auto/Manual settings. The default is [Auto].

ODT NOM (B2)

Use this to change ODT (CH B2) Auto/Manual settings. The default is [Auto].

ODT PARK (A1)

Configure the memory on die termination resistors' PARK for channel A1.

ODT PARK (A2)

Configure the memory on die termination resistors' PARK for channel A2.

ODT PARK (B1)

Configure the memory on die termination resistors' PARK for channel B1.

ODT PARK (B2)

Configure the memory on die termination resistors' PARK for channel B2.

COMP Setting

RCOMP0: DQ ODT (Read)

Default is 121.

RCOMP1: DQ /CLK Ron (Drive Strength)

Default is 75.

RCOMP2: CMD/CTL Ron (Drive Strength)

Default is 100.

DQ ODT Driving

Adjust ODT Driving for better signal. Default is 60.

DQ Driving

Adjust DQ Driving for better signal. Default is 26.

Command Driving

Adjust Command Driving for better signal. Default is 20.

Control Driving

Adjust Control Driving for better signal. Default is 20.

Clock Driving

Adjust Clock Driving for better signal. Default is 26.

DQ Slew Rate

Adjust DQ Slew Rate for better signal. Default is 59.

Command Slew Rate

Adjust Command Slew Rate for better signal. Default is 53 for 1N, 89 for 2N.

Control Slew Rate

Adjust Control Slew Rate for better signal. Default is 53.

Clock Slew Rate

Adjust Clock Slew Rate for better signal. Default is 53.

Dll Bandwidth 0

Configure the Dll Bandwidth 0.

Dll Bandwidth 1

Configure the Dll Bandwidth 1.

Dll Bandwidth 2

Configure the Dll Bandwidth 2.

Dll Bandwidth 3

Configure the Dll Bandwidth 3.

MRS Setting

MRS tCL

Configure the tCL for Memory MRS MR0.

MRS tWRtRTP

Configure the tWRtRTP for Memory MRS MRC.

MRS tCWL

Configure the tCWL for Memory MRS MR2.

MRS tCCD_L

Configure the tCL for Memory MRS MR6.

Advanced Setting

ASRock Timing Optimization

Configure the fast path through the MRC.

Realtime Memory Timing

Configure the realtime memory timings.

[Enabled] The system will allow performing realtime memory timing changes after MRC_DONE.

Command Tristate

Configure the Command Tristate Support.

Exit On Failure

Configure the Exit On Failure for MRC training steps.

Reset On Training Fail

Reset system if the MRC training fails.

MRC Fast Boot

Enable Memory Fast Boot to skip DRAM memory training for booting faster.

Voltage Configuration

Voltage Mode

[OC] If this option is selected, there is larger range voltage for overclocking.

[Stable] If this option is selected, there is smaller range voltage for stable system.

CPU Core/Cache Voltage

Configure the voltage for the CPU Core/Cache.

CPU Load-Line Calibration

CPU Load-Line Calibration helps prevent CPU voltage droop when the system is under heavy loading.

GT Voltage

Configure the voltage for the integrated GPU.

GT Load-Line Calibration

GT Load-Line Calibration helps prevent integrated GPU voltage droop when the system is under heavy load.

DRAM Voltage

Use this to configure DRAM Voltage. The default value is [Auto].

DRAM Activating Power Supply

Configure the voltage for the DRAM Activating Power Supply.

VTT DDR Voltage

Configure the VTT DDR Voltage.

PCH +1.0 Voltage

Configure the chipset voltage (1.0V).

VCCIO Voltage

Configure the voltage for the VCCIO.

CPU PLL Voltage

Configure the voltage for the CPU PLL.

CPU PLL Eventual Voltage

Configure the CPU PLL Voltage for booting into OS.

CPU PLL2 Voltage

Configure the voltage for the CPU PLL2.

CPU PLL2 Eventual Voltage

Configure the CPU PLL2 Voltage for booting into OS.

VCCSA Voltage

Configure the voltage for the VCCSA.

VCC PLL Voltage

Configure the voltage for the VCC PLL.

VCC PLL Eventual Voltage

Configure the VCC PLL Voltage for booting into OS.

CPU Cold Bug Killer Voltage

Cold Bug Killer Voltage. Recommended to set for Ln2 benching. It will solve most of CPU cold bug.

CPU Cold Bug Killer Eventual Voltage

CPU Cold Bug Killer Voltage for booting into OS.

CLK VDD Voltage

Configure the voltage for the CLK VDD.

DMI Voltage

Configure the voltage for the DMI.

CPU Internal PLL Voltage

Default is 0.900V. Each step is 0.015V. Adding 9- 15 steps will helps CPU PLL to lock internal clock during High frequency under Ln2 cooling. For example: 1.020V - 1.125V will be proper value. But the voltage level will be different on each processor. User has to find the best value for your own processor. CPU Vcore Voltage must higher than CPU Internal PLL Voltage, or your processor will hang.

GT PLL Voltage

Default is 0.900V. Each step is 0.015V. Adding 9 -15 steps will help CPU PLL to lock internal clock during High frequency under Ln2 cooling. For example: 1.020V -

1.125V will be proper value. Bu the voltage level will be different on each processor.
User has to find the best value for user's own processor.

Ring PLL Voltage

Default is 0.900V. Each step is 0.015V. Adding 9 -15 steps will help CPU PLL to lock internal clock during High frequency under Ln2 cooling. For example: 1.020V - 1.125V will be proper value. Bu the voltage level will be different on each processor.
User has to find the best value for user's own processor.

System Agent PLL Voltage

Default is 0.900V. Each step is 0.015V. Adding 9 -15 steps will help CPU PLL to lock internal clock during High frequency under Ln2 cooling. For example: 1.020V - 1.125V will be proper value. Bu the voltage level will be different on each processor.
User has to find the best value for user's own processor.

Memory Controller PLL Voltage

Default is 0.900V. Each step is 0.015V. Adding 9 -15 steps will help CPU PLL to lock internal clock during High frequency under Ln2 cooling. For example: 1.020V - 1.125V will be proper value. Bu the voltage level will be different on each processor.
User has to find the best value for user's own processor.

Save User Default

Type a profile name and press enter to save your settings as user default.

Load User Default

Load previously saved user defaults.

Save User UEFI Setup Profile to Disk

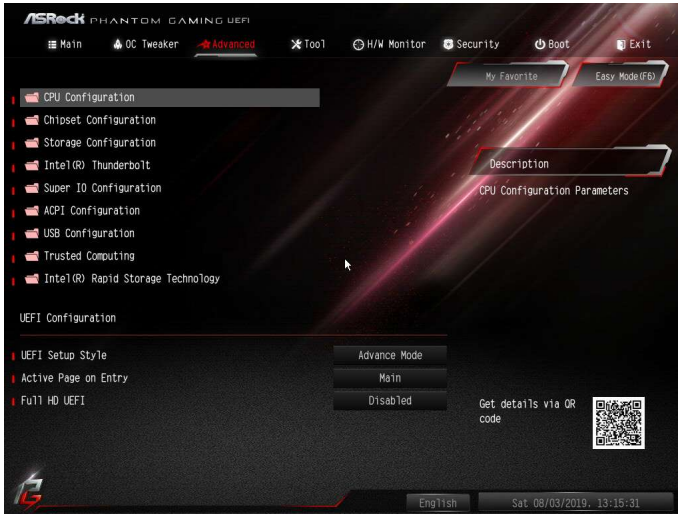
It helps you to save current UEFI settings as an user profile to disk.

Load User UEFI Setup Profile from Disk

You can load previous saved profile from the disk.

4.6 Advanced Screen

In this section, you may set the configurations for the following items: CPU Configuration, Chipset Configuration, Storage Configuration, Intel(R) Thunderbolt, Super IO Configuration, ACPI Configuration, USB Configuration, Trusted Computing and Intel(R) Rapid Storage Technology.



Setting wrong values in this section may cause the system to malfunction.

UEFI Configuration

UEFI Setup Style

Select the default mode when entering the UEFI setup utility.

Active Page on Entry

Select the default page when entering the UEFI setup utility.

Full HD UEFI

When [Auto] is selected, the resolution will be set to 1920 x 1080 if the monitor supports Full HD resolution. If the monitor does not support Full HD resolution, then the resolution will be set to 1024 x 768. When [Disable] is selected, the resolution will be set to 1024 x 768 directly.

4.6.1 CPU Configuration



Intel Hyper Threading Technology

Intel Hyper Threading Technology allows multiple threads to run on each core, so that the overall performance on threaded software is improved.

Active Processor Cores

Select the number of cores to enable in each processor package.

CPU C States Support

Enable CPU C States Support for power saving. It is recommended to keep C3, C6, C7 and C10 all enabled for better power saving.

Enhanced Halt State (C1E)

Enable Enhanced Halt State (C1E) for lower power consumption.

CPU C3 State Support

Enable C3 sleep state for lower power consumption.

CPU C6 State Support

Enable C6 sleep state for lower power consumption.

CPU C7 State Support

Enable C7 sleep state for lower power consumption.

CPU C10 State Support

Enable C10 sleep state for lower power consumption.

Package C State Support

Enable CPU, PCIe, Memory, Graphics C State Support for power saving.

CFG Lock

This item allows you to disable or enable the CFG Lock.

CPU Thermal Throttling

Enable CPU internal thermal control mechanisms to keep the CPU from overheating.

Intel Virtualization Technology

Intel Virtualization Technology allows a platform to run multiple operating systems and applications in independent partitions, so that one computer system can function as multiple virtual systems.

Hardware Prefetcher

Automatically prefetch data and code for the processor. Enable for better performance.

Adjacent Cache Line Prefetch

Automatically prefetch the subsequent cache line while retrieving the currently requested cache line. Enable for better performance.

Software Guard Extensions (SGX)

Use this item to enable or disable Software Controlled Software Guard Extensions (SGX).

4.6.2 Chipset Configuration



Primary Graphics Adapter

Select a primary VGA.

Above 4G Decoding

Enable or disable 64bit capable Devices to be decoded in Above 4G Address Space (only if the system supports 64 bit PCI decoding).

VT-d

Intel® Virtualization Technology for Directed I/O helps your virtual machine monitor better utilize hardware by improving application compatibility and reliability, and providing additional levels of manageability, security, isolation, and I/O performance.

PCIe1 Link Speed

Select the link speed for PCIe1.

PCIe2 Link Speed

Select the link speed for PCIe2.

PCIe3 Link Speed

Select the link speed for PCIe3.

PCIe4 Link Speed

Select the link speed for PCIe4.

PCIe5 Link Speed

Select the link speed for PCIe5.

PCI Express Native Control

Select Enable for enhanced PCI Express power saving in OS.

PCIe ASPM Support

This option enables/disables the ASPM support for all CPU downstream devices.

PCH PCIe ASPM Support

This option enables/disables the ASPM support for all PCH PCIe devices.

DMI ASPM Support

This option enables/disables the control of ASPM on CPU side of the DMI Link.

PCH DMI ASPM Support

This option enables/disables the ASPM support for all PCH DMI devices.

DMI Max Link Speed

Select the link speed for DMI.

PCIe PLL SSC

Use this feature to enable PCIe Phase-locked Loop (PLL) Spread Spectrum Clocking.

Share Memory

Configure the size of memory that is allocated to the integrated graphics processor when the system boots up.

IGPU Multi-Monitor

Select disable to disable the integrated graphics when an external graphics card is installed.
Select enable to keep the integrated graphics enabled at all times.

Inte(R) Ethernet Connection I219-V

Enable or disable the onboard network interface controller (Intel® I219V).

Inte(R) Ethernet Controller I211

Enable or disable the onboard network interface controller (Intel® I211AT).

Realtek RTL8125AG

Enable or disable the onboard network interface controller (Dragon RTL8125AG).

Onboard HD Audio

Enable/disable onboard HD audio. Set to Auto to enable onboard HD audio and automatically disable it when a sound card is installed.

Front Panel

Enable/disable front panel HD audio.

Onboard HDMI HD Audio

Enable audio for the onboard digital outputs.

Onboard WAN Device

Enable/disable the onboard WAN device.

WAN Radio

Enable/disable the WiFi module's connectivity.

Bluetooth

Enable/disable the bluetooth.

Deep Sleep

Configure deep sleep mode for power saving when the computer is shut down.

Restore on AC/Power Loss

Select the power state after a power failure. If [Power Off] is selected, the power will remain off when the power recovers. If [Power On] is selected, the system will start to boot up when the power recovers.

Turn On Onboard LED in S5

Turn on/off the LED in the ACPI S5 state.

Restore Onboard LED Default

Restore the onboard LED default value.

RGB LED

RGB LED and header allows users to connect LED strip and create their unique PC style easily.

BIOS Backup Switch

Configure BIOS Backup Switch function.

Onboard Button LED

Enable/disable the onboard Power button and Reset button LED.

Onboard Debug Port LED

Enable/disable the onboard Dr. Debug LED.

4.6.3 Storage Configuration



SATA Controller(s)

Enable/disable the SATA controllers.

SATA Mode Selection

[AHCI] Supports new features that improve performance.

[Intel RST Premium (RAID)] Combine multiple disk drives into a logical unit.

Use RST Legacy OROM

This option appears when the SATA Mode Selection is set to [Intel RST Premium (RAID)]. Enable or disable to use RST Legacy OROM when CSM is enabled.

Teton Glacier Mode

Enable or disable the Teton Glacier Mode for Optane Memory H10.

SATA Aggressive Link Power Management

SATA Aggressive Link Power Management allows SATA devices to enter a low power state during periods of inactivity to save power. It is only supported by AHCI mode.

Hard Disk S.M.A.R.T.

S.M.A.R.T stands for Self-Monitoring, Analysis, and Reporting Technology. It is a monitoring system for computer hard disk drives to detect and report on various indicators of reliability.

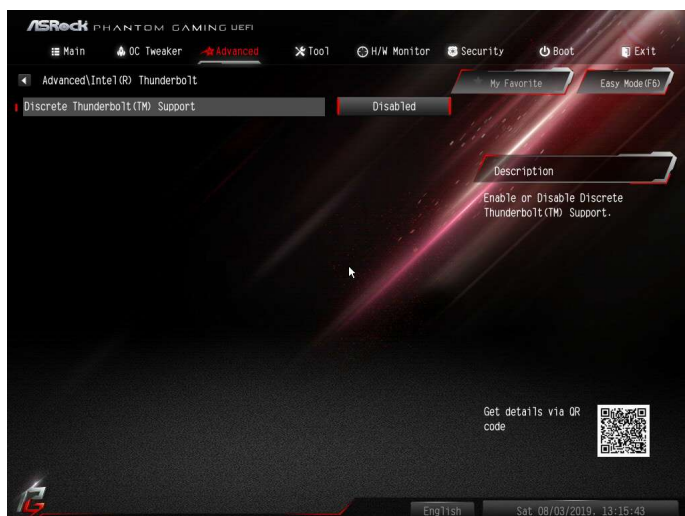
Third Party SATA 3 Controller

Enable or disable the third party SATA3 controller.

Third Party SATA3 Hot Plug

Enable or disable Hot Plug for Third Party SATA3 port.

4.6.4 Intel® Thunderbolt



Discrete Thunderbolt(TM) Support

Enable or disable the Discrete Thunderbolt(TM) Support.

Thunderbolt Boot Support

Enabled to allow booting from Bootable devices which are present behind Thunderbolt.

Thunderbolt Usb Support

Enabled to allow booting from Usb devices which are present behind Thunderbolt.

Titan Ridge Workaround for OSUP

Enable or disable Titan Ridge Workaround for OSUP.

Security Level

This item allows you to choose a security level for the Thunderbolt ports.

SW SMI on TBT hot-plug

When enabled, BIOS generates software SMI to assign resource to TBT devices.

ACPI Notify on TBT Hot-plug

When enabled, BIOS generates ACPI Notify.

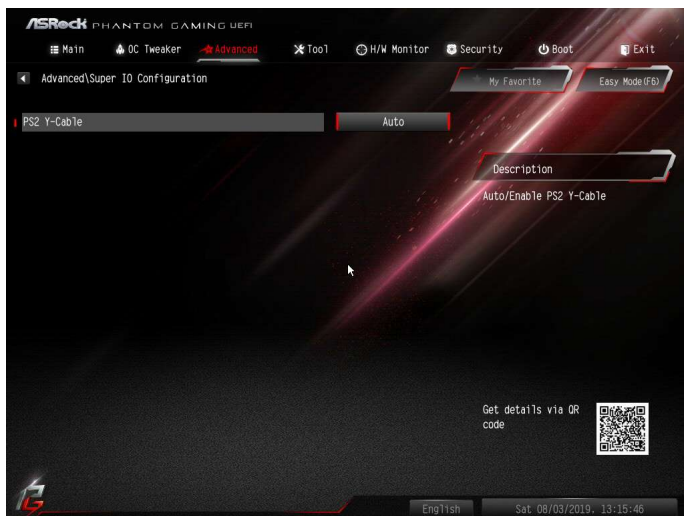
Windows 10 Thunderbolt support

Specify Windows 10 Thunderbolt support level.

Disabled: No OS native support.

Enabled: OS Native support only, no RTD3.

4.6.5 Super IO Configuration



PS2 Y-Cable

Enable the PS2 Y-Cable or set this option to Auto.

4.6.6 ACPI Configuration



Suspend to RAM

Select disable for ACPI suspend type S1. It is recommended to select auto for ACPI S3 power saving.

ACPI HPET Table

Enable the High Precision Event Timer for better performance.

PS/2 Keyboard S4/S5 Wakeup Support

Allow the system to be waked up by a PS/2 Keyboard in S4/S5.

PCIE Devices Power On

Allow the system to be waked up by a PCIE device and enable wake on LAN.

I219 LAN Power On

Allow the system to be waked up by I219 LAN.

RTC Alarm Power On

Allow the system to be waked up by the real time clock alarm. Set it to By OS to let it be handled by your operating system.

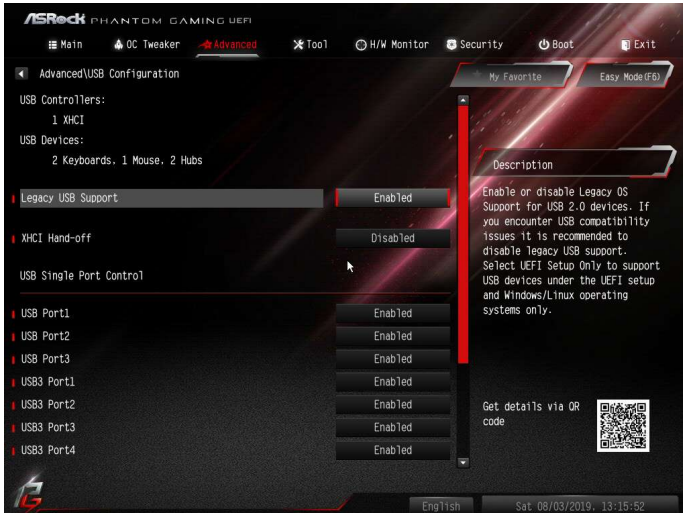
USB Keyboard/Remote Power On

Allow the system to be waked up by an USB keyboard or remote controller.

USB Mouse Power On

Allow the system to be waked up by an USB mouse.

4.6.7 USB Configuration



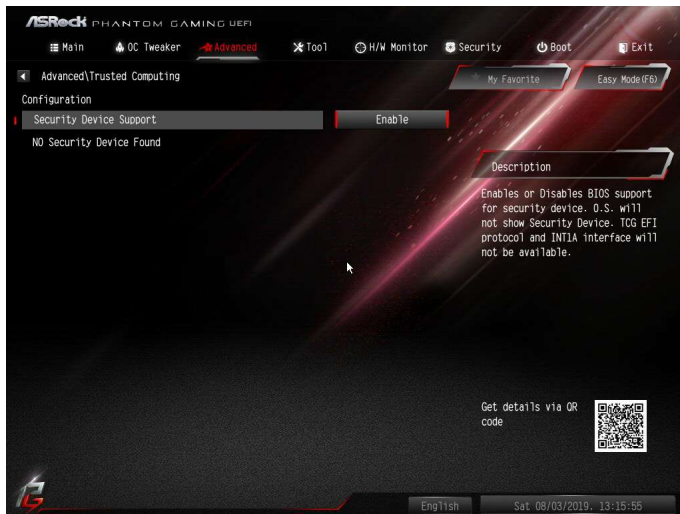
Legacy USB Support

Enable or disable Legacy OS Support for USB 2.0 devices. If you encounter USB compatibility issues it is recommended to disable legacy USB support. Select UEFI Setup Only to support USB devices under the UEFI setup and Windows/Linux operating systems only.

XHCI Hand-off

This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.

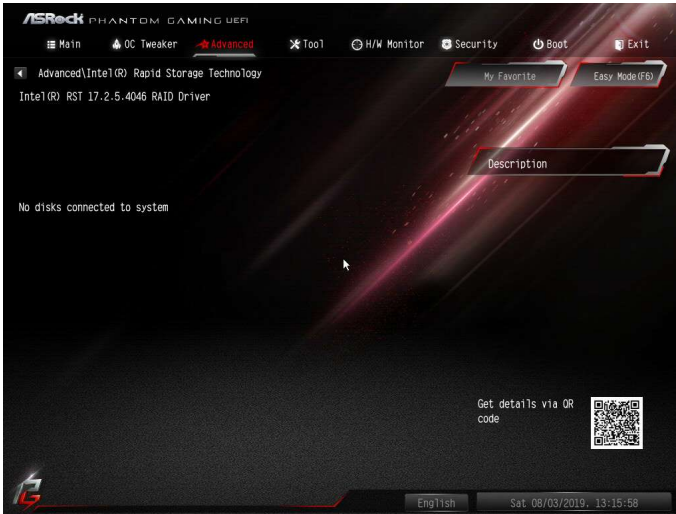
4.6.8 Trusted Computing



Security Device Support

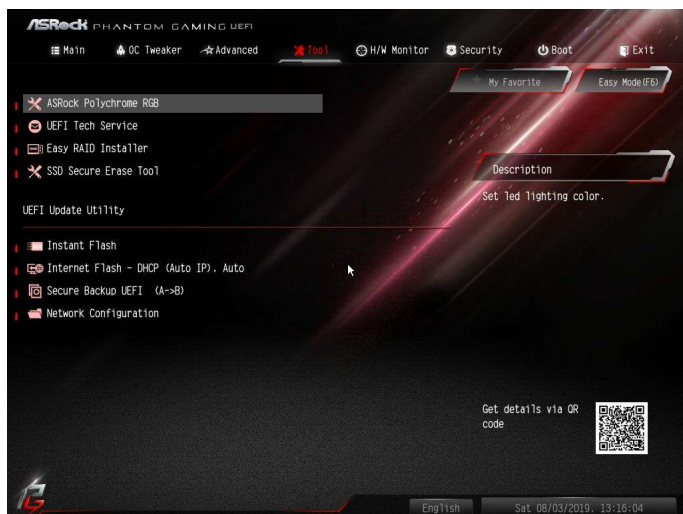
Enable or disable BIOS support for security device.

4.6.9 Intel(R) Rapid Storage Technology



Intel® Rapid Storage Technology provides new levels of protection, performance and expandability for desktop and mobile platforms. Whether using one or multiple hard drives, users can take advantage of enhanced performance and lower power consumption. When using more than one drive, the user can have additional protection against data loss in the event of a hard drive failure.

4.7 Tools



ASRock Polychrome SYNC

ASRock Polychrome SYNC allows you to adjust the RGB LED color to your liking.

UEFI Tech Service

Contact ASRock Tech Service if you are having trouble with your PC. Please setup network configuration before using UEFI Tech Service.

Easy RAID Installer

Easy RAID Installer helps you to copy the RAID driver from the support CD to your USB storage device. After copying the drivers please change the SATA mode to RAID, then you can start installing the operating system in RAID mode.

SSD Secure Erase Tool

Use this tool to securely erase SSD.

Instant Flash

Save UEFI files in your USB storage device and run Instant Flash to update your UEFI.

Internet Flash - DHCP (Auto IP), Auto

ASRock Internet Flash downloads and updates the latest UEFI firmware version from our servers for you. Please setup network configuration before using Internet Flash.

*For BIOS backup and recovery purpose, it is recommended to plug in your USB pen drive before using this function.

Secure Backup UEFI

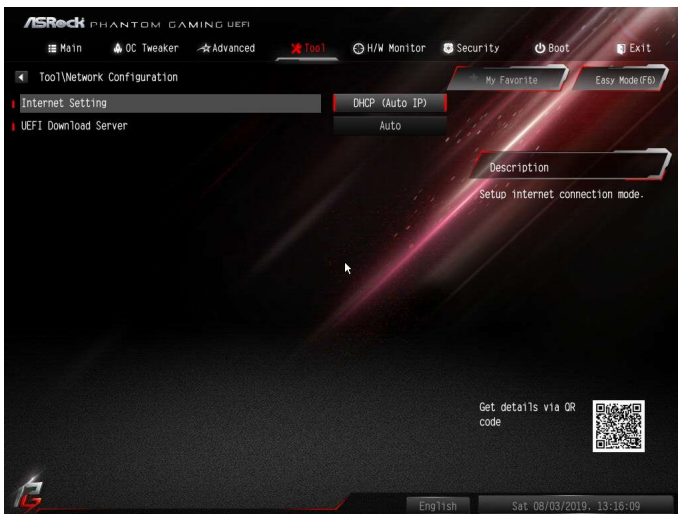
Whenever one of the ROM images are outdated or corrupted, switch to the other flash ROM and execute Secure Backup UEFI to duplicate the current working ROM image to the secondary flash ROM..



This motherboard has two BIOS chips, an active BIOS (BIOS_A) and a backup BIOS (BIOS_B), which enhances the safety and stability of your system. Use "Secure Backup UEFI" to duplicate a working copy of the BIOS files to the active BIOS to ensure normal system operation. Normally, the system will work on the active BIOS. However if the active BIOS is corrupted or damaged, after several failed boot attempts, the backup BIOS will take over. For safety issues, users are not able to update the backup BIOS manually. Users may refer to the BIOS LEDs (BIOS_A_LED or BIOS_B_LED) to identify which BIOS is currently activated.

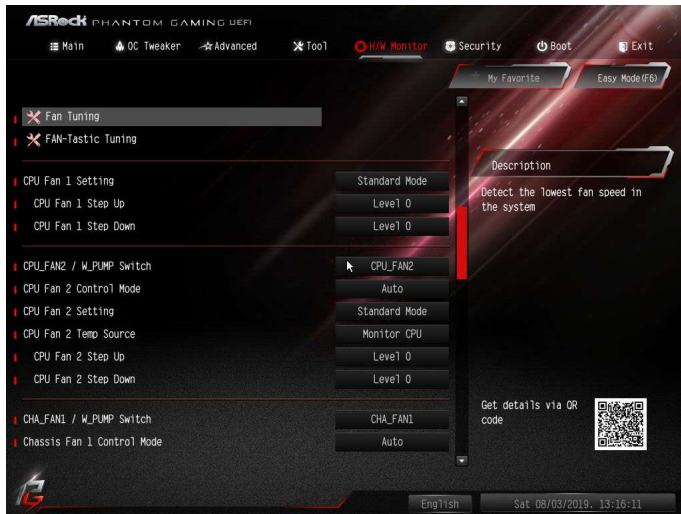
Network Configuration

Use this to configure internet connection settings for Internet Flash.



4.8 Hardware Health Event Monitoring Screen

This section allows you to monitor the status of the hardware on your system, including the parameters of the CPU temperature, motherboard temperature, fan speed and voltage.



Fan Tuning

Measure Fan Min Duty Cycle.

Fan-Tastic Tuning

Select a fan mode for CPU Fan 1, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

CPU Fan 1 Setting

Select a fan mode for CPU Fan 1, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

CPU Fan 1 Step Up

Set the value of CPU Fan 1 Step Up.

CPU Fan 1 Step Down

Set the value of CPU Fan 1 Step Down.

CPU_FAN2 / W_Pump Switch

Select CPU Water Pump mode.

CPU Fan 2 Control Mode

Select PWM mode or DC mode for CPU Fan 2.

CPU Fan 2 Setting

Select a fan mode for CPU Fan 2, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

CPU Fan 2 Temp Source

Select a fan temperature source for CPU Fan 2.

CPU Fan 2 Step Up

Set the value of CPU Fan 2 Step Up.

CPU Fan 2 Step Down

Set the value of CPU Fan 2 Step Down.

CHA_FAN1 / W_Pump Switch

Select Chassis Fan 1 or Water Pump mode.

Chassis Fan 1 Control Mode

Select PWM mode or DC mode for Chassis Fan 1.

Chassis Fan 1 Setting

Select a fan mode for Chassis Fan 1, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 1 Temp Source

Select a fan temperature source for Chassis Fan 1.

Chassis Fan 1 Step Up

Set the value of Chassis Fan 1 Step Up.

Chassis Fan 1 Step Down

Set the value of Chassis Fan 1 Step Down.

CHA_FAN2 / W_Pump Switch

Select Chassis Fan 2 or Water Pump mode.

Chassis Fan 2 Control Mode

Select PWM mode or DC mode for Chassis Fan 2.

Chassis Fan 2 Setting

Select a fan mode for Chassis Fan 2, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 2 Temp Source

Select a fan temperature source for Chassis Fan 2.

Chassis Fan 2 Step Up

Set the value of Chassis Fan 2 Step Up.

Chassis Fan 2 Step Down

Set the value of Chassis Fan 2 Step Down.

CHA_FAN3 / W_Pump Switch

Select Chassis Fan 3 or Water Pump mode.

Chassis Fan 3 Control Mode

Select PWM mode or DC mode for Chassis Fan 3.

Chassis Fan 3 Setting

Select a fan mode for Chassis Fan 3, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 3 Temp Source

Select a fan temperature source for Chassis Fan 3.

Chassis Fan 3 Step Up

Set the value of Chassis Fan 3 Step Up.

Chassis Fan 3 Step Down

Set the value of Chassis Fan 3 Step Down.

CHA_FAN4 / W_Pump Switch

Select Chassis Fan 4 or Water Pump mode.

Chassis Fan 4 Control Mode

Select PWM mode or DC mode for Chassis Fan 4.

Chassis Fan 4 Setting

Select a fan mode for Chassis Fan 4, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 4 Temp Source

Select a fan temperature source for Chassis Fan 4.

Chassis Fan 4 Step Up

Set the value of Chassis Fan 4 Step Up.

Chassis Fan 4 Step Down

Set the value of Chassis Fan 4 Step Down.

CHA_FAN5 / W_Pump Switch

Select Chassis Fan 5 or Water Pump mode.

Chassis Fan 5 Control Mode

Select PWM mode or DC mode for Chassis Fan 5.

Chassis Fan 5 Setting

Select a fan mode for Chassis Fan 5, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 5 Temp Source

Select a fan temperature source for Chassis Fan 5.

Chassis Fan 5 Step Up

Set the value of Chassis Fan 5 Step Up.

Chassis Fan 5 Step Down

Set the value of Chassis Fan 5 Step Down.

CHA_FAN6 / W_Pump Switch

Select Chassis Fan 6 or Water Pump mode.

Chassis Fan 6 Control Mode

Select PWM mode or DC mode for Chassis Fan 6.

Chassis Fan 6 Setting

Select a fan mode for Chassis Fan 6, or choose Customize to set 5 CPU temperatures and assign a respective fan speed for each temperature.

Chassis Fan 6 Temp Source

Select a fan temperature source for Chassis Fan 6.

Chassis Fan 6 Step Up

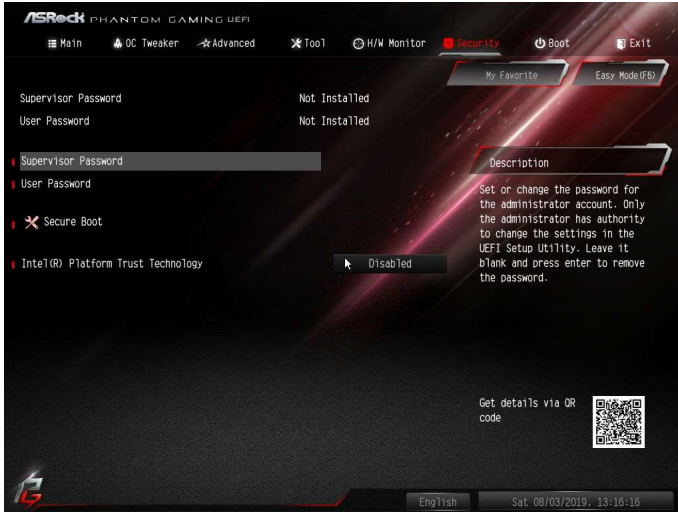
Set the value of Chassis Fan 6 Step Up.

Chassis Fan 6 Step Down

Set the value of Chassis Fan 6 Step Down.

4.9 Security Screen

In this section you may set or change the supervisor/user password for the system. You may also clear the user password.



Supervisor Password

Set or change the password for the administrator account. Only the administrator has authority to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

User Password

Set or change the password for the user account. Users are unable to change the settings in the UEFI Setup Utility. Leave it blank and press enter to remove the password.

Secure Boot

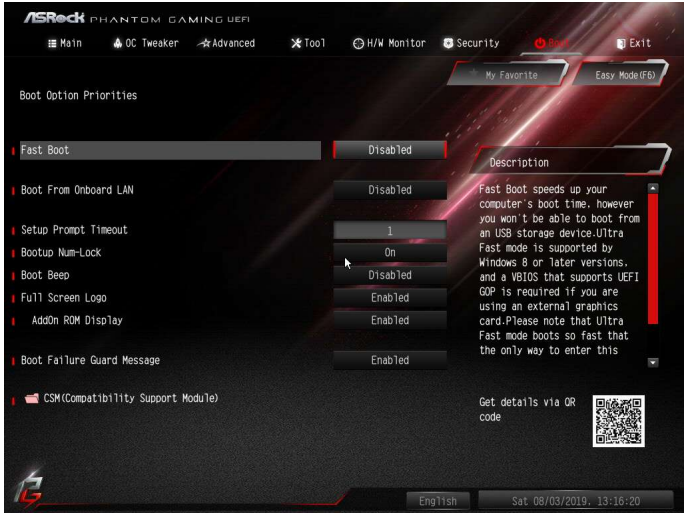
Use this item to enable or disable support for Secure Boot.

Intel(R) Platform Trust Technology

Enable/disable Intel PTT in ME. Disable this option to use discrete TPM Module.

4.10 Boot Screen

This section displays the available devices on your system for you to configure the boot settings and the boot priority.



Fast Boot

Fast Boot minimizes your computer's boot time. In fast mode you may not boot from an USB storage device. The VBIOS must support UEFI GOP if you are using an external graphics card. Please notice that Ultra Fast mode will boot so fast that the only way to enter this UEFI Setup Utility is to Clear CMOS or run the Restart to UEFI utility in Windows.

Boot From Onboard LAN

Allow the system to be waked up by the onboard LAN.

Setup Prompt Timeout

Configure the number of seconds to wait for the setup hot key.

Bootup Num-Lock

Select whether Num Lock should be turned on or off when the system boots up.

Boot Beep

Select whether the Boot Beep should be turned on or off when the system boots up. Please note that a buzzer is needed.

Full Screen Logo

Enable to display the boot logo or disable to show normal POST messages.

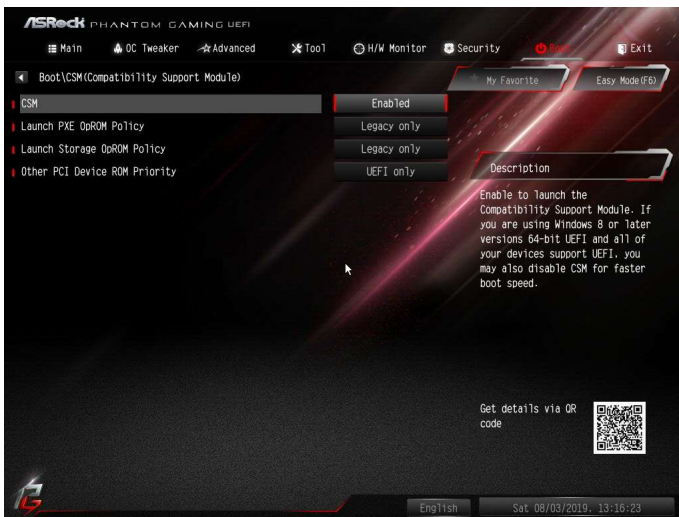
AddOn ROM Display

Enable AddOn ROM Display to see the AddOn ROM messages or configure the AddOn ROM if you've enabled Full Screen Logo. Disable for faster boot speed.

Boot Failure Guard Message

If the computer fails to boot for a number of times the system automatically restores the default settings.

CSM (Compatibility Support Module)



CSM

Enable to launch the Compatibility Support Module. Please do not disable unless you're running a WHCK test.

Launch PXE OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

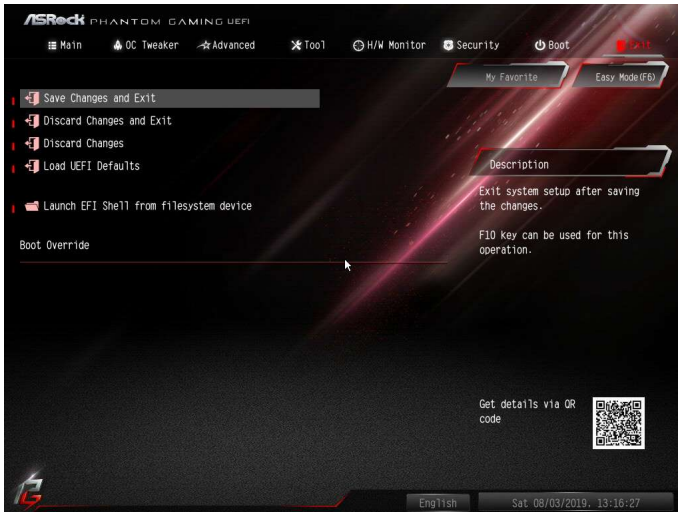
Launch Storage OpROM Policy

Select UEFI only to run those that support UEFI option ROM only. Select Legacy only to run those that support legacy option ROM only. Select Do not launch to not execute both legacy and UEFI option ROM.

Other PCI Device ROM Priority

For PCI devices other than Network, Mass storage or Video defines which OpROM to launch.

4.11 Exit Screen



Save Changes and Exit

When you select this option the following message, “Save configuration changes and exit setup?” will pop out. Select [OK] to save changes and exit the UEFI SETUP UTILITY.

Discard Changes and Exit

When you select this option the following message, “Discard changes and exit setup?” will pop out. Select [OK] to exit the UEFI SETUP UTILITY without saving any changes.

Discard Changes

When you select this option the following message, “Discard changes?” will pop out. Select [OK] to discard all changes.

Load UEFI Defaults

Load UEFI default values for all options. The F9 key can be used for this operation.

Launch EFI Shell from filesystem device

Copy shellx64.efi to the root directory to launch EFI Shell.

Contact Information

If you need to contact ASRock or want to know more about ASRock, you're welcome to visit ASRock's website at <http://www.asrock.com>; or you may contact your dealer for further information. For technical questions, please submit a support request form at <https://event.asrock.com/tsd.asp>

ASRock Incorporation

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DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2.1077(a)



Responsible Party Name: ASRock Incorporation

Address: 13848 Magnolia Ave, Chino, CA91710

Phone/Fax No: +1-909-590-8308/+1-909-590-1026

hereby declares that the product

Product Name : Motherboard

Model Number : Z390 Phantom Gaming X

Conforms to the following specifications:

☒ FCC Part 15, Subpart B, Unintentional Radiators

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Representative Person's Name: James

Signature:

A handwritten signature in black ink, appearing to read 'James', with a long, sweeping horizontal stroke extending to the right.

Date : May 12, 2017

EU Declaration of Conformity **ASRock®**

For the following equipment:

Motherboard

(Product Name)

Z390 Phantom Gaming X/ ASRock

(Model Designation / Trade Name)

ASRock Incorporation

(Manufacturer Name)

2F, No.37, Sec. 2, Jhongyang S. Rd., Beitou District, Taipei City 112, Taiwan (R.O.C.)

(Manufacturer Address)

☒ **EMC —Directive 2014/30/EU (from April 20th, 2016)**

☐ EN 55022:2010/AC:2011 Class B

☒ EN 55024:2010/A1:2015

☒ EN 55032:2012+AC:2013 Class B

☒ EN 61000-3-3:2013

☒ EN 61000-3-2:2014

☒ **RED—Directive 2014/53/EU**

☐ EN 300 328 V2.1.1

☒ EN 301 489-17 V3.1.1

☐ EN 301 893 V2.1.1

☐ EN 301 489-3 V2.1.1

☐ EN 300 220 V3.1.1

☐ **LVD —Directive 2014/35/EU (from April 20th, 2016)**

☐ EN 60950-1 : 2011+ A2: 2013

☐ EN 60950-1 : 2006/A12: 2011

☒ RoHS — Directive 2011/65/EU

☒ CE marking



(EU conformity marking)

ASRock EUROPE B.V.

(Company Name)

Bijsterhuizen 1111 6546 AR Nijmegen The Netherlands

(Company Address)

Person responsible for making this declaration:

(Name, Surname)

A.V.P

(Position / Title)

May 17, 2019

(Date)